



ICAO AFI/MID ASBU IMPLEMENTATION WORKSHOP

Cairo, 23-26 November 2015

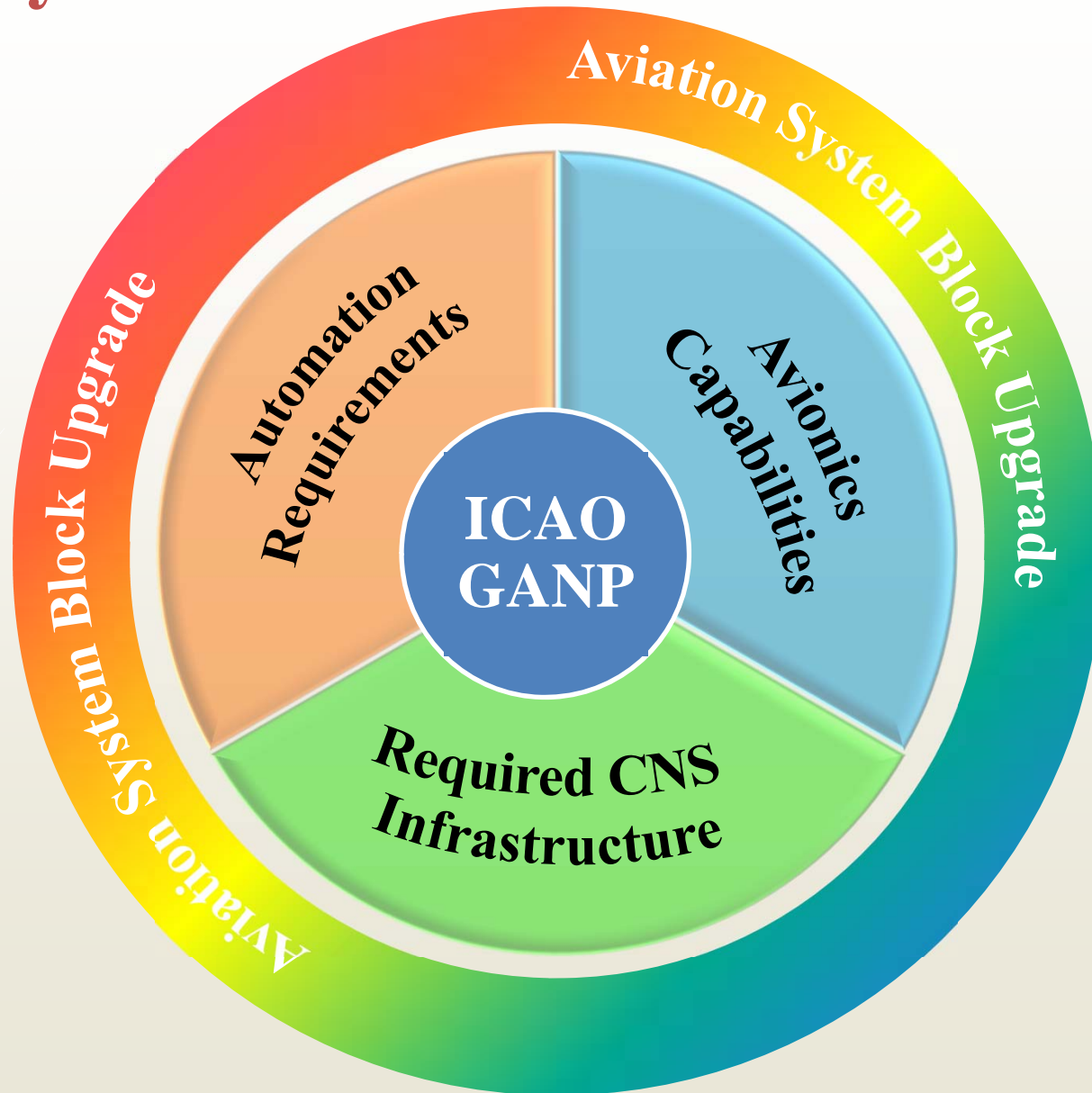
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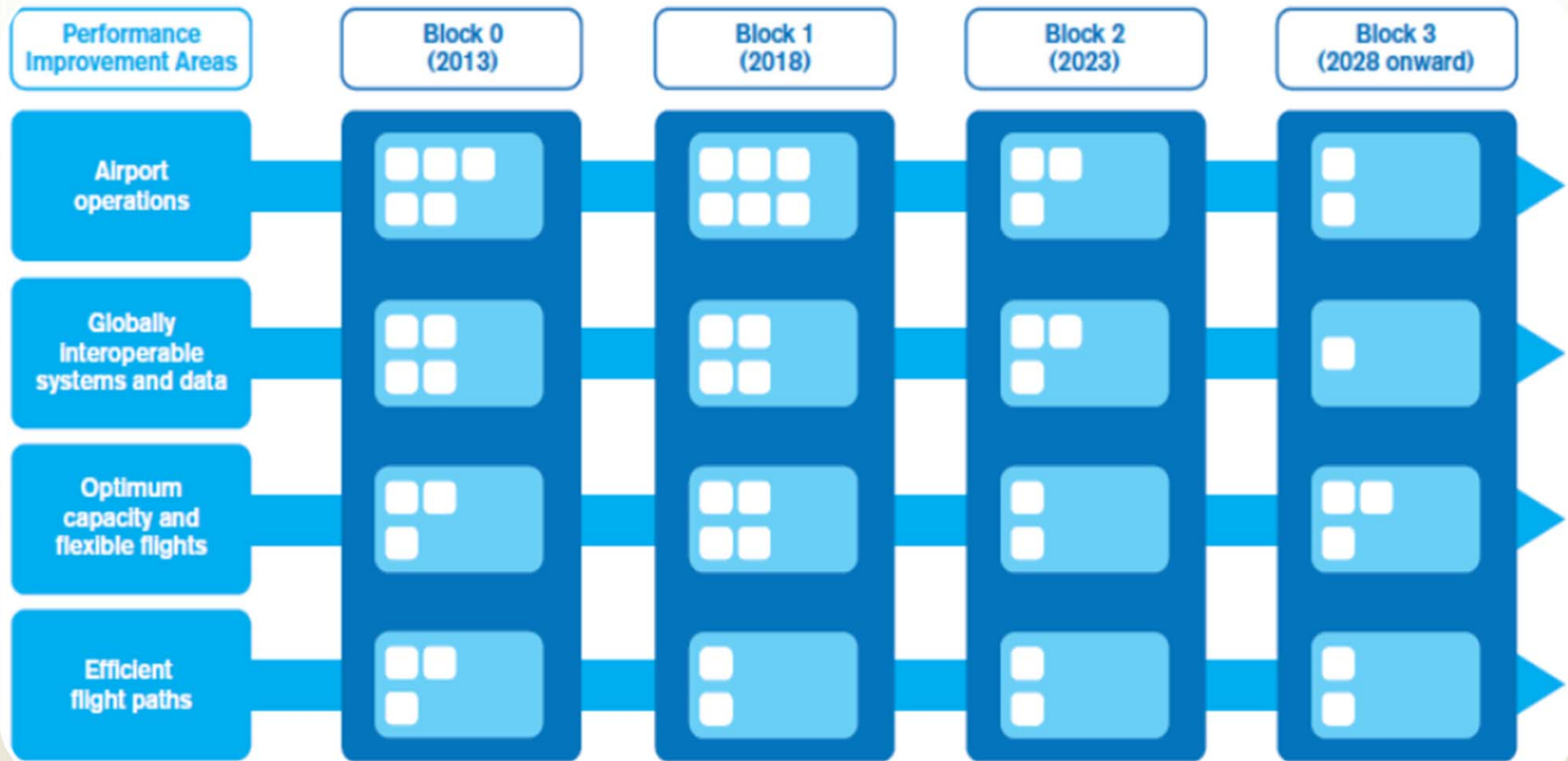
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Why ASBU?



