GBAS-SBAS Procedure Design Training at APAC FPP

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ICAO Asia-Pacific Flight Procedure Programme

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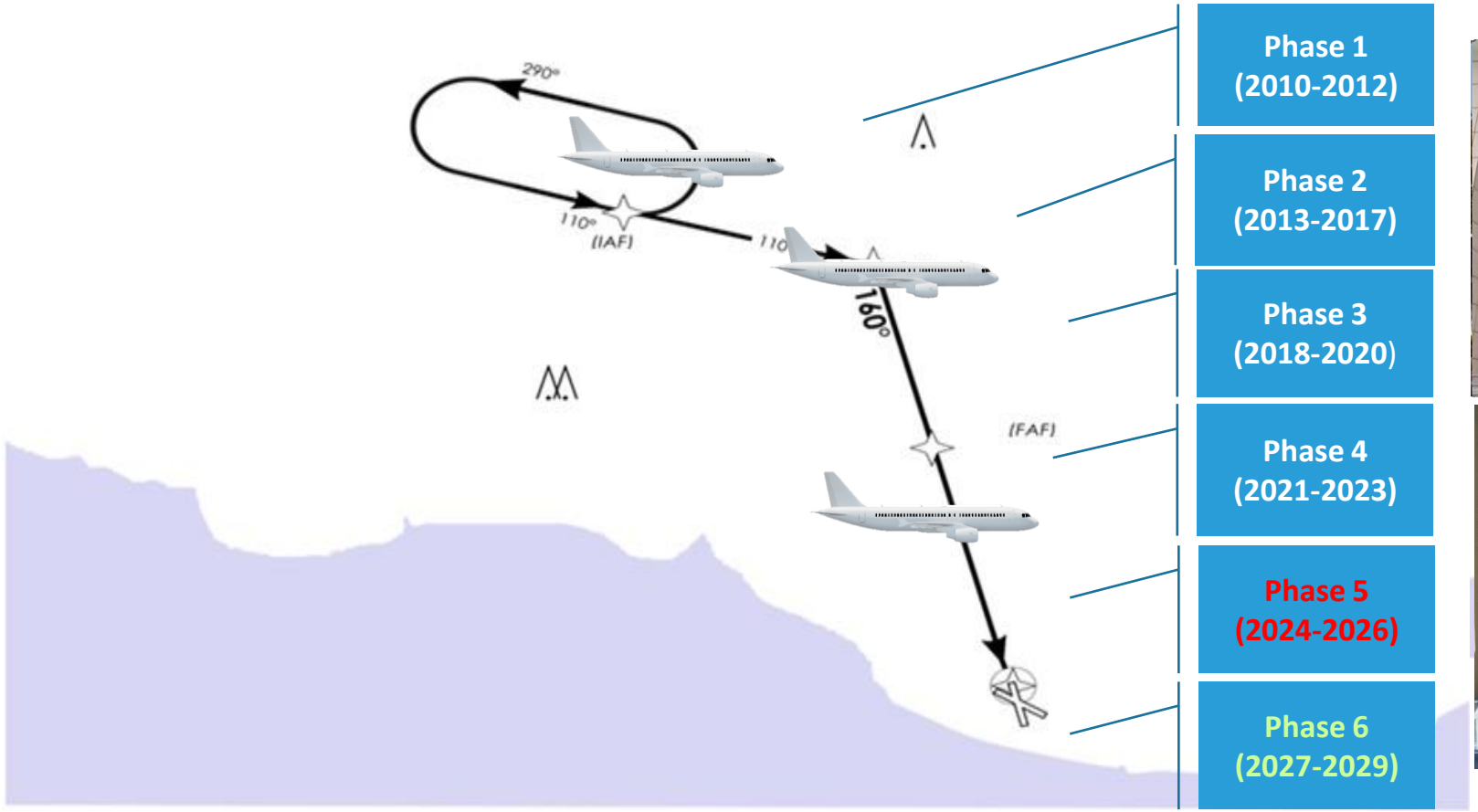
Flight Procedure Programme (FPP) History

- To support ICAO Assembly Resolution A36-23 and then A37-11 on PBN implementation, ICAO Asia-Pacific PBN Task Force recommended ICAO APANPIRG to establish the FPP.
- In September 2009, APANPIRG/20 meeting endorsed the concept.
- With supports from 10 Active Participating members, the FPP office was established in October 2009 and located in Beijing, China hosted by the Civil Aviation Administration of China (CAAC).
- In June 2013, co-located with APAC RSO.

