



Aviation Spectrum Resources Inc.
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AFC

Aeronautical Frequency Committee

14 Oct 2016

**MINUTES OF THE AFC SPRING MEETING 2016
7- 8 June 2016, Portland, Oregon**

1. OPENING REMARKS AND INTRODUCTIONS

Vytas Cerniauskas (ASA Alternate), as the AFC Chairman convened the Aeronautical Frequency Committee (AFC) meeting on 7 June 2016 at the Marriott City Center Hotel, Portland, OR.

All members introduced themselves to the group.

AFC Attendees:

Greg Baker (ASRI)	Steve Leger (RC)*
Vytas Cerniauskas - Chairman (ASA Alternate/ACG Systems)	Jeff Monroe (ASA) – Vice Chairman*
Lorena Carvajal (FAA)	John Monto (RC)
Chris Collings (Harris)	Vic Nagowski (ASRI Consultant)
Bob Dick (FFT Alternate/ACG Systems)*	Tim Pawlowitz (FAA)
James Dickens (Bristow)*	Tim Payne (DAL)*
Terry Gambill (PHI)*	Mike Richards (AAL)*
Michael Hinojosa (ASRI)	Andrew Roy (ASRI) – Executive Secretary
Terry Horn (SITA)*	Tim Totten (UPS)*
Kris Hutchison (ASRI)*	Joe Williamson (JBU Alternate)*
Zbig Jasiukajc (SITA)	Neal Young (SWA)*
Andy Johnson (UAL)*	

*Recognized voting member present at the meeting

Guests:

Ramsey Abid (RC)	John Seybold (Harris)
Yun Chong (RC)	Chuck Stewart (UAL)
Joe James (Harris)	

Apologies:

Ken Adams (DAL)	Chris Kelly (UAL)
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Joe Cramer (Boeing)	Chris Naugle (FDX)
Tom Davis (DAL)	Barry Pilkington (FDX)
Rich Farr (AAL)	Dave Robinson (ERA)**
Michael Francis (NATA)	Brian Romine (USA/AAL)
Mark Hagan (UPS)	David York (HAI)
Pete Incaini (UAL)	

**Voting member declared inactive due to missing of previous 3 meetings

Andrew Roy (ASRI - Executive Secretary) reviewed the current AFC membership, associate members and observers' status. There were 13 voting members present out of an AFC membership total of 17, therefore a quorum was achieved. The Secretary explained the meeting format and formal/informal voting procedures.

The Executive Secretary asked that AFC meeting attendees be mindful of any information shared be intended for the AFC membership only, and therefore please do not distribute the AFC meeting information outside the AFC membership.

The Executive Secretary presented letters requesting changes to the AFC Membership:

- A letter was received from American Airlines advising of the merger between American and US Airways, combining their existing membership into a single AFC member organization. Mr. Rich Farr would be the primary AA member of the AFC, and Mr. Mike Richards and Mr. Brian Romine would be his alternate representatives.
- A letter was received from Harris asking that Mr. Joe James and John Seybold be recognized as Associate members.

A formal motion was made by Mike Richards (AAL) and seconded by Kris Hutchison (ASRI) to accept all the proposed membership requests. A vote was taken, with 10 votes supporting the motion and 3 abstaining. With the motion approved, ASRI will present the AFC membership changes to the ASRI Board of Directors for approval.

Kris Hutchison (ASRI) announced that ASRI has added two new Board of Directors: Jeff Monroe (ASA) and Bill Stine (Independent representing business aviation).

Kris Hutchison (ASRI) presented a token of appreciation to past AFC chairmen:

1. Neal Young (SWA) for his leadership in 2012
2. Vytas Cerniauskas (ASA Alternate/ACG Systems) for his leadership in 2013
3. Terry Gambill (PHI) for his leadership in 2014

2. APPROVAL OF THE AGENDA

The agenda was reviewed and approved as presented.

3. APPROVAL OF THE WINTER 2016 MEETING MINUTES

Andrew Roy (ASRI) – The AFC Executive Secretary introduced the minutes from the Winter 2016 AFC meeting and the group conducted a page-by-page review. After some minor

corrections were made, a formal motion to approve the minutes as modified was provided by Kris Hutchison (ASRI) and seconded by Neal Young (SWA). A vote was taken and there was unanimous agreement by the AFC membership to approve the modified minutes.

4. STANDING REPORT OF RELATED ACTIVITIES

A) International Telecommunications Union-Radiocommunications (ITU-R) Activities

(i) ITU-R Updates (SG5 and WP5B)

Andrew Roy (ASRI) briefed on the ITU-R Updates. A Working Party 5B (WP 5B) meeting was held 7-20 May 2016 in Geneva, Switzerland. The meeting was the first of six meetings in preparations for the WRC-19 study cycle, with WRC-19 estimated for Nov 2019). The group deals with radar, aeronautical, and maritime issues, and was held in conjunction with Study Group 5 which approves the work plan and ratifies WP 5B's output.

