

2019 Fall TWG/STIWG 124th Meeting
Thursday, December 5th, 2019
(Virtual Via Webex and Teleconference)

Special Topics Session:

SPRES Study - Pete Kurucz – NOAA/NESDIS/ACIO Data Management & Continuity Operations Branch

Pete Kurucz briefed the meeting on the Spectrum Pipeline Request 1675 - 1680 MHz Engineering Study (SPRES) Program. (See the slide called **SPRES program findings. ?????**) One result of the study is the examination of the alternative architectures that may replace or mitigate the RFI issue. The scope of the study is listed in bullets below. The architecture study is developing ROM costs for each of the alternatives being considered.

- Establish a user/customer data flow and user needs baseline to facilitate quantifying impacts to end users resulting from a loss of access to data received via direct broadcast links
 - Identify options to mitigate interference – occurrences and impacts
- Perform interference analysis to determine Interference Protection Criteria (IPC) for federal Earth stations and protection zones around these downlink sites
- Examine Radio Frequency Interference (RFI) monitoring and other mitigation techniques
- Examine alternative architectures for future implementation on space and ground based assets, i.e., GOES-Next

The SPRES Program consists of eleven projects that have discrete end results. Some are interdependent. The critical path goes through Projects 1, 3 and 4. He briefed that they are three quarters of the way through the program and that seven of the projects are complete and that the remaining four are in progress. A list of the projects with a short summary and the basic program finding, as of December 5, 2019 are listed below.

- GOES Data Use
 - (Not surprisingly) All GOES data products have found their way into the US infrastructure, including most federal agencies, commercial weather services, state and local level services, and individual households.
 - Identified/quantified basic data flows through the architectures to the users.
 - Characterized system architectures and their capabilities.
- RFI Modalities and Risk
 - Identified types of likely LTE signals and their in-band and adjacent band impacts on the GOES downlinks.
 - Identified risk areas based on receiver performance, local topography, atmospheric conditions, LTE tower density.
- Mitigation Options and Feasibility

- Examined current and possible future architectures that may reduce the risk of interference from LTE carriers.
- Currently developing ROM costs for these architectures.
- Project 1: Spacecraft-to end-user data flow analysis – see the slide
 - **Status complete**
 - Discovered not only federal users but also the non-federal users with varying requirements using the 1675 – 1680 MHz band.
- Project 2: Analysis of impacts to users
 - **Status: Complete**
 - Examined 37 government GOES sites.
 - Analysis did not include the potential risk due to anomalous propagation, ground clutter effects, or the beneficial impact of mitigations
 - Sites were rated high, medium or low for RFI risk
 - This project found that the primary risk of interference in either the 1675-1680 or 1680-1695 MHz bands is from AWS downlinks due to downlink transmitters with higher EIRP and antennas that are located high above the terrain
- Project 3: Alternative GOES ground system architectures
 - **Status: Complete**
 - DADDs is the preferred alternative for DCP.
 - Operationalizing the terrestrial network between CBU, WCDAS and NSOF would eliminate the need to create protection zones in Suitland
- Project 4: ROM costs for implementing alternative architectures
 - **Status: In progress**
 - Cost and schedule for design, development, and implementation of alternative architectures to current dissemination methods
 - Dependent on Project 3 (completed) outputs
- Project 5: Alternative communication techniques for satellite downlinks
 - **Status: In progress**
 - Latency and availability information of downlink data in alternative architectures
 - Recommendations for GOES-Next bandwidth and modulation requirements
 - Dependent on Project 3 (completed) outputs
- Project 6: Detailed survey of receiving equipment
 - **Status: Complete**
 - Provided a detailed look at site GOES receiver configurations, data architecture, and data flows.
 - Details of susceptibility RFI
 - Visited and assessed thirty five sites
- Project 7: Protection studies
 - **Status: In progress – 50% completed**
 - Still underway looking at development of appropriate methods for protection of receiver sites

