**3GPP TSG SA WG 1 Meeting #106 S1-241386**

**Jeju , Korea, 27-31 May 2024 Revision of S1-241272 and S1-241060**

**Source: ISSDU, III**

**pCR Title: Pseudo-CR on** **New use case on Satellite Communication with Resilient Operation Mode for Public Safety**

**Draft Spec: 3GPP TR 22.887**

**Agenda item: 7.3**

**Document for: Approval**

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*Abstract:*

**1. Introduction**

As the first commercial deployments of 5G-based satellites are underway, many new use cases will be addressed in the context of 5G Advanced (Release 20). This use case describes a satellite communication system for public safety that supports resilient operation mode when either the backhaul link between LEO satellite and a group of ground stations is temporarily unavailable due to natural disasters or the core newtork of LEO satellite was temporally unavailable due to cyberwarfare attack.

**2. Reason for Change**

To provide a new use case on Satellite Communication with Resilient Operation Mode for Public Safety.

**3. Conclusions**

The resilient satellite communication system ensures continuous reporting and connectivity for the Coast Guard crew during natural disasters by switching to resilient operation mode and dynamically searching for alternative communication paths.

**4. Proposal**

It is proposed to agree the following changes to 3GPP TR22.887v0.0.0.

\* \* \* First Change \* \* \* \*

## 5.x Use case on Satellite Communication with Resilient Operation Mode for Public Safety

### 5.x.1 Description

This use case describes a scenario where the resilient satellite communication system for public safety supports resilient operation mode when either the backhaul link between the LEO satellite and the ground station is temporarily unavailable due to a natural disaster or the core newtork of LEO satellite was temporally unavailable due to cyberwarfare attack.

In order to preserve service continuality, the resilient operation could eliminate service interruption period before re-establish the backhaul link or restore the core newtork service.



Figure 1: Scenario for Support of Satellite Communication with Resilient Operation Mode for Public Safety

### 5.x.2 Pre-conditions

The Coast Guard has deployed a smart boat named Virginia for river patrol. Officers Jason and Alice can navigate the boat while reporting their status periodically to the Coast Guard Administration Centre.

### 5.x.3 Service Flows

1. Connectivity Details:

* Both officers’ smartphones and their smart boat are connected to the 5G system via a LEO satellite link.
* They periodically report their current status to the Coast Guard Administration Centre.

2. Interruption Scenario:

* An EF5 tornado develops and moves toward the satellite ground station.
* The backhaul link between the LEO satellite and the ground station becomes temporarily unavailable because the ground station's antennas are damaged by the EF5 tornado.

### 5.x.4 Post-conditions

The resilient satellite communication system automatically switches to resilient operation mode after the LEO satellite loses the backhaul link connection.

Officer Jason and Alice can still report their status to the Coast Guard Administration Centre via UE-Satellite-UE communication under the resilient operation mode.

The resilient satellite communication system continually searches for an available communication path and reconnects to the ground station via multi-hop inter-satellite links over LEO/MEO/GEO satellites.

### 5.x.5 Existing features partly or fully covering the use case functionality

Currently, 5G systems lack mechanisms for Resilient Satellite Communication with Resilient Operation Mode

### 5.x.6 Potential New Requirements needed to support the use case

[PR.5.x.6-1] The system shall provide resilient operation for Public Safety over satellite when backhaul-link is unavailable in order to preserve service continuality.

Editor's Note: the definition of resilient operation is FFS.

[PR.5.x.6-2] The system shall provide alternative backhaul-link communication with the same service level agreement (SLA) via multi-orbits satellite access for resilient satellite communication.

\* \* \* End of Change \* \* \* \*