



Procedure Design Seminar on GBAS/SBAS by APAC FPP

Manager of APAC FPP, Liu Lujiang



WHO WE ARE?

Phase IV:

9 Active members



To become active members need to pay annual contribution(20,000USD) and enjoy the top priority for all kinds of trainings and services by **free**, and right of decision making as FPP SCM members.

13 User members



To become User members need to **sign** the Pro doc of APAC FPP without annual contribution and enjoy the priority for free basic training and basic technical consulting services

WHAT WE DO?



✓ **FPP OBJECTIVES**

“NO COUNTRY LEFT BEHIND” IN THE INSTRUMENT FLIGHT PROCEDURE DOMAIN TO DEVELOP APAC STATES’ CAPABILITIES IN IFP DESIGN **THROUGH TRAINING, PROJECT CONSULTING AND FLIGHT PROCEDURE DESIGN.**

MAKING REGIONAL PROGRESS IN TERMS OF **SAFETY, EFFICIENCY AND ENVIRONMENTAL IMPROVEMENT.**

APAC FPP Training Plan in 2023

	Date	Activities	Location*
1	06-17 Mar	Flight Procedure Design Course- Module 1 (main topic: Foundation skills & SIDs)	Beijing/Online
2	08-19 May	Flight Procedure Design Course- Module 2 (main topic: 2D approach, NPA& RNP APCH)	Beijing/Online
3	24-28 Jul	RNP AR workshop	Beijing/Online
4	4-15 Sep	Flight Procedure Design Course- Module 3 (main topic: 3D approach, ILS & Baro-VNAV)	Manila/Online
5	9-10 Nov	Procedure Design Seminar (GBAS/SBAS)	Beijing/Online

As first step, FPP prefers to use the PD seminar as a platform, plans to brainstorm and discuss the **challenges encountered in procedure design** from different States, then makes more **targeted work plans and solutions** for the flight procedure design of GBAS/SBAS. **More following topics will be shared with real cases during PD seminar.**

SCOPE



WHAT WE CAN DO?

- 01 Focusing on the final approach procedure design of GBAS&SBAS.
- 02 What are the differences of flight procedure design Among the ILS, GBAS & SBAS?
- 03 Where are the Challenges for GBAS & SBAS flight procedure design?
- 04 Which key steps need to focus for GBAS/SBAS Flight Procedure Design ?

All above will be shared though ICAO Documents/Annex, and real cases analysis which from Australia, France and China

Steps

Which key steps need to focus for GBAS/SBAS FPD

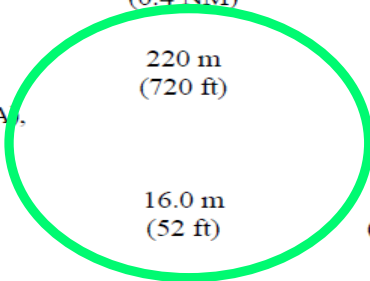
- Which performance requirements could apply?
- How to generate the files for FAS Data block?
- How to validate FAS Data block?
- How to use the software for FAS Data block?
- How to input data for FAS Data block?
- How to ensure the quality/accuracy from input to transmission?

APAC FPP are focusing on above during the PD seminar



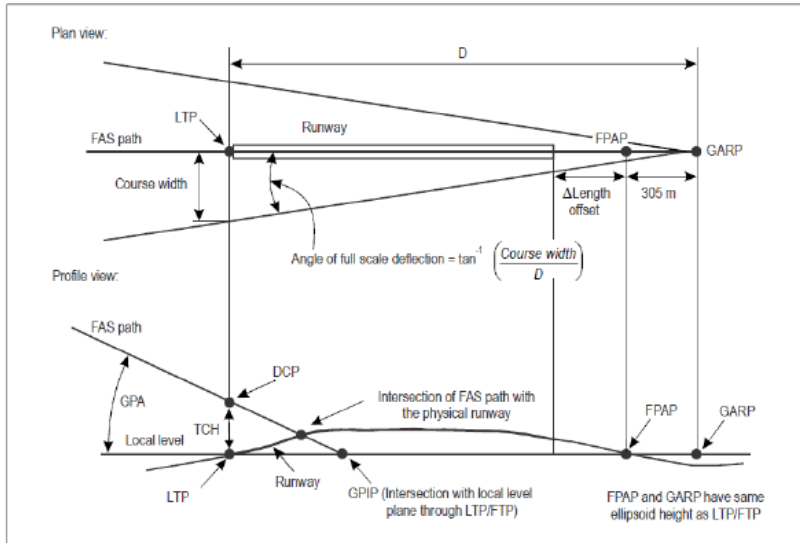
Table 3.7.2.4-1 Signal-in-space performance requirements

Typical operation	Accuracy horizontal 95% (Notes 1 and 3)	Accuracy vertical 95% (Notes 1 and 3)	Integrity (Note 2)	Time-to-alert (Note 3)	Continuity (Note 4)	Availability (Note 5)
En-route	3.7 km (2.0 NM)	N/A	$1 - 1 \times 10^{-7}/h$	5 min	$1 - 1 \times 10^{-4}/h$ to $1 - 1 \times 10^{-8}/h$	0.99 to 0.99999
En-route, Terminal	0.74 km (0.4 NM)	N/A	$1 - 1 \times 10^{-7}/h$	15 s	$1 - 1 \times 10^{-4}/h$ to $1 - 1 \times 10^{-8}/h$	0.99 to 0.99999
Initial approach, Intermediate approach, Non-precision approach (NPA), Departure	220 m (720 ft)	N/A	$1 - 1 \times 10^{-7}/h$	10 s	$1 - 1 \times 10^{-4}/h$ to $1 - 1 \times 10^{-8}/h$	0.99 to 0.99999
Approach operations with vertical guidance (APV-I) (Note 8)	16.0 m (52 ft)	20 m (66 ft)	$1 - 2 \times 10^{-7}$ in any approach	10 s	$1 - 8 \times 10^{-6}$ per 15 s	0.99 to 0.99999
Approach operations with vertical guidance (APV-II) (Note 8)	16.0 m (52 ft)	8.0 m (26 ft)	$1 - 2 \times 10^{-7}$ in any approach	6 s	$1 - 8 \times 10^{-6}$ per 15 s	0.99 to 0.99999
Category I precision approach (Note 7)	16.0 m (52 ft)	6.0 m to 4.0 m (20 ft to 13 ft) (Note 6)	$1 - 2 \times 10^{-7}$ in any approach	6 s	$1 - 8 \times 10^{-6}$ per 15 s	0.99 to 0.99999



Annex 10, VOL I show that the most difference among the approach procedures requirement is navigation accuracy.

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

FAS path definition

The FAS (final approach segment) data block shall contain parameters that define a GBAS/SBAS approach procedure. The FAS data block contains **21 parameters**. Some of the FAS data block **are not** the responsibility of the procedure designer. The procedure designer should provide **alphanumeric input** to an **appropriate software tool** that generates the binary string describing the FAS data block as well as calculating the **cyclic redundancy check (CRC)** remainder. The standardized alphanumeric input of the elements into the FAS data block tool is described in **Doc 8168 appendix**.

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.

FAS data block

Welcome to attend PD Seminar as audience or **speakers**



ICAO



More info through: <https://www.icao.int/APAC/APAC-FPP/Pages/default.aspx>
Please contact by email lujiangliu@icao.int for being volunteer speakers in PD Seminar