Aviation topics included:

- Global Aeronautical Distress Safety Service (GADSS)
- Sub-orbital vehicles (i.e. space planes)
- ADS-B
- GFT
- Unmanned Aircraft Systems (UAS)

As it was the first WP 5B meeting of the study cycle, not much progress was made on any issue other than a few papers suggesting ways of dealing with the work. This was especially true of UAS, which experienced the same political opposition seen in the last WRC study cycle, and almost made no progress despite a 3-year head start on the other issues.

A Special Task Group was created to investigate mobile broadband spectrum above 6 GHz, TG5/1 In frequency ranges that are not a primary concern to known aviation systems, though the aviation community are still investigating all possible impacts.

The next meeting is tentatively scheduled for two weeks in November 2016.

B) International Civil Aviation Organization (ICAO) Aeronautical Communications Panel (ACP) Activities Report

(i) Frequency Spectrum Management Panel (FSMP).

Kris Hutchison (ASRI) provided a brief update on ICAO FSMP, which ASRI is a panel member alongside other states and IATA. At the meeting Mike Biggs of the FAA was nominated as Chairman and Andrew Roy (ASRI) as Vice Chairman.

The next meeting is scheduled for 6 -16 September 2016 in Montreal, Canada. The Working Group will meet 6 -14 September and the Panel will meet 15 -16 September. The future work

includes finalizing the initial ICAO position for WRC-19 including space planes and GADSS. Airlines were strongly encouraged to attend either in the IATA or ASRI delegation.

(ii) European Frequency Management Group (FMG).

A presentation was provided by Kris Hutchison (ASRI) on the European FMG. The VDLM2 Common Signaling Channel (136.975 MHz) has contributed to the performance issues in Europe due to traffic congestion. The FMG has recommended the implementation of multiple VDL frequencies and an optimized RF environment, based on VDLM2 capacity and measurement analysis. The additional VDLM2 frequencies have been identified as: 136.725, 136.775, 136.825, and 136.925 MHz. The FMG has noted that VDL Mode 4 has been planned for 136.925 MHz in the EUR Region, but there was uncertainty over its actual use.

The VDL frequency changes included the ceasing of operation on 136.750 MHz for Plain-Old-ACARS (POA) for SITA in March 2016 and the ceasing operation on 136.725 MHz for POA for ARINC starting in June 2016 with completion expected by August/September 2016. The eventual VDL configuration will include one CSC, two frequencies for SITA (terminal and enroute) and two frequencies for ARINC (terminal and enroute).

The FMG will continue to work with UK NATS, Airbus, Boeing, ENAV, SITA and ARINC to review VDL performance analysis, review multi-frequency options, and conduct RF modeling and testing. The next FMG coordination meeting is scheduled for June 2016 in Toulouse, France. The next FMG Plenary meeting is scheduled for November 2016.

C) FAA REPORT

(i) FAA DataComm Program

Tim Pawlowitz (FAA) provided an overview of the FAA Data Communications program that will provide data communications between the cockpit and controllers to replace some of the current voice communications.

Tim stated that the FAA Spectrum Office is unfamiliar with the FCC rules on traffic categories for VHF, and therefore is uncertain if the current FCC definition of frequency usage for ATC and AOC allows the sharing of a VDLM2 CSC supporting both services. The FAA is deciding how to support the future frequency coordination process between the FAA and ASRI in the lower 136 MHz band.

(ii) ADS-B Implementation Progress and Future intentions (Terrestrial and SATCOM).

Tim Pawlowitz (FAA), state that he had no comments on the status of the ground network. A group has been formed to investigate the support of ADS-B over satellite and funding is being pursued via the Joint Resource Council.

(iii) FAA's AeroMACS Deployment Update.

Tim Pawlowitz (FAA) stated that MITRE has been tasked to conduct a study to investigate the AeroMACS channel requirements. The study would provide a recommendation on the splitting of channel assignments between the FAA and the industry. The intent is to provide the number of channels necessary to meet FAA needs. Initial feedback is that four out of the eleven AeroMACS channels would be required to support FAA services. The Harris ground network group will be the central office responsible for AeroMACS frequency coordination. The FAA would go to Harris to do the engineering assessment and the FAA would then go to the NTIA for frequency assignments. The other AeroMACS users would also go through Harris and then apply through the FCC for their frequency assignments.

Concern was expressed about airport authorities and others applying for AeroMACS channels to support non-aeronautical safety services, which would limit capacity for airline use as the system was originally intended for.

