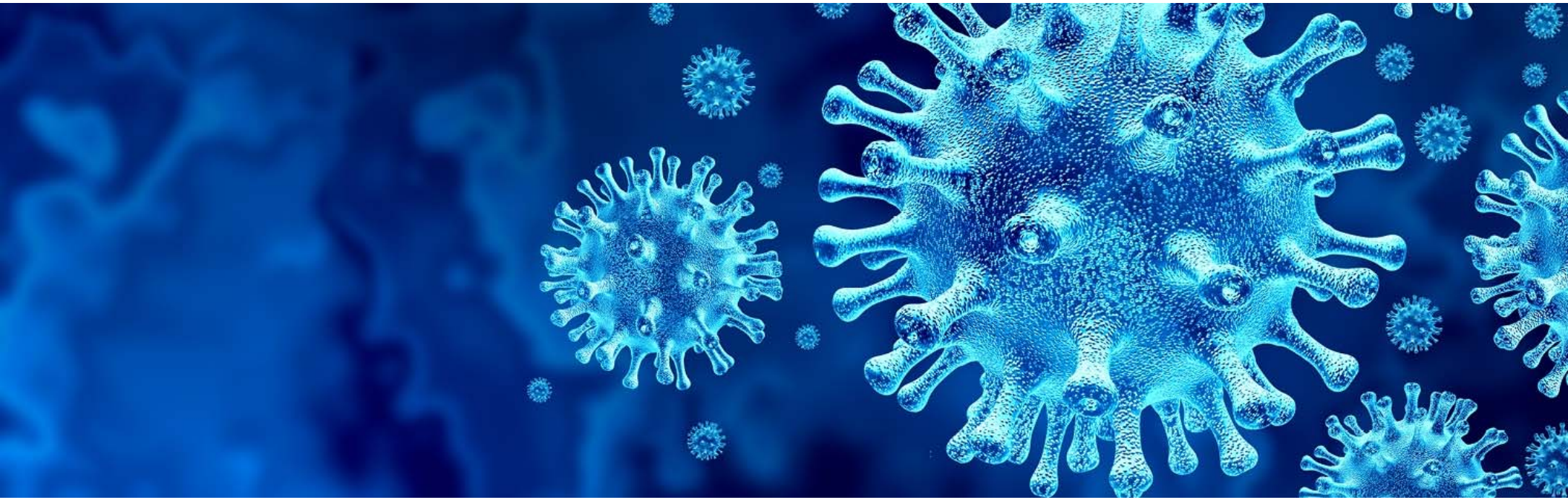
ICAO MID

24 August 2020

# ASBU Webinar

**(13-15 October 2020)**




# ASBU Threads

- CNS Technology and Services Threads
- Information Threads
- Operational Threads


# MSG/7 (1-3 September 2020)

*MSG CONCLUSION 7/6: UPDATE OF MID REGION AIR NAVIGATION STRATEGY*

*That, in order to improve the Initial Draft of the revised MID Region Air Navigation Strategy at Appendix 5.1A, with States and stakeholders inputs:*

*a) States be invited to provide the MID Office by 15 October 2020 with their Air Navigation priorities and updated National Plan considering the provisions of the 6th Edition of the GANP endorsed by the 40th Session of the General Assembly (A40);*

*b) MIDANPIRG Sub-Groups provide proposals of amendment of the MID Region Air Navigation Strategy, considering the 6th Edition of the GANP, the inputs of States and Stakeholders, and agreed priorities, before 15 Dec 2020; and*

*c) the joint ACAO/ICAO ASBU Symposium review the inputs of States, Stakeholders and MIDANPIRG Sub-Groups for consolidation of the revised version of the MID Region Air Navigation Strategy to be presented to MIDANPIRG for endorsement*.


# MID Region Air Navigation Strategy (ICAO MID DOC 002)

Priority 1: Elements that have the highest contribution to the improvement of air navigation safety, capacity and/or efficiency in the MID Region. These elements should be implemented where applicable and will be used for the purpose of regional air navigation monitoring and reporting.