ASBU Modules



ASBU Module (B0-SURF)

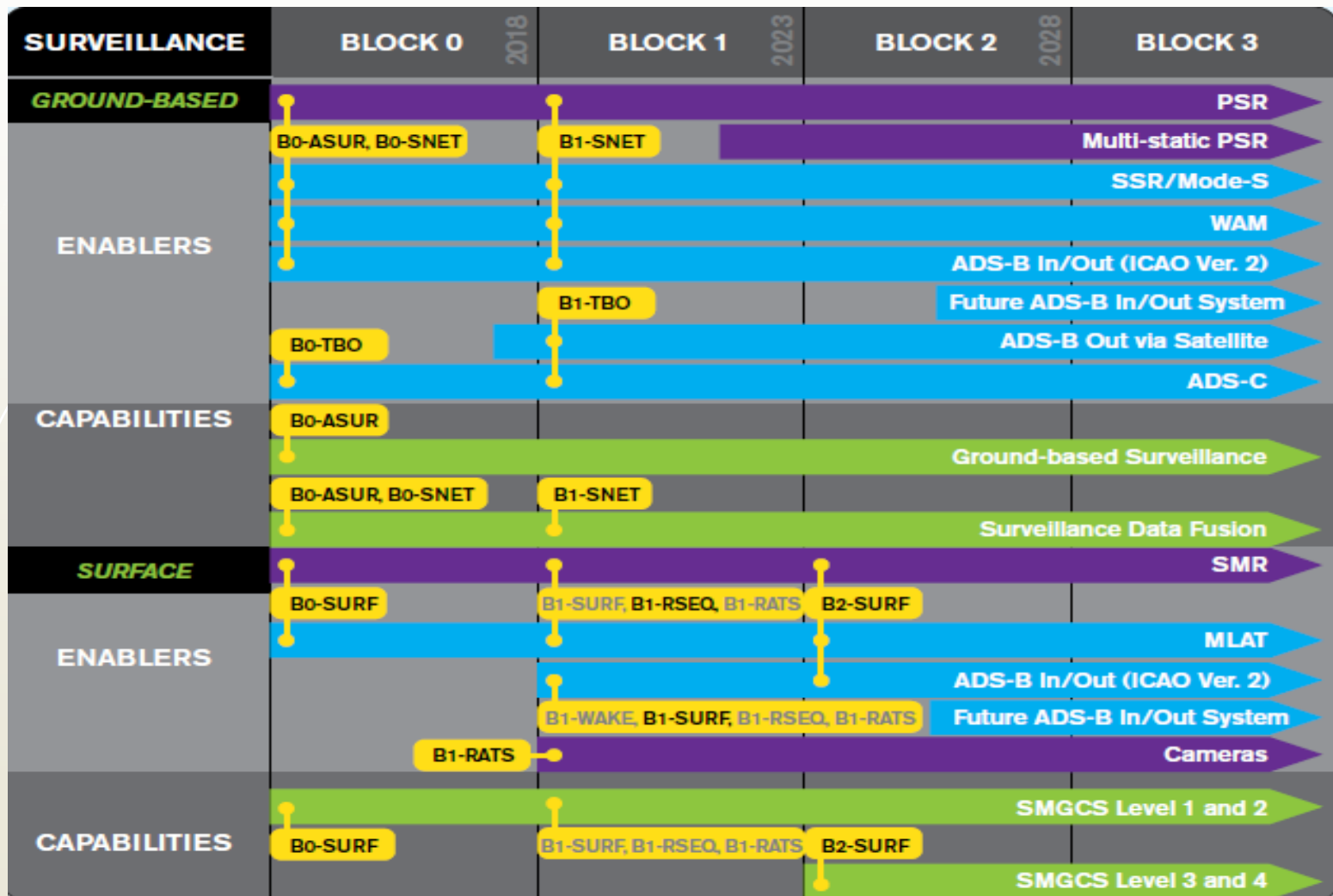


priority one ASBU module in the
MID Air Navigation Strategy.