5. REPORT ON OTHER REGULATORY AND TECHNICAL ORGANIZATIONAL UPDATES

A) Ligado Networks and GPS/Weather Data

Andrew Roy (ASRI) provided an update on Ligado Networks, formally known as LightSquared. Ligado has begun a new approach to the issue in 2016, albeit with a spectrum plan that is similar to what was proposed before with some minor tweaks.

They have pushed the FCC to issue public notices of 22 April 2016 requesting consideration of Ligado's GPS proposals for a waiver, and possible licensing of the NOAA weather band. The Ligado proposals could potentially affect four different areas of aviation: certified GPS receivers, non-certified GPS receivers, AMS(R)S SATCOM (i.e. Iridium and Inmarsat), and NOAA weather satellite interference.

Based on public comments made by the AFC membership in 2015 and 2016, Ligado are proposing that the FAA impose license conditions on any FCC license to protect aviation GPS. However, there are still many outstanding questions on how this would be implemented, and what control measures would apply.

For non-certified GPS receivers, Ligado is conducting its own testing of devices using a new metric it has created. This is entirely different to the approach of the Dept of Transport test supported by the GPS industry, which is due to publish its results in late 2016.

The SATCOM issue affects both Inmarsat (using the same frequencies as Ligado) and Iridium (using adjacent frequencies to Ligado's handsets). At this time, no assessment has been made in the FCC on the affects to these systems, and Inmarsat has submitted studies into the ITU-R and the UK that show interference is expected.

Additionally, a plan by Ligado to mitigate some of the GPS interference now has the potential to affect the NOAA datalinks including weather balloons and Geostationary Operational Environmental Satellites (GOES). The GOES system is the primary source for numerous

advisories that NOAA issues, including AIRMETS and SIGMETs. Only Ligado has conducted any technical analysis on potential interference, and this has not been peer reviewed.

Given the long list above, ASRI and 11 other AFC signatories filed opposition comments on the Ligado GPS proposals with the FCC on the 23 May 2016, noting that the proposal was premature and there were too many outstanding issues. From the certified receiver perspective, it is uncertain about what mechanism and rules the FAA would use to protect GPS devices from an FCC licensed system.

The FCC Public Notice timelines include GPS comments period due to finish 6 and 16 June 2016 and NOAA satellite comments due by 23 June 2016. ASRI plans to seek signatories in the same process as before for NOAA comments and may schedule a WebEx briefing for AFC members if there is an interest. The FCC is unlikely to rule on anything soon given the current opposition. ASRI will update the AFC as the issue develops, and interested parties should contact the AFC Executive secretary if this wish to be included on the dedicated distribution.

B) AEEC Data Link Users Forum

Vic Nagowski (ASRI Consultant) provided a presentation on the last meeting of the AEEC Data Link Users Forum (DLUF). The DLUF holds two meetings each year with one in the US and one in Europe and are normally hosted by a participant organization. The last DLUF meeting was held on February 2-3, 2016 in Miami, Florida hosted by Rockwell Collins IMS. The primary subjects of discussion were the FAA Data Communications program status, feedback from the airlines on DCL service, and aircraft equipage. A Media Independent Aircraft Messaging (MIAM) workshop was held on the afternoon of February 1, 2016.

The next DLUF meeting is scheduled for September 13-14, 2016 in Dublin, Ireland hosted by Airtel ATN. An airline only roundtable meeting is scheduled for the morning of September 15, 2016 to review the previous meeting results and identify items for discussion at the next DLUF meeting. A workshop is scheduled for the afternoon of September 12, 2016 to further investigate the implementation of the MIAM functionality. The key issue will be obtaining the status of the ELSA Consortium work.

The next US DLUF meeting is tentatively scheduled for February 7-8, 2017 with a host and location to be determined.

C) FCC Technical Advisory Council (TAC)

No meeting since the last AFC, so new updates on this subject.

D) LMCC

No new updates on this subject.

E) AEEC General Session

Vic Nagowski (ASRI Consultant) provided a presentation on the AEEC General Session (GS). The AEEC GS marks the culmination of the years' standards development work. New ARINC Standards and updates to existing standards are discussed and approved at this meeting. Furthermore, the AEEC initiates the work program and schedule for the coming year.

The last AEEC GS was held in Atlanta, GA on April 25-28, 2016 hosted by Delta Air Lines. The Avionics Maintenance Conference (AMC) was held in parallel with the AEEC GS. Over 750 attendees participated in both meetings. There were some membership changes to the AEEC Executive Committee. The future AEEC GS/AMC meetings are scheduled for May 1-4, 2017 in Milwaukee, Wisconsin and April 23-26, 2018 in Dallas, Texas hosted by Southwest Airlines.

The AEEC GS initiated 10 projects and approved 14 new standards. Infocomavia of Russia submitted a last minute request to the AEEC Industry Activities to include 136.775 MHz into the ARINC 618 Characteristic identifying this frequency as a common signaling channel for ACARS in Russia. The AEEC Executive Committee agreed with incorporating their request into the A618 standard.