History

FPP Phases



- Phase 1 (2010-2012)
- Phase 2 (2013-2017)
- Phase 3 (2018-2020)
- Phase 4 (2021-2023)
- Phase 5 (2024-2026)
- Phase 6 (2027-2029)

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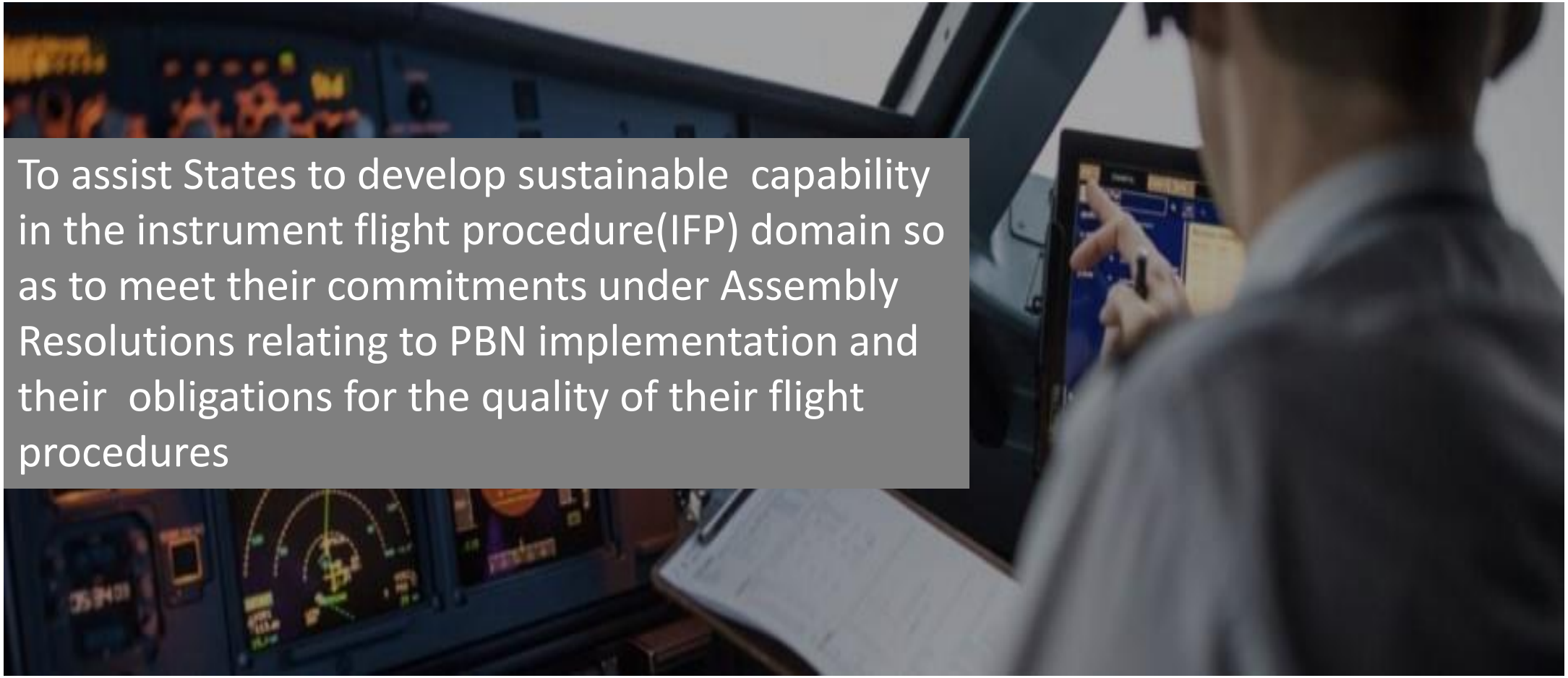
FPP Objectives



To assist States to develop sustainable capability in the instrument flight procedure(IFP) domain so as to meet their commitments under Assembly Resolutions relating to PBN implementation and their obligations for the quality of their flight procedures

FPP Members

MEMBER STATES

- **8 Active** Members (**SCM** members)
- **1 Donor** Member
- 12 **User** Members

+ ACTIVE STATES

8 active participanting States/Administrations, including the Host State which participate in the Programme funding by annual contributions and is a Member of the Steering Committee.