Priority 2: Elements recommended for implementation based on identified operational needs and benefits.

Priority 1 Thread: Any thread with at least 1 priority 1 element

| | B0 | B1 | B2 | B3 | B4 |
|---|---|---|---|---|---|
| **ACAS** Airborne Collision avoidance System | | X | X | | |
| | X | | X | | |
| **ACDM** Airport Collaborative Decision Making | X | X | X | X | |
| | X | X | | | |
| **AMET** Advance MET Information | X | X | X | X | X |
| | X | X | | X | |
| **APTA** Airport Accessibility | X | X | X | | |
| | X | X | | | |
| **ASEP** Airborne Separation | | | | | |
| | X | X | X | | |
| **ASUR** Alternative Surveillance | X | X | X | X | X |
| | X | | | | |
| **CCO** Continuous Climb Operation | | | | | |
| | X | | | | |
| **CDO** Continuous Descent Operation | | | | | |
| | X | X | X | | |
| **COMI** COM Infrastructure | X | X | X | X | |
| | | | | | |
| **COMS** COM Services/systems | X | X | X | X | |
| | | | | | |
| **CSEP** Cooperative Separation | | X | X | X | X |
| | | | | | |
| **DAIM** Digital Aeronautical Information Management | | X | X | | |
| | X | X | | | |
| **FICE** Flight & Flow in Collaborative Environment | X | | X | X | X |
| | X | X | X | X | |

| | B0 | B1 | B2 | B3 | B4 |
|---|---|---|---|---|---|
| **FRTO** Free Route Operations | X | X | X | | |
| | X | X | | | |
| **GADS** Global Aeronautical Distress and Safety System (GADSS) | | X | X | | |
| | | | | | |
| **NAVS** Navigation Systems | X | X | X | | |
| | | | | | |
| **NOPS** Network Operations | X | X | X | X | |
| | X | X | X | X | |
| **OPFL** Optimum Flight Levels | X | X | | | |
| | X | | | | |
| **RATS** Remote ATS | | X | | | |
| | | X | | | |
| **RPAS** Remotely Piloted Aircraft System | | | | | |
| | | X | X | X | |
| **RSEQ** Runway Sequencing | X | X | X | X | |
| | X | X | X | X | |
| **SNET** Ground-based Safety Nets | X | X | | | |
| | X | X | | | |
| **SURF** Surface Operations | X | X | X | X | |
| | X | X | X | | |
| **SWIM** System-Wide Information Management | | | X | X | |
| | | X | X | | |
| **TBO** Trajectory-based Operations | X | X | X | X | X |
| | X | X | | X | |
| **WAKE** Wake Turbulence Separations | | | X | X | X |
| | | X | X | X | |