6. GUEST PRESENTATION

Chuck Stewart (UAL) provided a presentation on B787 Fleet: VDL Implementation Airline Lessons Learned. Chuck explained that the B787 is a VDL equipped aircraft, with a significant increase in data requirements. He suggested that planning in the area of airline host programming and missing data in downlinks is essential to minimize implementation issues with VDL for airlines. He strongly recommended teamwork and collaboration between Boeing and airline staff to improve implementation.

He noted some surprises that occurred during the Implementation were:

- Alpha-suffix flight numbers errors
- 787 CMF AMI aircraft parameters differing from the B777 aircraft,
- End of flight definition changes
- Copious and lengthy CFD/DFD/ENG messages.

The B787 message size and message quantity have significantly increased over the B777. The average messages per flight transmission have increased by 330%, the average characters per message transmission has increased by 424%, and the average block transmission per flight have increased by 424%. It has been observed that a single aircraft could take over one hour to unload stored data link messages after landing. Examples of the message priority differences between the B777 aircraft and the B787 aircraft were provided. It is critical to report issues as soon as possible to Boeing in order to resolve issues in a timely manner.

Other issues identified included:

- Crew manual selection of VHF/HFDL data
- Chirping sounds over the voice frequencies
- Poor selective calling performance

- Erroneous aircraft parameter data
- Reminder function issues
- Loss of SATCOM service
- All media “no comm” condition due to a VDLM2 issue
- Initialization data dropped
- CPDLC messages not transmitted
- Uplink message processing failure
- Intermittent failures to print

Boeing was very responsive to United Airlines concerns and worked with the airline staff to remedy the issues identified. Chuck reminded the other airlines to think outside the box when addressing issues and be patient. Some new software releases are available and other software releases are planned. He noted that block changes are only available on a fixed schedule so airlines will need to wait for some software updates.

7. SYSTEMS STATUS

A) VHF Spectrum Congestion Options

Michael Hinojosa (ASRI) provided a presentation on the VHF Spectrum Congestion Options. Mike said that ASRI has 6,192 current assignments across the US and users are experiencing congestion in high traffic areas. ASRI has 128 channels in the lower band of which 32 channels are US primaries, 32 channels are Canadian primaries, and 64 channels are shared between the US and Canada on a first come, first served basis. The 20 channels in the upper 136 MHz band are being cleared for VDLM2 operations, except for a few voice users to minimize congestion in the lower AES band.

The possible assignment policy changes include:

- No changes to existing assignment policies and procedures
 - ASRI continues current process and users accept levels of congestion in the VHF spectrum
 - Increasing shared use of VHF voice channels for new and existing users
 - Users will need to proactively implement more measures to mitigate interference (e.g. filtering, better radios, antenna placement, etc.)
- Stricter compliance and enforcement of ASRI assignment rules
 - ASRI initiated reclaiming existing frequency assignments deemed underused.
 - Actively change criteria as congestion increases, to impose more strict rules on usage and requirements for additional channels
 - More spectrum monitoring for compliance
- Implementation of 8.33 kHz frequency assignments
 - Begin the conversion to 8.33 kHz assignments on the existing 25 kHz assignment center frequencies.
 - Possible reorganization of spectrum at a future date when enough users have made the conversion.

Coverage maps were provided illustrating the 6,192 channel assignments supporting voice and data combined, 1,986 channel assignments supporting only voice stations, and 1,240 channel assignments supporting only the ACARS services. The ASRI spectrum monitoring system is being planned to be used to confirm channel usage.

In summary, the Northeast US is nearly out of available frequencies to assign and any unused frequencies should be returned to the frequency pool for reassignment as needed.

B) Data Link Systems (RC/SITA)

Steve Leger (Rockwell Collins/ARINC) stated that they had nothing new to present from the last summary provided at the March 2016 AFC meeting.

Zbig Jasiukajc (SITA) provided a verbal update on the SITA data link networks. Zbig stated that in the US work continues on the transferring of ground stations under the control of Harris. SITA has implemented new software to manage the VDL alternate frequencies in Europe and expects to request an additional VDL frequency in Europe. SITA has observed that only about 5% of the traffic in Europe is used to support air traffic services. The overhead associated with the ATN protocol is using a large portion of the capacity of the RF channel. There is a proposal to use IPS protocol with broadcast that would reduce the overhead being observed on the RF channels. The FANS protocol does not have the high overhead associated with the ATN protocol.

In Europe, there is a plan to implement the VDL service in regional domains. Several countries in Europe such Italy, Spain, and others are moving forward with this new concept. The concept is having a single network supporting multiple service providers. The VDL network continues to expand to other parts of Eastern Europe. SITA has deployed another 30 ground stations around the world. All air/ground communications are now being supported under the new banner of SITAOnAir.