- Outcome will quantify the impact to sites from in-band and adjacent band interference from LTE or other high power transmitters in the vicinity of Federal sites. Definitive protection criteria and protection zones. sites
- Project 8: Anomalous propagation interference to critical GOES stations
 - **Status: Complete**
 - Atmospheric conditions that allow propagation of signals far beyond their design.
 - Primary impact is along the East Coast and Gulf Coast
 - Static protection zones required to reduce RFI risks to less than 5% will be large and encompass many heavily populated areas. Some form of adaptive sharing such as a dynamic exclusion technique may be required.
 - Mitigation options based on detection or prediction and adaptive coordination will require additional study.
- Project 9: Interference thresholds for Federal GOES-R Broadcast Receivers
 - **Status: Complete**
 - Got a first cut for receiver performance
 - DCS DCPR is the most vulnerable to interference
 - Carrier ID does not appear to be useful as a mitigation tool in most interference scenarios.
 - The interference is partially in-band
 - The DRGS system and signal design increase its susceptibility to interference.
- Project 10: RFI monitoring analysis for the 1675-1980 MHz band
 - **Status: In progress**
 - Perform trade study on the state of current and future monitoring capabilities
- Project 11: LTE TDD simulations, passive site surveys, an active tests
 - **Status: Complete**
 - FDD downlink operation is the dominant mode for LTE RFI analysis, and can also be used to represent RFI analysis for TDD operations
 - TDD LTE combines uplink and downlink traffic on the same frequency channel

Pete noted that the predominance of the interference comes from the towers not the handsets. He also noted that they know there is a filing for the 1675 to 1695 band.

LySanias Broyles Question: What alternative architecture have you identified as candidates?

Answer: They include a DADDS based architecture which is best for DCS, an ESPDS variant which is best for FRB, and build a completely remote site for data ingest.

LySanias Broyles Question: How do exclusion zones fit into equations? What about things that interrupt the internet? Answer: We are still looking at that in project four. This is subject to where you are and what internet you are getting

Question: Is there an effect near any large body of water as you briefed there is near the Atlantic Ocean and the Gulf of Mexico? Answer: There are some instances where this can occur inland but there is not much of an effect inland. This effect can last minutes to hours.

Richard Antoine Question: On project three, operationalizing the terrestrial network? Answer: Up for consideration is the backup link between CBU and the NSOF. The system at the CBU does not demodulate the DCS signal. It can be passed to the NSOF. Data is passed to the NSOF on a regular basis. The NWAVER is the current connection. No other sites have been considered.

Presentations from the December 2019 STIWG meeting can be found on the Satellite Telemetry Interagency Working Group (STIWG) web page at <https://acwi.gov/hydrology/stiwg/Meetings/>.

Small Sat Update – Beau Backus - NOAA/NESDIS/ACIO/Data Management and Continuity Operations Branch

Beau Backus gave a presentation on the small-sat project including validation of the use of the small-sats for DCS Use. The concept is to potentially make DCS available to small-sats. The project is to see if this is viable. This is satellite to satellite communications. EUMETSAT is also looking to work with us on this project.

The most challenging issue is the Doppler effect. He briefed that they have done some work to offset doppler shift. Microcom built a board to transmit DCS from GOES to a small-sat. It was hosted on Techedsat -8 which was a failure. TechEdSat-10 will have a similar configuration for our testing. The sats can cross-connect GOES-East and GOES-West.

Techedsat 8 was a failure due to the fact that the satellite board failed due to too much power. Techedsat 10 is planned for launch on March 1st on SpaceX20. It should deploy 3-5 weeks after docking with the international space station. We will test the doppler correction, plan for ground site collection and work with EUMETSAT. There will be a Techedsat 11. There will be international testing with EUMETSAT Meteosat. This launch will be in late 2020.

There is future work that is currently unfunded to include developing two-way communications, the use of higher data rates (1200/1600), alternative modulation schemes and exploring the potential use of DCS for monitoring the surface MARS.