B0 – SURF

*Safety and Efficiency of
Surface Operations
(A-SMGCS Level 1-2)*

Surveillance / Surface-Roadmap



ASBU Module (B0-SURF)

A-SMGCS

- The basic advanced-surface movement guidance and control system provides **surveillance and alerting** of movements of both aircraft and vehicles at the aerodrome.
- To improve **capacity and safety** by making use of modern technologies such as **cooperative surveillance systems**: ADS-B, MLAT and a higher level of integration between its various functionalities.
- Using of A-SMGCS depend on the aerodrome conditions .

A-SMGCS Functions

The role is to designate route for each aircraft or mobile Vehicle

Routing

The main role is to provide ATC with a view of the complete situation of the mobiles on airport surface.

Surveillance

**A-SMGCS
Basic
Functions**

provides Directions to pilot and vehicle drivers to follow designated route.

Guidance

help ATC to sequence the traffic predict conflicts and, raise alarms to controller or directly to the pilots.

Control

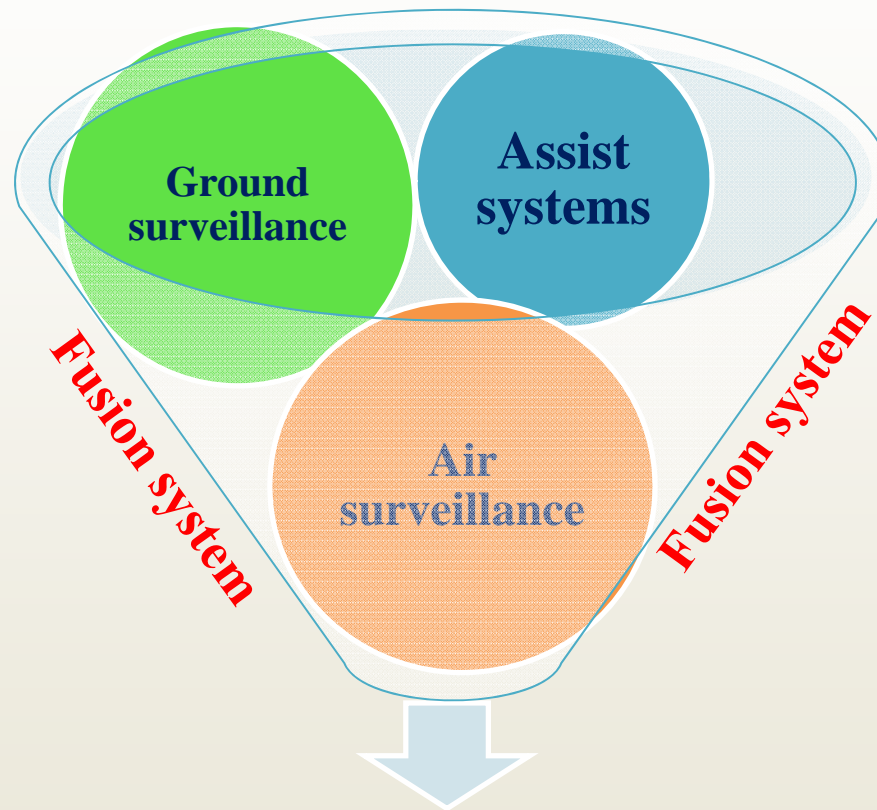
A-SMGCS Implementation Levels



A-SMGCS Implementation Levels

Levels	Surveillance		Control		Route Planning	Guidance	
	Users	Mobiles and areas covered	Users	Conflicts detected	Users	Users	Type
0	Strict application of SMGCS						
1							
	Surveillance						
	Controller	All vehicles in the manoeuvring area All aircraft in the movement area					
2							
	Controller	All vehicles in the manoeuvring area All aircraft in the movement area	Control			Guidance	
			Controller	RWY incursions		Drivers	Airport Static Map & mobile position on a screen as an option
3							
	Controller All participating mobiles	All vehicles in the manoeuvring area All aircraft in the movement area	Controller Equipped mobiles	All conflicts	Route Planning	Pilots Drivers	Airport Dynamic Map (with runway status,...), mobile position on a screen Automatic switch of ground signals
					Controller		
4							
	Controller All participating mobiles	All vehicles in the manoeuvring area All aircraft in the movement area	Controller All participating mobiles	All conflicts + Conflict Resolution	Controller Equipped mobiles	Pilots Drivers	Airport Dynamic Map (with runway status,...), mobile position & route from route planning function on a screen Automatic switch of ground signals

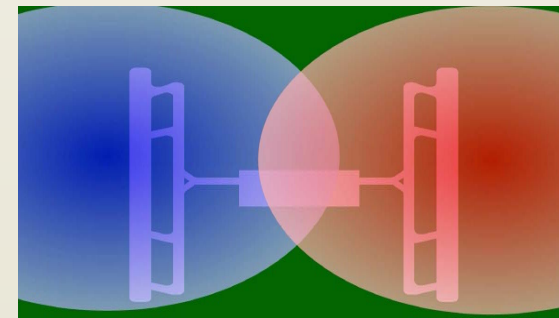
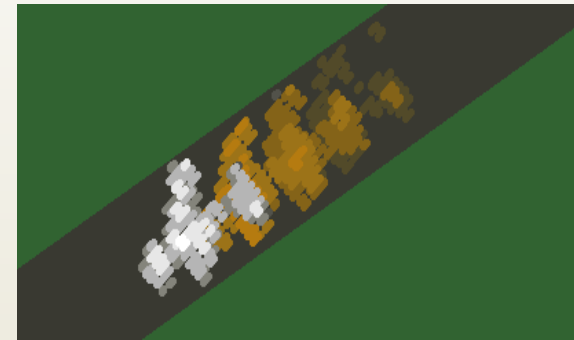
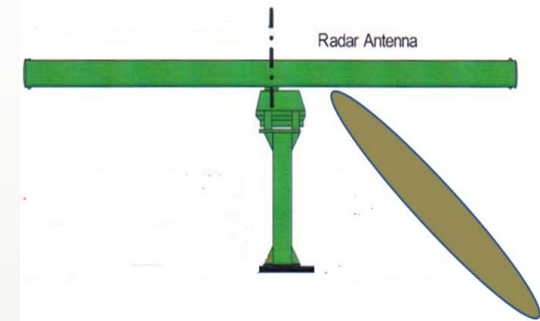
How does A-SMGCS System Work ?