C) SELCAL

A presentation was provided by Vic Nagowski (ASRI Consultant) on the Selective Calling (SELCAL) code pool expansion program. Vic provided some background information on the current limitation of the SELCAL system and how the industry developed a SELCAL code pool expansion solution.

The RTCA SC-232 held six meetings in total to develop the SELCAL Minimum Operational Performance Standard (MOPS). The final meeting of SC-232 was held in January 2016 in Washington, DC. The primary objectives of the meeting were to disposition comments received on the draft MOPS document and review the status of avionics testing for backward compatibility.

The bench testing conducted on avionics associated with both Airbus and Boeing fleet aircraft avionics indicated that all legacy avionics are fully backwards compatible with the proposed SELCAL code pool expansion. Airbus completed a flight test campaign in December 2015 to verify backward compatibility with A320/A350 aircraft. Free Flight Systems conducted bench

testing with the assistance of AvtechTyee and their avionics were backward compatible. Honeywell and Rockwell Collins did not conduct avionics testing but did advise the SC-232 committee to proceed with the SELCAL code pool expansion.

A theoretical analysis on intermodulation products when the new 16 tones are incorporated into the existing SELCAL system was completed. The committee decided to provide guidance to ASRI in the MOPS concerning early assignment of SELCAL codes in order to reduce the probability of false triggering. Guidance was also provided to the FAA and the airlines on the impact on their respective ground systems that currently support SELCAL codes. The MOPS document was presented and approved at the RTCA Program Management Committee held on March 17, 2016.

The ICAO Communications Panel Meeting is scheduled for October 10-14, 2016 in Montreal, Canada. ASRI plans to submit a working paper on the status of the successful avionics backward compatibility testing completed consisting of theoretical analysis, bench testing and flight-testing. The ICAO approval process will commence after that meeting and updates to the appropriate standards can be expected in the 2017/18 timeframe. Implementation by the Air Navigation Service Providers can be expected in the 2018 timeframe.

D) **AeroMACS**

A presentation was provided by Vic Nagowski (ASRI Consultant) on the ICAO WG-S and the AEEC AeroMACS Working Group. Vic provided some background information on the AeroMACS system and provided an update on the various committees developing avionics standards.

The RTCA Special Committee 223 has completed a Profile document and Minimum Operational Performance Standards (MOPS). The RTCA Program Management Committee meeting held on March 17, 2016 redefined the scope of SC-223 and it is now called the Internet Protocol Suite (IPS) and AeroMACS. SC-223 will be addressing system security as it applies to AeroMACS and other systems being defined by RTCA special committees. The last meeting held on April 26-28, 2016 in Washington, DC.

The ICAO WG-S is an ICAO sponsored initiative to develop standards for the AeroMACS system. The WG-S objectives include the development of the System and Recommended Practices (SARPs) standard, the Technical Manual (TM), and coordination with other committees as necessary. The SARPs has been completed and the TM is expected to be complete by end of 2016. The last meeting was held in May 24-26, 2016 in Montreal, Canada.

The AEEC formed an AeroMACS Working Group (WG) that is tasked with defining an airborne radio suitable for installation in all types of aircraft. A draft ARINC Project Paper 766 (AeroMACS Transceiver and Aircraft Installation Standards) has been prepared. The goal of the WG is to develop a mature draft of ARINC 766 by the end of 2016. The next meeting is scheduled for July 28-29, 2016 in London. A list of key issues the WG are addressing was provided.

E) Radio Station Inspection Programs (ASRI).

Michael Hinojosa (ASRI) gave a short briefing on the status of the 2016 ASRI radio station inspection program. Thus far, there were 401 inspections completed in 2016 in California, Florida, North Carolina, and South Carolina. Planned inspections include Colorado, Indiana, New Mexico, Michigan, Texas, and Utah. The goal for 2016 is 1000 inspections.

Some problems identified during the inspections include:

- Radios found on frequencies that were not included on the station license,
- Radios licensed that are not being used and need to be decommissioned,
- Transmitters not marked with the licensed frequency,
- Customers using frequencies that they are not licensed for, and
- Unlicensed radios have been found that were abandoned by the customers.

F) Station RFI Issues (ASRI).

Michael Hinojosa (ASRI) gave a presentation on all RFI incidents since the Winter 2016 AFC meeting. ASRI acknowledged the outstanding help received from the FAA ATC Spectrum Engineering Services office, the FCC, the airlines involved, Rockwell Collins/ARINC, and ACG Systems in the resolution of the RFI problems.

Problems were identified and resolved (December 2015 to May 2016) at the following airports: BUF, SUS, BTV, and ACT. Interference issues are still open at DFW and PBI.