A list of risk reduction and other benefits follows:

- Risk Reduction
 - Band allocated to allow space to Earth transmission for satellite operations
 - Satellites primarily transmit in all directions (omnidirectional antennas)
 - Radiate in the direction of GOES and other DCS receiving satellites
 - Radiated energy, aggregated across multiples of these satellites is expected to become a problematic source of RFI to the DCS
 - Sat DCS use enables improved control of the radiated energy to work with the other DCS transmitters and minimize interference
 - Sat DCS use will assist in decreasing risk of interference but will not eliminate it
- Other Benefits to GOES DCS

- Increased use of the DCS channels, some of which are currently underutilized.
- Low cost enablement of scientific, educational, and development satellite low data rate communications to respective mission centers
- Ability to enable LEO&A during clustered deployments
- Projected demand for enabling two-way communications capabilities of the DCS – while in view of GOES
- Demonstrated continued efforts by meteorological community to facilitate good spectrum stewardship and efforts towards responsible sharing of spectrum resources.

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Two Way Update - Brett Betsill - Microcom Design, Inc.

Brett Betsill provided a briefing on -Two-Way communications. This is the previous interrogate or DCP Command project. Brett noted that the project was authorized in October of 2018. There were three tasks:

- 1 MHz Bandwidth Study
 - Completed in November 2018
- Phase Coherence Analysis
 - Completed in April of 2019
- Design and fabrication of Two-Way Modulator and Two-Way Receiver
 - There is a two-way over the-air test ongoing they hope will be completed to be completed in next 4-6 weeks.

Phase 1 of the upcoming work is the One MHz Bandwidth Study. We need to widen the bandwidth to maintain the same total power. He noted that it should be relatively easy to adapt the hopping design to cover 1 MHz, provide immunity to land mobile radio and very high confidence we can switch in the future through commanding to change 100 KHz to 1 MHz

Phase 2 of the upcoming work is the phase coherence analysis. With properly functioning synthesizers, Phase coherence with hopping signals could be maintained indefinitely. Microcom recommends an over-the-air prototype development.

Phase 3 is the over the air prototype. They hope to finish this by the end of Jan 2020. A new hardware design is required.

A summary of the two-way project includes:

- Two-Way Modulator:
 - Hardware completed in late August.
 - Final software completed in early November.
 - Two-Way Modulator installed at WCDA on November 22ND and presently transmitting CW signal to GOES-East.

- Two-Way Demodulator:
 - Hardware completed in mid-September.
 - In process of porting Bench Prototype code into new design.
 - Hope to be mating to Front-End Receiver in coming weeks.
- Two-Way Front-End Receiver:
 - Design and fabrication completed in mid-October.
 - Currently undergoing Over-the-Air testing with CW signal.
- Two-Way Antenna:
 - 468 MHz cross Yagi receive antenna currently being characterized and range tested.

He noted that Microcom hopes to do initial verification testing by Christmas 2019 and to accomplish more testing in January and produce a report by the end of January.

Question: How could users interact with the two-way environment? Answer: It would enhance DADDS. Users would request to send instructions to your platform. The message would be queued, sent and then an acknowledgement would be sent back through DADDS.

Question: What happened to DCS in ITU conference in India. Answer: The answer to a change to 100 KHz was NO CHANGE.

Richard Question: When could two-way become a reality? Microcom can start with the DADDDS interface. NOAA needs to receive it for monitoring. The equipment has been designed for NOAA. Deploying field equipment is the next step. The reference design should be disseminated to all.

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Unsupported Windows CE Version Device Issues - LySanias Broyles – STIWG Chair and U.S. Army Corps of Engineer, Rock Island District and Chris Buchner - OTT HYDROMET

LySanias Broyles gave a short talk on Unsupported Windows CE Version Device Issues (Note: Now is “Windows Embedded Compact”, formerly “Windows Embedded CE” and “Windows CE”). In the Spring, there were questions about the CE version affecting hand-held devices. This affects some DCS devices in the field. He asked vendors if any were using CE. He is looking for input on how this impacts users. Sutron replied that a lot of Sutron systems that are CE **based**. **He noted that Version CE5 is now at end-of-life or EOF. They are now using CE6. These systems can be shipped until 2026. Sutron will support CE-based dataloggers until 2033. The last point is that the Sutron Satlink Product Family DCPs are not CE based. CE is only applicable on Sutron’s upper line of Xpert data loggers. A short list of points is below.**

