



ICAO

UNITING AVIATION

NO COUNTRY LEFT BEHIND



Concept and benefits of GBAS - SBAS



Raphael GUILLET
Chief of the ICAO Asia Pacific
Regional Sub-Office
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GBAS & SBAS

Concept 

Benefits 

Implementation challenges 



Satellite constellations



GPS

Glonass

Galileo

Beidou



Several types of errors :

- Satellite clock & ephemerid
- Ionosphere
- Troposphere

And lack of integrity

Need to elaborate corrections



Global Navigation Satellite System (GNSS)



GPS

Three types of augmentations

Glonass

Galileo

Beidou



ABAS



Aircraft Based Augmentation System

GBAS



Ground Based Augmentation System

SBAS

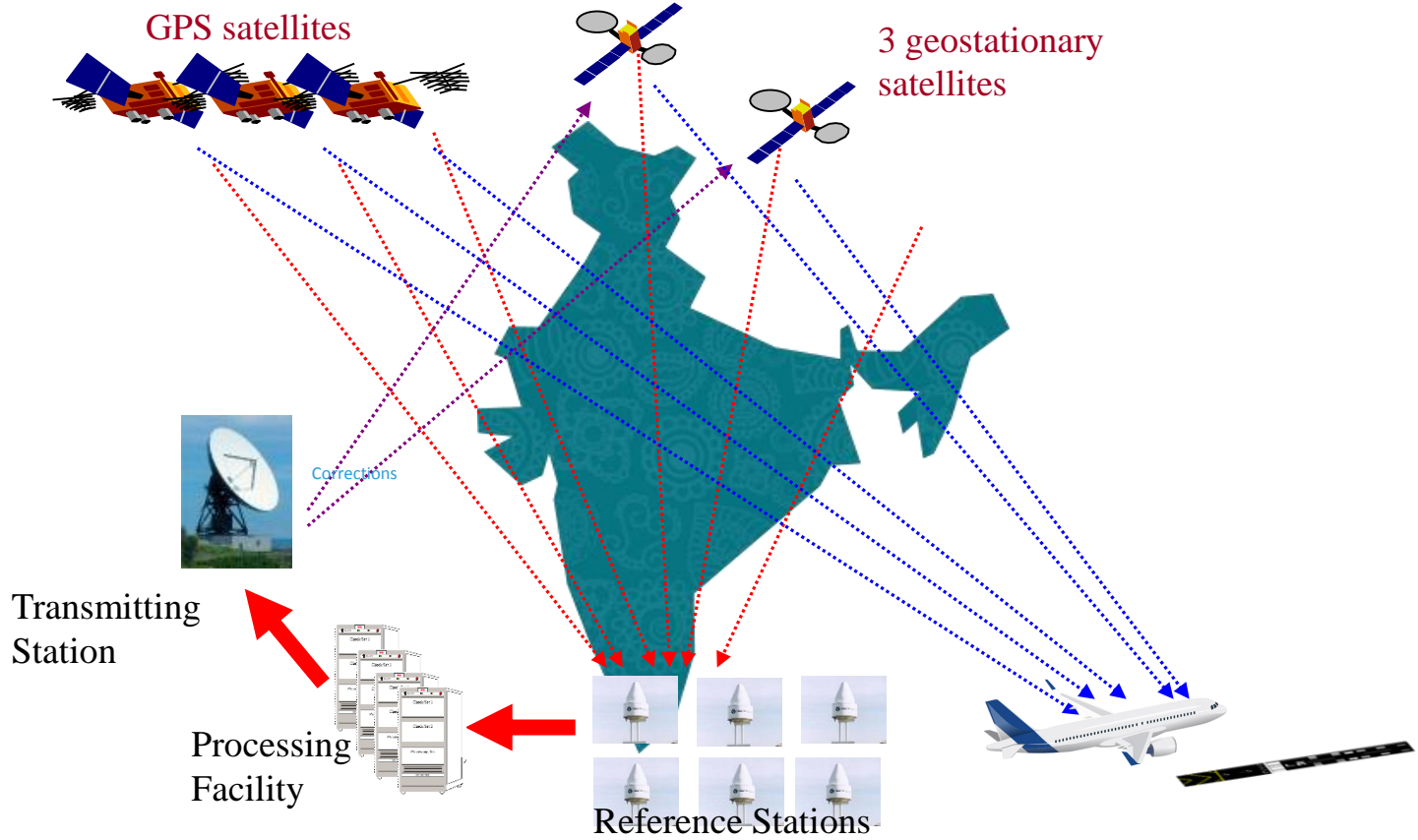


Satellite Based Augmentation System

Future : Development of dual frequency multi constellation receiver. Great improvement of PBN coverage all over the globe, especially for the vertical.