Green: GANP 6th edition
Blue: GANP 5th edition

# Technology Elements


## 1) ASUR: Alternative Surveillance

| | | |
|---|---|---|
| ASUR-B0/1 | Automatic Dependent Surveillance – Broadcast (ADS-B) | Technology |
| ASUR-B0/2 | Multilateration cooperative surveillance systems (MLAT) | Technology |
| ASUR-B0/3 | Cooperative Surveillance Radar Downlink of Aircraft Parameters (SSR-DAPS) | Technology |
| ASUR-B1/1 | Reception of aircraft ADS-B signals from space (SB ADS-B) | Technology |
| ASUR-B2/1 | Evolution of ADS-B and Mode S | Technology |
| ASUR-B2/2 | New community based surveillance system for airborne aircraft (low and higher airspace) | Technology |
| ASUR-B3/1 | New non-cooperative surveillance system for airborne aircraft (medium altitudes) | Technology |
| ASUR-B4/1 | Further evolution of ADS-B and MLAT | Technology |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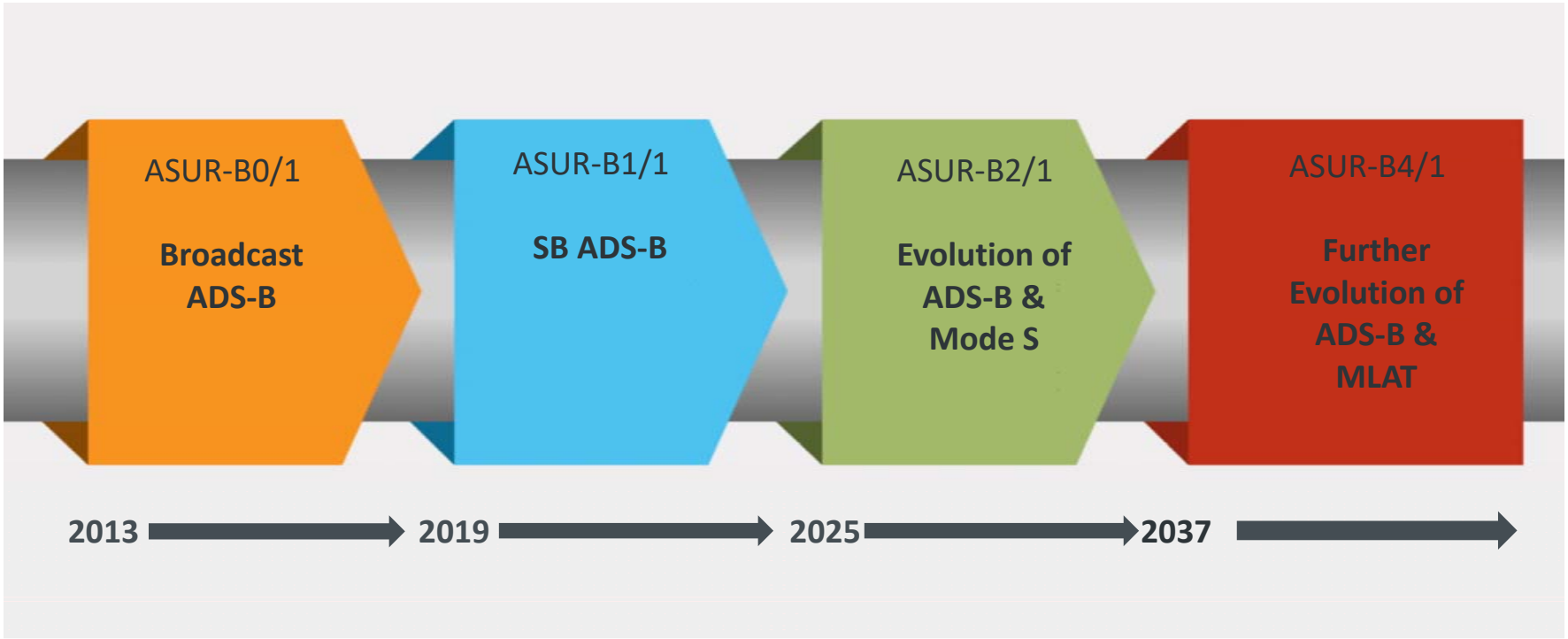
ASUR-B0/1
Broadcast ADS-B
ASUR-B1/1
SB ADS-B
ASUR-B2/1
Evolution of ADS-B & Mode S
ASUR-B4/1
Further Evolution of ADS-B & MLAT
2013
2019
2025
2037