- Status
 - Xpert and 9210 Loggers are shipping with CE6 since September 2019
 - 8310/7310 shipping with CE6 as of Dec 2019
 - Existing CE5 stations cannot be upgraded to CE6 due to increased RAM requirements
 - New CE6 units can be shipped until FEB 2026 (due to Microsoft EOL licensing restrictions)
- Support
 - CE5 or CE6 field life or support is not constrained by Microsoft
 - All CE-based data loggers will be supported by OH until 2033
 - Bug fixes and improvements apply to both CE5 and CE6 units
 - Software upgrade packages support upgrading both CE5 and CE6 units
- Key Takeaways
 - There is no need or particular advantage to change operational field units from CE5 to CE6 as the CE6 units being shipped now should be considered operationally transparent to the users
 - All Satlink family DCP's from OTT Hydromet (Sutron) are NOT windows CE based. The Satlink family of products enforce all NOAA/NESDIS GOES certification requirements and do not rely on external loggers for anything other than setup and TX data content

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DigiRIT/XRIT HRIT Visualization -Mike Guberek – Global LG and Bret Betsill - Microcom Design, Inc.

Mike Guberek and Brett Betsill gave a presentation on the DigiRIT/XRIT HRIT Visualization Tools. Microcom DigiRit systems are primarily designed to get the DCS data out of the HRIT/LRIT data stream. They have never gone to the next steps of decoding the remainder of the data (Note: GOES-R Satellite Series Imagery and level 2 products and the NWS EMWIN content). There are two ports; one for DCS and another for the rest of the data. Microcom pulls out all of the messages from the HRIT signal. Microcom systems do not now strip out the imagery and EMWIN files. He briefed that they are now working with Dartcom on this issue.

Mike Guberek then briefed that he is the U.S. representative for Dartcom products. They make turn-key reception systems for the display and manipulation of the imagery files. He supplies HRIT systems for the U.S. Air Force and also for OSPO at the NSOF.

The Dartcom system takes data from receiver and puts it on computer disk. One component is the IDAP interactive image processor for visualization and to be able to do multiple processes on the images. Another component; Macro works with image loops, etc. From the application, you

can archive raw data or sectors defined in common formats including geotiff, erdas etc. The receiver performs data quality monitoring; e.g. bit error issues etc.

Question: How difficult is the effort for DigiRit and Guberek to work to together? Answer: Microcom will use the East stream to analyze a sample of files and then could pull out parts to visualize the data.

An action was taken for Microcom Design, Inc to report back to the STIWG on the Microcom DigiRIT and Dartcom XRIT software for HRIT Visualization. See Appendix I, Action 124-3.

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Government-Only Session:

DCS Future Status - Craig Keeler - NOAA/NESDIS/GOES Program Office/ Systems Engineering Division

Craig Keeler presented a brief on the future status of GOES DCS. There is initial planning going on for the next generation of GOES satellites. The current generation should be operational in some constellation until the mid-2030s.

Specifically noted were links to the “Overview of the NOAA Satellite Observing Systems Architecture (NSOSA)” slide presentation (<https://www.space.commerce.gov/wp-content/uploads/2018-06-NSOSA.pdf>), the “Overview of the NOAA Satellite Observing Systems Architecture (NSOSA)” report (https://www.nesdis.noaa.gov/sites/default/files/SPRWG_Final_Report_20180325_Posted.pdf) and the Federal Register “Notice of Availability of a NOAA Satellite Observing System Architecture Study Draft Report and Public Meeting” (<https://www.federalregister.gov/documents/2018/05/31/2018-11599/notice-of-availability-of-a-noaa-satellite-observing-system-architecture-study-draft-report-and>).

Robbie Swofford Question: Who do I get in touch with on lightning products. Answer: Dan Lindsey is best point of contact on GLM lightning products.

LySanias Broyles Question: When we are looking at the next generation of GOES and what about being relegated to a terrestrial system? Answer: It is possible that there will continue to have a downlink from a satellite but it may be different than what we have now. Craig used the example of the changes over time to the shipping tracking system.

Craig also noted that when they wrote the requirements for the last DADDs, there was a STIWG represented on the team (Dryer).

Comment: NOAA must continue to consider severe weather situations when considering a terrestrial only solution for DCS.

