

The authors, representing Aerovironment, Inc. and the StratoComm Corporation, oppose the adoption of a US proposal for WRC-2012 for No Change (NOC) to the Radio Regulations, Article 5, Table of Frequency Allocations, in the range 5850-7075 MHz, as contained in IWG-2 Doc. A.I. 1.20 #29.

Summary of Opposition to the Proposal

We believe the proposal to be premature, technically unsupported and one that is detrimental to the international interests of the United States. Studies necessary to support any conclusion on the feasibility and difficulty of sharing are now underway in the ITU-R but have not been completed. Furthermore, the characteristics of HAPS systems and interference criteria have not been agreed. Neither has the ITU-R recommended, considered or evaluated operational techniques or procedures that would mitigate unacceptable interference. Therefore, the United States should not make any proposals to WRC-2012 on this matter at this time.

The proposal is inimical to the international interests of the United States

Agenda Item 1.20 of WRC-2012 calls for the Conference to “consider the *results* of ITU-R studies and spectrum identification for gateway links for high-altitude platforms (HAPS in the range between 5850-7075 MHz in order to support operations in the fixed and mobile services, in accordance with Resolution 734 (Rev. WRC-07).”

Those studies, which commenced shortly after WRC-07 are now in progress in ITU-R WP 5C, among others ITU-R groups. Contributions to those studies have submitted primarily by the United States, but also by Korea and the Russian Federation. Several countries and regional organizations strongly support those studies and none have made proposals for WRC-2012 pending completion of the studies.

Korea has adopted a preliminary view on Agenda Item 1.20 (HAPS): “The Republic of Korea has a view that the spectrum identification for HAPS gateway links could provide more flexible operations such as backhaul connections, access to terrestrial public/private networks, and data collection in the fixed and mobile services, but such identification should ensure the adequate protection of existing services. Therefore, the Republic of Korea supports the relevant sharing studies within ITU-R in accordance with Resolution **734 (Rev.WRC-07)**, taking into account the technical and operational characteristics of HAPS gateway links provided in the PDNR ITU-R F.[HAPS CHAR].”

China, for its part, has taken essentially the same stand: “HAPS has the potential to be a low-cost third alternative to terrestrial and satellite communications. It is believed that HAPS can offer additional and alternative capacity to broadcasters and telecom operators. Owing to the conflicts with the existing terrestrial and satellite platforms, it is

necessary to deepen the sharing study between HAPS gateway link and the current services, especially to assess interference from possible new HAPS gateway links.”

Malaysia has also submitted a paper to APT APG 2011 in support of Resolution 734 sharing studies. In addition, QucomHAPS Malaysia, a subsidiary of QucomHAPS, Dublin, Ireland, is proposing to provide HAPS infrastructure in Malaysia. (Qucom HAPS also has subsidiary companies in Indonesia and the Middle-East. See www.qucomhaps.net for details.)

Australia supports the appropriate identification and allocation of spectrum for such two-way gateway link operations and related sharing conditions at WRC-11 for HAPS within a portion of this range of spectrum, provided that ITU-R studies confirm that harmonious sharing is possible with incumbent services in existing allocations.

The Asia-Pacific Telecommunications Union (APT) itself at APG2011 has adopted the view that “supports ITU-R sharing studies between HAPS gateway links in the fixed service and other services to which the frequency band is allocated in the range 5 850-7 075 MHz, in accordance with Resolution 734 (Rev. WRC-07).”

The Preliminary CEPT position is essentially the same: “To support the extended sharing studies, with the aim of ensuring adequate protection of existing services including conventional fixed stations.”

What does the precipitous, premature, prejudicial US proposal to WRC-2012 signify to other countries?

All the members of the ITU respect the work of the ITU-R and look to it for technical guidance both in its Recommendations and Reports and, in particular the Reports of the Conference Preparatory Meetings.

For the United States to dismiss the studies of the ITU-R WP5C on an important, open agenda item as irrelevant and not even worthy of consideration before they have been concluded – before mitigation techniques have been taken into account, and before a Conference Preparatory Meeting has made its findings and recommendations to the Conference -- will be seen as disrespectful to the countries that support the completion of the studies (Korea, China, Malaysia and Australia), Japan who has long been a supporter and developer of HAPS, and the Russian Federation which has contributed to the HAPS studies. It is also disrespectful to the ITU-R itself. And it is in sharp contrast to the time-honored principle of the ITU that allocations and other Radio Regulations should be based on the best technical information available. Incomplete studies do not represent the best information available nor should they be the basis for conclusive, definitive decisions on the feasibility of sharing fully three years the Conference convenes.

The major users of HAPS technology will undoubtedly be the developing countries of the world. For the United States to cut off consideration of this emerging technology

that would be most cost-effective for countries with poor terrestrial and satellite infrastructure will signal that we have no interest in providing or exporting HAPS systems, components and technology. That would be a sharp contrast to the companies and governmental organizations in Japan, Korea and in several European countries that are actively developing HAPS systems and technology for use wherever in the world they would be useful.