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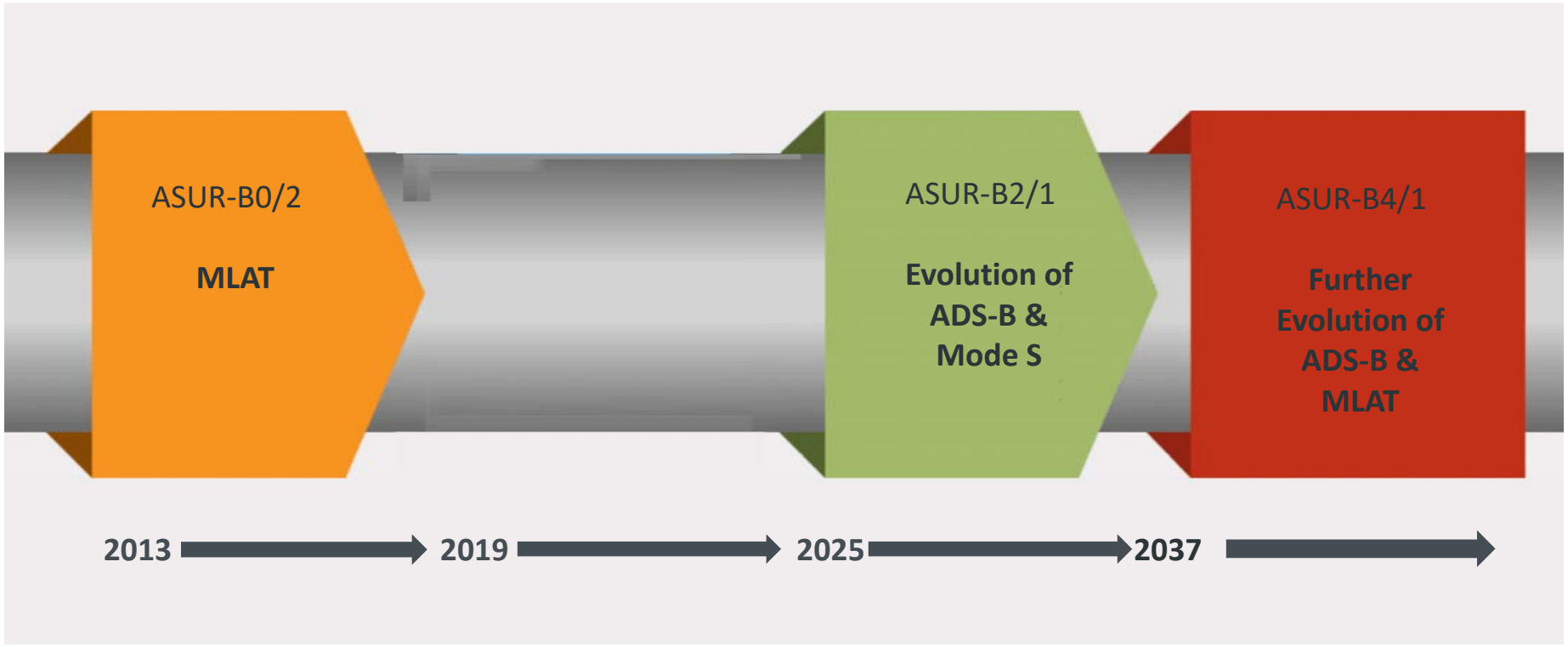
ASUR-B0/2
MLAT
ASUR-B2/1
Evolution of ADS-B & Mode S
ASUR-B4/1
Further Evolution of ADS-B & MLAT
2013
2019
2025
2037


