

GBAS Trial at the Hong Kong International Airport

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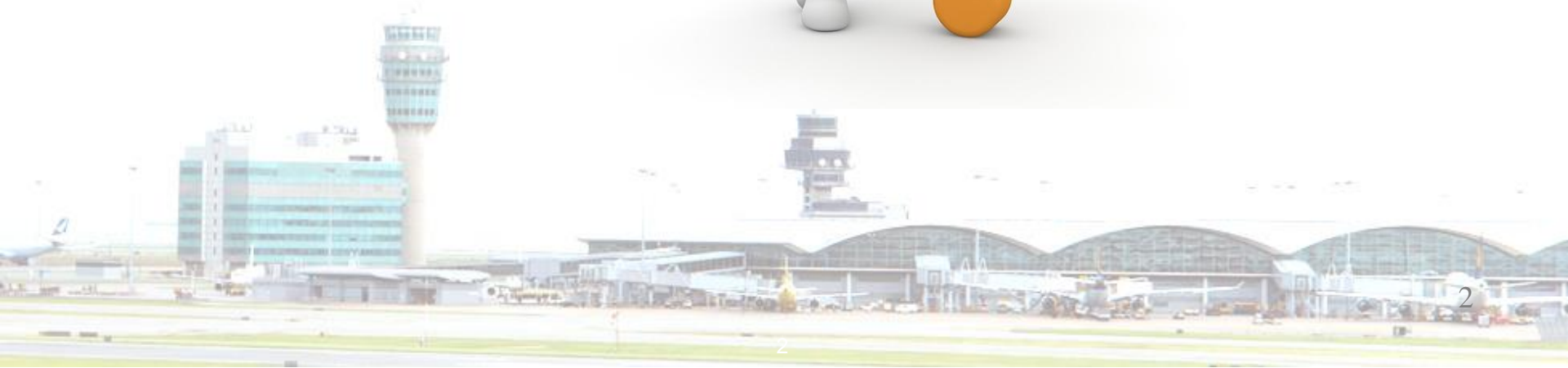


Purposes of GBAS Trial at HKIA

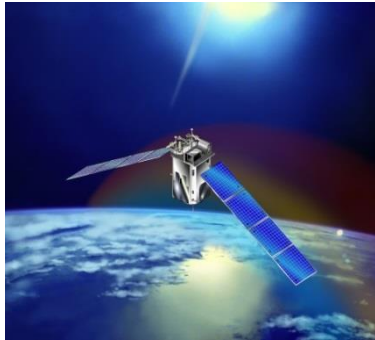
*Proven feasibility
for use of GBAS
and GLS
procedures at HKIA*

*Assessment on
potential constraints
for GBAS
implementation at
HKIA*

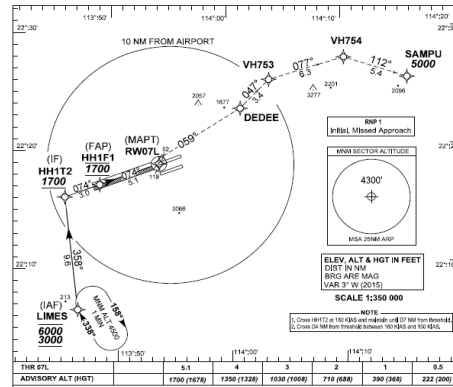
*Proof-of-concept
in GLS flight
procedures
developed*