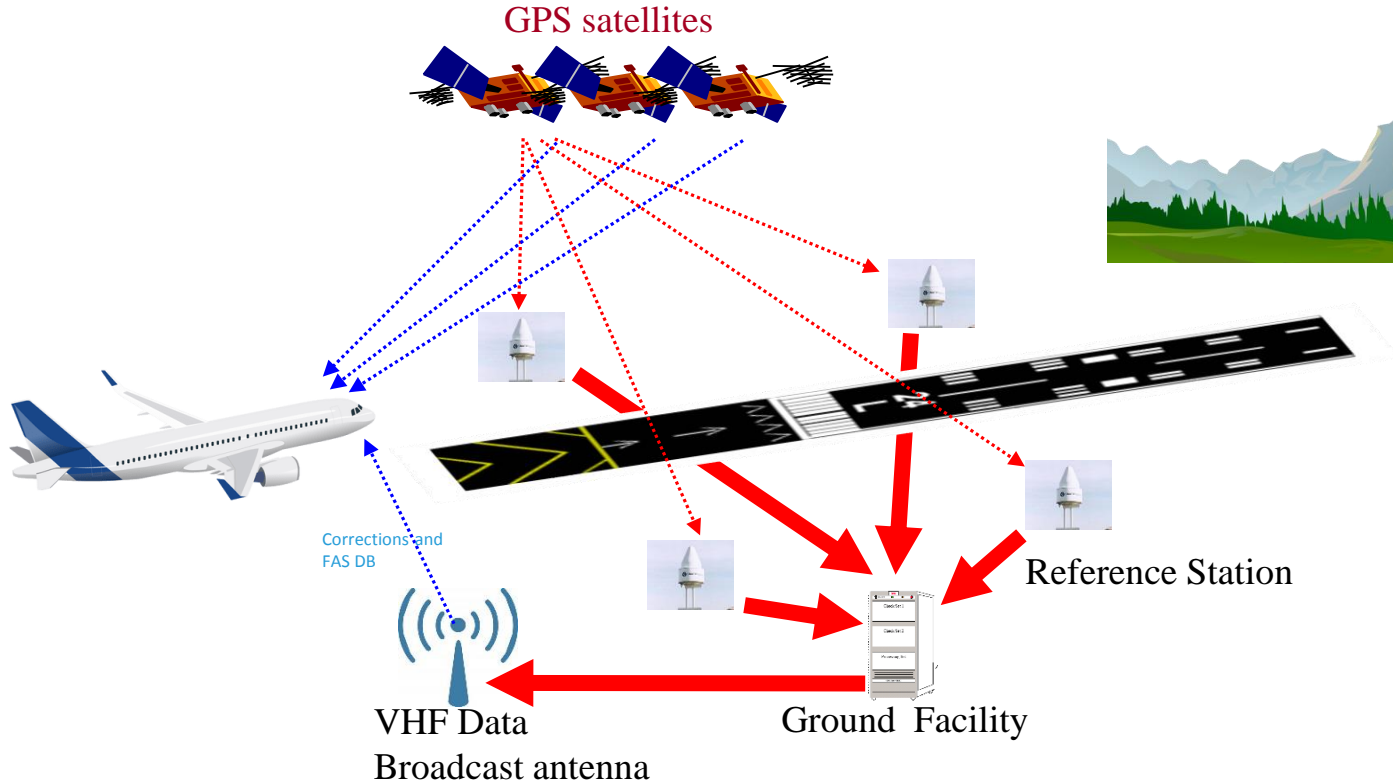


SBAS architecture



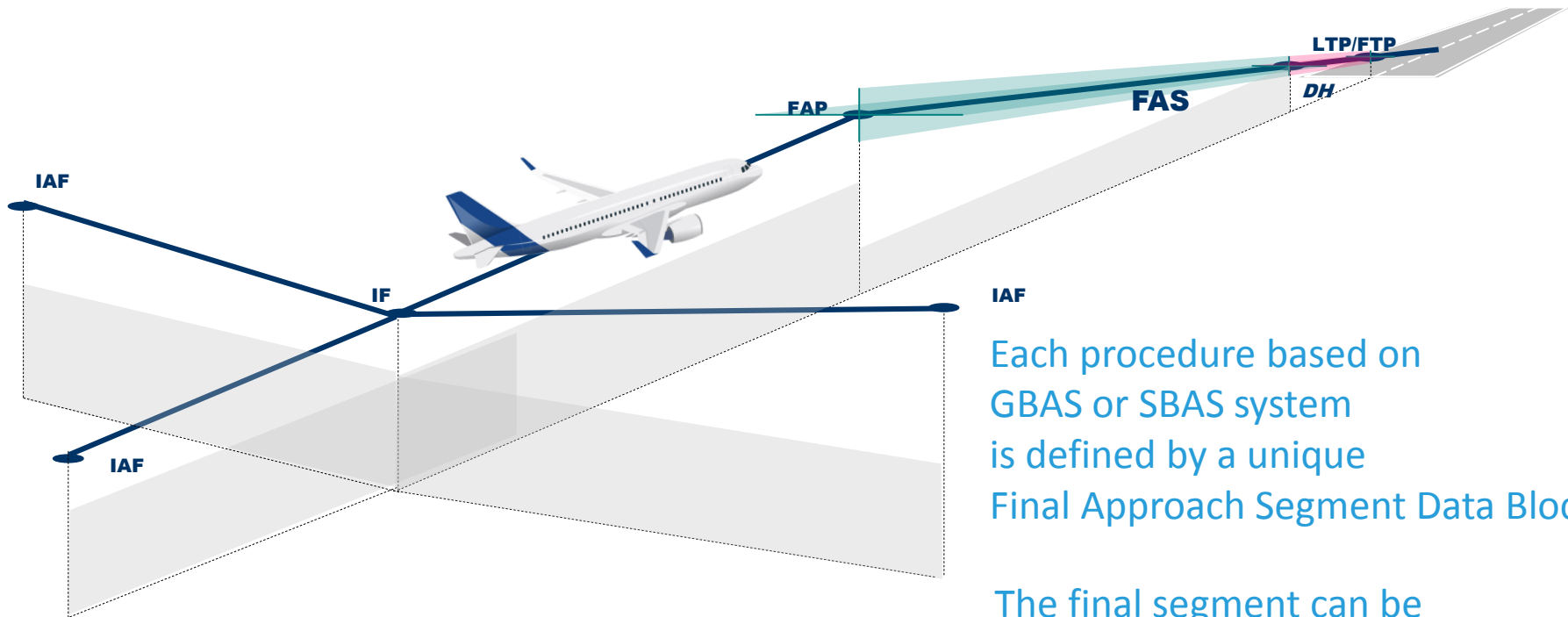


GBAS architecture





Final Approach Segment Data Block



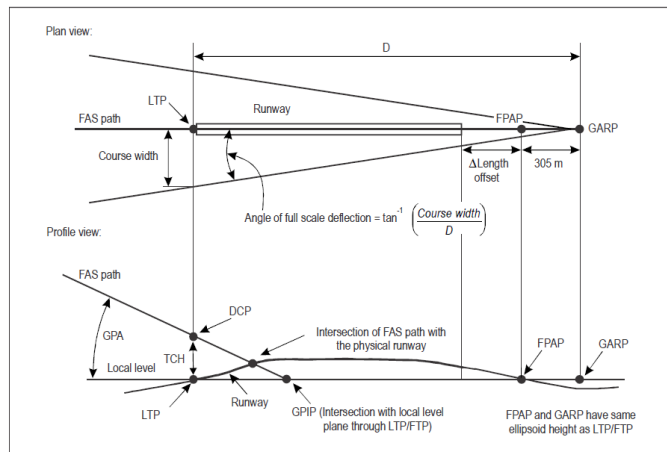
Each procedure based on GBAS or SBAS system is defined by a unique Final Approach Segment Data Block

The final segment can be intercepted before the FAP



Final Approach Segment Data Block

Table B-66. Final approach segment (FAS) data block



- DCP — datum crossing point
- FAS — final approach segment
- FPAP — flight path alignment point
- FTP — fictitious threshold point (see Figure D-7)