Australia,
China,
Hong Kong SAR China,
Macao SAR China,
Philippines,
Republic of Korea,
Singapore,
Thailand

+ USER STATES

12 user States/Administrations which use the Programme and shall bear certain expenses for assistance provided to but does not participate in the Programme funding by annual contributions.

Bangladesh,
Cambodia,
Fiji,
Indonesia,
Lao PDR,
Malaysia,
Maldives,
Mongolia,
Nepal,
Pakistan,
Sri Lanka,
Vietnam

+ DONOR STATES

1 donor State which supports APAC-FPP by financial contribution or contribution in-kind and is a member of the Streering Committee upon approval by the SC.

France

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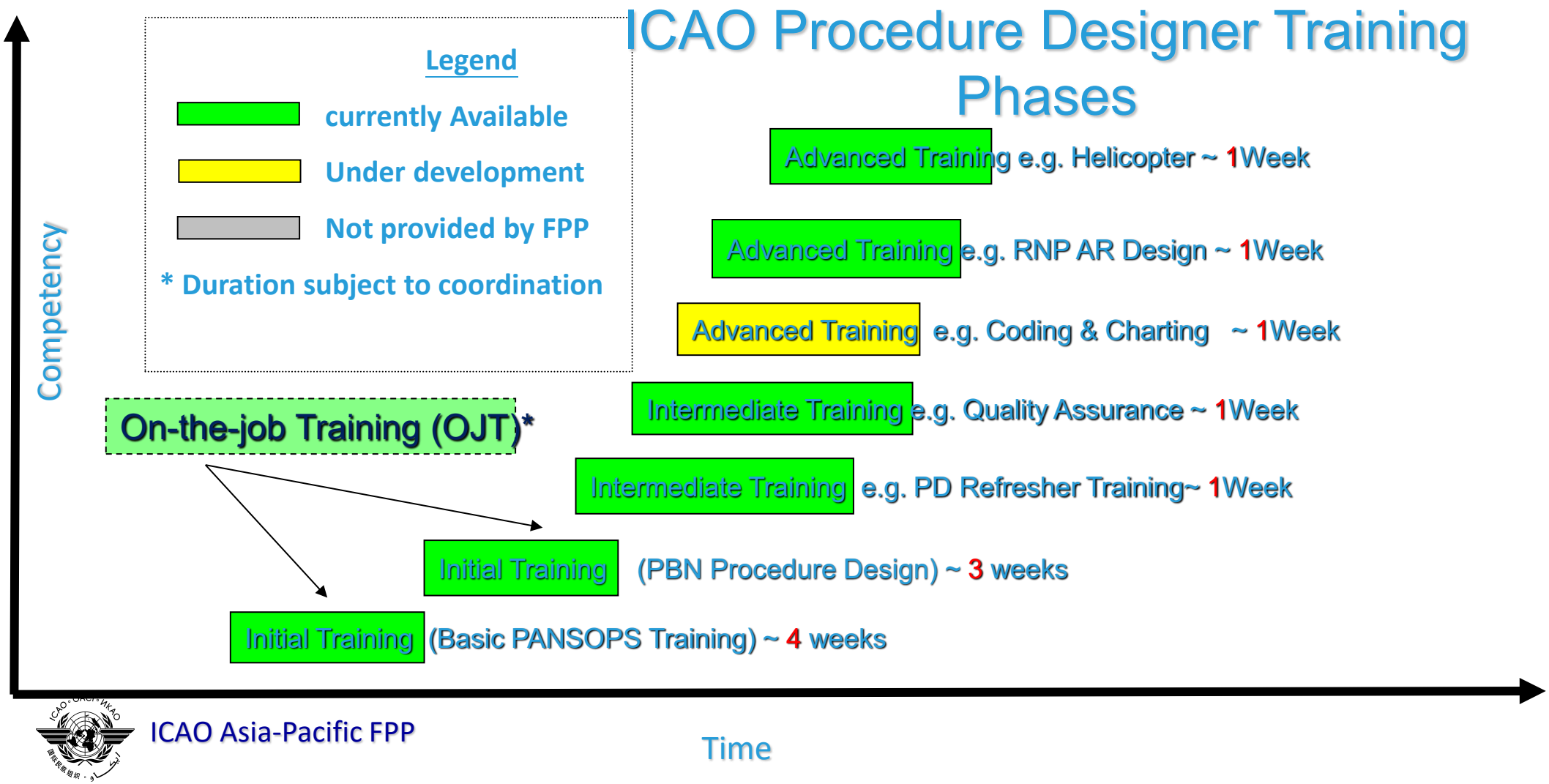
WHAT WE DO

"No country left behind" in the instrument flight procedure domain, develop APAC states' capabilities in IFP design through training, project consulting and flight procedure design service.