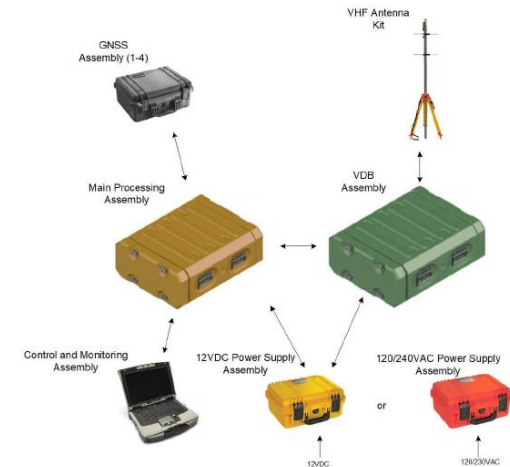
Scope of GBAS Trial



**Ionospheric
Data Analysis**



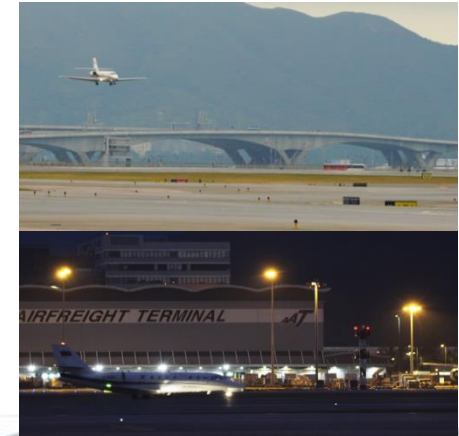
**GLS Flight Procedures
Development**



**Portable GBAS System
Installation at HKIA**



Flight Demonstration with Airline



Flight Inspection

Safety and Risk Assessment

Engineering



Stakeholders

- ❖ Engineering
- ❖ Air Traffic Control
- ❖ Airworthiness
- ❖ Flight Standard
- ❖ Airport Operator
- ❖ Airport Standard
- ❖ Airline