**Identified tracks and
conflict alerts**

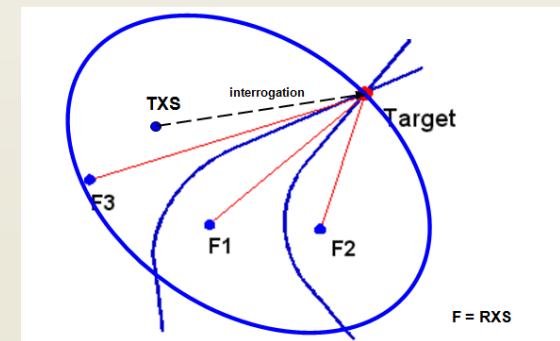
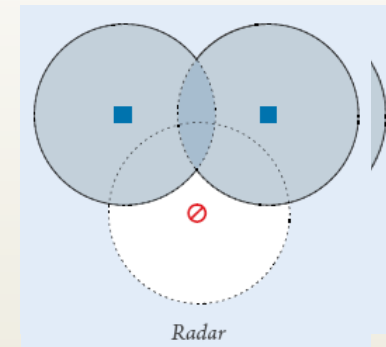
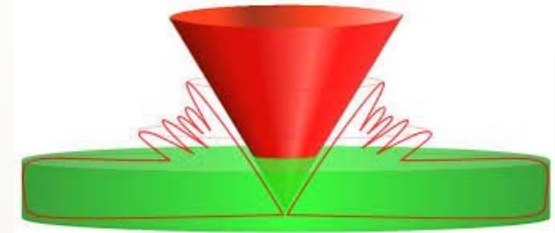
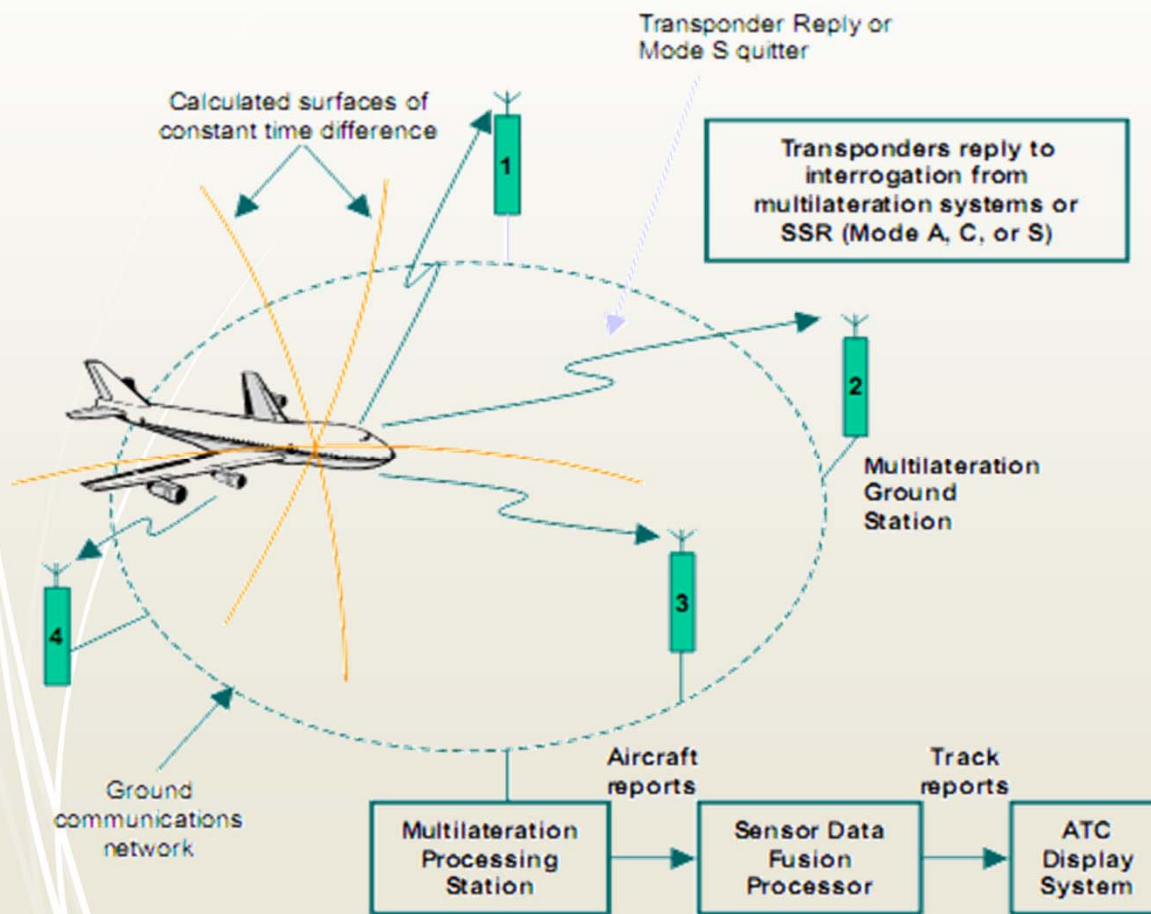
Basic Elements (Enablers).

1- Surface Movement Radar (SMR) .



Basic Elements (Enablers).

2- Multilateration system (MLAT).



Basic Elements (Enablers).

