International Civil Aviation Organization

WORKING PAPER

A42-WP/313
TE/122
28/7/25

ASSEMBLY — 42ND SESSION

TECHNICAL COMMISSION

Agenda Item 25: Other issues to be considered by the Technical Commission

ADDRESSING PERFORMANCE AND RELIABILITY ISSUES FOR COMMUNICATION SERVICE PROVIDERS (CSPS) AND SATELLITE SERVICE PROVIDERS (SSPS)

(Presented by Canada, the United States and the Civil Air Navigation Services Organisation)

EXECUTIVE SUMMARY

Modern civil aviation has evolved to rely heavily on satellite-based communication and surveillance for improved safety and efficiency, especially in oceanic and remote areas where traditional ground-based communication and surveillance infrastructure has not been available or feasible. Recent communication service provider (CSP) and satellite service provider (SSP) outages have exposed significant system vulnerabilities, risking operational safety by increasing air traffic controller (ATCO) workload, delaying essential communication, and compromising operational efficiencies that had been gained through investment in satellite-based technology. This paper recommends the development of Standards and Recommended Practices (SARPs) for CSP and SSP performance and reliability that will ensure standardized expectations and secure services to support global air traffic services provision

Action: The Assembly is invited to:

a) acknowledge the progress ICAO has made in developing SARPs and guidance material addressing CSP/SSP performance and reliability, including proposed amendments to Annex 10, Volume III, and the development of frameworks such as the Network Outage Reporting and Impact Assessment (NORIA) handbook;
b) recommend that ICAO continue to develop and refine SARPs and guidance material defining minimum performance and reliability metrics for CSPs and SSPs, building on the work already undertaken and as outlined in this paper;
c) encourage States to incorporate these standards into national regulatory frameworks to enhance operational safety and efficiency in oceanic and remote regions; and
d) urge ICAO to periodically review and update these SARPs and guidance in light of evolving technologies, operational experience, and lessons learned from recent service outages.

Strategic Goals:	This working paper relates to *Every Flight is Safe and Secure.*
Financial implications:	The introduction of an independent layer of assessment and regulation for providing satellite communication in the aeronautical safety satellite services will require consideration of a means of funding required regulatory activities, such as annual fees payable by satellite service providers without requiring Member State contributions
References:	Annex 10 — *Aeronautical Telecommunications* Doc 9925, *Manual for Aeronautical Mobile Satellite (Route) Service*

1. INTRODUCTION

1.1 The collective network provided by communication service providers (CSPs) and satellite service providers (SSPs) is the pillar of data link services, enabling the exchange of communication and surveillance messaging that support air traffic services.

1.2 The aviation industry's dependence on satellite services has grown significantly and will continue to be an essential component in ensuring safety and efficiency going forward. These systems are integral to industry sustainability, communications, surveillance, and the reduction of separation minima in remote and oceanic areas.

1.3 Due to a dependence upon this network, it is critical for degraded or lost services to be re-established as quickly as possible, and clear and structured communication between all parties is essential to support operational decision-making.

1.4 CSPs, such as ARINC and SITA, act as intermediaries contracting with SSPs, such as Inmarsat and Iridium, to deliver services to air traffic service providers (ATSPs). However, CSPs are unable to guarantee consistent levels of service performance and reliability due to their lack of control over satellite infrastructure and services. This disconnect undermines accountability and operational continuity in data provision which is not tolerated in other areas of aviation data provision and usage.

1.5 In recent years there has been an increase in outages and service degradations. Although such occurrences are typically of short duration, they can lead to cascading effects, such as increased air traffic control officer (ATCO) workload and delayed communication, undermining the provision of safe and efficient services.

1.6 Individual contracts between CSPs and aircraft operators, and between CSPs and ATSPs, are not publicly transparent. It is therefore unclear if business requirements are taking precedence over safety requirements; an issue further exacerbated by the internal working agreements between CSPs and SSPs.

2. DISCUSSION

2.1 It is recalled that this topic was discussed during the 40th Session of the ICAO Assembly where the Technical Commission agreed that since civil aviation was becoming increasingly dependent on mobile satellite systems, ICAO should examine an international solution to the regulation of service agreements who offer services related to civil aviation provided by mobile satellite services providers.

2.2 Regional efforts to establish a cooperative reporting mechanism

2.2.1 In 2018 the Network Outage Detection and Reporting (NODAR) Project Team (PT) was established by the North Atlantic (NAT) region's Technology and Interoperability Group (TIG) to work collectively between data link system stakeholders to improve the detection and reporting related to outages within the CSP and SSP subnetworks and systems. In 2024 the NAT region endorsed the NODAR template as the baseline for network outage reporting and notification in the NAT region. The intent was to standardize how CSPs report and notify NAT ATSPs regarding network outages, ensuring critical data (such as impacted service, location, and estimated duration) supported significant NAT ATSP decision making. Since endorsing the regional NODAR template, very little progress has been made towards achieving the necessary notifications during data link outages and degradations caused by planned or unplanned maintenance and failures.

2.2.2 In 2024 the NAT TIG developed a Network Outage Reporting and Impact Assessment (NORIA) handbook, which provides standard guidance material regarding network outage reporting and impact assessment for CSPs, SSPs and NAT ATSPs. Currently, the intent is to continue developing the document into a NAT regional guidance document as a first step towards developing it into a global guidance document through coordination with the ICAO Communication Panel's Operational Data Link Working Group (OPDLWG).

