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|  | **COMMENT RESPONSE DOCUMENT** |
| **EASA SC-RPAS.C2-01** **[Published on the 11-March-2016 and officially closed for comments on the 01-April-2016]** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016***  |

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| ***Comment # 1*** **Paragraph No:** Applicability**Comment:** The definition of the C2 Link is not in line with ICAO annex 2: “Command and control (C2) link. The data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the flight.” The ICAO definition does not mention «  controlling » the flight.**Justification:** ICAO Annex 2 definitions**Proposed Text (if applicable):** “Command and control (C2) link. The data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the flight.” |
| ***EASA response: Not accepted. ICAO Annex 2 has also definitions related to the pilot in command. Control does not only mean to move the control surfaces but to have the ability to intervene on the behaviour of the aircraft. “Managing” could be misleading for the current aviation community.*** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016*** |

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| ***Comment # 2*** **Paragraph No:** SC.RPAS.C2 c)**Comment:** In SC.RPAS.C2 c), additional functions are necessary for the purpose of managing the flight which spawn other data like surveillance, navigation data or recording data for example which cannot be considered as status data or flight parameters.**Justification:** As above**Proposed Text (if applicable):** None |
| ***EASA response: Not accepted. Surveillance, navigation and recording of data are not purely airworthiness issues related to C2. Other Special Conditions might cover those aspects.*** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016*** |

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| ***Comment # 3*** **Paragraph No:** None**Comment:** It should be mentioned that the C2 Link does not carry payload data.**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Noted. In the definition of C2 link payload data is excluded but EASA recognises that the resources could be shared.*** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016*** |

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| ***Comment # 4*** **Paragraph No:** SC.RPAS.C2 e)**Comment:** In SC.RPAS.C2 e), avoiding interferences does not necessary means to work on different frequencies and reciprocally. Modulation techniques allow to work on the same frequency without interferences for example and different frequencies may interfere with another one. I believe this sentence could be simplified: “The Command and Control Datalink is designed such that it is properly protected from external and internal radiofrequency interference.”**Justification:** As above**Proposed Text (if applicable):** “The Command and Control Datalink is designed such that it is properly protected from external and internal radiofrequency interference.” |
| ***EASA response: Accepted. Although the requirement is not mandating multiple frequencies, the text proposed is accepted.*** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016*** |

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| ***Comment # 5*** **Paragraph No:** SC.RPAS.C2 g)**Comment:** In SC.RPAS.C2 g), a. The “communication performance transaction time” is usually specified with a 95 % statistical spread.b. Frequency, bandwidth and throughput are not in my understanding “performance specification”, but a “system characteristics” from which the performance derives.c. The “range” performance can only be indicative as many outside conditions can significantly modify it. The range depends on the architecture of the Link, which is adapted to the mission to be performed.**Justification:** As above**Proposed Text (if applicable):** None |
| ***EASA response: Noted.*** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016*** |

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| ***Comment # 6*** **Paragraph No:** Guidance Material**Comment:** The specified performances of the C2 Link in the GM part do not match those in SC.RPAS.C2 g)**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Noted. In the guidance material only clarification paragraphs are included.*** |

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| ***Commenter 1 : Eurocontrol (Mr. Colin) – date 14-03-2016*** |