Making REGIONAL progress in terms of safety, efficiency and environmental improvement.

WHAT WE DO


ICAO Procedure Designer Training Phases
Legend
currently Available
Under development
Not provided by FPP
* Duration subject to coordination
Competency
On-the-job Training (OJT)*
Advanced Training e.g. Helicopter ~ 1Week
Advanced Training e.g. RNP AR Design ~ 1Week
Advanced Training e.g. Coding & Charting ~ 1Week
Intermediate Training e.g. Quality Assurance ~ 1Week
Intermediate Training e.g. PD Refresher Training~ 1Week
Initial Training (PBN Procedure Design) ~ 3 weeks
Initial Training (Basic PANSOPS Training) ~ 4 weeks
ICAO Asia-Pacific FPP
Time

WHAT WE HAVE DONE

Training

Courses and Workshops

101 Total

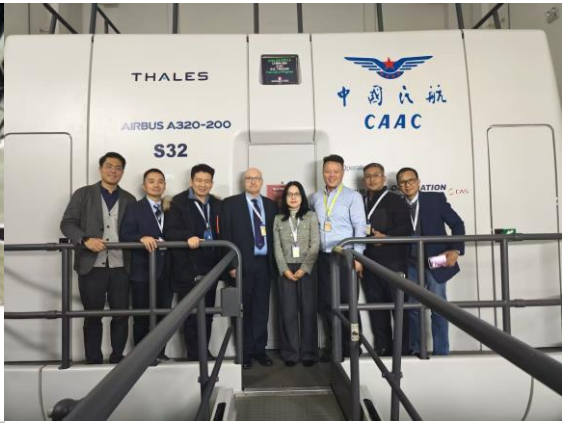
From **36** States/Administrations

1056 Days

3449 Total overall participants

33 more students

Compare with Number of Participants in 2024



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Challenges

- Significant Safety Concerns (SSCs) have been raised during the USOAP audit in one Region which are related to publications and the associated oversight/regulatory inadequacies of IFPs.
- The statistics show that regional States and/or Air Navigation Service Providers are still facing some of the following main procedure design-related issues and problems:

a) Need for enhancement of procedure design training: initial, on-the-job (OJT), and/or recurrent;

b) High turnover among procedure designers;

c) Insufficient procedure design work in some States to attain or maintain proficiency;

Challenges

d) Lack of depth in procedure design organization to perform quality assurance (QA);

e) Insufficient expertise in procedure design organization to provide adequate QA of procedures;

f) Lack of experience in both charting and navigation database coding;

g) Lack of regulatory oversight framework; and

h) Insufficient regulatory expertise to oversee the procedure design service provider

Phase 6 (2027-2029)

GBAS-SBAS Procedure Design Training

Procedure Design Course Schedule-Module 3 3D Approach(PA & APV)

"APV Baro-VNAV"	**APV Baro-VNAV : approach segment**	**APV Baro-VNAV : approach segment (offset approach)**	***APV Baro-VNAV : approach segment**
"APV Baro-VNAV"	**APV Baro-VNAV : Missed approach segment**		***APV Baro-VNAV : Missed approach segment**
"APV SBAS/GBAS and LPV/GLS concept"	**APV SBAS/GBAS concept**	**LPV/GLS concept**	**Coding for 3D approach**
"PBN in combination with ILS (PBN + ILS)& RF turn "	PBN in combination with ILS (TF leg)	PBN in combination with ILS (RF leg)	*Coding
"Charting"	Sum up	*Progress test & Self-assessment	

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Procedure Design Refresher Course Schedule

Registration & Introduction	Doc 8168 Amendment & Doc 9613	Quality Assurance (DOC 8168/9906)	RF Turn
Baro-VNAV	Baro-VNAV	Exercise 1 : Baro-VNAV	Exercise 1 : Baro-VNAV
RNAV + ILS	RNAV + ILS	Exercise 2 : RNAV + ILS	Exercise 2 : RNAV + ILS
SBAS/GBAS Concept	SBAS/GBAS Concept	Charting	Sum up