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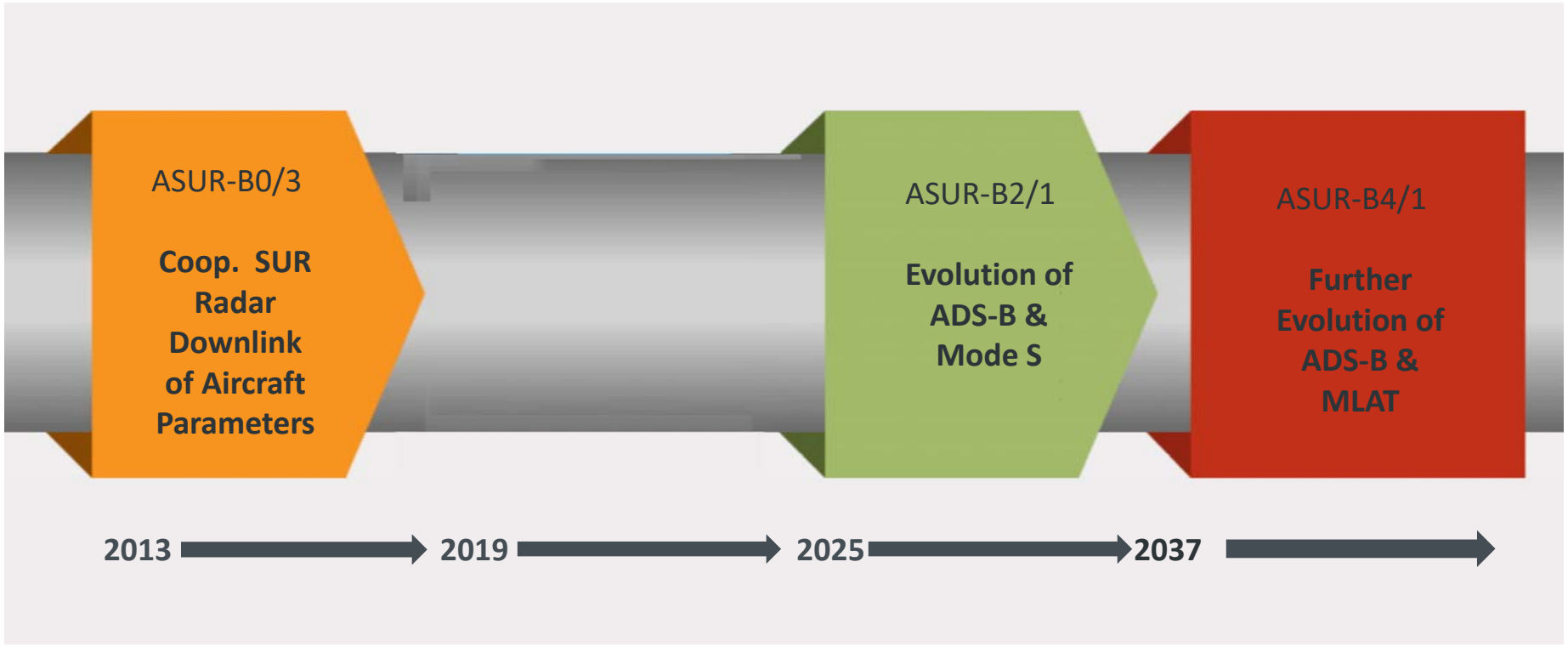
COVID19


ASUR-B0/3
Coop. SUR Radar Downlink of Aircraft Parameters
ASUR-B2/1
Evolution of ADS-B & Mode S
ASUR-B4/1
Further Evolution of ADS-B & MLAT
2013
2019
2025
2037


## MID Region Surveillance Plan (MID DOC 013)

*Short Term (2018 – 2020)*

- *Make full use of SSR Mode 'S' capabilities, reduce reliance on 4-digit octal code.*
- *States to consider emerging dependent Surveillance technologies (ADS-B and MLAT) in their National Surveillance Plans.*
- *Non-cooperative Surveillance radars maybe retained for Airports and approach services based on States operational needs (detection drones, non-equipped vehicle,…,etc).*
- *ADS-B/Out Implementation:*
  - *Prioritize ADS-B/Out implementation in areas where there is no radar coverage surveillance.*
  - *State shall conduct safety assessment for ADS-B/ MLAT implementation as per Reference [5].*
  - *The proportions of equipped aircraft are critical for the ADS-B deployment, therefore, States should early involve Users, communicate the change, the rationale and the impact.*
  - *States are encouraged to use INCENTIVE strategy with stakeholders to accelerate ADS-B equipage; incentive approach might be financial or operational incentive or combined (e.g. Most Capable Best Served principle, waive fees).*
- *MLAT/SMR to be implemented at Aerodrome to enable A-SGMCS*