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| ***Comment # 7*****Paragraph No:** Guidance Material**Comment:** I believe that the term “command and control link loss strategy” could be misleading. In ICAO we prefer “Lost C2 Link management”, which include recovery procedures.**Justification:** None**Proposed Text (if applicable): “**Lost C2 Link management” |
| ***EASA response: Noted. There is no international consensus on terminology yet.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 8*****Paragraph No:** Applicability**Comment:** Is this SC applicable only for RPAS in segregated airspace or also for non-segregated airspace?**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Noted. Applicability is not limited to segregated airspace.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 9*****Paragraph No:** Applicability**Comment:** The initial text defines the Command and Control as a functionality and the C2 link as the datalink terminal itself. In RPAS, the C2 functionality is distributed between the RPA Control Station equipment (HMI+command generation), the communication system (that includes the Datalink Terminals) and the management system on board (command application and status generation).**Justification:** None**Proposed Text (if applicable):** In the Special Condition it should be clarified if the definition of C2 link includes the complete C2 chain or the Datalink Terminals. |
| ***EASA response: Noted. For the particular projects for which this special condition is raised, the C2 link includes the complete chain.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 10*****Paragraph No:** SC-RPAS.C2**Comment:** The title is "RPAS Command and Control (C2)" but the SC is only referred to "RPAS Command and Control (C2) Datalink" and not to "Command and Control (C2)". It is confusing. Depending on the design of a specific RPAS, some of the functionalities listed will not be part of the "data link" but will be part of the Command and Control chain.**Justification:** None**Proposed Text (if applicable):** Suggest to focus the special condition to the whole "Command and Control (C2)" and not only to the data link (that it is a part of the complete chain): "SC-RPAS.C2, RPAS Command and Control (C2) ~~Datalink~~" |
| ***EASA response: Partially accepted. For consistency reasons “Command and Control Datalink” is used throughout the document in the revised text.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 11*****Paragraph No:** SC-RPAS.C2**Comment:** Since C2 is used in the section heading "SC-RPAS.C2, suggest using "C2 datalink".**Justification:** None**Proposed Text (if applicable): “**SC-RPAS.C2, RPAS Command and Control (C2) Datalink” |
| ***EASA response: Accepted. “Command and Control Datalink” is used throughout the document in the revised text.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 12*****Paragraph No:** SC.RPAS.C2 a)**Comment:** The wording "approved datalink" does not provide added value since it is defined as those which are supporting the functionality indicated in paragraph c).**Justification:** None**Proposed Text (if applicable):** Suggest to replace the wording 'approval' and make reference to paragraph c). |
| ***EASA response: Not accepted. Approved refers to a system approved by the Agency. Section c) refers to the minimum functionality.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 13*****Paragraph No:** SC.RPAS.C2 c)**Comment:** Editorial for clarification.**Justification:** None**Proposed Text (if applicable):** “An approved C2 datalink provides…” |
| ***EASA response: Not accepted. Already covered by paragraph a)*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 14*****Paragraph No:** SC.RPAS.C2 c) 3)**Comment:** Pairing is understood as "bi-univocal relationship between RPA and ground Station in command" but clarification in the guidance material would be welcome.**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Accepted. A similar text is added to the GM in the final version.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 15*****Paragraph No:** SC.RPAS.C2 c) 4)**Comment:** This is a cockpit function, not a C2 datalink function but the C2 datalink equipment must provide suitable information.**Justification:** None**Proposed Text (if applicable):** “Capability to provide information to enable C2 datalink status to be displayed to the pilot.” |
| ***EASA response: Not accepted. The datalink provides means to indicate to the pilot, not actual indicators.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 16*****Paragraph No:** SC.RPAS.C2 c) 4) ii.**Comment:** The **effective** range depends upon various factors, like flight altitude, orographical situation, distance to the antenna and/or attenuation due to weather. This attenuation is under the same weather conditions further more depending on the frequency band. As "weather" may be different between the location of the pilot station and the position of the RPA, it seems to be not suitable to define the effective range as a requirement! In any case, it cannot be more than a more or less usable prediction. For details please see INOUI D4.1, Section 2.2.3 where detailed information about datalink is given. (Document attached). In addition, speaking of LOS links, flight altitude and distance to the antenna are major factors defining the antenna beam elevation above the horizon, if a directed pencil beam linkage is used instead of an ommni directional broadcasting link. This elevation is also to be taken into account if topographical obstacles in linkage direction have to be assesed in terms of masking the beam..**Justification:** As above**Proposed Text (if applicable):** Prior to propose a new text, the meaning of "effective" needs to be defined. After that, the word may become replaced by: actual. Another solution may be to display a theoretical range which is based upon the factors that are highlighted in the comment column. As the guidance material at the end of the text speaks of a "maximum effective range", this may be what we understand her as "maximum theoretical range"? Another option might be the usage of “actual range” or “maximum theoretical range” instead of “effective range. It seem to be important to define clearly what is expected. Each specific operation could have different “maximum range” depending on the environment, orography, etc… |
| ***EASA response: Partially accepted. For reasons of consistency, the Stanag 4671 definition of effective maximum range is used in the final version.***  |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 17*****Paragraph No:** SC.RPAS.C2 d)**Comment:** This would be provided by c) 4) as part of the status in real-time.**Justification:** None**Proposed Text (if applicable): “**Any limitations due to antenna masking or pointing and associated procedures are described in the Aircraft Flight Manual (AFM).” |
| ***EASA response: Partially accepted. Text has been changed to allow both real time information or AFM content.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 18*****Paragraph No:** SC.RPAS.C2 f)**Comment:** “command and control”**Justification:** None**Proposed Text (if applicable):** “C2 function” |
| ***EASA response: Accepted. Text changed.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 19*****Paragraph No:** Applicability; SC.RPAS.C2 h)**Comment:** exercise his control of the aircraft - Prefer to use the ICAO wording (out of sequence for page 1)**Justification:** ICAO**Proposed Text (if applicable):** “manage the flight of the aircraft” |
| ***EASA response: Not accepted. ICAO Annex 2 has also definitions related to the pilot in command. Control does not only mean to move the control surfaces but to have the ability to intervene on the behaviour of the aircraft. “Managing” could be misleading for the current aviation community.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 20*****Paragraph No:** SC.RPAS.C2 g)**Comment:** The text mixes the specification, configuration, quality and performance of the C2 datalink. These topics should be separated out. "Effective range" is not a suitable metric: it is used in STANAG 4671 but it is not easy to define. Have tried to capture the intent of paragraph 4 of the Guidance Material.F11**Justification:** None**Proposed Text (if applicable):** g) The C2 datalink shall use frequencies allocated to the aeronautical mobile route service and comply with the Radio Regulations concerning emissions, co-channel and adjacent channel interference, effective isotropic radiated power, and other applicable constraints. The frequencies used shall be agreed with the relevant frequency assignment authorities and the recommendation is to use those frequencies defined by ITU for Command and Control of RPAS.g') The C2 datalink shall comply with communications performance requirements to achieve the availability, continuity, integrity and latency necessary to support the pilot's safe management of the flight of the RPA during all phases of flight.g'') The C2 datalink shall achieve the throughput required to manage the flight of the RPA safely during all phases of flight.g''') The AFM shall indicate the typical effective range achievable under normal operating conditions for the range of configurable parameters of the C2 datalink, EIRP of the C2 datalink transmitter and sensitivity of the C2 datalink receiver. |