2.2.3 In 2024 the NAT TIG presented the CP-OPDLWG-JPT/07 meeting with the NODAR template and NORIA handbook, recommending that the OPDLWG develop the handbook to have global applicability. The OPDLWG agreed on the value of this work and of making it a global document both for ATSPs and operators, though noted that to expand it to other regions, it required significant work due to the complexity and dynamic nature of the network paths.

2.2.4 In 2024 the NAT Safety Oversight Group (SOG) established a project team (PT) aimed at determining if the current oversight of CSPs and SSPs is sufficient for current and predicted future NAT operations. The PT assessed if the current CSP and SSP oversight meets ICAO Standards and Recommended Practices (SARPs). The recommendations of the PT included a set of minimum deliverables/requirements from CSPs/SSPs to be captured within contracts to ensure a standard level of service to ANSPs, including such things as service delivery metrics that meet defined performance indicators in terms of availability and reliability, 24-hour customer support, a real-time data portal and outage notifications, monthly performance reporting, and periodic contract reviews.

2.2.5 With more than 80 per cent of air traffic in the NAT region using data link CSP/SSP services, along with a low level of involvement from some CSPs in the ongoing improvement efforts noted in paragraph 2.2.2, the NAT Implementation Management Group (IMG), in coordination with the NAT SOG, identified in 2024 a growing need for improved oversight of CSP/SSP services in accordance with the performance-based communication and surveillance (PBCS) charter. The NAT IMG and NAT SOG thus proposed that the ICAO Regional Director, Europe and North Atlantic (EUR/NAT), send a letter on behalf of the NAT Systems Planning Group (SPG) to CSPs and SSPs to emphasize the need for reliable data link services in the NAT region.

2.3 Performance and reliability issues affecting safety

2.3.1 The lack of reliability in CSP/SSP services is increasingly evident. Recent examples include:

a) November 2024 - A multi-hour outage involving both CSP and SSP networks disrupted communication and surveillance in multiple oceanic regions. During the incident:

   1) over 200 flights experienced delayed or failed position reports, resulting in sole reliance on high-frequency (HF) voice through radio operators for all positions reporting and pilot/ATC communications;

   2) separation minima were increased, reducing airspace efficiency, and increasing fuel burn; and

3) ATCOs experienced a significant increase in workload, elevating the likelihood of human error and consequently increasing the risk to safety.

b) August 2024 - A CSP outage that lasted 17 hours resulted in service degradation that impacted Canadian and European airspace, as well as the NAT Region. This had a significant impact on ATSP staffing and workload for both ATCOs and technical specialists, and it negatively impacted service delivery since reduced separations could not be applied. This increased traffic complexity, reduced capacity, and required the use of manual (voice) position reports, which were further impacted by poor HF conditions. The timeliness and availability of useful information regarding this service degradation presented challenges for end users since there was no information provided as to when service would be restored.

c) November 2023 - A four-day outage in the Pacific Ocean left Oakland Air Traffic Control Center with stale/untrustworthy aircraft positions and the inability to communicate directly with multiple civil aircraft in nearly half of the flight information region. This outage introduced risk into the system before it was even identified by delaying necessary reports and messages, causing confusion, and increasing workload exponentially. After the outage was identified, there was additional risk caused by the discontinuity of standard operations and reduced separation standards requiring ad hoc traffic management initiatives, including overloading the HF radio operators.

2.4 Operational and safety impacts

2.4.1 Outages adversely affect mitigated risks in high-traffic oceanic airspace, where separation between aircraft is reduced based on having reliable satellite systems. The consequences of not having CSP/SSP service assurance and accountability from all areas, include:

a) delayed clearances and deviations from optimal flight paths, increasing fuel costs and emissions;

b) the absence of real-time position reporting, which increases the risk of mid-air collisions;

c) overloading of HF radio systems (which is the only backup for satellite-based communications);

d) reduced efficiency;

e) safety benefits not being realized to their fullest; and

f) the inability to maintain or improve capacity in the absence of reliable data provision.

2.5 Lack of accountability and transparency

2.5.1 ATSPs and aircraft operators lack direct contracts with SSPs, relying instead on CSPs for access to satellite services. This arrangement further complicates global efforts to enforce performance standards or investigate service failures. Current ICAO guidance, such as the *Performance-based Communication and Surveillance (PBCS) Manual* (Doc 9869), is insufficient in addressing these accountability gaps and it is unclear whether the benefits and efficacy of the PBCS Charter has been realized since it is not mandated, nor has it been reviewed since its publication.

2.5.2 The significance of this service has matured to a level that requires more robust oversight. ICAO SARPs do not sufficiently cover these service provisions and are necessary to ensure global data link reliability and performance.

3. CONCLUSION

3.1 The significant and increasing reliance of the aviation industry on data link services provided by CSPs and SSPs demands an appropriate level of reliability, transparency, and performance. Despite the regional initiatives such as the NODAR template and the NORIA handbook not enough progress has been made towards achieving the necessary notifications during data link outages and degradations caused by planned or unplanned maintenance and failures as evidenced by experiences during recent outages.

3.2 Moving forward, States and stakeholders are urged to collaborate under the auspices of ICAO to develop effective oversight solutions that can attain the levels of performance, reliability and coordination that support current and planned air traffic services critically dependent upon the data link network. Through open dialogue, information sharing and cooperation among all parties - SPs, SSPs, ATSPs, and aircraft operators - the global aviation community can strengthen the resilience of data link services and achieve the highest standards of safety and efficiency in international airspace.

— END —