- GARP — GNSS azimuth reference point
- GPA — glide path angle
- GPIP — glide path intersection point
- LTP — landing threshold point
- TCH — threshold crossing height

Figure D-15. FAS path definition

Data content	Bits used	Range of values	Resolution
Operation type	4	0 to 15	1
SBAS provider ID	4	0 to 15	1
Airport ID	32	—	—
Runway number	6	1 to 36	1
Runway letter	2	—	—
Approach performance designator	3	0 to 7	1
Route indicator	5	—	—
Reference path data selector	8	0 to 48	1
Reference path identifier	32	—	—
LTP/FTP latitude	32	±90.0°	0.0005 arcsec
LTP/FTP longitude	32	±180.0°	0.0005 arcsec
LTP/FTP height	16	-512.0 to 6 041.5 m	0.1 m
ΔFPAP latitude	24	±1.0°	0.0005 arcsec
ΔFPAP longitude	24	±1.0°	0.0005 arcsec
Approach TCH (Note)	15	0 to 1 638.35 m or 0 to 3 276.7 ft	0.05 m or 0.1 ft
Approach TCH units selector	1	—	—
GPA	16	0 to 90.0°	0.01°
Course width	8	80 to 143.75 m	0.25 m
ΔLength offset	8	0 to 2 032 m	8 m
Final approach segment CRC	32	—	—

Note.— Information can be provided in either feet or metres as indicated by the approach TCH unit selector.



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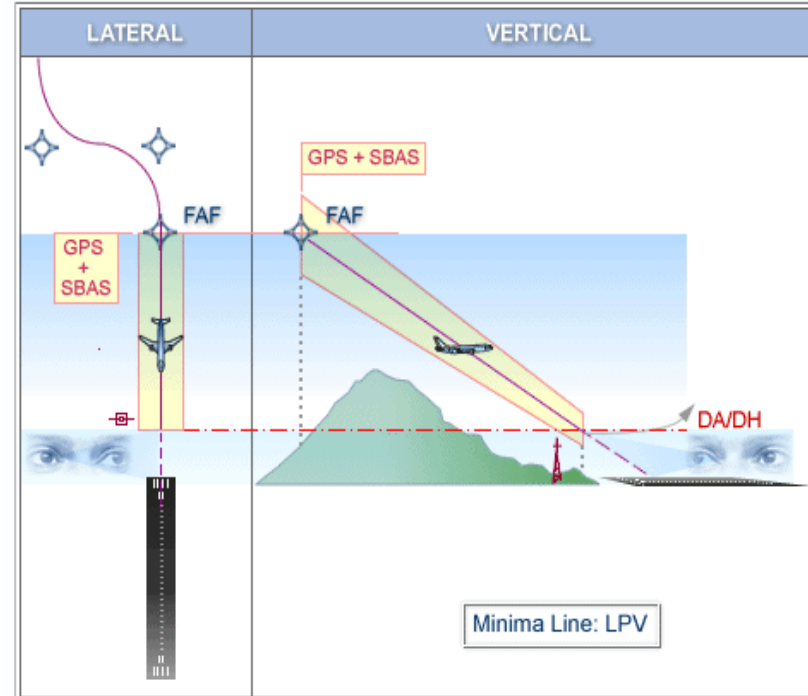
Implementation challenges