| ***EASA response: Partially accepted. For reasons of consistency, the Stanag 4671 definition of effective maximum range will be used in the final version. Elements of the proposed text are considered in the AMC.***  |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 21*****Paragraph No:** SC.RPAS.C2 g) Effective range**Comment:** The term "effective" needs to become explained in depth or replaced by a more precise wording. The maximum range i.a.w with theoretical performance and all environmental aspects to be taken into account in the flight planning phase.**Justification:** As above**Proposed Text (if applicable):** Replace "effective" by "theoretical". |
| ***EASA response: Partially accepted. For reasons of consistency, the Stanag 4671 definition of effective maximum range will be used in the final version.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 22*****Paragraph No:** SC.RPAS.C2 h) **Comment: “**The system that provides the Command and Control link is designed accordingly as demonstrated by an adequate assessment of the design in accordance with the requirements of SC-RPAS.1309-01” - Sentence is understood as an Acceptable Means of Compliance for the requirement. Is that the right interpretation?**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Not accepted. The sentence is the requirement h) of the Special Condition. The note just below explains that guidance and AMC will be developed later. As this Special condition is developed for current certification projects, the AMC will be provided tailored to the current applications.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 23*****Paragraph No:** Guidance Material – C2 Datalink modes…**Comment:** We understand that a clear definition of datalink shall be stated, separating between datalink system/service, datalink terminal and C2 functionality, which could be carried out by several elements in the system, not only “datalinks”. Clear definition of data link should be provided in the introduction, not only the modes. It is supposed that EASA is concerned about communication system or service and not data link terminal. With such clarification, then modes could be defined, otherwise definition of specific modes may be in contradiction with the rest of the SC.**Justification:** None**Proposed Text (if applicable):** The AFM shall describe the C2 datalink modes including the capability for manual control, automatic control and any others that are provided. |
| ***EASA response: Partially accepted, definition is improved. The C2 datalink doesn’t necessarily have different modes of operation.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 24*****Paragraph No:** Guidance Material – The status data of the RPAS…**Comment:** Similar to comment on 1.c) 4), this seems more a human factors or cockpit requirement. It is also more applicable to the C2 application / functionality and not for the C2 datalink. However the C2 datalink must enable this to be done.**Justification:** None**Proposed Text (if applicable):** The status data supplied via the C2 datalink should include navigational information, response to pilot commands and other relevant equipment operating parameters to the appropriate extent required for type certification or by operating rules. |
| ***EASA response: Partially accepted, text changed.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 25*****Paragraph No:** Guidance Material – The effective maximum range…**Comment:** Similar to comment 1.g), operating within effective range does not assure the required performance.**Justification:** None**Proposed Text (if applicable):** Could delete this paragraph if comments on 1.g) are accepted? Otherwise it could be a addition to include topics 1. 1.g’ and 1.g’’’ as guidance material. |
| ***EASA response: Partially accepted. For reasons of consistency, the Stanag 4671 definition of effective maximum range will be used in the final version.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 26*****Paragraph No:** Guidance Material – Attempt to communicate…**Comment:** The paragraph following this is better.**Justification:** None**Proposed Text (if applicable):** Delete the sentence, or move it to the end of the next paragraph. |
| ***EASA response: Accepted, sentence deleted.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 27*****Paragraph No:** Guidance Material – The intended function…**Comment:** This is stated on page 1.**Justification:** None**Proposed Text (if applicable):** Suggest deleting this paragraph. |
| ***EASA response: Partially accepted, definitions have been improved in the final text.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 28*****Paragraph No:** Guidance Material – C2 Datalink performances…**Comment:** Editorial rewording.**Justification:** None**Proposed Text (if applicable):** “The status information supplied by the RPA to the RPS (control station) via the C2 datalink should provide a means to monitor the extent to which the C2 datalink performance is being achieved to enable the pilot to manage the flight of the aircraft safely.” |
| ***EASA response: Not accepted, not an editorial change, the sentence proposed is too prescriptive.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 29*****Paragraph No:** Guidance Material – Lapse times… and Any degradation…**Comment:** These paragraphs could be merged.**Justification:** None**Proposed Text (if applicable):** “Any degradation of the C2 datalink shall be indicated to the RPAS pilot together with information about the cause if available, e.g. attitude of the RPA that masks the antenna. The AFM shall state the acceptable maximum degradation period that the RPAS can tolerate to maintain safe flight. Degradation of the C2 datalink that leads to failure to achieve the C2 datalink performance shall be considered as loss of C2 functionality and the pilot shall take appropriate action as stated in the AFM.” |
| ***EASA response: Not accepted, requiring the pilot to take action following loss of C2 datalink might not be appropriate.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 30*****Paragraph No:** Guidance Material – C2 Datalink latencies**Comment:** All relevant performance parameters must be complied with, as well as latency. C2 Datalink performances related to Safety (i.e. integrity, signal strength, latency, continuity) should be monitored.C2 Datalink latencies should be determined for those operating parameters required for type certification or by perating rules. These latencies should not lead to an unsafe condition. The complete Command and Control (C2) chain should be considered, for example for latency parameter.**Justification:** None**Proposed Text (if applicable):** “C2 datalink typical latencies as well as degraded condition declaration threshold should be indicated in AFM. Failure to achieve the required latencies shall not cause a safety hazard.functionality and the pilot shall take appropriate action as stated in the AFM.” |
| ***EASA response: Not accepted, the proposed text is too prescriptive, the AFM information on latencies might not be appropriate.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 31*****Paragraph No:** Guidance Material – An approved Command and Control Datalink…**Comment:** Clarification to 1.c) makes this paragraph redundant. Apologies - out of sequence.**Justification:** None**Proposed Text (if applicable):** Delete this paragraph or at least the wording "approved". |
| ***EASA response: Not accepted. Approved refers to a system approved by the Agency.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 32*****Paragraph No:** Guidance Material – Lapse times or interruptions of C2 Datalink should be assessed in order to identify the acceptable interruption time which allow safe operation of RPA. When C2 Communications performance is not achieved (beyond the time assessed acceptable), loss of C2 Communications should be considered.**Comment:** This would exclude the idea that RPA can continue to safely operate when the Datalink is lost. As there are efforts to demonstrate that concept, it should be stated as an alternative means of compliance.**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Noted. The intention is to define the maximum time that the RPAS (remotely piloted) can safely be flown without datalink. Autonomous operation is out of the scope of this Special Condition.*** |