Flight Operation

Considerations in Safety Assessment

*Flyability of GLS
Procedures*

Loss of GBAS Signal

Adverse Weather

*Mix of GLS Flights
with ILS Flights*

*Loss of Aircraft
GBAS Capability*

FOD

Visual Flight

*Advance
Coordination with
Stakeholders*

*Enhanced Site
Installation*

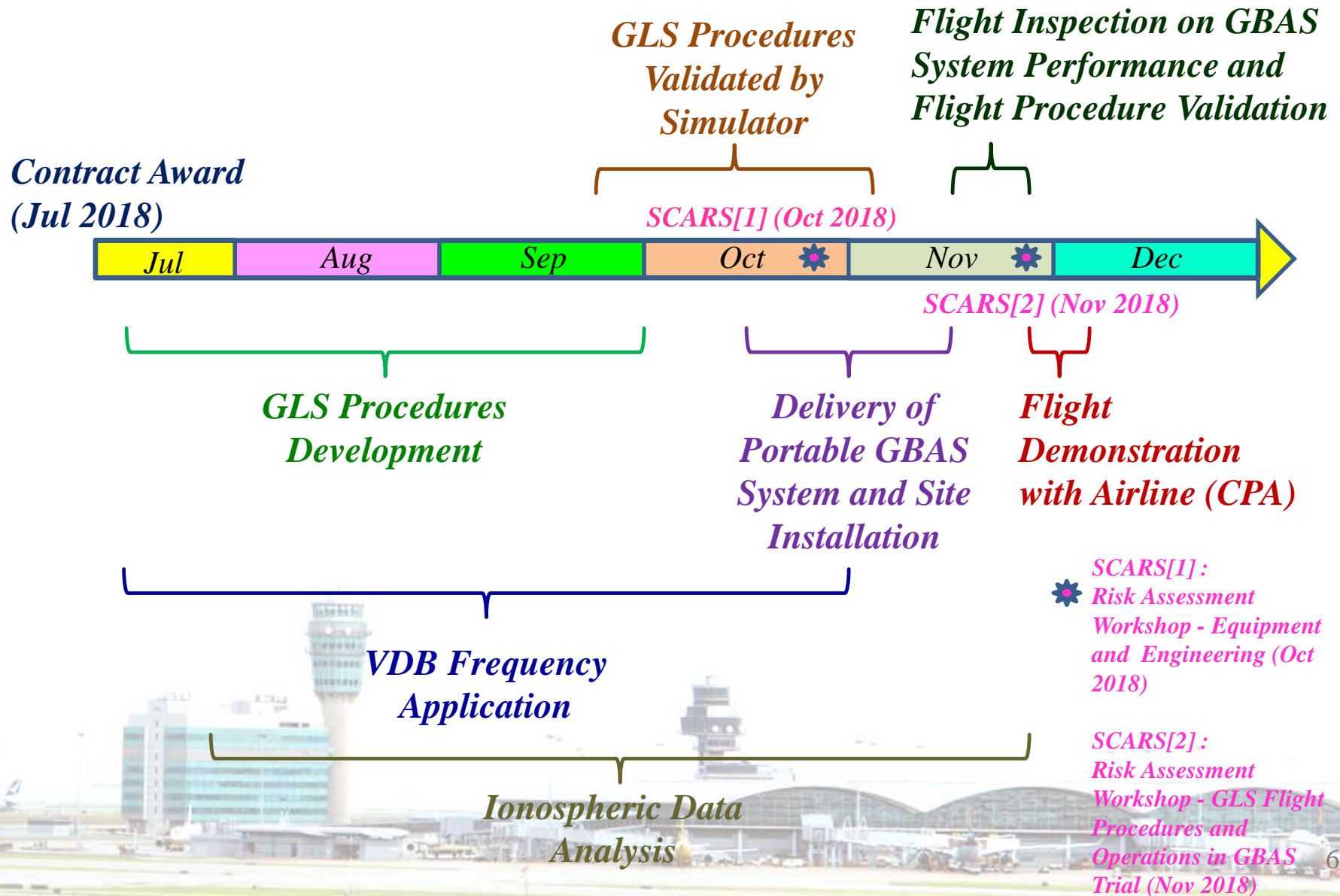
*Flight Procedure
Validation*

*On-site Support
and Monitoring*

*Coordinated
Flight Demo Time
Slots*



GBAS Trial Timeline



Parties Involved

Hong Kong Civil Aviation Department

*Airport Authority
Hong Kong
(AAHK)*

*Cathay Pacific
Airways (CPA)*

CAAC FIC

*Office of the
Communications
Authority (OFCA)*

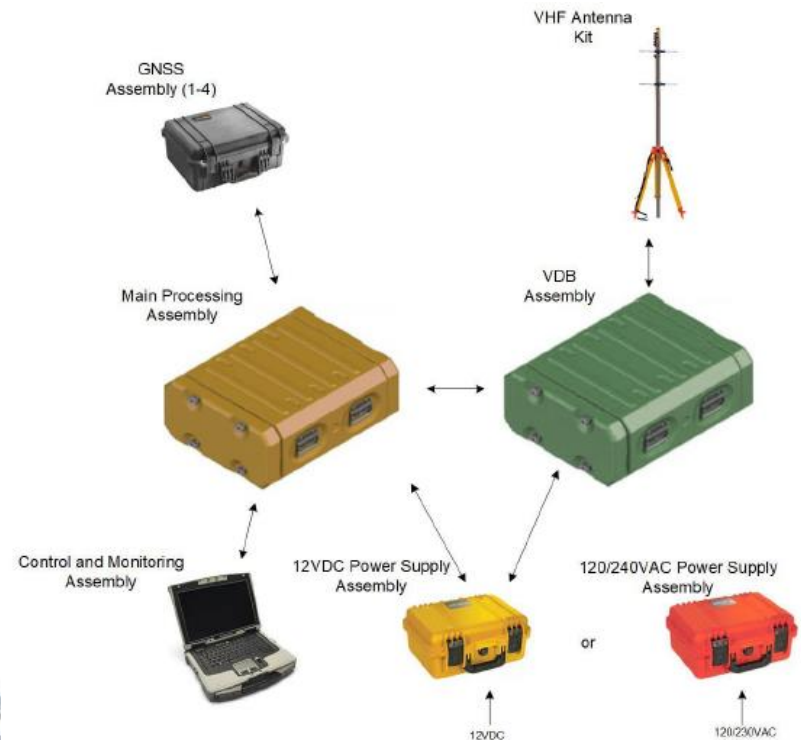
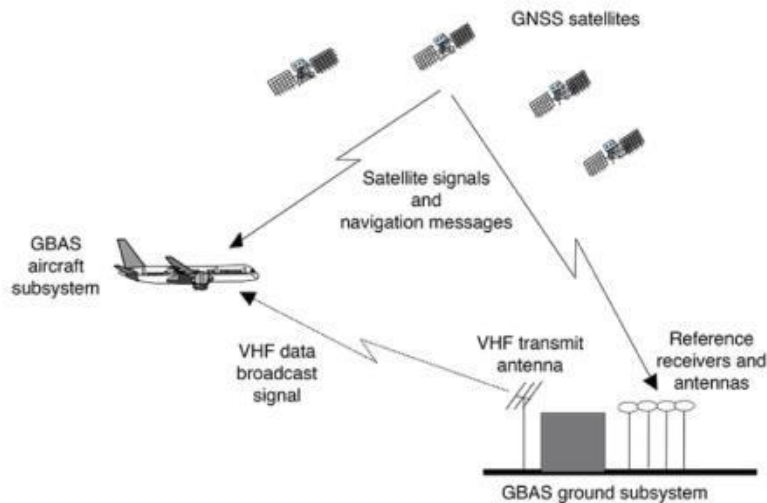
Service Contractor for GBAS Trial