## MID Region Surveillance Plan (MID DOC 013)

*Mid Term (2021-2024)*

- *ADS-B/Out Implementation (High proportion of ADS-B equipage is anticipated):*
- *ADS-B to be implemented for Area and approach Control Services, where implementation would bring capacity and operational efficiencies;*
- *Relocate, as appropriate, WAM Sensors to work as ADS-B receivers.*
- *States to share Radar/ADS-B data to improve boundary coverage and enhance the surveillance availability.*
- *Retain SSR Mode S Radar as backup to ADS-B*
- *MLAT/SMR/Camera to be implemented at Aerodrome for Ground/ Surface Management service.*
- *Surveillance Camera can be used to operate Remote Control Tower (B1-RTAS).*

*Long Term (2025 Onward)*

- *ADS-B is foreseen to be main Surveillance technology. The existence of Multi-constellation GNSS (GPS, Galileo, GLONASS, …, etc.) reduces the likelihood of ADS-B outage.*
- *Implementation of Airborne Collision Avoidance System (ACAS) adapted to trajectory-based operations with improved surveillance function supported by ADS-B aimed at reducing nuisance alerts and deviations.*
- *Airlines to upgrade ADS-B/Out Avionic to ADS-B in/out.*


| ASUR | | Priority | Applicability | Performance Indicator* |
|---|---|---|---|---|
| B0/1 | ADS-B | 1 | TBD | Indicator: % of States that have implemented ADS-B to supplement surveillance coverage |
| B0/2 | MLAT | 1 | TBD | Indicator: % of States that have implemented Mulitlateration as required |
| B0/3 | SSR-DAPS | 1 | TBD | Indicator: % of States that have enabled the downlink of the aircraft parameter (DAPS) |
| B1/1 | SB ADS-B | 2 | - | - |

**The performance indicator/ supporting metric, target and timeline for each element will be discussed during the CNS SG/10*

# Technology Elements


## 2) NAVS: Navigation

| | | |
|---|---|---|
| NAVS-B0/1 | Ground Based Augmentation Systems (GBAS) | Technology |
| NAVS-B0/2 | Satellite Based Augmentation Systems (SBAS) | Technology |
| NAVS-B0/3 | Aircraft Based Augmentation Systems (ABAS) | Technology |
| NAVS-B0/4 | Navigation Minimal Operating Networks (Nav. MON) | Technology |
| NAVS-B1/1 | Extended GBAS | Technology |
| NAVS-B2/1 | Dual Frequency Multi Constellation (DF MC) GBAS | Technology |
| NAVS-B2/2 | Dual Frequency Multi Constellation (DF MC) SBAS | Technology |
| NAVS-B2/3 | Dual Frequency Multi Constellation (DF MC) ABAS | Technology |


## Guidance on GNSS Implementation in the MID Region

- *States Should introduce rationalizing terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations; in accordance with AN-Conf/12 recommendations 6/10. Some ILSs may be retained to support precision approach and to mitigate GNSS outage.*

- *Removal of conventional ground infrastructure should be planned carefully to ensure that safety is not compromised, such as by performance of safety assessment, consultation with users through regional air navigation planning.*

- *Transition from ILS to GBAS should be based on an economic assessment, an operational assessment and from a safety and security perspective. Cost benefits analysis should be conducted taking on consideration that one GBAS can be used for several runways ends and even in some cases more than one Airports.*


| ASUR | | Priority | Applicability | Performance Indicator* |
|---|---|---|---|---|
| NAVS B0/1 | Ground Based Augmentation Systems (GBAS) | Priority 2 | | |
| NAVS B0/2 | Satellite Based Augmentation Systems (SBAS) | Priority 2 | | |
| NAVS B0/3 | Aircraft Based Augmentation Systems (ABAS) | Priority 1 | All States | Indicator: % of States requiring aircrafts' equipage with the Aircraft Based Augmentation System (ABAS) to enable PBN Operations |
| NAVS B0/4 | Navigation Minimal Operating Networks (Nav. MON) | Priority 1 | All States | Indicator: % of States developed the plan of rationalized conventional navaids network to ensure the necessary levels of resilience for navigation |
| NAVS B1/1 | Extended GBAS | Priority 2 | | |

**The performance indicator/ supporting metric, target and timeline for each element will be discussed during the* CNS SG/10