G) Spectrum Monitoring Capability (ASRI).

Michael Hinojosa (ASRI) provided a presentation on the Spectrum Monitoring Capability. The LS Telecom Observer is a portable unit that monitors the frequency bands to capture and store the data for instant decision-making or later analysis. The parameters such as range of frequencies to monitor, time to monitor, start and end times, can be programmed by the operator. ASRI plans to use the monitor at larger US airports to collect statistics on the VHF band usage and issues.

The monitor capabilities include the ability to:

- Continuously monitoring the entire AES spectrum
- Filter specific frequencies or bandwidth
- Triangulate transmission sources
- Remotely access monitored data
- Demodulate, listen and record transmissions (only DSB-AM voice can be demodulated)

The initial training and familiarization with a direction-finding tool was conducted at BWI and IAD airports. The monitor is being used to identify the use of unlicensed frequencies and monitor the proper use of licensed frequencies.

8. EXISTING BUSINESS

A) VDLM2 Implementation Plan for Data Comm. (ASRI/RC/SITA/HARRIS)

Andrew Roy (ASRI) provided a presentation on the VDLM2 deployment plan. ASRI has worked with both CSPs, Harris and the FAA to develop a proposal for adoption by the AFC to assign new VDLM2 channels while minimizing the impact on existing users.

After receiving approval from previous AFC meetings, ASRI is completing a 4-phase process which was initiated on July 1, 2014:

1. Reorganize lower band AES voice users - Completed
2. Migrate affected voice users from the upper AES band - Completed
3. Migrate upper band ACARS networks
 - a. Secondary RC and SITA ACARS networks – Completed
 - b. SITA ACARS base frequency – June 2017
4. Assign VDLM2 frequencies in the upper AES band – As required

The currently proposed VDL channel plan is a refinement of the AFC VDLM2 planning completed in 2010. The revised plan allows for dedicated ground and enroute frequencies for each CSP. The plan provides the best available spectral/physical separation given the VDLM2 emission profile and the available physical and spectral separation possible. Charts illustrating the proposed VDLM2 channel plan and the current timelines were provided.

The outstanding actions for AFC consideration included:

- RC change proposal
- SITA adjacent frequency implementation for 131.725 MHz
- Canadian coordination
 - 131.725
 - 129.350
- Lower 136 MHz channel plan
- Licensing of lower 136 MHz band
- Site coordination for ground/enroute stations
- Future of VDLM2 spectrum sub-group

After the background presentation, RC presented a proposal to change in the AFC's approved VDLM2 plan. The new plan would keep SITA POA base frequency on 136.850 MHz and reorganize the VDLM2 plan with no voice users in the 136 MHz band. The key issues cited by RC were SITA having a competitive advantage, intermodulation concerns between ground stations, and avionics modifications will be required for frequency table updates.

Steve Leger (Rockwell Collins IMS) provided a presentation on Voice Channels and VDLM2 Capacity Degradation. The RC analysis concluded third order interference (voice on data) concerns can be mitigated if voice users are separated by >2000 feet. The ASRI and FAA voice users in the 136 MHz band provide a potential for third order intermodulation interference. A potential VDLM2 channel capacity reduction of 15% (10-20 % based on Media Access mode) can be expected based on the presence of voice channel users within 2000 feet.

The RC presentation concluded that without a sound 136-137 MHz spectral plan as a foundation, interference and performance issues will be likely and extremely difficult to identify, isolate, and address. It was also concluded that the reverse intermodulation products could reduce channel throughput by 20%. If voice channels are not licensed at the airports, then guard channels are not required and more data channels are possible in the 136 MHz band.

As a result, RC recommended that the AFC should accept their proposed VDL spectral plan:

- Proposed Data Frequencies in 136-137 MHz Band (March 2016):
 - 136.975 MHz - VDL CSC
 - 136.850 MHz – SITA ACARS base frequency
 - 136.650 MHz - ARINC VDL on-airport
 - 136.500 MHz - SITA VDL on-airport
 - 136.275 MHz - VDL on-airport alternate
 - 136.100 MHz - VDL on-airport alternate
- Voice Users:
 - Require all voice users to move outside of 136-137 MHz Band

Steve was asked to address the avionics modifications and competitive advantage that would be required because of the VDL spectral plan. The airlines with static frequency tables will incur a cost to modify their avionics to support the VDL spectral plan. From the competitive advantage, an aircraft entering North American airspace from an international destination could inadvertently select SITA as a service provider even though they would prefer the RC network.

Zbig Jasiukajc (SITA) provided a presentation on POA Base Frequency Migration. SITA's position included a hard ACARS cutover scheduled for 30 June 2017 as agreed by the AFC. The company had started engagement with customers, manufacturers and OEMs on the move, with some airlines having already implemented frequency table updates. SITA VHF network migration preparation included:

- More than \$2 M USD spent by SITA on capital expenditure
- Additional labor/manpower costs
- Additional expenses for missions, contractors, materials etc.

