SUBJECT	**:**	**RPAS Command and Control (C2) Datalink**
CERTIFICATION SPECIFICATION	**:**	CS-VLA.1301, CS-VLA.1309
PRIMARY GROUP / PANEL	**:**	6 (Avionic Systems)
SECONDARY GROUPE / PANEL	**:**	-
NATURE	**:**	Special Condition

PROPOSED SPECIAL CONDITION

RPAS Command and Control (C2) Datalink

This Special Condition and the related AMC & GM are applicable to any RPAS:

- for which a type certification is requested,
- for which the kinetic energy assessment in accordance with section 6 of the EASA policy E.Y013-01 results in an initial certification basis according to CS-VLA, and
- with no occupant on board.

Command and Control (C2) Datalink is the element of the Command and control function that provides the interface between the RPA and the Ground Control Station for the purposes of commanding and controlling the flight.

SC-RPAS.C2, RPAS Command and Control (C2) Datalink

a) The RPAS shall be equipped with an approved Command and Control Datalink.

b) The Command and Control Datalink system and associated procedures are described in the AFM.

c) The Command and Control link provides the following functions:
   1) Uplink of crew commands from the Control Station to the RPA , and
   2) Downlink of RPAS flight parameters and status data from the RPA to the Control Station.
   3) Pairing between the control station and the RPA.
   4) Means to indicate to the remote pilot:
      i. The status of the Command and Control Datalink
      ii. The effective range of the Command and Control Datalink.

d) Any limitations due to antenna masking or antenna pointing are indicated to the pilot.

e) The Command and Control Datalink is designed such that it is properly protected from external radiofrequency interference and, where more than one datalink is used, these must operate at frequencies which exclude mutual interference.

f) The transfer of command and control from one datalink channel to another channel, within the same Control Station, is seamless and does not lead to safety hazards.

g) The Command and Control Datalink performance is specified in terms of:
- Effective range
- Frequencies, Bandwidth and Throughput
- Latency (Communication transaction time)
- Availability
- Message error rate (MER)

h) The non-restorable loss of Command and Control Datalink is considered as loss of the ability of the pilot to exercise his control of the aircraft. 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 .

Note: Additional Guidance Material and AMC may be developed to take into account the aircraft classes, mass and kinds of operation.

Guidance Material

a) An approved Command and Control Datalink refers either to one or more links which are supporting the functionality indicated in paragraph c.

b) Command and Control Datalink modes affecting the C2 functionality should be indicated in the Flight Manual, when applicable.

c) Pairing is understood as a bi-univocal relationship between RPA and ground control station

d) The status data supplied through the Command and Control Datalink should include, navigational information, response to pilot commands and equipment operating parameters required for type certification or by operating rules.

e) As a minimum, the strength and integrity (i.e. frame/bit error rate) of the Command and Control uplink and downlink should be provided and continuously monitored at a refresh rate consistent with safe operation.

f) The effective maximum range should be defined so that the specified performances (throughput, latency, continuity, availability and integrity) are met, taking into account a margin to guarantee safe operation for the foreseen environmental conditions where the RPAS will operate.

g) When the maximum effective range may depend on environmental or geographical conditions, AFM should contain the adequate information to allow pilot to calculate the maximum effective range applicable for each flight. *This recommendation refers to CS-VLA.1501 and CS-VLA.1525.*

h) When aircraft fly near the maximum effective range, means to alert the pilot should be provided.

i) The intended function of Command and Control is understood as “to maintain the pilot in control” of the remote aircraft.

j) Command and Control Datalink performances related to Safety (i.e. integrity, signal strength, latency, continuity) should be monitored.

> *Note: Within the scope of compliance with 1309, safety assessment should allow to define the values (of such monitored performances) which allow safe operation of RPA.*

k) Lapse times or interruptions of Command and Control 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.

l) Command and Control Datalink latencies should be determined for those operating parameters required for type certification or by operating rules. These latencies should not lead to an unsafe condition.

m) Any degradation of the Command and Control Datalink should be indicated to the RPAS crew. Alerting cues should inform the pilot of degradation of Command and Control capabilities (e.g. approaching antenna masking attitudes where applicable, approaching external interfering antennas, approaching maximum data link range, etc.) in order allow pilot to take appropriate action before total non-restorable loss of the datalink.

n) In absence of OPS rules, a Command and Control Datalink loss strategy should be established, and described in the RPAS Flight Manual

> *Note: The command and control data link loss strategy should include a reacquisition process in order to try to re-establish in a reasonable short time the Command and Control Datalink. In case the reacquisition fails, means to alert the pilot should be provided.*