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| ***Commenter 2 : Airbus DS (Mr. Labonde) – date 31-03-2016*** |

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| ***Comment # 33*****Paragraph No:** Guidance Material – In the absence of OPS rules a command and control link loss strategy should…**Comment:** OPS not defined, obligation must be stronger.**Justification:** None**Proposed Text (if applicable):** “In the absence of operational rules, a C2 datalink loss procedure should be specified and described in the AFM.” |
| ***EASA response: Not accepted. The current text is preferred.*** |

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| ***Commenter 3 : FOCA (Mr. Farner) – date 31-03-2016*** |

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| ***Comment # 34*****Paragraph No:** SC.RPAS.C2 a)**Comment:** It is not possible to approve a datalink, due his nature and behaviour which is influenced by natural phenome’s.**Justification:** None**Proposed Text (if applicable):** “The RPAS shall be equipped with an approved Command and Control Link Function.” |
| ***EASA response: Not accepted. GPS, ILS and other navigation and communication systems are approved in a similar way.*** |

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| ***Commenter 3 : FOCA (Mr. Farner) – date 31-03-2016*** |

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| ***Comment # 35*****Paragraph No:** SC.RPAS.C2 g) Message error rate (MER)**Comment:** As it is not clear out of the SC, what MER is, this needs to be explained or it needs to be deleted. Proposal: Delete**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Accepted, a definition is provided in the final text.*** |

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| ***Commenter 3 : FOCA (Mr. Farner) – date 31-03-2016*** |

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| ***Comment # 36*****Paragraph No:** None**Comment:** You may add the drawing out of the E-Mail from Dominique Colin from EUROCONTROL:RX/TXRX/TXFCUSignal in SpaceCommand and Control FunctionRPSRPAActuatorsSensors**Justification:** None**Proposed Text (if applicable):** None |
| ***EASA response: Not accepted, EASA believes that the command and control function is broader as defined in the picture. Rather, it should include all command and control chain up to the actuators and sensors in the surfaces. The C2 Datalink is depicted as Command and Control function.*** |