

Please email completed comment form to:

lan.Atkins@faa.gov

Arthur.Hinaman@faa.gov

Definitions of the Importance of the comment:

Critical	Comments requesting changes of such a serious nature that failing to make the changes could have significant adverse impacts on stakeholders. Rationale for critical comments must be provided.
Substantive	Comments that suggest important changes, warranting close scrutiny of authors in reviewing the document.
Administrative	Comments that address editorial items such as typographical, formatting, and/or grammatical errors.

Item No.	Reviewer Name / Organization	Line Numbers	Figure / Table No.	Importance (C/S/A)	Current Wording	Suggested Change	Comment / Rationale
1	Small UAV Coalition	57-60		C	There is an additional significant barrier for L-band: The need to safely coexist within the L-band that is heavily used by multiple systems that are essential for the safety and regularity of both civil (e.g., commercial) and public (e.g., military) flight operations.	Add language after last sentence: Appropriate and robust measures, including spectrum guarding, must be in place to protect spectrum bands currently in use from interference before consideration is given to the use of adjacent spectrum.	UAS and aviation stakeholders currently use portions of L-Band for GPS and navigational purposes. Those existing uses must be protected from interference first and foremost, before usage of adjacent spectrum is contemplated. Measures to mitigate against any interference must be taken to ensure current and planned L-Band usage is not sacrificed.
2	Small UAV Coalition	107-108		C	The opportunity to allow coexistence of UAS in L-band spectrum used by manned aviation needs to be carefully assessed to ensure that safety of manned aviation will be preserved.	The opportunity to allow coexistence of UAS in L-band spectrum used by manned aviation needs to be carefully assessed to ensure that safety of manned aviation and existing UAS operations will be preserved.	The FAA should contemplate the overall safety of the National Airspace System in recommending any changes to the current spectrum regime - and this should include recognition of current UAS operations. Permitting new utilization of L-Band spectrum adjacent to spectrum already in use by existing UAS operations could jeopardize the safety of the NAS, including manned and unmanned aviation.
3	Small UAV Coalition	119		C	No matter what type of spectrum is used, appropriate safety-risk mitigations must be in place for the occasions when RFI or frequency congestion disrupts UAS functions that help ensure flight safety and help safeguard human life and property (i.e., safety-related UAS functions).	No matter what type of spectrum is used, the FAA will need to ensure that appropriate safety-risk mitigations are in place for the occasions when RFI or frequency congestion disrupts UAS functions that help ensure flight safety and help safeguard human life and property (i.e., safety-related UAS functions). The FAA will coordinate with the FCC and industry stakeholders on these determinations to ensure any safety requirements take into account existing technical requirements for particular spectrum bands.	The FAA should make clear in this report that as it relates to safety requirements, it is the appropriate agency to develop them. The report should also clarify that the FAA will coordinate with the FCC in developing safety requirements to ensure the requirements, where possible, consider existing technical requirements for particular spectrum bands. This should help ensure that spectrum is not inadvertently excluded from use when it would otherwise be suitable.
4	Small UAV Coalition	228-232		C	Additionally, stakeholders pointed out that, given the scarcity of spectrum available for UAS, the possibility of excess capacity is extremely remote, and the band will be fully utilized by UAS in the near future. Therefore, the possibility of allowing the C-band to be used for non-UAS functions was not further considered and is not included in the proposed concept for C-band use	Additionally, while a number of stakeholders pointed out that, given the scarcity of spectrum available allocated for UAS is scarce, others stakeholders explained that while not specifically allocated for UAS, there are other spectrum alternatives that may be suitable for use in C2 and other UAS operations, as this report indicates. Because the disposition of C-band will need to be resolved through a more rigorous regulatory process, this report assumes, without pre-judging any future determination, that the C-band is not available for non-UAS functions.	The issue of whether the C-band should be exclusively reserved for UAS is the subject of a pending petition before the FCC. Therefore, the report should be neutral in its analysis of the outcome of that petition. Moreover, there is no infrastructure currently in place for use of the C-band, a point acknowledged later in the report. Construction of a new network for these purpose, particularly if for an exclusive use of UAS operations, would likely be cost prohibitive. For these reasons, preserving optionality at this point is prudent.
5	Small UAV Coalition	695-699		S	In all cases, UAS radiocommunication and radionavigation functions that enable a DAA capability must not use unlicensed spectrum. UAS radiocommunication and radionavigation functions that enable a DAA capability must not use unlicensed spectrum. Because the DAA capability is intended to safeguard human life in manned aircraft and on the ground and because the DAA capability is relied upon by the FAA as the principal means of safeguarding human life during periods of lost C2 link, use of unlicensed spectrum is prohibited.	In all cases, UAS radiocommunication and radionavigation functions that enable a DAA capability must not use unlicensed spectrum. UAS radiocommunication and radionavigation functions that enable a DAA capability must not use unlicensed spectrum. UAS radiocommunications and radionavigation functions that enable DAA capability must not use unlicensed spectrum, except in limited circumstances where said spectrum have a justified function and can meet the same safety mitigations used for all spectrum analyses. Because the DAA capability is intended to safeguard human life in manned aircraft and on the ground and because the DAA capability is relied upon by the FAA as the principal means of safeguarding human life during periods of lost C2 link, use of unlicensed spectrum is prohibited.	Technologies utilizing spectrum available for unlicensed use may not be able to perform the primary functions of DAA to meet the desired safety requirements of such systems, but there is likely augmentation of information that can be provided using such technologies that could enhance the performance of the DAA system. As written, the text would prohibit such use.

