3GPP SA WG1 Meeting #97e
Electronic Meeting, 14 Feb –24 Feb 2022

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Additional capabilities of mobile networks for drone operations and management

China Mobile

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Motivation

- 5G mobile networks are well suited to support low-altitude drone communication and to be integrated with drone traffic management systems, in order to enhance the safety and security of drone operations.

- In some industrial UAV scenarios, some new functions and capabilities of 5GS can be applied to UAV flight management and application.

- There have already been some topics focusing on the support of UAV application in 3GPP, for example, TS 23.256: Support of Unmanned Aerial Systems (UAS); connectivity, identification and tracking; TS 23.255: Application layer support for Unmanned Aerial System (UAS); Functional architecture and information flows.

- However, there has not proposed any requirements related to additional capabilities of mobile networks for drone operations and management

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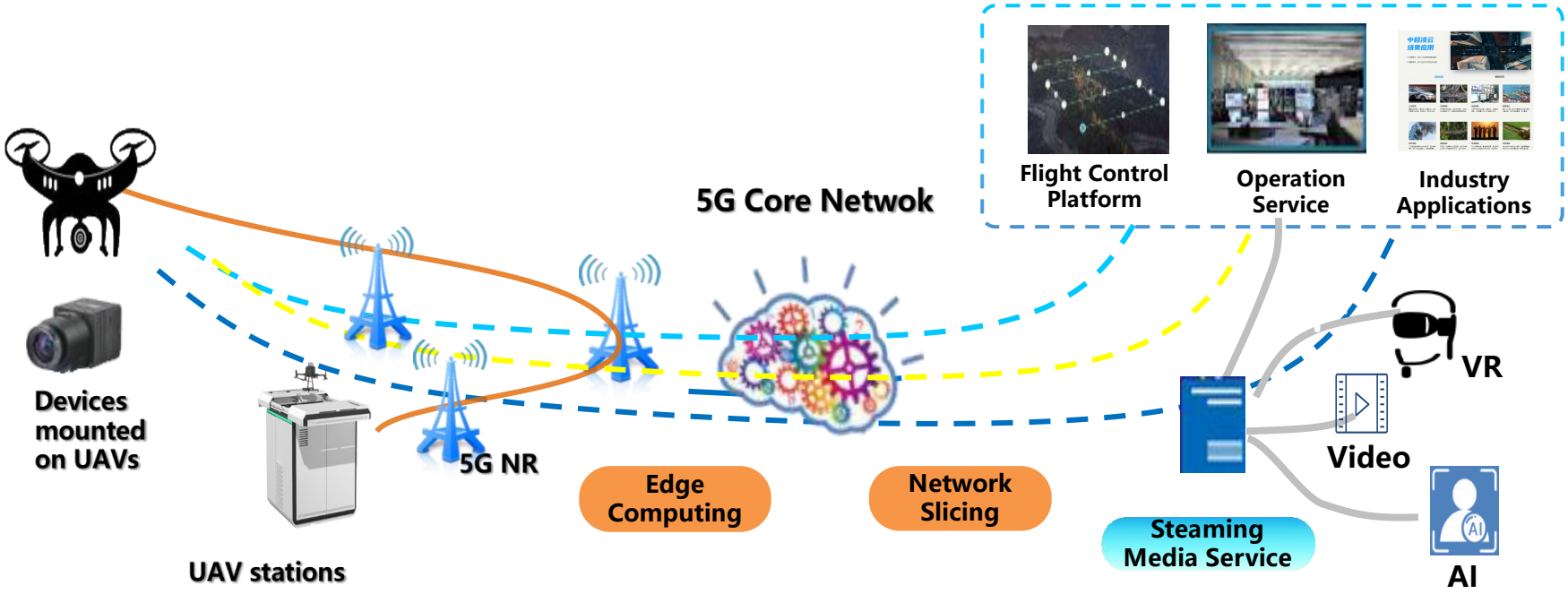
Motivation

- This study aims to enhance the interaction between UAV System and 5G communication network by using 5G network as one way to enhance the traditional self-built communication and control link (e.g. C2 link) of UAV to realize the remote flight control , real-time data collection and transmission and real-time analysis in NLOS situation.