System for GBAS Trial

Site Installation

- *West End of South Runway – Outdoor Area near 25L LLZ Building*



Flight Inspection on System Performance

1. Validate System Performance

a) Accuracy : Ground Check Along Centre-Line and S-Shape



b) VDB Signal Coverage

❖ Orbiting, Level Arc, Level Run, Approach

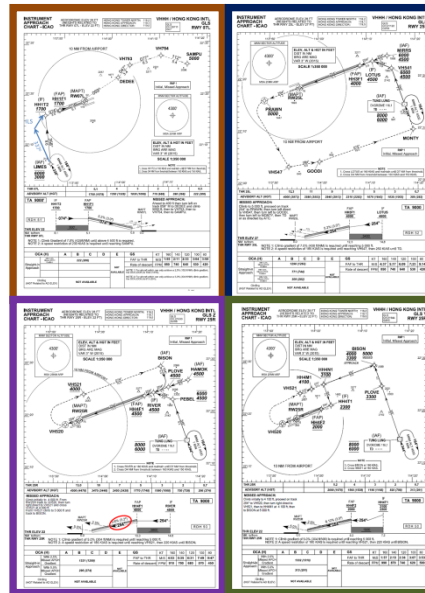
2. Conducted prior to Flight Procedure Validation

Flight Procedure Validation

1. Conducted validation for four developed GLS flight procedures after System Performance Validated with Satisfactory Results

❖ *GLS RWY07L - shortest possible GLS approach procedure RNP1 into GLS (GLS RWY 07L)*