Warren Dorsey Question: Will there be more information on these topics for the Spring STIWG?
Answer: They will know the reward recipients for the studies.

Spectrum Update/ FCC - David Lubar – NOAA/NWS/OAA/CIO Office of the Assistant Chief Information Officer for Weather Services

Dave Lubar presented information on Spectrum Sharing. He stated that there were two major things that have happened recently; 1) results from the ITC Radio Conference and 2) an update on the Ligado frequencies sharing issue. He noted that International Radio Regulations regulation compliance is a treaty obligation for the United States. He summarized some of the highlights of the ITC conference:

Internationally:

The International Telecommunication Union (ITU) World Radiocommunications Conference (WRC) just ended in late November in Egypt. This month-long meeting is held approximately every 4 years to update the international Radio Regulations. Compliance with the international regulations is a treaty obligation of the United States, and most changes find their way into the domestic regulations in the future.

Items of interest to STIWG:

Agenda Item 1.2 (Res 765) to consider in-band power limits for earth stations operating in the mobile satellite service, met sat service or EESS in the bands 401-403 and 399.9-400.05 MHz

Note EESS and Met Sat are Earth-to-Space]

5.C12 In the frequency band 401-403 MHz, the maximum e.i.r.p. of any emission of each earth station in the meteorological-satellite service and the Earth exploration-satellite service shall not exceed 22 dBW in any 4 kHz band for geostationary systems and non-geostationary systems with an orbit of apogee equal or greater than 35 786 km.

The maximum e.i.r.p. of any emission of each earth station in the meteorological satellite service and the Earth exploration-satellite service shall not exceed 7 dBW in any 4 kHz band for non-geostationary systems with an orbit of apogee lower than 35 786 km.

The maximum e.i.r.p. of each earth station in the meteorological-satellite service and the Earth exploration-satellite service shall not exceed 22 dBW for geostationary systems and non-geostationary systems with an orbit of apogee equal or greater than 35 786 km in the whole 401-403 MHz frequency band. The maximum e.i.r.p. of each earth station in the meteorological-satellite service and the Earth exploration-satellite service shall not exceed 7 dBW for non-

geostationary systems with an orbit of apogee lower than 35 786 km in the whole 401-403 MHz frequency band.

Until 22 November 2029, these limits shall not apply to satellite systems for which complete notification information has been received by the Radiocommunication Bureau by 22 November 2019 and that have been brought into use by that date. After 22 November 2029, these limits shall apply to all systems within the meteorological-satellite service and the Earth exploration-satellite service operating in this frequency band. (WRC-19)

Agenda Item 1.3 (Res 766) to consider possible upgrading of the secondary allocation to the met sat service (Space-earth) to primary status and a possible primary allocation to the EESS (Space to Earth) in the frequency band 460-470 MHz

- No change – this remained secondary status
- Other administrations with Land Mobile services wanted to restrict the emission limits or add footnotes which would have kept this service secondary to Land Mobile. It was best to have it remain secondary under those circumstances.

Agenda Item 1.7 (Res 659). To study the spectrum needs for telemetry, tracking in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations.

Domestically

Federal Communications Commission

- Financial media reports that a Ligado license in the mobile satellite bands was under consideration (this is below 1.6 GHz), not adjacent to GOES. This is NOT 1675-1680 MHz.
- DoD Secretary of Defense sent a letter in opposition to that request, directly to the Head of the FCC, on Nov 18, 2019, requesting that the FCC reject the license modification request (of Ligado) and not allow the proposed system to be deployed.
- Ligado filed copies of those letters in the FCC proceeding and held several meetings where they disputed the claims – with arguments they have generally used before.
- Ligado leases the 30 MHz of spectrum from UK-based satellite operator INMARSAT. INMARSAT is in the process of being sold to a group of entities and pension funds, and had judicial hearings scheduled in London in November.
 - Three minority ownership shareholders – all hedge funds – objected to not including any valuation in the INMARSAT bid for possible future income from Ligado spectrum leases. The INMARSAT board refused to add any value for Ligado – there was a delay in those hearings until Dec 3 and 4th – possibly with the hope that the FCC act on their license request, which it did not.
 - No one really knows what the FCC may or may not do in the Mobile Satellite Service band.
- All has been quiet on 1675-1680 MHz. We assume they are awaiting the completion of the 1675 – 1680 MHz SPRES study, which Pete Kurucz briefed to you earlier today.