GBAS SBAS expected benefits

- Main benefit on the final segment
 - Horizontal and Vertical geometric guidance
 - ILS like display in the cockpit
 - with a Decision Altitude / Height
 - Independent of QNH setting and of temperature





GBAS SBAS expected benefits

– Can bring operations

- SBAS : down to **CAT I** (APV 250 ft and SBAS CAT I 200 ft)
- GBAS : **CAT I** to **CAT III** (special study for Ionosphere)

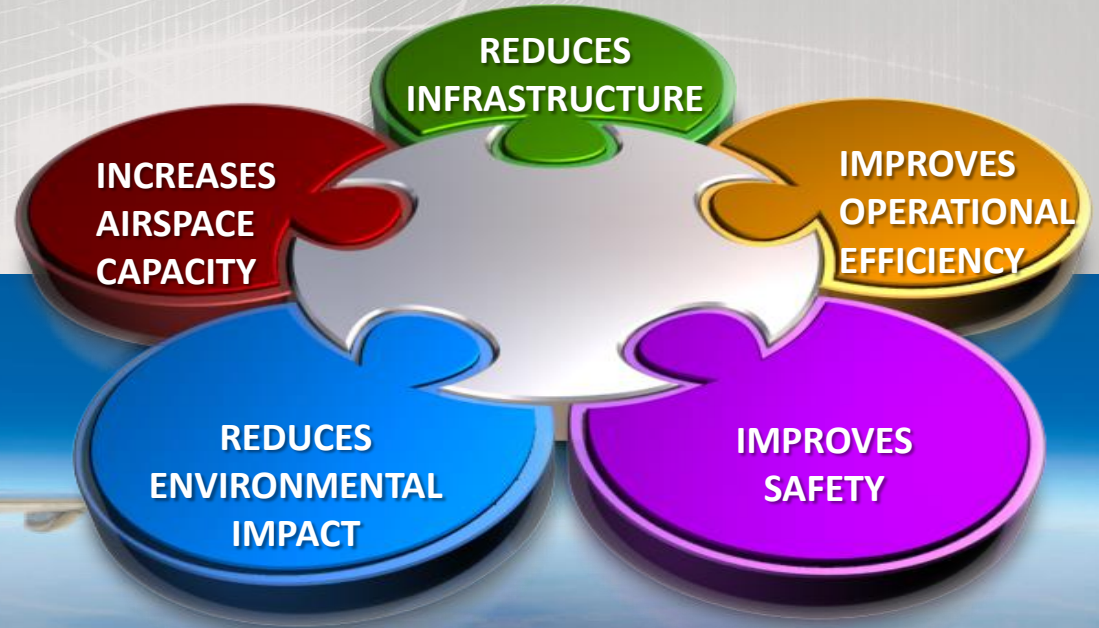
– Can serve

- SBAS : All IFR runway ends **on a whole continent**
- GBAS : All IFR runway ends **at the same airport**





