SUBJECT AND PURPOSE

Control and Non-Payload Communications (CNPC) / Command and Control (C2) of Unmanned Aircraft System (UAS) / Remotely Piloted Aircraft System (RPAS) in non-segregated airspaces using primary allocations of the fixed-satellite service (FSS)

Agenda Item 1.8 for **ITU's World Radio Conference (WRC) 2023** defines the revision of the **Resolution 155 issued by the WRC-15** and revised by the **WRC-19** with the objective to accommodate the **use of the FSS by CNPC of UAS.**

GOALS OF REGULATIONS AND AIRWORTHINESS CERTIFICATIONS

✓ **Provision of a regulatory framework and procedural guidance for the safe and reliable operation of UAS/RPAS** in non-segregated airspaces using primary allocations of the FSS under its already regulated conditions
→ use-as-is principle

✓ **Paving the way for using of the huge amount of existing satellite capacity in the FSS** being the only existing technical solution for long-range applications of medium to high altitudes

✓ **Use of the experiences on UAS/RPAS flights in segregated airspaces gained over the last decade** and transfer of operational, and technical achievements into the use of the non-segregated airspaces under clear regulatory and operational rules

✓ **Guaranteeing a safe UAS / RPAS operation without the need of new developments of satellite technology.** Existing resources cold be used right away for supporting worldwide UAV / RPA operations

PLEASE SCAN QR CODE FOR FURTHER UAS INFORMATION

UAS DIGITAL DICTIONARY

WRC-23 AI 1.8
CONTROL AND NON-PAYLOAD COMMUNICATION OF UNMANNED AIRCRAFT SYSTEMS USING THE FIXED-SATELLITE SERVICE

BACKGROUND, ANSWERS AND KEY ELEMENTS

2023

RESPONSIBILITIES

UNITED NATIONS

PROVISION OF A REGULATORY AND STANDARDIZED FRAMEWORK

For the **use of primary allocated FSS** spectrum

ITU ITU Radio Regulations → **RES.155**

ICAO Convention on International Civil Aviation → **SARPs**

For **safe and reliable operation of RPAS**

FOLLOWING

- **the adoption of Resolution 155**
- **setting the rules** for its implementation
- **the endorsement of SARPs** with guidelines for the Required Link Performances

Responsibility is transferred to the state and administration level

STATE LEVEL

Implementation of the regulatory framework

NOTIFYING ADMINISTRATION

- Coordination and notification of GSO networks for UAS CNPC
- Provision of spectrum licenses
- Reporting / managing of interference

COMPETENT AUTHORITY

- Provision of Type Certificate
- Oversight of national RPAS operators
- Airspace specific safety and C2 Link performance criteria
- Flight approval and flight operations

Implementation of the regulatory framework

CONCLUSION

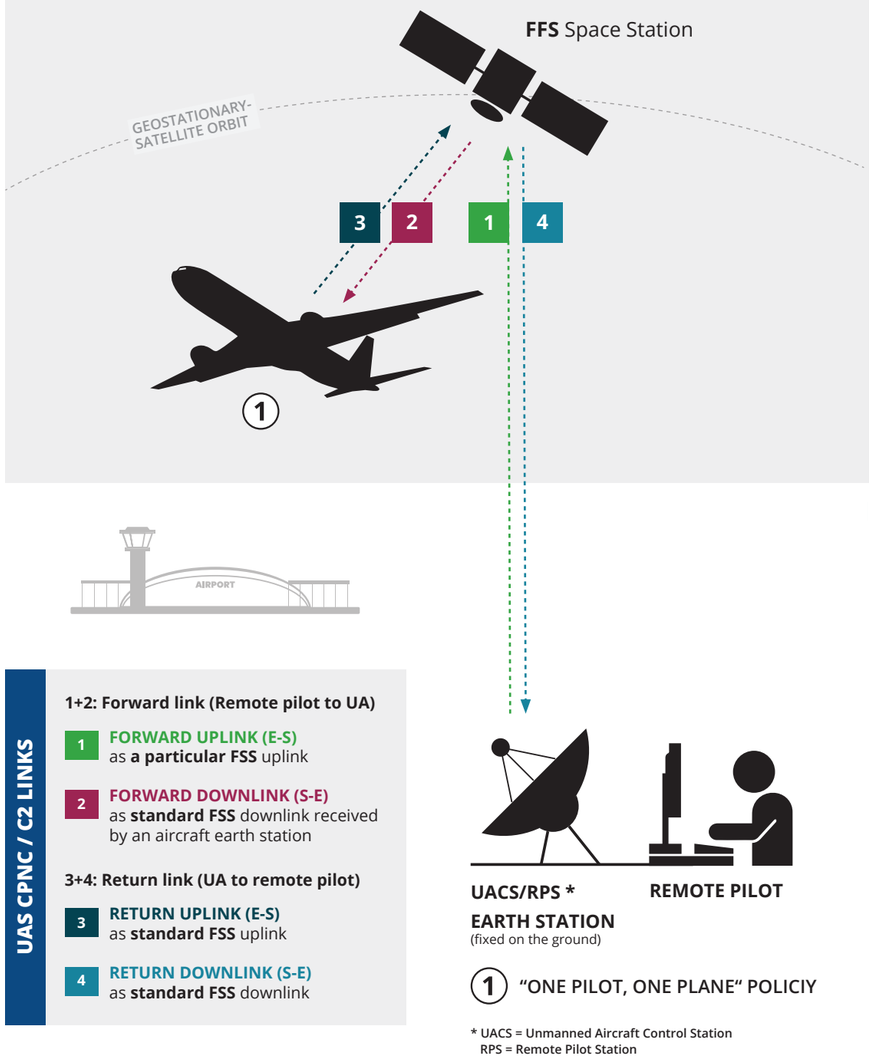
✓ **SARPs and Resolution 155 pave the way for the safe and reliable use of FSS for CNPC / C2 Links** under the developed regulatory and procedural framework