Airline/avionics impacts:

- Updated geographical region maps developed by avionics vendors and made available to airlines, including those prepared by Airbus and Rockwell-Collins
- Some airlines have started loading the new world maps into their airplanes

Zbig announced that SITA is making a commitment to the AFC to configure their system to ignore RC customer's aircraft should they try to communicate with the RC network on 131.725 MHz in North America (customers would have the option to implement this or not, without charge). SITA would configure their ACARS processor to not ACK those aircraft via the US/Canada stations so after no ACK timeout the aircraft would go NO COMM and the aircraft

would restart the frequency scan to find the RC 131.550 MHz service. This will prevent airlines from facing costs for unwanted SITA service usage.

Terry Horn (SITA) said that SITA attempted to mitigate the base frequency issue about 20 years ago. SITA believes that they will lose customers because of the new VDL spectral plan.

Harris produced a technical assessment of intermods and concluded that it did not believe intermods are an issue (<.03% chance) and identified a future interference risk to the CSC if POA traffic remains on 136.850 MHz.

The FAA stated that it did not want to move federal voice users out of the 136 MHz band. They would need to migrate entirely to a UHF system over 3 years and non-FAA users affected, so the source of funding (approx. \$500k) was not yet agreed to between agencies.

ASRI noted that it is limited on options to migrate voice users, with only one spare channel in lower AES band (SITA's presumed ACARS). One airline and several other users, affected on 136.500 MHz and 136.525 MHz, have expressed strong opposition to changing frequencies again.

There was much discussion about the RC parameters used in their analysis, including:

- Voice and data channel usage
- Voice conversation lengths,
- Distance and receive/transmit power between radios of interest
- Number of data radios on the same frequency at an individual airport
- The impact of leaving ACARS on 136.850 MHz

After all the discussion above, Steve Leger (RC) made a motion to change the original VDL spectral plan to the revised VDL spectral plan as proposed by RC. The motion was seconded by Mike Richards (AAL).

Discussion followed the motion: UPS thanked the AFC membership for a good discussion on the subject, had internal discussions within UPS, and support the original plan. Harris stated that the original plan that was previously agreed to in June 2015 meets their requirements. Alaska Airlines held internal discussions and thanked the AFC membership for a good discussion but ASA supports the original plan. Jet Blue stated that they support the original plan.

The motion to adopt the RC revised spectral plan was put to a vote:

- 3 AFC Members supported the revised RC plan,
- 7 AFC Members opposed the revised plan
- 3 AFC Members abstained.

Therefore, it was agreed by a majority vote to keep the original VDL spectral plan as defined at the June 2015 AFC meeting. After the vote, RC thanked the meeting for all the discussion and feedback, noting the positive tone of the debate from all participants.

B) AFC Manual Review (SWG Report)

Andrew Roy (ASRI) gave a briefing on the status of the AFC Manual Review. Andrew stressed how important the manual is since it defines the policies that provide the guidance on how the AFC and ASRI operate. The SWG has met 5 times since the last AFC and produced a revised manual that is available on the ASRI website. The suggested modifications are highlighted in the draft document, with a summary table at the end.

The plan is to have a full review of AFC Manual. The AFC SWG is splitting the work into stages with a preliminary review of all sections, approval of the full AFC manual at the October 2016 AFC meeting, followed by a recommendation for ASRI BoD to approve the document at the October 2016 BoD meeting. If the document cannot be agreed at the Oct meeting, then approval of the manual will be deferred to the next AFC meeting.

The administration section primarily covers membership and meeting procedures with the re-organization to reflect current working practices. It was suggested to revise the membership to only four categories: full, associate, guest, and lifetime. The primary AFC member must be an employee of organization that is being represented, though alternates can be contractors as required by the company. The proxy voting process has been clarified with other organizations or the Executive Secretary can be nominated if needed. Proxy voting cannot be used for more than two consecutive meetings. The inactive status has been updated and initiated after two missed meetings and only reactivated when attending a regular AFC meeting in person.

The formal motion process has been updated for specified topics that are required and yet to be determined if a majority of attendance/membership is required. A new process for overturning previous formal motions is being evaluated to determine if voting is a requirement. It was suggested that for a formal motion would require a majority of the actual attendance but to overturn a motion it would require a 2/3 majority of all active AFC members. The specified informal motions process will be used for minor decisions. The online meeting process needs clarification in support of special/urgent AFC meetings. The new meeting conduct section will include confidentiality of information and confirming that the AFC is a 'closed door' meeting. The anti-trust requirements will need further review and incorporated into the draft document. The ASRI BoD approval process will also be reviewed and documented.