Review Actions from TWG and STIWG - LySanias Broyles - STIWG Chair and U.S. Army Corps of Engineer, Rock Island District and Richard Antoine - NESDIS/OSPO/SPSD/Direct Services Branch

Postponed due to lack of time. An action was taken to do this review via email or Google document. See Appendix I, Action 124-1

CS2 Update – Richard Antoine – NESDIS/OSPO/SPSD/Direct Services Branch

Deadline for total transition is May 31, 2026, but the sooner we transition over to CS2 the more channels can be created AND the more frequent transmission assignments can be provided. We have already started creating new CS2 channels. There is an opportunity for some Users with critical stations to receive 15-minute assignments, but the stipulation is that only CS2 transmitters deployed on these new channels

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Random Channel Working Group - Jesse Gray – Bureau of Land Management

Jessie Grey gave a presentation on the Random Channel Working Group. BLM regularly uses channels 195 and 196 for test transmissions. This allows immediate testing of a transmitter without waiting on the assigned time and assists in troubleshooting a station. We need to bring more people onto the working group for more perspective. There are lots of uses for random channels; e.g. tsunamis and flooding. Duane Prebble did a study on random channels in 1982 before he worked for Microcom Design. The working group would like to bring Microcom on board to do an update of the study.

He noted the following need to establish rules for Random Channel use.

- Primary Use: Usually a Self-Timed channel used by most stations
- Secondary Use: Would this be preferred use for most applications?

Jesse asked if anyone solely using random channels. Answer: Beau Backus said small-sats would use random channels. Letecia said that 3% of the messages now are random.

Question: How many channels? There appear to be about 10 for 20 KHz. There may be 20-30 out of about 250. So, 3% of the messages on about 10% of the channels. One question would be how to better assign random channels. There needs to be a 90% probability that the random messages would not have collisions which means there cannot be heavy loading on those channels. Small-sats would have to use international channels. Small-sats will not stay on one channel. This might be something to look at for domestic users. Jesse will add this topic to the working group.

Jesse Question: Should we try to free up some of these channels? Answer. There is no hurricane at this time. Hurricane events increase the number of random messages on the existing channels.

LySanias Broyles states that people like Duane, Microcom Design etc should participate in the working group.

There was an action taken to see if Microcom Design or another person or organization could be tasked to update the random channel study. See Appendix I, Action 124-5

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Open DCS MOA/Unified Platform status - LySanias) **10 mins**

Future of ACWI and impact on STIWG – LySanias Broyles - ?????

Presidential to reduce the number of working groups. The ACWI maybe sun-setted. Where will the STIWG fall under. This is a heads-up for all members.

Action was taken for LySanias Broyles to determine the path forward for STIWG existing outside of ACWI. See Appendix I; Action 124-2.

Open DCS Software – LySanias Broyles - STIWG Chair and U.S. Army Corps of Engineer, Rock Island District

The Army Corps will use existing MOAs and MOUs with the other agencies of STIWG members to be able to fund future developments to the OpenDCS Software. NOAA will be the first agency to have the agreement completed. These agreements will establish a mechanism to jointly fund upgrades to OpenDCS software in the future. The STIWG should be able to expedite projects. The plan is to publish source and compiled code for the STIWG OPENDCS software.

Upcoming STIWG location – Richard Antoine - NESDIS/OSPO/SPSD/Direct Services Branch

At this time, Richard is considering nominating the D.C. area probably the NCWCP in College Park. There is a hotel close by and it is centrally located between all three area airports.

Dan Schwitalla of USGS nominated the USGS Reston headquarters or the Maryland Science Center in Baltimore.

An action was taken to investigate these three options and make a final decision by January 15th so that logistical arrangements can be made. See Appendix I, Action 124-4.