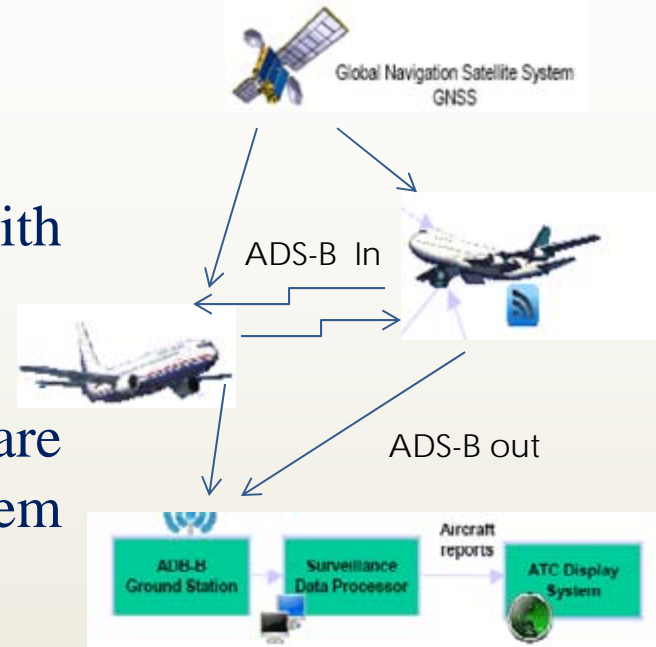
3- Automatic Dependent Surveillance system ADS-B

Automatic : periodically transmits information's with pilot or operator input required .

Dependent : positioning and velocity vectors are derived from global navigation surveillance system (GNSS).

Surveillance : A method of determining the position of aircraft and vehicles .

Broadcast : transmitted information are available to any one with appropriate receiving system .

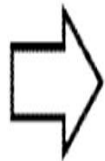


Basic Elements (Enablers).

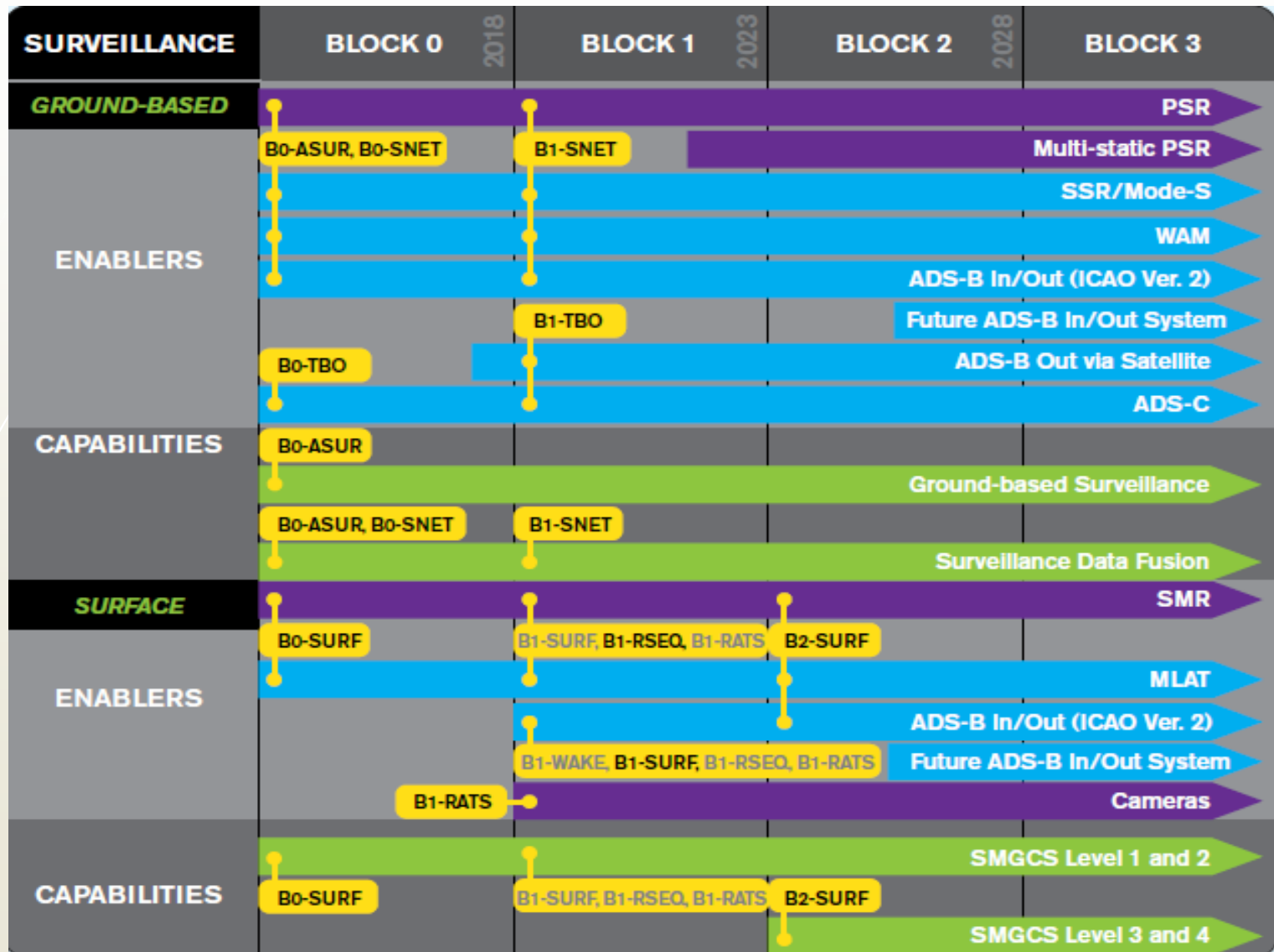
4- Cameras :

High Definition (HD) cameras and Pan Tilt Zoom (PTZ) are used for remote visual surveillance techniques, providing Situational awareness.

It has the advantages of using Visibility Enhancement Technology .
Surveillance cameras may be integrated with A-SMGCS to compose remote tower system.



Enablers Road MAP



Necessary System Capability

Ground systems

A-SMGCS: surface movement radar (SMR) should be complemented by a cooperative surveillance as MLAT means allowing to track A/C and ground vehicles. A surveillance display including some alerting functionalities is required in the tower.

Vehicles

Vehicle cooperative transponder systems, type as a function of the local A-SMGCS installation.