Chapter 3 (VHF Installation Standards) will involve a terminology change. Chapter 4 (HF Policy) will be updated on regional information and frequencies. Chapter 7 (Federal and International Agencies) will be consolidated into one section and rewritten into small summaries. Chapter 8 (Frequency Allocations, Coordination and Assignments) will involve some minor terminology updates. Chapter 9 (Glossary, Two Letter State and Territory Abbreviations, Terms and Definitions) will be updated to include the glossary from Section 2 terms and the states list will be removed. Chapter 10 (AFC Recommendations and Resolutions) will be transferred to a separate AFC History document. Chapter 11 (AFC Composition and Members List) will be updated to the current membership.

The VHF assignments process (Section 2) that was covered during the meeting included the following:

- DOC table revision of altitude heights
- Voice assignment calculation
- GSARS process
- Deicing

The DOC table of altitude heights will need to be revised to reflect a more realistic policy. The current VHF frequency justification needs to be replaced, with a proposal that the new system be modified to be based on landings and takeoffs over the calculated four busiest 15-minute periods at a site. The ASRI GSARS are an annual reporting requirement for all VHF licensees with more than one frequency assignment at any site. It has been proposed that the GSARS process be modified to make it more accessible, while also increasing the enforcement of collecting the data.

Andy provided information on the de-icing frequency policies. In the 2015/16 season ASRI assigned de-icing frequencies at 78 airports using 59 different frequencies for 26 different users. Airports with most de-icing assignments:

- ATL 18 frequencies
- SLC 19 frequencies
- MSP 12 frequencies
- DTW 10 frequencies

Lessons to be learned by comparing ASRI to the European de-icing assignments provided some insightful information. In reviewing 10 major airports in Europe for their de-icing assignments, it was observed that all de-icing assignments are in ATC spectrum. There were no AOC de-icing frequencies assigned. The Europeans are using 8.33 kHz channels for de-icing and they are sharing frequencies at more than one de-icing pad. The airlines were asked to provide feedback on sharing frequencies at more than one de-icing pad at the same airport.

9. NEW BUSINESS

A) LED Lighting Interference to VHF

Ramsey Abid (Rockwell Collins/ARINC) provided a presentation on LED Lighting Interference to VHF. Rockwell Collins/ARINC received an airline report of poor ACARS and VDL performance at two gates at BNA. The initial actions included verifying GS station functionality, on-site station inspection of transceiver, coax, antenna, and availability of RF signal, replacement of the transceiver, and finally an engineering staff visit to BNA to investigate further.

Ramsey concluded that the LEDs require high-speed DC power for maximum non-flicker lighting. The actual LED does not cause interference, but the embedded power converter emits a lot of power in the 30 to 300 MHz band. The LEDs should meet FCC Part #15 rules for filtering out noise. The industry is encouraged to move toward LED lighting for efficiency and the individual airport authorities may be unadvised of the impact on customer communications. It was suggested that an outreach program be considered to warn the aviation industry of the potential troubles with lower cost LEDs. ASRI agreed to begin planning how to address the

issue from the commercial aviation side, while the FAA noted they had also begun working on the issue.

10. MEETING SUMMARY (SECRETARY)

A) Action Items from the Meeting

Andrew Roy (ASRI) reviewed the open action items from the meeting:

- VDL planning still has some concerns that need to be addressed – All AFC membership
- Ligado filing and follow-up work - ASRI
- Investigate the LED lighting concerns and how to inform the industry - ASRI
- Review the draft AFC Manual and provide feedback on the suggested modifications prior to the next AFC meeting – All AFC membership

B) AFC Topics for the Attention of the ASRI Board of Directors

There was no ASRI BoD meeting scheduled following the AFC meeting.

11. LOCATION OF NEXT MEETINGS (SECRETARY)

The Fall 2016 AFC meeting is scheduled for 25-26 October 2016 in Austin, TX.

The Winter 2017 AFC meeting is provisionally scheduled for February 28 – March 1, 2017 in Charleston, SC

12. ANY OTHER BUSINESS (CHAIRMAN)

A) Company updates and closing remarks. (AFC Roundtable)

- (i) Andrew Roy (ASRI) offered a special thanks to Vytas Cerniauskas (Chairman) for chairing this AFC meeting. He noted that the spectrum is congested and we can expect to have similar discussions in the future and thanked everyone for supporting the AFC meeting.
- (ii) Vytas Cerniauskas - Chairman (ASA Alternate/ACG Systems) thanked everyone for staying on topic during some difficult discussions and thanked everyone for their support.

13. ADJOURNMENT (CHAIRMAN)

The meeting was adjourned by the Chairman at 11:35 AM, June 8, 2016.

Andrew Roy
Executive Secretary

Attachments posted to ASRI Website