International Civil Aviation Organization

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WORKING PAPER

THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE A

Agenda Item 5: Emerging issues
5.4: Cyber resilience

ESTABLISHING THE AVIATION COMMUNITY OPERATIONAL RESILIENT NETWORK SERVICES (ACORNS)

(Presented by the United States)

EXECUTIVE SUMMARY

This paper presents the Aviation Community Operational Resilient Network Services (ACORNS) concept. ACORNS will be a foundational global framework built with cybersecurity and interoperability as part of its core concepts, ensuring an infrastructure that is ready for the integration of future air traffic management (ATM) concepts and new entrants. The infrastructure will also be ready to adopt improved cybersecurity policies as new threats emerge.

Action: The Conference is invited to approve the recommendations in paragraph 3.1.

1. INTRODUCTION

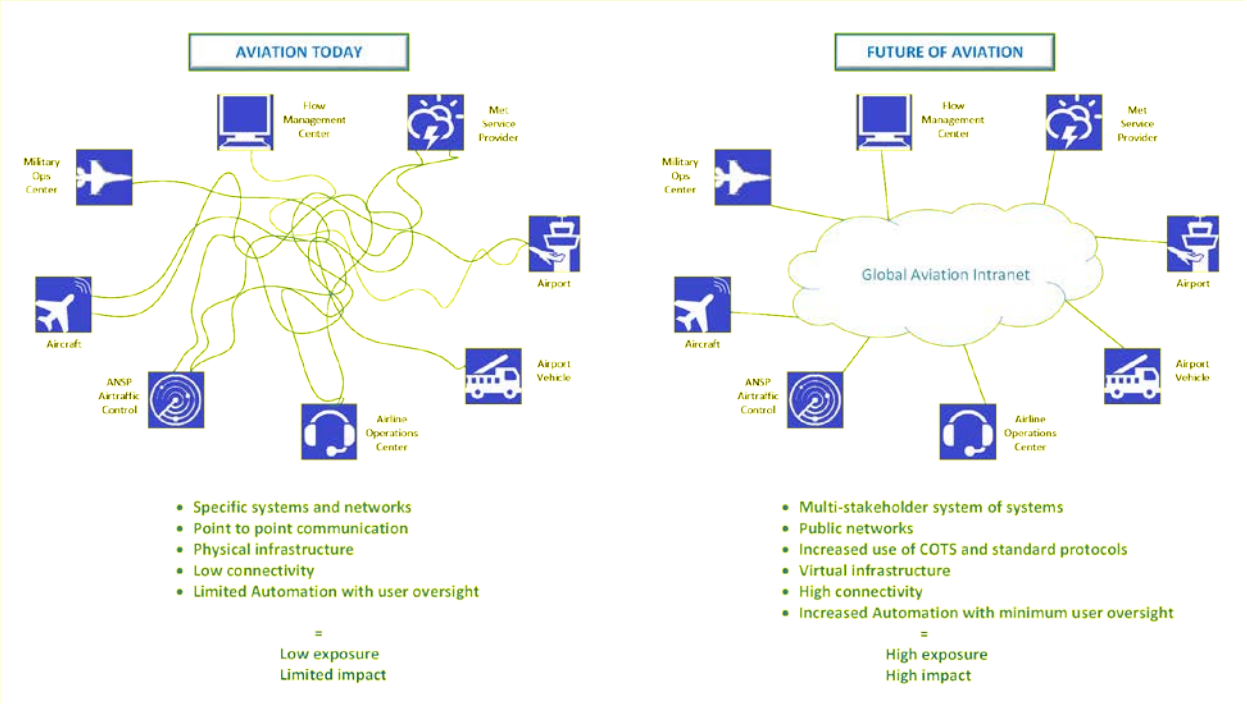
1.1 The unprecedented future growth projected in global aviation demands an air traffic management (ATM) concept that is adaptable, global, integrated and highly interoperable. The *Global Air Navigation Plan* (Doc 9750, GANP) vision will require a global ATM system capable of enabling, "...all users, across all phases of flight, that meets agreed levels of safety, provides for optimum economic operations, is environmentally sustainable and meets national security requirements."

1.2 Global modernization efforts will create a more agile environment to introduce airspace management efficiencies, such as performance-based operations, trajectory-based operations (TBO), and greater integration of information into planning and decision-support systems. Additionally, the introduction of unmanned aircraft systems (UAS) and remotely piloted aircraft systems (RPAS) and other emerging technologies will demand agility and flexibility for managing air traffic. This future state and the GANP both suggest that ATM service delivery management will operate seamlessly across all service providers and phases of flight.

1.3 Delivering a global ATM system requires the Aviation Community Operational Resilient Network Services (ACORNS), provided by a secure global aviation Intranet where all operational stakeholders can exchange information regardless of the origin or destination of the information.

2. DISCUSSION

2.1 Today's aviation networks are a patchwork of regional ground networks, point-to-point connections, and commercial air-to-ground network providers. The current network infrastructure does not provide global access to services, irrespective of which country provides the service or which country consumes the service.



2.2 The ICAO Information Management Panel (IMP) has made great progress in establishing system wide information management (SWIM) Standards; however, States still have concerns about individual and regional information security. Without an approach for global, interoperable, resilient and secure network services, the promise to increase the efficiency and capacity of the international aviation system documented in the GANP will not be realized.