Item No.	Reviewer Name / Organization	Line Numbers	Figure / Table No.	Importance (C/S/A)	Current Wording	Suggested Change	Comment / Rationale
6	Small UAV Coalition	748-750		C	The key principle for the proposed concept is for UAS operators to use this spectrum in ways that will not conflict with existing incumbents and preserve safety as the highest priority, while increasing spectrum utilization when possible.	Add language after last sentence: Existing incumbents here include those operating in spectrum adjacent to 960-1164 MHz that could suffer from interference caused by new usage within that range.	GNSS spectrum immediately adjacent to 960-1164 MHz could be impacted by interference caused by usage toward the upper end of the 960-1164 range. Existing usage of these adjacent bands should be protected from interference before any usage within 960-1164 is allowed.
7	Small UAV Coalition	1026-1029		S	An automated system managed by the FAA to identify the available spectrum would be preferred. This automated system of identifying and mapping available L-band spectrum could be designed, developed, and deployed by the FAA.	There are private sector spectrum management systems that have been developed for management of other whitespace systems. Those models could be followed or, alternatively, an automated system managed by the FAA could be developed to identify the available spectrum would be preferred. This automated system of identifying and mapping available L-band spectrum could be designed, developed, and deployed by the FAA.	As with LAANC, any whitespaces system should encourage private sector development in coordination with the FAA. Similarly, the FCC has worked with private sector vendors to provide dynamic spectrum management. The FAA should continue its efforts to coordinate with the private sector on such functions in the development of UAS. The report should consider building on the FCC's whitespaces offerings, which created a competitive framework of white spaces administrators to administer TV white spaces. Such an approach would dramatically reduce costs for the FAA.
8		1131-1135		S	A potential option for networked UAS C2 is the use of commercial cellular network infrastructure, operating in this band for UAS C2 link service. The use of the existing cellular network infrastructure could accelerate UAS BVLOS operations by improving the economic feasibility of providing the needed C2 network services. Existing network infrastructure could potentially have C-band services added to their existing services.	Insert after the existing language: This option is made in recognition of the fact that deployment of a new network for exclusive use with C-band is likely cost prohibitive. Based on the costs associated with deploying ubiquitous cellular networks that provide the link availability performance metric outlined in Appendix A, the costs of building infrastructure dedicated to the deployment of C-band would likely be in the hundreds of millions of dollars. Additionally, absent the ability to leverage the existing cellular networks, the time needed to build and operationalize a network dedicated to C-band would greatly hinder its ability to quickly provide UAS BVLOS operations. It is important to note, however, that cellular networks and their accompanying infrastructure are operated by private entities that will need to determine whether the investment made to build out this band are capable of achieving a return on investment (ROI). As noted, leveraging the existing cellular networks will greatly reduce that investment, thus making achievement of an ROI less onerous than a stand-alone network. The FCC, FAA, and industry stakeholders should work to determine how best to encourage existing cellular networks operators to leverage their networks to achieve the acceleration in BVLOS and other opportunities in UAS operations. (cite to supra n. 38 ("create flexible models for spectrum management, including standards, incentives, and enforcement mechanisms that promote efficient and effective spectrum use, including flexible-use spectrum licenses, while accounting for critical safety and security	Setting up optionality in the report for the FAA and FCC to determine how best to structure the C-band access to ensure UAS BVLOS can quickly be realized, is critical. The proposed language is intended to demonstrate that there are options to just having the C-band as a stand-alone network, which the report in some limited way does, but add additional color to help better inform Congress and others of the options.
9	Small UAV Coalition	1174		A	also by	also by	There is an extra space
10	Small UAV Coalition	1178-1184		C	Several stakeholders have strongly reacted with concerns related to the need for protected spectrum to be reserved for safety-critical UAS functions. Additionally, stakeholders pointed out that, given the scarcity of spectrum available for UAS and the increasing number of UA systems and proposed applications, the possibility of excess capacity is extremely remote, and the band will be fully utilized by UAS in the very near future. Therefore, the possibility of allowing the use of this band by non-UAS users was not retained for further consideration in this report and is not included as part of the proposed concept.	Several A number of stakeholders have strongly reacted with concerns related to the need for protected spectrum to be reserved for safety-critical UAS functions. These stakeholders Additionally, stakeholders pointed out that, given the scarcity of spectrum available allocated for UAS, the possibility of excess capacity is extremely remote, and the band will be fully utilized by UAS in the near future. Others stakeholders explained that while not specifically allocated for UAS, there are other spectrum alternatives that may be suitable for use in C2 and other UAS operations, as this report indicates. Because the disposition of C-band will need to be resolved through a more rigorous regulatory process, this report assumes, without pre-judging any future determination, that the C-band is not available for non-UAS functions.	The issue of whether the C-band should be exclusively reserved for UAS is the subject of a pending petition before the FCC. Therefore, the report should be neutral in its analysis of the outcome of that petition. Moreover, there is no infrastructure currently in place for use of the C-band, a point acknowledged later in the report. Construction of a new network for these purpose, particularly if for an exclusive use of UAS operations, would likely be cost prohibitive. For these reasons, preserving optionality at this point is prudent.