❖ *GLS RWY25R with 3.2° glide slope (GLS Z RWY 25R)*



❖ *GLS RWY25L (GLS RWY 25L)*

❖ *GLS RWY25R via Tai Lam using RNP1 to GLS (GLS Y RWY 25R)*

2. All four GLS flight procedures were flown successfully with adequate support / coverage of GPS signal

Flight Demonstration

1. Flight demonstration with Airline

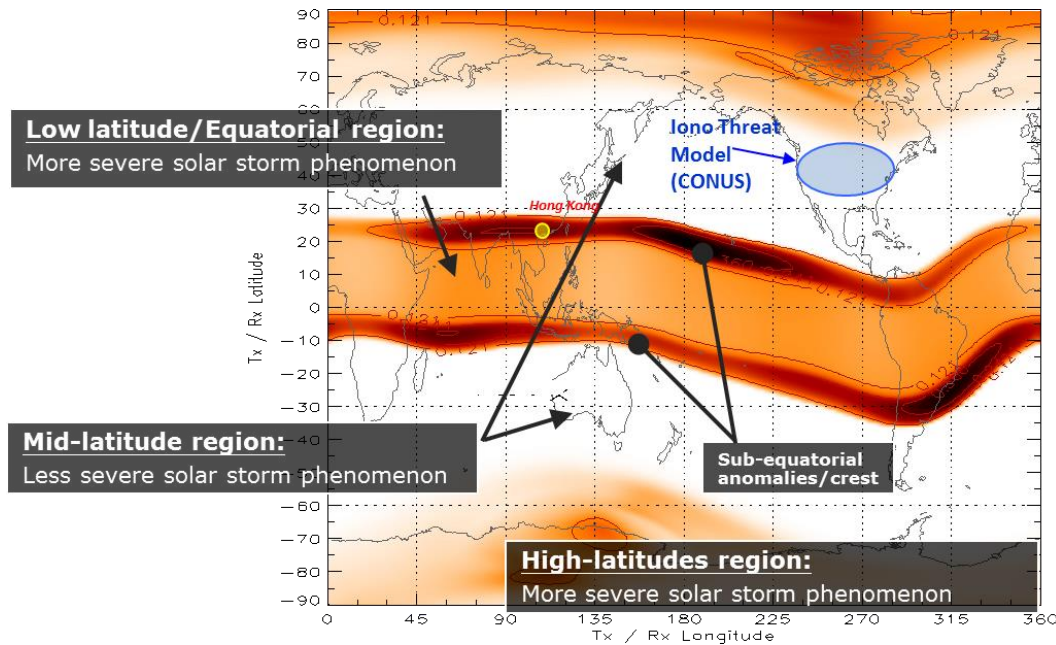
- ❖ *Safety assessment workshop conducted for GBAS flight operation*
- ❖ *Cathay Pacific Airways (CPA)'s B747-8 approved to conduct GLS approaches during flight demonstration period*

2. Coordinated Flight Demonstration in Period: 27 Nov – 3 Dec 2018

- ❖ *Seven (7) time slots scheduled with CPA for 16 cargo flights*
- ❖ *CAD Engineering Officers and Contractor's technical representatives on site during scheduled time slots for monitoring performance of portable GBAS system*
- ❖ *NOTAM issued regarding VDB signal broadcasted for GBAS Trial*
- ❖ *Advance coordination made with ATC OPS*
- ❖ *Nine (9) cargo flights landed with GLS flight procedure (GLS RWY 07L)*
- ❖ *Positive feedbacks from pilots choosing GLS flight procedures for landing*

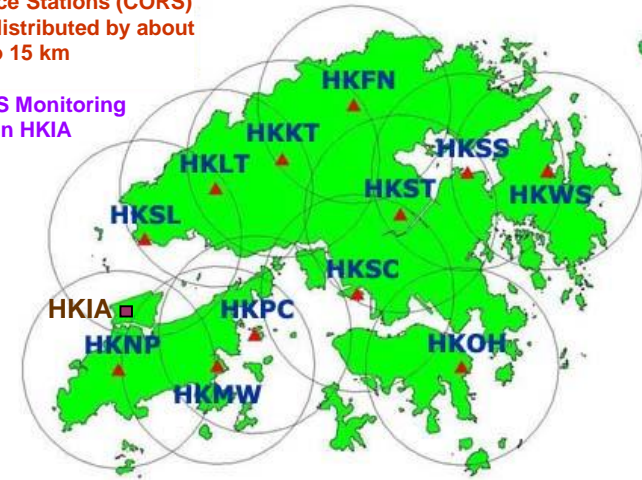


Ionospheric Data Analysis



▲ 12 Continuously Operating Reference Stations (CORS) evenly distributed by about 10 km to 15 km

■ One GPS Monitoring Station in HKIA



Analysis based on GPS data collected from four GPS receivers (HKSL, HKPC, HKNP and HKIA) and scintillation data at HKIA in 2015



Conclusion

1. **GBAS trial has been completed successfully with supports from all involved parties**
2. **Served the purposes for :**
 - ❖ **Proof-of-concept in GLS flight procedures developed with consideration of terrains around HKIA**
 - ❖ **Proven feasibility for use of GBAS and GLS procedures at HKIA**
 - ❖ **Assessment on potential constraints for GBAS implementation at HKIA**
3. **Observations and experience gained in the GBAS trial are valuable references for forthcoming GBAS deployment under 3RS Project**