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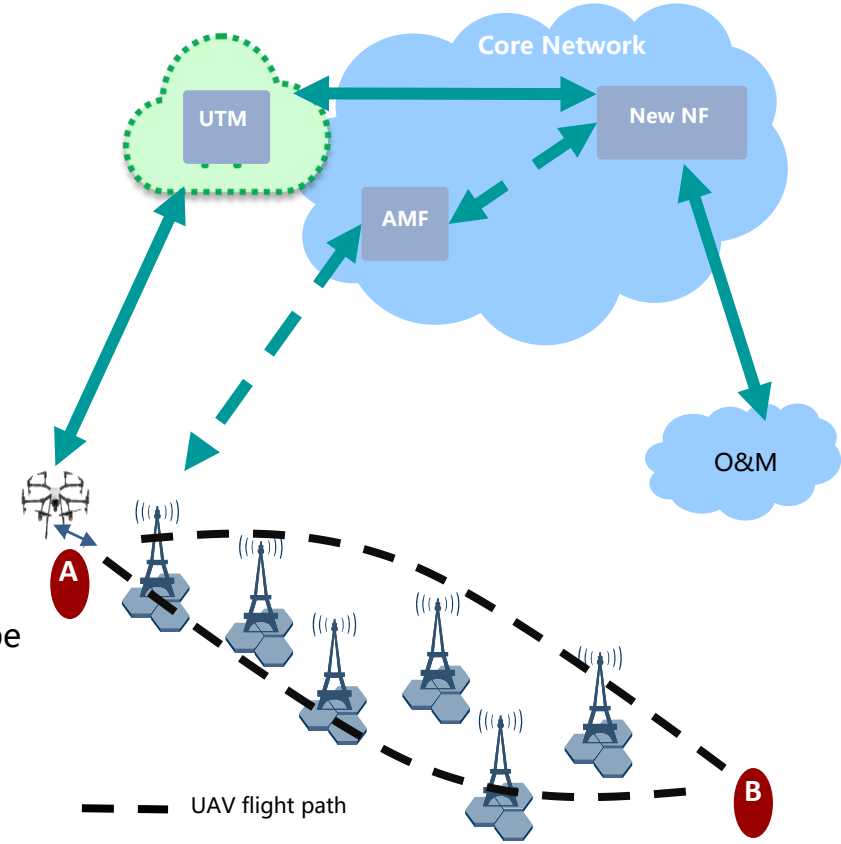
Example Use Cases

- -5G network can provide functionality or capabilities (e.g, flight mission application, flight monitoring) to support UTM functionality and to collect detailed information about UAS. The network can utilize detailed location information resource to optimize the UAV fight path scheduling based on UAV tracking and propose flight path optimization to the UTM.
- Assist UTM/drone operator to determine whether the UAV can access the network, or continue the flight operation if UAV has already accessed, according to the network capacity and load condition on the flight path.
- UAV service monitoring in mobile network needs further discussion, especially while the flight path change, or the handover occurrences during the long-distance flight, or QoS guarantee on UAV flight path to ensure service quality.
- Compared with the traditional mechanism of Detect and Avoid (DAA) between UAVs, DAA between networked UAVs can also be realized by mobile network, e.g., collision warning may be notified by the 5GS.
- Enhancing information collection (e.g. local UAV awareness, micro-weather awareness, etc.) by the MNO and distributing such information to UAVs by leveraging edge services would enhance the set of services that the MNO can provide to UAVs, UAV operators, and the UTM infrastructure.



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Objectives

The objectives of this work item are to identify use cases and potential requirements on the 5G system for meeting the industrial UAV applications needs for the interaction between 5GS and UAS. Additional requirements on capabilities of mobile networks for drone operations and management can be derived.

The use cases for studying further Stage 1 potential requirements in this study item will include:

-The use of 5G network to realize better support for UAS functionality or capabilities (e.g, flight mission application, flight monitoring) to facilitate UAV flight efficiency, such as,flight path recommendation, optimizing C2 and critical connectivity of a UAV, considering a variety of flight missions and flight durations.

-The use of 5G system to support UAV long distance flight, e.g.network/UTM handover, UAV service monitoring in mobile network during long flight missions

-The use of 5G system to enhance the safety and security of drone operations, such as support of network-assisted or ground-based Detect and Avoid (DAA) between networked 3GPP UAVs, UAV flight management related to the network capacity and load/QoS condition on the flight path.

-the use of 5G system and edge solutions to collect, process, and distribute to UAVs and to UTM information available locally (e.g. UAV location awareness, micro-weather conditions, etc.)

- Identification of security, charging and regulatory requirements from 5GS and UAS.
- A gap analysis will be performed between potential new service requirements and identified KPIs and existing requirements and functionalities, to identify any new needs to support the identified use cases by 3GPP.

A GLOBAL INITIATIVE

Thank you

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