Item No.	Reviewer Name / Organization	Line Numbers	Figure / Table No.	Importance (C/S/A)	Current Wording	Suggested Change	Comment / Rationale
11	Small UAV Coalition	1287-1291		C	The FAA has identified key potential technological barriers related to the concept for use of C-band for UAS operations. The challenges center on the feasibility of establishing viable cellular standards, both well-established (e.g., 4th Generation [4G]/Long Term Evolution [LTE]) and new (e.g., 5G) to assure aviation safety. In other words, there is a need to determine whether such systems can deliver the performance levels required for safe UAS operations and to prioritize the use of the band for C2 functions over non-safety-related functions.	Technical standards that have been implemented in the cellular network and that are being developed for use in 5G cellular networks will allow for prioritization of data traffic, multi-channel transmission capability, and dynamic channel assignment to ensure greater connectivity. The FAA has identified key potential technological barriers related to the concept for use of C-band for UAS operations. The challenges center on the feasibility of establishing viable cellular standards, both well-established (e.g., 4th Generation [4G]/Long Term Evolution [LTE]) and new (e.g., 5G) the FAA developing safety standards to assure aviation safety. In other words, there is a need to determine whether such systems can deliver the performance levels required for safe UAS operations and to prioritize the use of the band for C2 functions over non-safety-related functions, the FAA will need to develop clear safety standards.	The technical work that has been implemented as well as the ongoing work of standards bodies such as 3GPP, Global UTM Association, RTCA and others is specifically developing those standards to ensure reliability, resiliency, and link availability levels aligned with those mentioned in Appendix A can be achieved. That work, however, is in some ways being done based on assumptions about the safety standards the FAA may require for UAS (and other agencies such as NHTSA will require for autonomous vehicles). The proposed language better reflects the current state of standards development and should be provided in the report.
12	Small UAV Coalition	1323-1324		S	These issues have to be fully assessed (including testing) to obtain definitive answers.	These issues are being assessed in ongoing work being undertaken by numerous stakeholders and the associated testing should help further demonstrate the viability of these standards for use with UAS. (Note: As an alternative the existing sentence could be deleted and the paragraph could stand on its own.)	There is significant work that has been undertaken and as currently written, that work is diminished. There should be an acknowledgment of the efforts, recognizing more needs to be done, as opposed to structuring this as if it is a new issue in need of assessment.
13	Small UAV Coalition	1443-1444		C	unlicensed spectrum must not be used by functions enabling DAA capabilities in either VLOS or BVLOS UAS operations.	See item 5 above	See item 3 above
14	Small UAV Coalition	1453-1455		C	When the FCC originally licensed these bands, there was no intended use for aviation, UAS, or other non-terrestrial uses. Given advancing emerging technologies, the FCC may need to review rules, allocations, and licenses for the use of these bands.	When the FCC originally licensed these bands, there may have been no expectation that these bands would be used for was no intended use for aviation, UAS, or other non-terrestrial uses. That, however, was the point of the FCC licensing these bands under its flexible use licensing regime. The FCC policy understood that while it may not be able to predict and thus allocate spectrum accurately for specific use, so long as it set the technical parameters on use of the spectrum, licensees would be permitted to use the spectrum for whatever use, so long as it met the technical parameters. That policy, in this instance, means that the Given advancing emerging technologies, the FCC may does not need to review rules, allocations, and licenses for the use of these bands	The point of flexible use licensing is to not have to review rules and change allocations. That should be reflected in the text.
15	Small UAV Coalition		6.1	A		The NTIA was created by a separate act of Congress in 1978; the chart does not reflect that.	
16	Small UAV Coalition	1660-1664		C	While cellular networks might be able to meet safety-related performance requirements to support high-risk UAS operations, there are potential regulatory and operational barriers. These concern whether these operations are allowed in those mobile services bands, up to what altitude, and whether their use would disrupt (by causing interference to) other users in different locations, domains or adjacent bands.	Delete this paragraph.	The preceding two paragraphs set up the discussion and the wording of this paragraph, as previously explained, inaccurately characterizes the barriers for use of cellular networks. As it is not necessary for the discussion, it can be deleted without disturbing the rest of the discussion in this section.
17	Small UAV Coalition	1816-1817		S	Availabilities of greater than 99.99% are needed for air traffic control and safety-related functions in many circumstances	Availabilities of greater than 99.99% are needed for air traffic control and safety-related functions in many circumstances (the report should set out a list of circumstances that the FAA is considering by providing examples)	There should be some indication as to what circumstances the FAA is considering.