

1. Title of Proposed Study:

Standardization of Unmanned Aerial Vehicle (UAV) Voice Communication and Recording System

2. Brief Description of Proposed Study:

Defining standards of the UAV Ground Control Station Voice Communication and Recording System

3. Background:

SG 101 PRE-FEASABILITY STUDY ON Interoperable Command and Control Data Link (IC2DL)

The study found:

- The development of interoperable capabilities of the data link for UAV systems was feasible and would have significant benefit for UAV operations, especially in joint / combined operations.
- National agreement on the data link critical performance requirements, e.g. operating frequency band, range and data link node velocities, is lacking.
- As a result the current IC2DL definition of the physical layer/RF waveform, for STANAG 4660, is not acceptable to all participating nations and their industry.

This section documents the key recommendations that have not already been incorporated into STANAG 4660.

- Submit the STANAG 'as is' for formal review by JCGUAV.
- 'Hard and Fast' requirements for STANAG 4660 Mode B to be defined by the Governments' representatives. Whilst this request for clarity may seem almost trivial, it is apparent from Section 6 that there is both diversity and uncertainty with regard to many aspects, including such fundamentals as range, max speed, spectrum availability. The real necessity of power efficiency and power consumption needs to be established as it potentially drives the choice of waveform.
- NATO should identify a single frequency band that all NATO nations can use.
- The PTT method should be added to STANAG 4660 as a requirement to ensure interoperability.
- Any other waveforms in STANAG 4660 should allow the spreading function to be turned off to minimise the used bandwidth.
- Any waveform selected should allow the hopping function to be turned off to minimise the required bandwidth.
- Any waveform should allow the data repetition function to be turned off to minimise the used bandwidth.

It is also recommended that a follow-on NIAG study be conducted to address the issues listed below:

- Once the 'Hard and Fast' requirements have been established, there should be consideration as to how the existing waveform may be extended to meet these requirements. If this concludes that the current waveform cannot be sensibly extended, then the alternative Mode B waveform should be explored further.
- NIAG to develop a minimum generic jammer scenario as a follow-on task to be used to compare the STANAG 4660 waveform and proposed alternative waveforms.
- An assessment of the practicality (relative to SWAP) of the linear power amplifier that would be necessary to support the current waveform.
- Evaluate the STANAG 4660 network synchronization scheme to assess its efficiency and robustness.

- Assess additional use cases, including the exceptional cases, to establish the robustness of the network to handle them.
- Strengthen collaboration with other study groups, connected with consortiums such as the RTCA, to develop a more efficient and realistic ATC voice architecture that supports a well-defined new voice technology transition plan.
- It is recommended that a Mode B variant be developed and added to the specification to address the enhanced requirements.

4. Objectives of the Study:

- Preliminary studies for preparing STANAG for Unmanned Aerial Vehicle (UAV) Voice Communication and Recording System
- Development of Command and Control System communication,
- Analysis of Voice Communication and control systems
- Investigation of interoperability status of voice communication and control systems,
- To enable UAVs to work with military and civil air traffic management elements
- Investigation of the technology
 - Data communication, recording
 - Data Security
 - Unmanned systems
 - Platform (air, land, sea, under-land)
 - Swarms
 - Investigation of UAV System Interfaces

5. Please indicate whether you would like to be presented with alternative solution options, taking into consideration that exploring various options may reduce the depth of the study scope: Yes

6. NATO Priority: High

7. Intended Follow on to the Study: It is expected to prepare STANAG document.

8. Other NATO Bodies Involved in the Related Area of Work: NIAG

9. Current Industrial Involvement with the Sponsor Group:-

10. Proposed Start Date: January 2021

11. Desired Completion Date: October 2021

12. Study Classification: NATO Unclassified

13. Study Open to Partner industries: Yes

14. Final report releasable to: -

15. Sponsoring Group Point and IS Point of Contact: