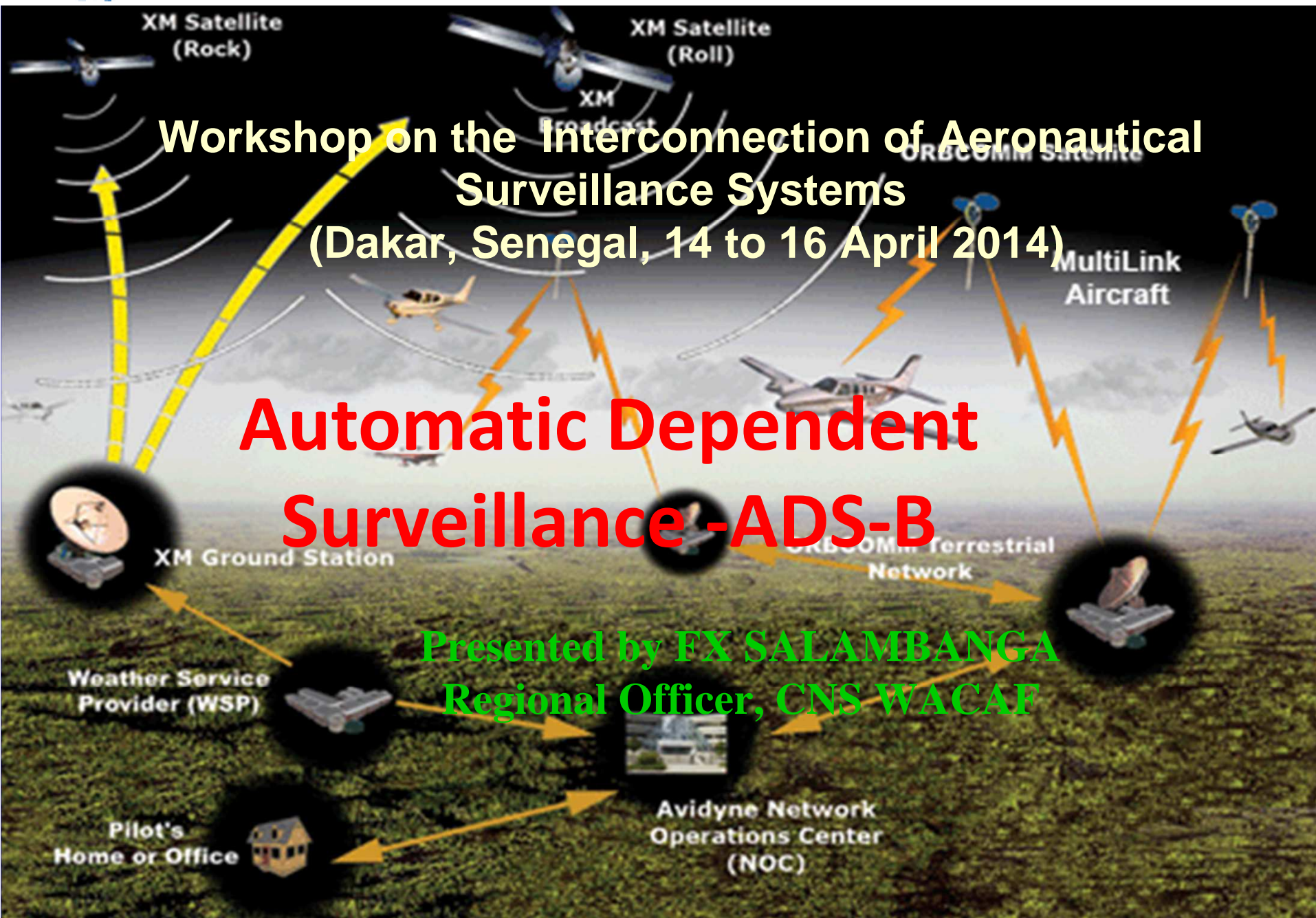


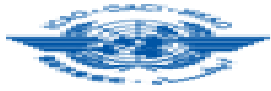


**Workshop on the Interconnection of Aeronautical Surveillance Systems  
(Dakar, Senegal, 14 to 16 April 2014)**

**Automatic Dependent Surveillance - ADS-B**

**Presented by FX SALAMBANGA  
Regional Officer, CNS WACAF**





# OUTLINE

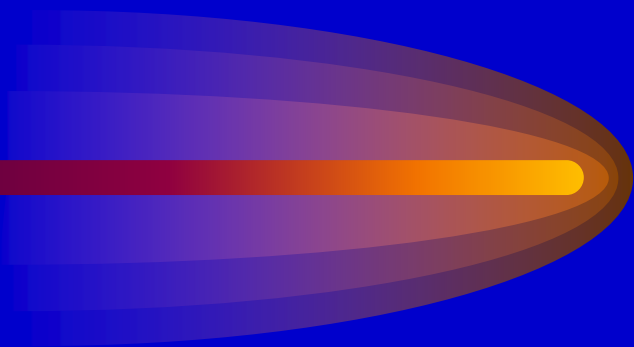
**I – Definition**

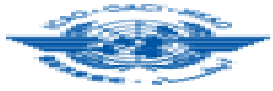
**II – Principles**

**III – Architecture**

**IV - ADS Functional objectives  
and services**

**V - Conclusions**





## Definition: ADS-B

**Automatic** - It's always ON and requires no operator intervention

**Dependent** - It depends on an accurate GNSS signal for position data

**Surveillance** - It provides "**Radar-like**" surveillance services, much like RADAR

**Broadcast** - It continuously **broadcasts aircraft position and other data** to any aircraft, or ground station equipped to receive ADS-B



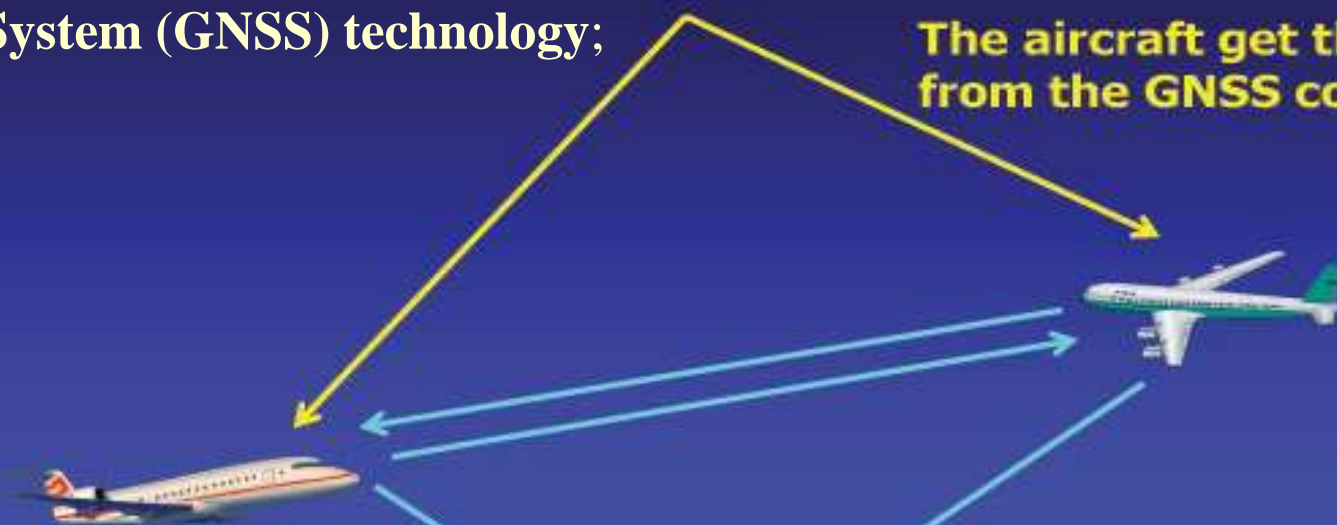
# ADS-B Principle (1)

## How Does ADS-B Work?

Conventional Global Navigation Satellite System (GNSS) technology;



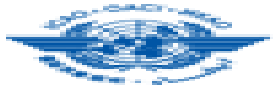
The aircraft get their position from the GNSS constellation



Then they simultaneously broadcast their position and other data to any aircraft, or ground station equipped to receive it



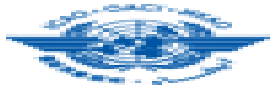
Ground Stations then transmit the aircraft's position to Air Traffic Control



## ADS-B Principle (2)

Also, unlike radar:

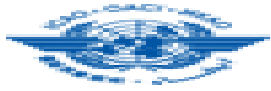
- ADS-B accuracy does not seriously ~~degrade with range, atmospheric conditions, or target altitude~~
- ADS-B update intervals do not depend on the rotational speed or reliability of mechanical antennas.