HAPS exports would provide the United States economy with jobs, returned profits, revenues and tax receipts. In addition to Aerovironment and StratoComm, two other American companies are developing HAPS systems for world-wide use: Sanswire and Global Near Space Services, Inc.

Given the upcoming ITU Plenipotentiary Conference in Mexico, where the US will have vital interests, it seems to us that we should not choose to be out of step with our Region in particular -- and with the world in general -- in the studied, cooperative, participatory way we prepare for World Radio Conferences and Plenipotentiary Conferences.

The proposal has no internationally agreed technical basis or conclusions

Preliminary studies of WP5C, not yet concluded, agreed or adopted by that Working Party -- let alone by the entire Study Group 5 -- indicate the possibility of interference. But mitigation techniques that would eliminate harmful interference have not yet been incorporated in those studies. For example:

1. A study (incorporated in Annex 11 to Doc. 5C/217) of interference to conventional systems in the fixed service indicates considerable interference or sizeable required separation distances if HAPS systems were to utilize 256 QAM modulation. But the characteristics of HAPS as currently revised at the May, 2009 meeting of WP 5C in Geneva show 64 QAM as the modulation method. Using 64 QAM modulation instead of 256 QAM would reduce the power, and hence the interference substantially (by about 17.1 dB including losses not included in the 256 QAM interference analysis). (While that would reduce the traffic capacity of the HAPS system, HAPS proponents consider that an acceptable condition for access to the spectrum.)

This conclusion of that study states clearly that “[unacceptably large values of I/N within the exclusion regions] would need to be reconsidered if the transmit power employed at the HAPS platform could be reduced by 20 dB.” This factor is emphasized by an Editor’s note at that point “*Editor’s Note : Summary and Conclusions need to be reconsidered based on reassessment of interference taking into account HAPS system characteristics provided in PDNR ITU-R F.[HAPS CHAR] and agreed interference criteria.*”

2. Another study (now included in Doc 5C/217, Annex 9) indicates that there would be severe interference to NGSO Mobile-satellite downlink feeders (operating in the FSS) from HAPS platform downlinks to its gateway stations. But that study was based on the

use of 256 QAM, not the 17.1 dB lower power 64 QAM now given for the HAPS modulation method in PDNR ITU-R F.[HAPS CHAR].

It notes that “the use of transmitter power back-off (PBo) in the HAPS platform and ground station can potentially mitigate harmful interference from HAPS gateway links to MSS systems operating in the band.” And further notes that the conclusion of severe interference “would need to be reconsidered if the transmit power employed at the HAPS platform could be reduced by 2 to 25 dB,” which would be the case with the use of 64 QAM.

We also believe it can be shown that such interference can be mitigated by avoiding main-beam coupling of HAPS platform antennas to main-beam and near sidelobes of MSS earth station receiving antennas. Since the precise location of MSS space stations is known continuously, HAPS platforms can reduce power (and therefore throughput) whenever an MSS feeder link earth station is receiving from one of its MSS satellites and also simultaneously pointing towards or near a HAPS platform. Alternatively, transborder interference from HAPS platforms could be avoided by observing the required separation distance.

3. Another study has shown that there could be interference from the up-link of gateway stations to the receivers of FSS GSO space stations. But those studies (5C/174 incorporated as Section 5.3 of Doc. 5C/217, Annex 9) show that only gateway stations at small, precisely known, geographical locations could cause such interference. Those locations would be avoided for gateway station installation and operation with little impact on HAPS system location, capacity, performance and design.

4. Studies have shown that there would be interference from transmitting gateway stations to receivers of Fixed service stations located less than a certain “required separation” distance away. Since the decision of whether a country will permit HAPS and/or conventional FS systems to operate is a matter for each administration to determine. If an administration chooses to permit HAPS operation, the sole concern of the Radio Regulations would be to prevent interference to FS stations in an adjoining country. In such cases, interference to FS stations in the other country would be prevented by requiring that HAPS gateway stations be installed no closer than the “required separation” distance from the border(s). See above comments.

5. The question of interference to planned FSS systems operating under Appendix 30B of the Radio Regulations (the so-called expansion bands) has been considered in a study by the Russian Federation (Document 5C-217, and incorporated in Doc. 5C/217, Annex 9). It shows that while there would be main-beam to main-beam interference to FSS receivers in the Plan from HAPS up-link gateway stations, it could be mitigated by “limiting the e.i.r.p. in any direction of the geostationary satellite orbit. *However, this case needs to be further studied.*” Moreover, we believe it can be shown that the interference could also be avoided by avoiding main-beam to main-beam coupling, a situation that can be avoided as discussed above.

Conclusion and Recommendation

In conclusion we recommend that IWG-2 take no action on US proposals for the 5850-7075 MHz band under WRC-2012 Agenda Item 1.20 until the ITU-R studies now underway are completed.