PBN Procedure Design Course Schedule

09:00-10:30	10:45-12:00	13:20-14:50	15:10-16:40
Departure	Departure Exercise	Departure Exercise	Departure Exercise
Arrival (TAA include)	Holding	RNAV ILS	RF
Coding	Coding Exercise	Charting	CDO
GBAS/SBAS & FAS data block	GBAS/SBAS & FAS data block	Progress Test 2	Group Exercise RNP 1 SID, STAR, RNP APCH
Group Exercise RNP 1 SID, STAR, RNP APCH	Group Exercise RNP 1 SID, STAR, RNP APCH	Group Exercise RNP 1 SID, STAR, RNP APCH	Group Exercise RNP 1 SID, STAR, RNP APCH

GBAS-SBAS Procedure Design

Contents

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GBAS-SBAS Procedure Design

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PART III. PERFORMANCE-BASED NAVIGATION PROCEDURES

Section 3. Procedure construction

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GBAS-SBAS Procedure Design

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PART III. PERFORMANCE-BASED NAVIGATION PROCEDURES

Section 3. Procedure construction

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What's new

- OAS termination
- Has a GARP(Ground Azimuth reference Point) instead of LOC
- SBAS Intermediate segment area ≠ LNAV intermediate segment area
- Guidance during Missed approach if TF
- No use of turning at altitude/height in the missed approach
- No use of Basic ILS surfaces
- OCH computation method:
  - APV SBAS (APV I) : OAS
  - APV Cat I : OAS or CRM

WHAT' S REMAINING ?

- Standard conditions
- Height loss
- Obstacle assessment
- CRM

Design Comparison

ILS Procedure

- Turn at altitude/height can be used in designing missed approach procedure
- Main ILS landing direction is generally the best direction of the terrain

GBAS-SBAS Procedure

- Turn at altitude/height can’t be used in designing missed approach procedure which causes some constraints
- Relatively challenging and large workload, GBAS SBAS procedure shall work for all runways

Design Comparison

ILS Procedure

- Glide path angle (GPA) and Landing threshold point (LTP) are fixed, determined by terrain and equipment installed
- Use Obstacle Assessment Surface (OAS) software

GBAS-SBAS Procedure

- GPA and LTP can be adjusted as needed. They shall be considered in the overall situation by procedure designers and modified in the FAS data block.
- Use OAS software, design of protection area is different, but the steps are the same.

FAS Data Block

Definition

Used to define the FAS path.

Path Accuracy

Totally dependent on accuracy , integrity of original data and the designers' calculation.

Not Affected

All the path are not affected by the location of ground facilities.

22

22 fields including the CRC, first 21 fields protected by the CRC;

Responsibility

Some elements of FAS data block are not the responsibility of designers.

Resolution

The fields value should be published in high resolution.

FAS Data Block Quality Assurance

Data element	*Accuracy*	*Resolution*	*Integrity*
FPAP (latitude and longitude)	0.3 m (1 ft)	0.0005″ (0.01″)	10^{-8}
LTP/FTP (latitude and longitude)	0.3 m (1 ft)	0.0005″ (0.01″)	10^{-8}
LTP/FTP (ellipsoidal height)	0.25 m	0.1 m	10^{-8}
Approach TCH	0.5 m	0.05 m	10^{-8}
Glide path angle	0.01°	0.01°	N/A
Course width	N/A	0.25 m	10^{-8}
Delta length offset	N/A	8 m	N/A

FAS Data Block

Data Content	*Example Data*
Operation Type	0
SBAS Provider Identifier	1
Airport Identifier	LFLC
Runway Number	26
Runway Letter	
Approach Performance Designator	0
Route Indicator	Z
Reference Path Data Selector	0
Reference Path Identifier	E26A
LTP/FTP Latitude	454718.3185N
LTP/FTP Longitude	0031114.4545E
LTP/FTP Height above ellipsoid	372.3
FPAP Latitude	454705.1260N
FPAP Longitude	0030900.4790E
Approach Threshold Crossing Height (TCH)	15
Approach TCH Units Selector	1
Glidepath Angle (GPA)	3
Course Width at threshold	105
Length Offset	48
Horizontal Alert Limit (HAL)	40
Vertical Alert Limit (VAL)	0
Final Approach Segment CRC	AB8761C6