Action:

Appendix I: Actions from the STIWG

- Action: 124-1 – An action was taken to do the review of the TWG and STIWG action items from the Spring 2019 meetings via email or Google document. See “Review Actions from TWG and STIWG”; page 11. (LySanias Broyles and Richard Antoine)
- Action 124-2 - Determine the path forward for STIWG existing outside of ACWI. See “Future of ACWI and impact on STIWG”; Page 12. (LySanias Broyles)
- Action124-3 – Report back to the STIWG on the Microcom DigiRIT and Dartcom XRIT software for HRIT Visualization. See “DigiRIT/XRIT HRIT Visualization”; Page 8. (Brett Betsill)
- Action 124-4 - Investigate the location options for the Spring 2020 STIWG, make a final decision by January 15th and begin to arrange logistics and communicate them to the TWG and STIWG members. See “Upcoming STIWG location”; Page 12. (Richard Antoine, LySanias Broyles, Letecia Reeves and Valerie Randall)
- Action 124-5 – Investigate whether Microcom Design or another person or organization could be tasked to update the random channel study. See “Random Channel Working Group”; Page 12. (Richard Antoine)

Appendix II: December 2019 124th STIWG (Virtual) Agenda

Special Topics Session: 1200 – 1400 CST

- SPRES Study (Pete Kurucz) 30 mins
- Small Sat Update (Beau Backus) 15 mins
- Two Way Update (Brett Betsill) 15 mins
- Unsupported Windows CE Version Device Issues (Vendors/Open Discussion) 10 mins
- DigiRIT/XRIT HRIT Visualization (Brett Betsill/ Microcom Design, Inc. and Mike Guberek/Dartcom)

Government-Only Session (Use Private Room WebEx link): 1415 – 1615 CST

- DCS Future Status (Craig Keeler) 30 mins
- Spectrum Update/ FCC (David Lubar) 15 mins
- Review Actions from TWG and STIWG (LySanias Broyles and Richard Antoine) 15 mins
- CS2 Update (Brett or Richard) 10 mins
- Random Channel Working Group (Jesse Gray) 10 mins
- Open DCS MOA/Unified Platform status (reminder/ update from Lysanias) 10 mins
- Future of ACWI and impact on STIWG 10 mins
- Upcoming STIWG location (R. Antoine) 10 mins

Appendix III: December 2019 STIWG (Virtual) Attendees

Participants

2019 Fall TWG/STIWG Meeting (virtual)

1. Akzhana Issabekova, FTS
2. Allen Furlow, NRPD
3. Ari Powers, USACE-Portland District
4. Arthur Armour, USACE
5. Beau Backus, NOAA
6. Bill Richard, BOR PN Region
7. Brian Jackson, NOAA
8. Brett Betsill, Microcom Design Inc.
9. Charles Allen, BOR
10. Chris Buchner, Sutron-OTT Hydromet
11. Craig Keeler, NOAA
12. Dan Schwitalla, USGS
13. David Lubar, NOAA GOES-R Program Office
14. Jan DeWitt, USACE
15. Jesse Gray, BLM
16. Jesse Taylor,
17. John Roger, NWD
18. Justin Dopp, BLM
19. Katie Barnella Sims,
20. Letecia Reeves, NOAA GOES DCS
21. Linnea Keating, NIFC, Forest Service
22. Lysanias Broyles, USACE
23. Matt Ceanfaglione, Microcom Design Inc.
24. Mike Guberek, Dartcom
25. Nathan Holcomb, NOAA-NOS
26. Paul Seymour, NOAA GOES DCS
27. Perry West, Microcom Design Inc.
28. Pete Kurucz, Aerospace Corporation
29. Philip Bartlett, FTS
30. Richard Antoine, NOAA GOES DCS
31. Richard Pardee, USGS
32. Robbie Swofford, BLM
33. Scott Mowery, NOAA-NOA
34. Sheraz Mirza, NOAA GOES DCS
35. Steve Simmer,
36. Tom Mecomber, LRN
37. Travis Thornton, NOAA-Wallops
38. Valerie Randall, NOAA GOES DCS
39. Warren Dorsey, NOAA-OSGS
40. Warren Krug, NOAA-NOS
41. Winston Hensley, NOAA-NOS