Avionics

Existing aircraft ADS-B and/or SSR transponder systems, including correct setting of aircraft identification.

Necessary Procedures (Air & Ground)

- Flight crew procedures specific to A-SMGCS are not beyond those associated with basic operation of aircraft transponder systems and settings of aircraft identification
- Vehicle drivers must be in a position to effectively operate vehicle transponder systems.
- ATC is required to apply procedures specific to A-SMGCS

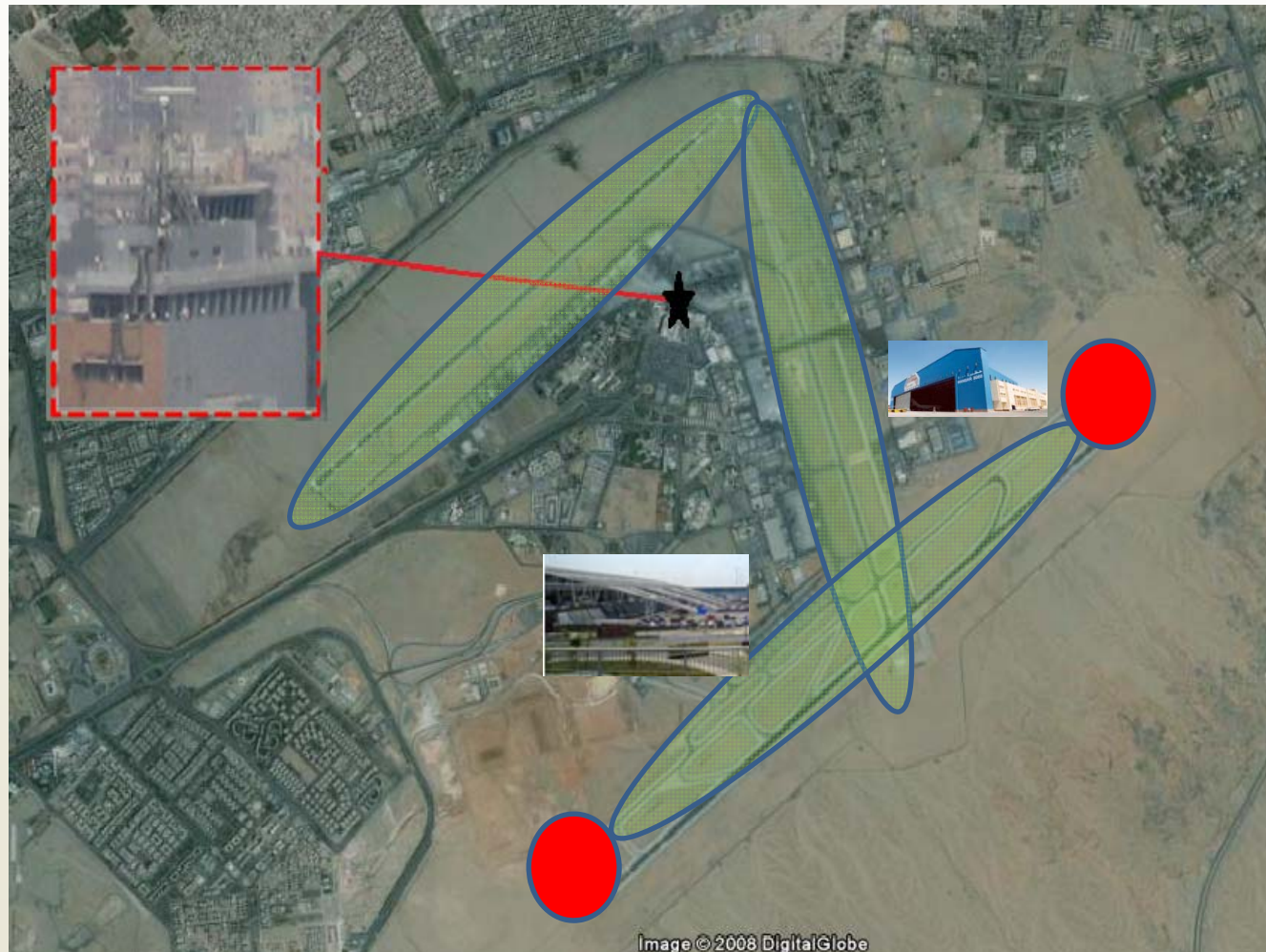
Reference Documents

- **ICAO Doc 9830**, Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual;
- **ICAO Doc 9871**, Technical Provisions for Mode S Services and Extended Squitter;
- **Eurocontrol Document** – “Definition of A-SMGCS Implementation Levels, Edition 1.2, 2010;
- **EUROCAE Document ED 87A** – “MASPS for A-SMGCS”
- **EUROCAE Document ED 116** – “MOPS for Surface Movement RADAR sensors systems for use in A-SMGCS ;
- **EUROCAE Document ED 117** – “MOPS for MLAT system for use in ASMGCS”;
- **Euro control standard documents for RADAR data exchange -part 1 and part 2-All Purpose Structured Euro control Radar Information Exchange (ASTERIX);**
- **ICAO Doc 9157** part 6 frangibility
- **Euro control A-SMGCS implementation-manual-v1.**

A-SMGCS Implementation at Cairo Airport (HECA)

Phase 1 (2006) :