✓ **Resolution 155 provides the rules and boundary conditions of regulatory provisions for use of FSS for UAS CNPC /RPAS** but does **not provide a blanket set** and is **not bypassing national rights**

✓ **UAS CNPC via FSS is a valid and SARPs-compliant technology, but needs to be evaluated on a flight-by-flight basis in terms of SLA and Resolution 155 compliance** as its performance and (non-) suitability depends on geographic, regulatory, and national boundary conditions

✓ **Both, the ICAO SARPs and the ITU-R Resolution 155 define and provide the international framework and general rules for FSS-based CNPC / C2 Links** but the States / ADMs have the rights and the possibility to define their own set of rules inside these frameworks for the operation of UAS/RPAS or even restrict operation in non-segregated airspace

TECHNICAL UNDERSTANDING



UAS CPNC / C2 LINKS

1+2: Forward link (Remote pilot to UA)

1 **FORWARD UPLINK (E-S)** as **a particular FSS** uplink

2 **FORWARD DOWNLINK (S-E)** as **standard FSS** downlink received by an aircraft earth station

3+4: Return link (UA to remote pilot)

3 **RETURN UPLINK (E-S)** as **standard FSS** uplink

4 **RETURN DOWNLINK (S-E)** as **standard FSS** downlink

* UACS = Unmanned Aircraft Control Station
RPS = Remote Pilot Station

REGULATORY RULES

- **CNPC links** are an **application of the primary FSS**
- **"Use-as-is" principle:**
  No regulatory change of the FSS – like every other FSS application:

  Links 1 and 4 as **standard links of FSS** to and from fixed (mostly specific) earth stations

  Link 2 as a **standard FSS downlink** received by an earth station on board UA. Mitigation measures should be in place to reduce the impact of interference caused by incumbent terrestrial radiocommunication services.

  Link 3 as **an application of the FSS uplink** from an earth station on board UA. PFD masks are established for the protection of co-primary terrestrial radiocommunication services in Ku band over territories of affected ADMs

- **No adverse impact** on exiting existing and future frequency coordination process (no safety of life argumentation in coordination / no safety status according to **ITU RR Article 4.10** for FSS-based CNPC)
- **Use of notified GSO networks (MIFR)** with recorded parameter ranges **of the FSS satellite network and its particular coordination agreements**

OPERATIONAL RULES / SARPS

- **Required Link Performance (RLP) and safety of flight to be fulfilled** inside the FSS boundary conditions for the RPAs command and control in non-segregated airspaces
- **End-to-end responsibility for guaranteeing the safety of flight** in the hand of the RPAS operator, beforehand certified by the responsible/competent authority
- **Satellite-based C2 Link via service provisioning concept** C2 Communication Service Provider (C2CSP) **based on SLAs** to fulfill the RLP guarantees that the QoSD (Quality of Service Delivered) be **commensurate / at least as good as QoSR** (QoS Required) based on the **exclusive use of the allocated satellite resource for that specific link**
- **Technology agnostic system performance characteristics for compliance with the RLPs**
- **Definition and international harmonization of C2 Link technologies**
- **Guidelines for developing the RLPs and concept for its transfer towards C2 Link specifications and the required QoS (QoSR)**
- **QoSR-compliant specific selection of the appropriate technical solution**
  - FSS service provider(s) with its satellites/coverages/beams
  - UAS control station (UACS)/Remote Pilot Station (RPS)