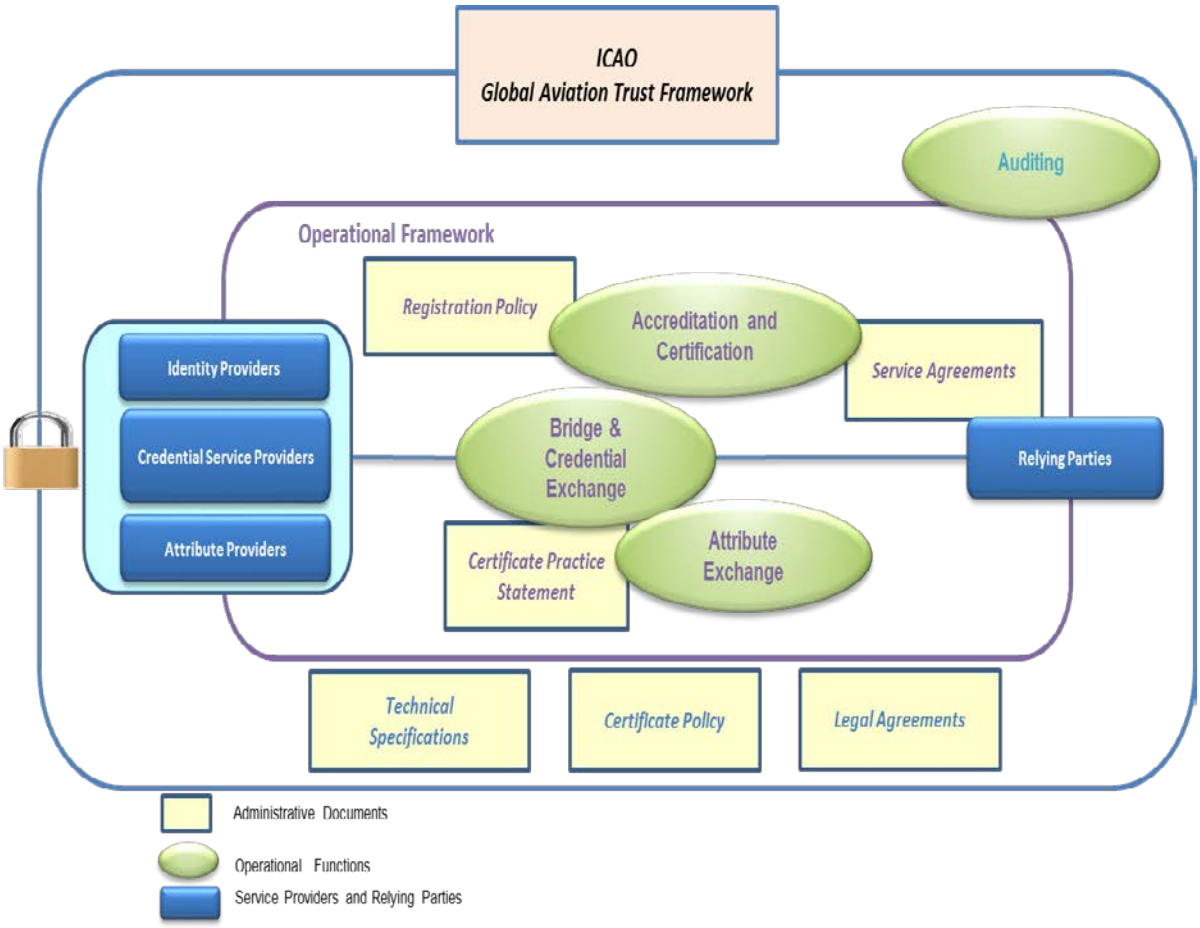
2.3 Concepts such as flight and flow information for a collaborative environment (FF-ICE) flight data requests service in the GANP require seamless digital flight information exchange among all operational stakeholders. The current location, direction, actual flight path, and projected arrival time of a flight originating in one country needs to be digitally available to the countries it transits and to the country of arrival. In order to make this information available in a timely fashion via SWIM, the following are necessary conditions: a) the airplane flight information is published securely to a SWIM node, and b) the countries interested in the flight information can subscribe to the information.

2.4 The publication of, and subscription to, flight information worldwide requires the establishment of ACORNS. In order to realize the efficiency and capacity gains of a secure global SWIM network, each country must have network access to the SWIM nodes via ACORNS.

2.5 By definition, resilient network services can detect, protect, respond, and recover from cyber-attacks. In order to ensure resiliency, the network services need to be aviation community based and secured from outside intrusion. Any user, system, application, or service connected to ACORNS will need to perform mutual authentication to ensure that the information exchange can be trusted. In order to do so and ensure integrity of information, a global trust framework for ACORNS must be established.

2.6 The secure global aviation Intranet will consist of currently available multiple independent networks together with new commercial network offerings, which converge to one performance-based network providing integrated ground-ground and air-ground communications. Flight safety applications, UAS and RPAS applications, airline operation system applications, maintenance applications, etc. each have different network performance requirements such as availability, bandwidth, latency, guaranteed delivery, resilience and security.

2.7 Due to the different network requirements, each of the independent networks will provide performance-based classes of network services that will apply to the appropriate applications. To make ACORNS secure, resilient, and interoperable, new global network, cybersecurity, interface, and identity management requirements and policies must be adopted. These policies will establish an interoperable trust framework allowing applications from different countries and organizations to establish secure communications through mutual authentication, authorization, and accounting.



3. CONCLUSION

3.1 The Conference is invited to agree to the following recommendation:

That the Conference:

a) urge ICAO to include the Aviation Community Operational Resilient Network Services (ACORNS) as a thread in the *Global Air Navigation Plan* (Doc 9750, GANP);

b) urge ICAO to develop a framework for establishing a consortium of network service providers creating ACORNS; and

c) urge ICAO to develop high-level policies for inter-organizational trust, as part of a global trust framework, and to commission in part their implementation through the appropriate ICAO expert groups and regional implementation groups.

— END —