A- SMR



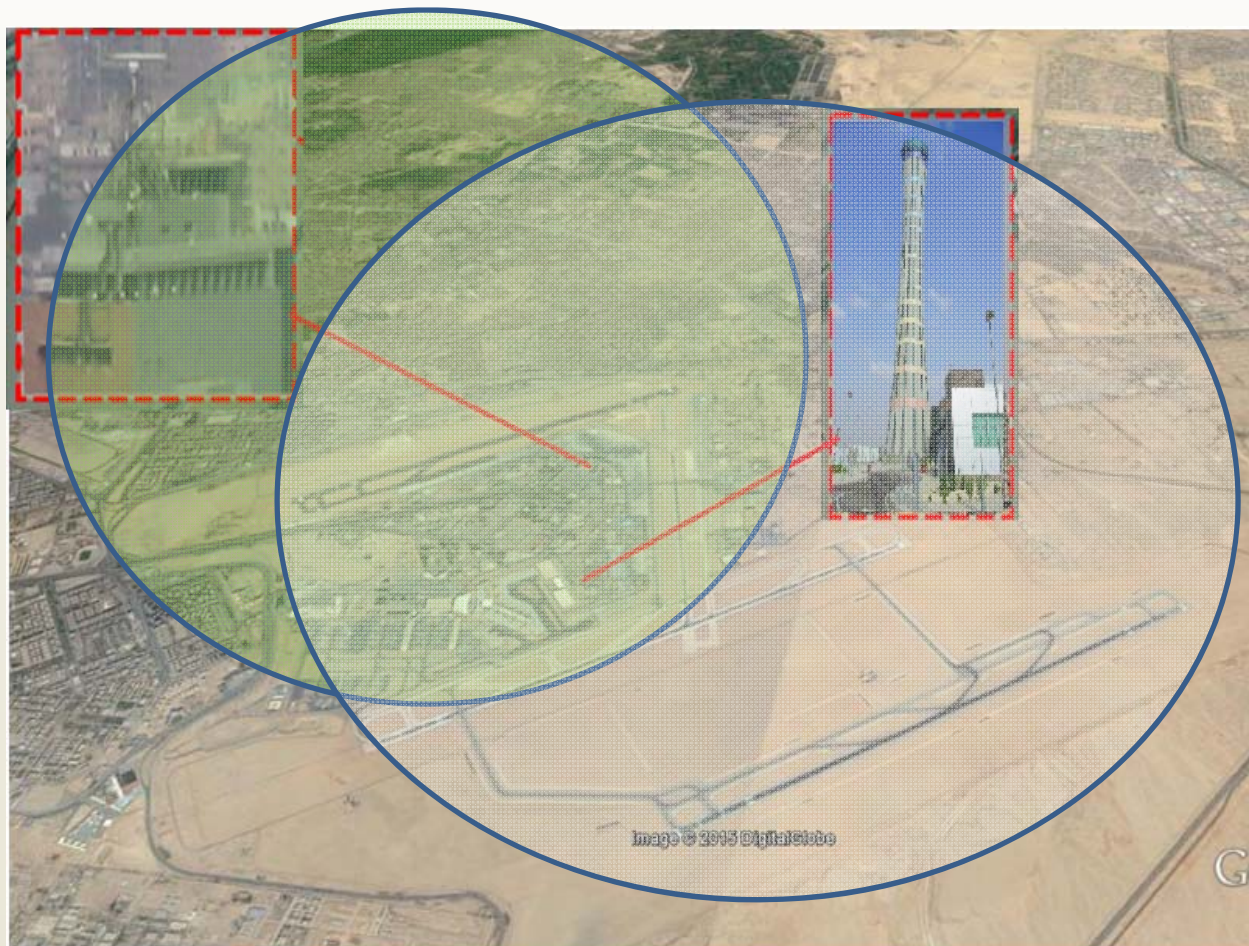
A-SMGCS Implementation at HECA

Phase 1 : B- Vehicle tracking system (VTS)