GBAS SBAS expected benefits





GBAS & SBAS

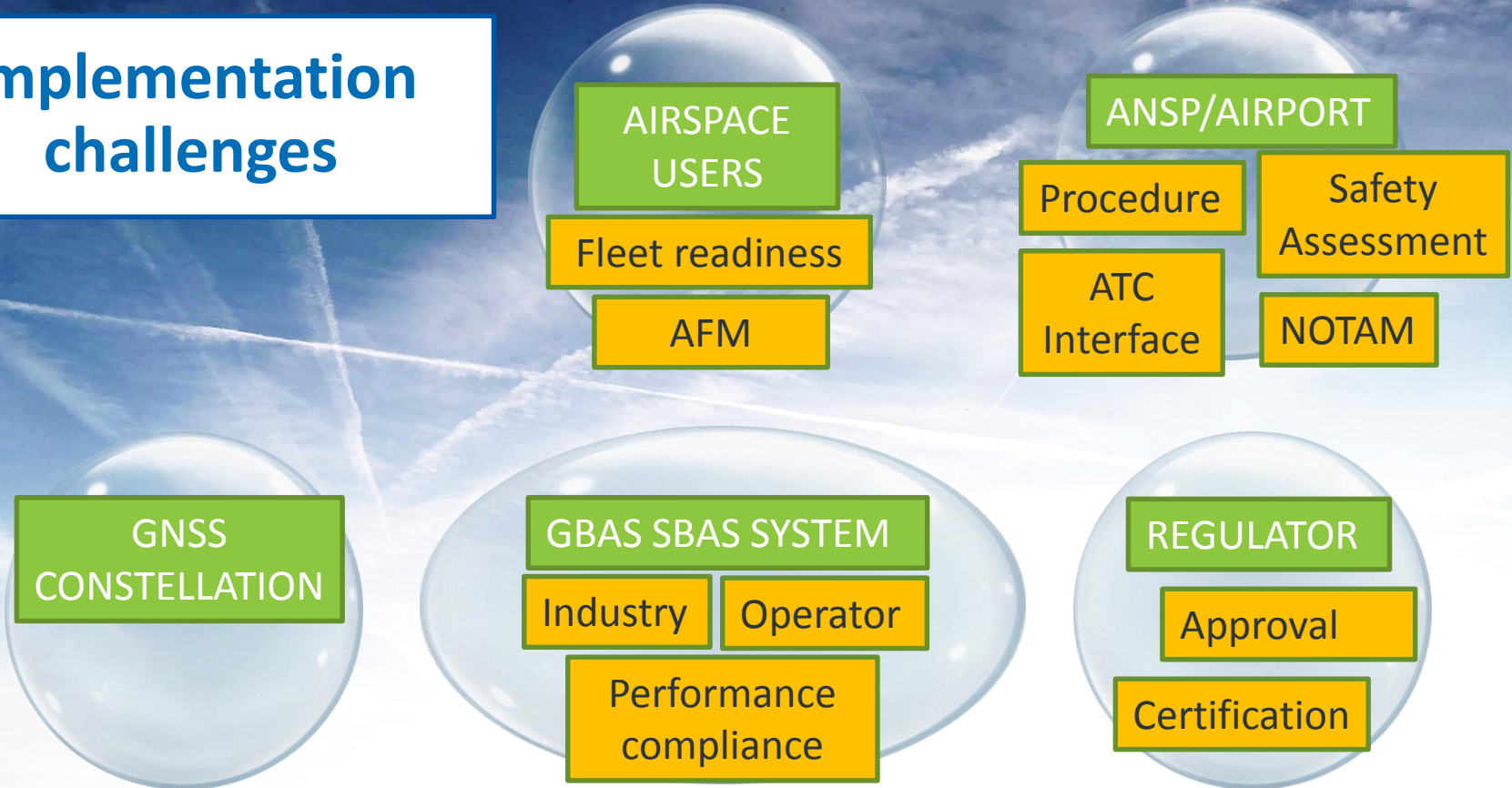
Concept

Benefits

Implementation challenges 



Implementation challenges





Implementation challenges





Implementation challenges



Need to involve all your stakeholders



ENJOY THE WORKSHOP





THANK YOU!