### **ADS-B Principle (3)**

**Aircraft precise position broadcasted in space via a digital datalink with other data (airspeed, altitude..), and whether the aircraft is turning, climbing, or descending.**

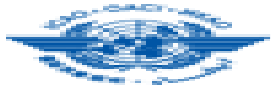
**ADS-B receivers provide users (Pilots/ATCs) with the same real-time information and accurate depiction of aviation traffic, both in the air and on the ground.**



## ADS-B Principle (4)

### Unlike conventional radar, ADS-B:

- Works at low altitudes and on the ground therefore can be used for taxiways and runways traffic monitoring.
- Is also effective in remote areas or in mountainous terrain where there is no radar coverage, or where radar coverage is limited.

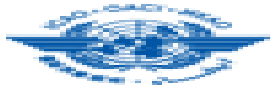


## ADS-B Principle (4)

### ADS-B OUT

- Aircraft to report position information to ATC and to other aircraft;
- **Aircraft must have**
  - An **IFR certified GPS** receiver as the position source, and;
  - A data link **Mode S Extended Squitter** to send the ADS-B data.
- **UAT data link** specific to US airspace –not approved elsewhere may only be used on GA aircraft at lower altitudes in the USA.

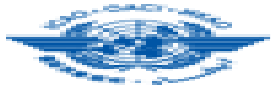




## ADS-B Principle (4)

### ADS-B IN

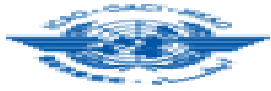
- Aircraft to be able to hear position reports from all the other nearby aircraft – independently of ATC;
- Such a facility would drive “Cockpit Display of Traffic Information”( **CDTI**);
- In practice this kind of display often integrated with a Multi-Function Display or moving map GPS display.



## ADS-B Principle (4)

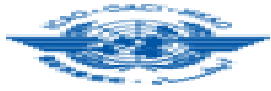
### ADS-B IN

- ADS-B “In” requires a **data link receiver**, in addition to the ADS-B “Out” data link transmitter ;
- **Mode S transponder based solutions today do NOT include the data link receiver;**
- **Instead, the Mode S based ADS-B receivers are generally packaged as a separate system. At the high end, these are usually integrated with TCAS systems;**
- **For GA aircraft a separate ADS-B receiver is used.**



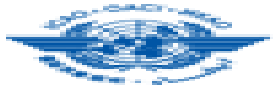
## Advantages of ADS-B

- **ADS-B gives pilots in the cockpit and controllers on the ground reliable, accurate, real-time information about air traffic;**
- **By using existing, proven, digital communications technology, ADS-B can be implemented rapidly for a relatively low cost;**
- **Effective range of more than 100 miles of ADS-B provides a much greater margin in which to implement conflict detection and resolution;**



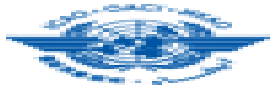
## Advantages of ADS-B

- Pilots and controllers using ADS-B data will be able to determine not only the position of conflicting traffic, but will clearly see the traffic's direction, speed, and relative altitude;
- As the conflicting traffic turns, accelerates, climbs, or descends, ADS-B will indicate the changes clearly and immediately;
- ADS-B systems can further enhance aviation safety through features such as automatic traffic call-outs or warnings of imminent runway incursion.