FAS Data Block

Number	Data Content	Example Data
1	Operation Type	0
2	SBAS Service Provider ID	14
3	Airport ID	EDDF
4	Runway number	25
5	Runway letter	R
6	Approach performance designator	1
7	Route indicator	Z
8	Reference path data selector	1
9	Reference path identifier	G25A
10	LTP/FTP latitude	500244.9700N
11	LTP/FTP longitude	0083201.3800E
12	LTP/FTP height above ellipsoid	+00478
13	FPAP latitude	500213.4000N
14	FPAP longitude	0082949.4800E
15	ΔFPAP latitude	-31.5700
16	ΔFPAP longitude	-131.9000
17	Approach TCH	15.00
18	Approach TCH units selector	1
19	Glide path angle	3.00
20	Course width	105.00
21	ΔLength offset	0
22	Final approach segment CRC	0x78A199B7

ULSAN/Ulsan(RKPU)
RNP RWY 36

FAS DATA BLOCK INFORMATION

INPUT DATA

Parameters	Values
Operation Type	0
SBAS Provider	6 (KASS)
Airport Identifier	RKPU
Runway	36
Runway Letter	0 (None)
Approach Performance Designator	0
Route Indicator	
Reference Path Data Selector	0
Reference Path Identifier	K36A
LTP/FTP Latitude	353504.1470N
LTP/FTP Longitude	1292108.9500E
LTP/FTP Ellipsoidal Height (meters)	+00383(+38.3m)
FPAP Latitude	353608.8905N
Delta FPAP Latitude (seconds)	64.7435
FPAP Longitude	1292103.5405E
Delta FPAP Longitude (seconds)	-5.4095
Threshold Crossing Height (TCH)	50.0(feet) / 15.2(m)
TCH Units Selector (Feet)	0
Glidepath Angle (GPA, degrees)	3.00
Course Width (metres)	105.00
Length Offset (metres)	0
Horizontal Alert Limit (HAL, meters)	40.0
Vertical Alert Limit (VAL, meters)	50.0

OUTPUT DATA

Data Block	60 15 10 0B 12 24 00 00 01 36 33 0B A6 6D 45 0F AC 16 83 37 7F 15 CF F9 01 BD D5 FF F4 01 2C 01 64 00 C8 FA 10 38 07 E6
Calculated CRC Value	103807E6

Change : Information of FAS data block information.

Summary

- Procedure design training is the core activity of APAC FPP. To support the implementation of GBAS-SBAS in the region, FPP incorporates relevant procedure design sessions in both PBN Procedure Design and Procedure Design Refresher training courses.
- GBAS SBAS procedure design itself is not technically challenging, as it shares strong similarities with ILS procedure design. The main challenge is the regulatory approval of such procedures.
- FAS data block is a distinctive and unique element of GBAS-SBAS procedures. The accuracy, resolution and integrity of FAS data block are critical components of the overall quality assurance.

Work Plan of 2026

	Date	Activities	Location*	Participants	Strategic Objectives	Organizer
1	19 Jan-6 Feb	Procedure Design OJT	Beijing, China	As required by CAA Bangladesh	Expand Value Creation	FPP
2	4-5 Feb	PBN Flight Procedure Design Workshop for non-Designers	Online	FPP and APAC	Expand Value Creation	FPP
3	30 Mar-3 Apr	RNP-AR Workshop	Beijing, China	FPP and APAC	Expand Value Creation	FPP
4	11-15 May	Point in Space (Pins) Procedure Design Course	Beijing, China	FPP and APAC	Expand Value Creation	FPP
5	12-14 May	GBAS-SBAS ITF/8	Melbourn, Australia	APAC	Technical Exchange Platform	RSO
6	25-27 May	18th Steering Committee Meeting	Seoul, ROK	FPP and ICAO	Expand Value Creation	FPP/Host State
7	15 Jun-10 Jul	Pans-Ops Procedure Design Initial Course	Beijing, China	FPP and APAC	Expand Value Creation	FPP
8	07-25 Sep	PBN Procedure Design Course	Beijing, China	FPP and APAC	Expand Value Creation	FPP
9	16-20 Nov	Procedure Design Refresher Course (including Charting-Coding for Procedure Designers)	Bangkok, Thailand	FPP and APAC	Expand Value Creation	FPP

Thank You!

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