**Agenda Item 4:** **Assessment of operational requirements to determine the implementation of improvements in communications, navigation and surveillance (CNS) capabilities for operations in route and terminal area**

## AIREON AND ITS DISTRIBUTION VIA A PAN-REGIONAL NETWORK

(Presented by Aireon)

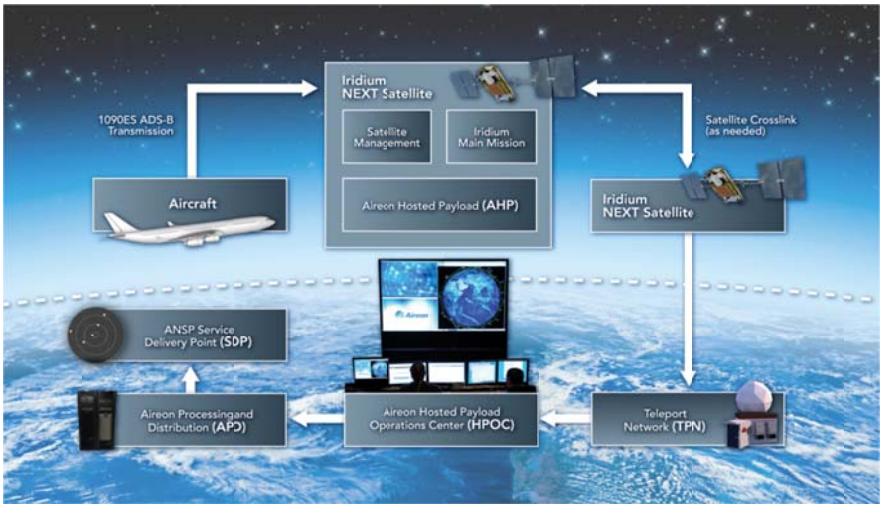


*Figure 1 - Aireon Satellite ADS-B data flow*

### 1. Background

1.1. The satellite reception of ADS-B is the new ATS Surveillance technology that is emerging in the short term (fully operational in 2018) and it will allow in the complete globe, pole included, to always have a ground independent surveillance layer. This will be translated in a huge increase of safety worldwide, as well as a much more flexible airspace that will potentially allow ANSPs to deliver a more optimized service to the airlines.

1.2. The system is taking benefits of the ADS-B hardware already on board of commercial aircrafts and will deliver in less than 2 seconds the received ADS-B message to the ANSP in a standard Asterix format; this data is then ready to be integrated in the ATC platform.

1.3. Worldwide data will be assembled and processed at Aireon Processing and Distribution (APD), where the raw ADS-B message will be processed, then the service volume for a single ANSP will be created and the traffic for that area will be sent via an MPLS connection to the Service Delivery Point (SPD). The SPD is composed by a replicated server and router, located typically into the ACC, that will provide as output the ADS-B surveillance data for the ANSP airspace. The SDP will also send automatically to the APD statistics about data reception and more generally will ensure the Aireon system of the correct transfer of the ADS-B data. The ANSP can monitor the performances of the Aireon system

via a portal, where the status of the overall system is projected, or it can monitor the output of the SPD with a dedicated GUI.

## 2. Usage of a regional network to distribute Aireon data in a region

2.1. Once the APD has created a service volume to be delivered to a specific ANSP, that transmission can be imagined as a VPN between APD and the SDP.

2.2. In case of a region where ANSPs already have in place a MPLS network, perhaps already used to share radar and VHF traffic, the usage of one (or few, for redundancy) SPD can be foreseen, in order to optimize APD<->SPD connections as well as the installations of many SPDs. This is the case of regions like Europe, where ANSPs are already sharing many data using a network named Pan European Network Service (PENS):

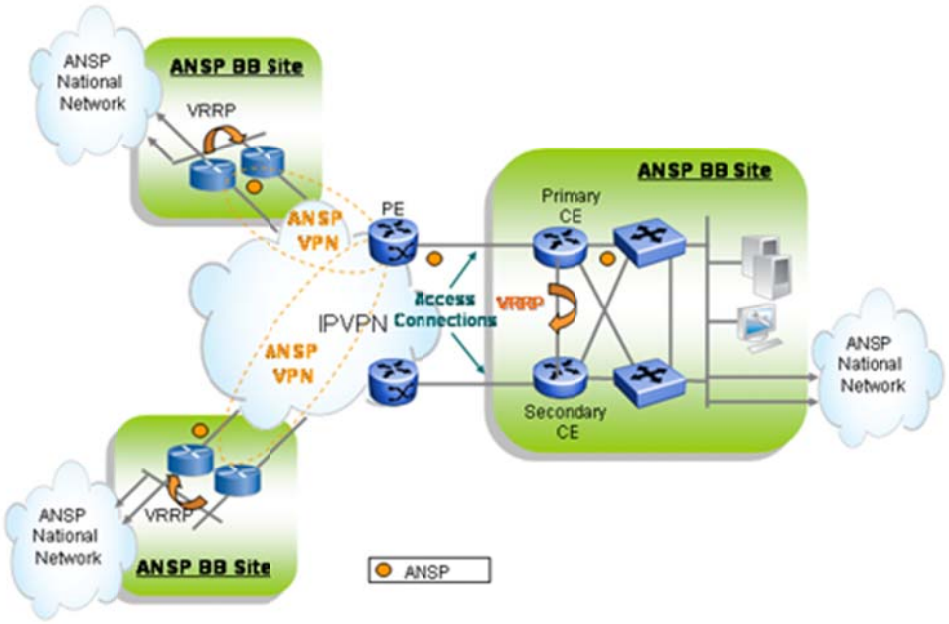


*Figure 2 - PENS infrastructure*

2.3. PENS is a joint EUROCONTROL/ANSP initiative established in order to provide a common IP based network for distribution of voice and data communication among European ANSP´s. PENS can provide different quality of services, depending of the users' requirements:

- IPVPNs with Gold Class of Service (three levels of priority; bronze/silver/gold/platinum)
- Dual stack IPv4 / IPv6
- IPv4 addresses are provided by PMU/SITA
- IPv6 addresses are provided by EUROCONTROL (based on the iPAX Task Force)
- Tight SLA with SITA for the service including:
  - 24/7 Dedicated PENS Service Desk
  - 99,99% availability
  - Certificate of physical diversity of the circuits
  - Quarterly audit of Single Points of Failures (layer 1/2/3)

- Remote monitoring access for ANSPs
- Monthly reporting.

The data service availability of PENS is > 1 GB/s, and distributed as shown in figure 3.

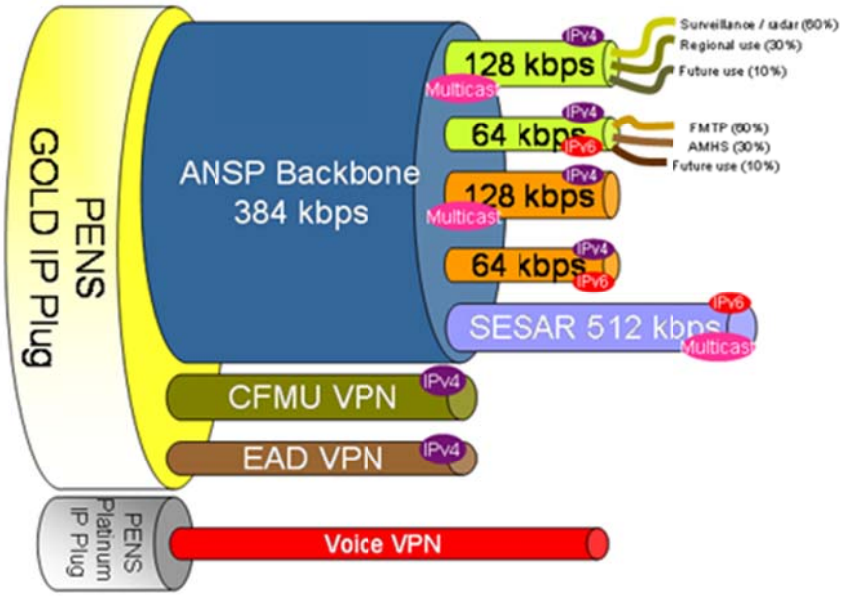


*Figure 3 - PENS data service distribution*

2.4. The PENS network itself does not require regulatory approval for transportation of ATM data. In accordance with European regulation it is the obligation of the user ANSP to demonstrate ATM data integrity under the ANSP approval certificate. It is assumed that PENS is capable of fulfilling the user requirements for data integrity since the current use of the network today entails distribution of CNS data for operational use.

2.5. Based on the analysis of the working method of PENS with regard to data delivery (accessibility and speed of transmission) and subscription method it appears that satellite ADS-B data can technically be distributed in Europe on the PENS network.

2.6. The interface between the APD and PENS can be set up by using an already established gateway SDP in Europe, i.e. through ENAV, IAA, Naviair. By using this method, the Aireon data is accessible on the PENS network. When Data Service contracts are established between Aireon and European (ECAC) member states which are PENS subscribers, it will be a matter for the Aireon customer to subscribe to data service delivery of Satellite ADS-B data, from the Gateway to the customer ANSP tracker. Aireon should reserve some bandwidth of PENS, so to allow the distribution of different VPNs traffic (one VPN for ANSP).

2.7. A similar approach can be investigated for similar other regional networks, such as **REDDIG** and **MEVA**.

2.8. An item to consider is that because the SPD is the demarcation point between the Aireon domain and the ANSP domain, in a geographic distribution like the one just described, Aireon will have status of the data received by SPDs, but not of how those data will be redistributed via the regional

network. ANSPs and/or company that manage the network are generally the ones that monitor the performances of the regional network data distributor.

2.9. In a scenario like the one described, the APD<->SPD connection can be established with a dual MPLS connection, so to avoid a single point of failure, and ANSPs can take benefits of regional MPLS connections already in place, ensuring the treatment of those very sensible data within a network that is designed to accommodate such safety of life information.

**3. Summary**

3.1. The SAM region could replicate the best practice currently existing in Europe, by the use of ATM data distribution through PENS, to distribute Space-based ADS-B data along the region, via REDIGG network, as this could have both operational and cost benefits for States and ANSPs.

**4. Suggested Actions:**

4.1. The Meeting is invited to:

a) Take note of the information presented herein; and

b) analyse the feasibility to distribute Space-based ADS-B data using REDIGG network.

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