## Advantages of ADS-B

- **ADS-B can be scaled and adapted for use in general aviation and in ground vehicles;**
- **This will provide affordable, effective surveillance of all air and ground traffic, even on:**
  - **Airport taxiways and runways, and in**
  - **Airspace where radar is ineffective or unavailable;**



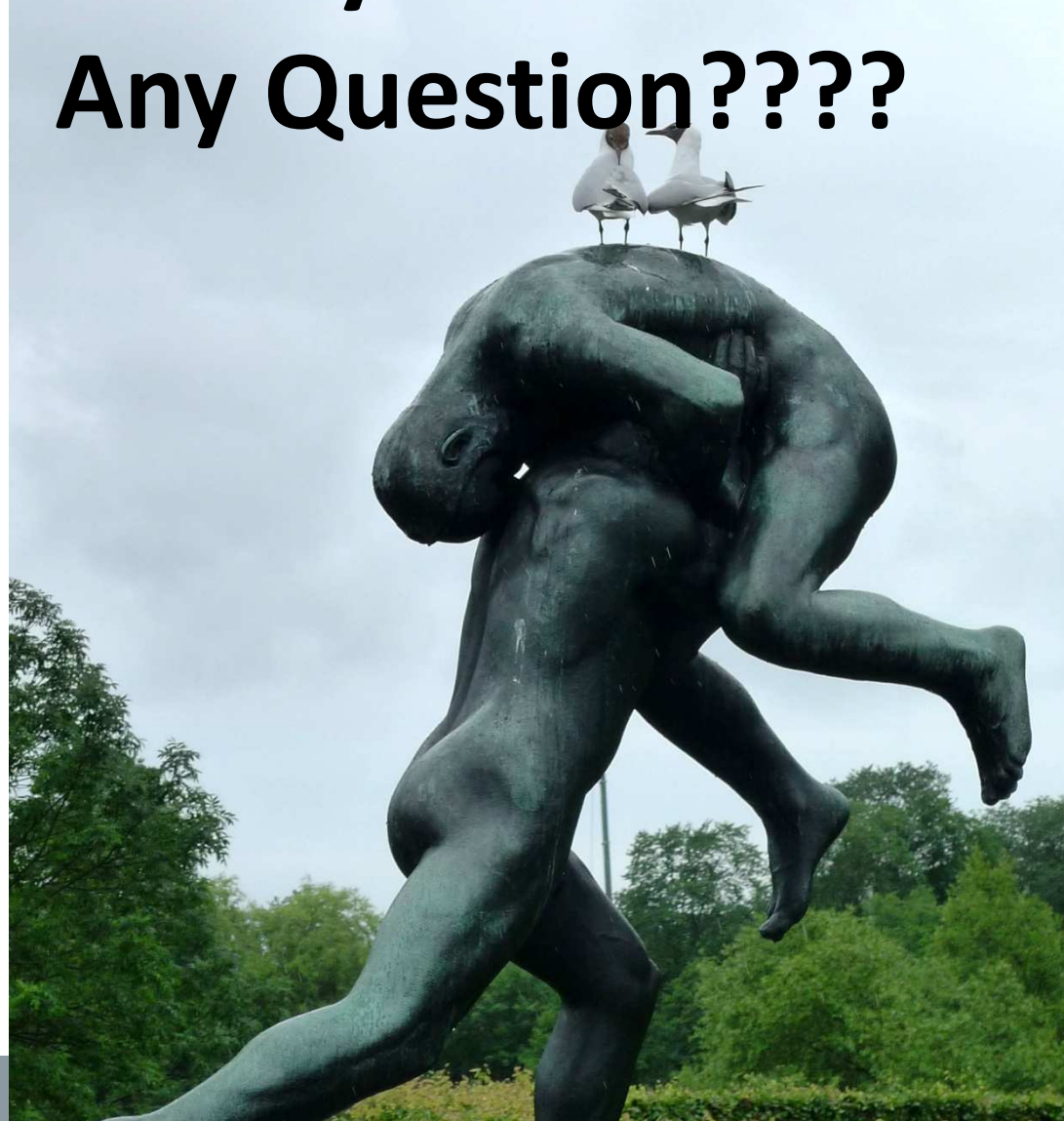
## Advantages of ADS-B

- **General aviation aircraft can use ADS-B data links to receive flight information services such as graphical weather depiction and textual flight advisories;**
- **In the past, these services have been unavailable or too expensive for widespread use in general aviation.**



**Thank you for your Kind attention !**

**Any Question????**



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