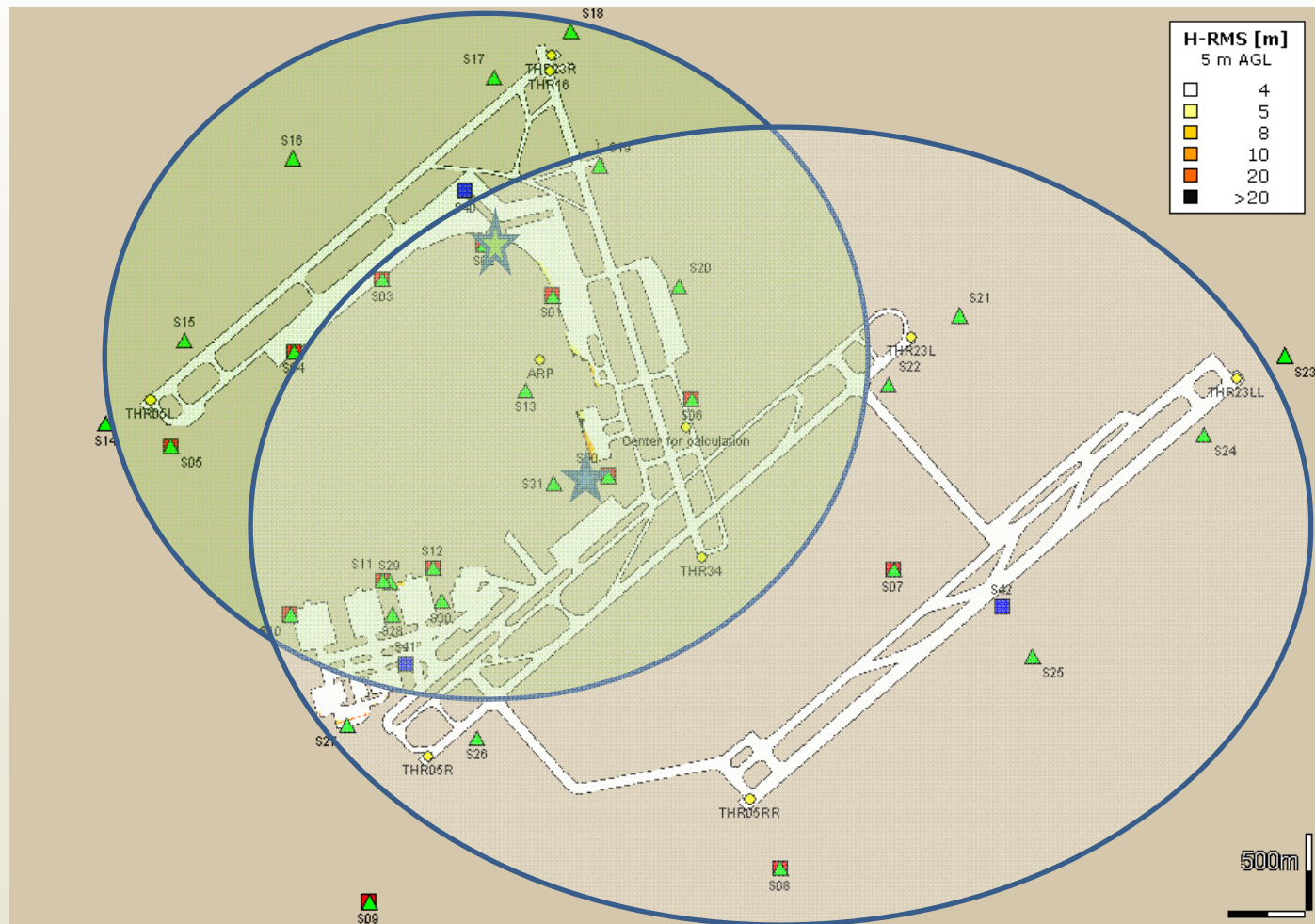
A-SMGCS Implementation at HECA

Phase 2 : A- SMR 1& SMR 2

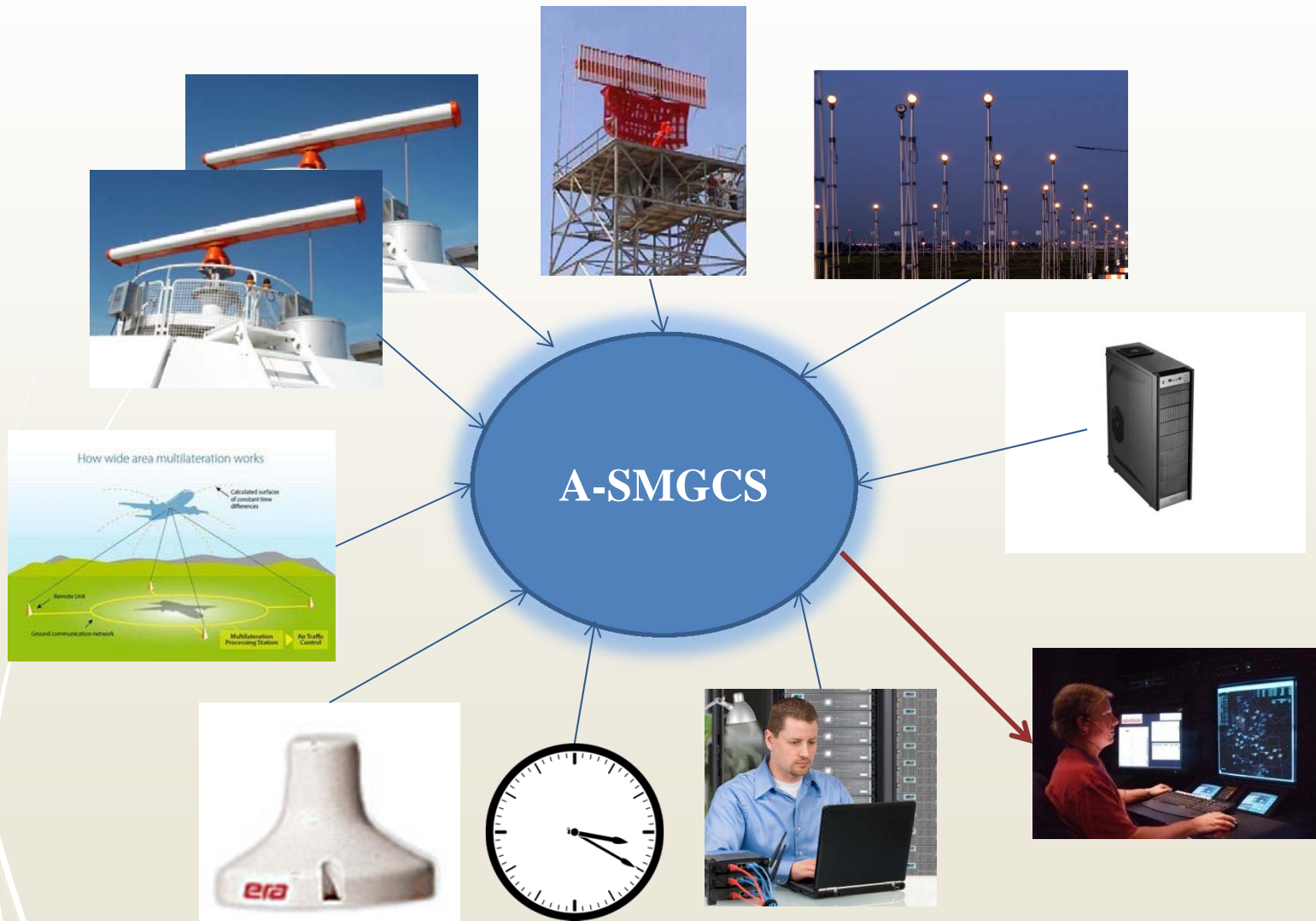


A-SMGCS Implementation at HECA

Phase 2 : B- Multilateration system



A-SMGCS Implementation at HECA



A-SMGCS Implementation at HECA

Alerts

- Centrally generated in the system
- Generated from: Event (e.g. track crossing a line) or State (tracks have Runway Incursion)
- Consist of pre-alerts (early warnings) and alerts

Alert Types

- Stop bar Violation Monitoring (SVM)
- Restriction Violation Monitoring (RVM)
- Area Penetration Monitoring (APM)
- Taxiway Collision Monitoring (TCM)
- Runway Incursion Monitoring (RIM)

Improvement of Performance Operation

Safety : Reduced runway incursions.

Efficiency : Reduced taxi times and hence reduced fuel burn

Capacity : Improved capacity

Environment : Reduced emissions

Access and equity : Improves access to portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft.

CBA : A positive CBA can be made from improved efficiencies in surface operations leading to significant savings in aircraft fuel usage.

Thank You !



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