# Technology Elements


## 3) COMS: ATS COMmunication Service

| | | |
|---|---|---|
| COMS-B0/1 | CPDLC (FANS 1/A & ATN B1) for domestic and procedural airspace | Technology |
| COMS-B0/2 | ADS-C (FANS 1/A) for procedural airspace | Technology |
| COMS-B1/1 | PBCS approved CPDLC (FANS 1/A+) for domestic and procedural airspace | Technology |
| COMS-B1/2 | PBCS approved ADS-C (FANS 1/A+) for procedural airspace | Technology |
| COMS-B1/3 | SATVOICE (incl. routine communications) for procedural airspace | Technology |
| COMS-B2/1 | PBCS approved CPDLC (B2) for domestic and procedural airspace | Technology |
| COMS-B2/2 | PBCS Approved ADS-C (B2) for domestic and procedural airspace | Technology |
| COMS-B2/3 | PBCS approved SATVOICE (incl. routine communications) for procedural airspace | Technology |
| COMS-B3/1 | Extended CPDLC (B2 incl. Adv-IM and dynamic RNP) for dense and complex airspace | Technology |
| COMS-B3/2 | Extended ADS-C (B2 incl. Adv-IM and dynamic RNP) for dense and complex airspace | Technology |


# 3) COMS: ATS COMmunication Service

| | |
|---|---|
| Baseline | Air-ground ATS communications have been historically accomplished through the use of voice communications between pilots and controllers.<br><br>Voice over HF has been the traditional communication means to provide Air Traffic Services over oceanic and remote airspace.<br><br>Voice over VHF has been the traditional communication means to provide Air Traffic Services over domestic airspace. Voice over SATCOM is used as a backup means for emergency situations. |
| Block 0 | Introduction of air-ground ATS data link services:<br><br>• **CPDLC (ATN B1)** as a complement to voice for domestic airspace in order to reduce voice channel congestion and increase capacity,<br>• **CPDLC and ADS-C (FANS 1/A)** as a means to improve communications and surveillance in airspace where procedural separation is being applied. |
| Block 1 | Extension of air-ground ATS data link services:<br><br>• **CPDLC (FANS 1/A+)** as a complement to voice for domestic airspace in order to reduce voice channel congestion and increase capacity,<br>• **PBCS approved CPDLC and ADS-C (FANS 1/A+)** as a means to apply reduced separations in airspace where procedural separation is being applied.<br><br>Introduction of **Satellite Voice Communications** in airspace where procedural separation is being applied for routine communications in support of Air Traffic Services. |


# 4) COMI: COMmunication Infrastructure

| | | |
|---|---|---|
| COMI-B0/1 | Aircraft Communication Addressing and Reporting System (ACARS) | Technology |
| COMI-B0/2 | Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI) | Technology |
| COMI-B0/3 | VHF Data Link (VDL) Mode 0/A | Technology |
| COMI-B0/4 | VHF Data Link (VDL) Mode 2 Basic | Technology |
| COMI-B0/5 | Satellite communications (SATCOM) Class C Data | Technology |
| COMI-B0/6 | High Frequency Data Link (HFDL) | Technology |
| COMI-B0/7 | ATS Message Handling System (AMHS) | Technology |
| COMI-B1/1 | Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS) | Technology |
| COMI-B1/2 | VHF Data Link (VDL) Mode 2 Multi-Frequency | Technology |

# Technology Elements


## 4) COMI (Contd)

| | | |
|---|---|---|
| COMI-B1/3 | SATCOM Class B Voice and Data | Technology |
| COMI-B1/4 | Aeronautical Mobile Airport Communication System (AeroMACS) Ground-Ground | Technology |
| COMI-B2/1 | Air-Ground ATN/IPS | Technology |
| COMI-B2/2 | Aeronautical Mobile Airport Communication System (AeroMACS) aircraft mobile connection | Technology |
| COMI-B2/3 | Links meeting requirements for non-safety critical communication | Technology |
| COMI-B3/1 | VHF Data Link (VDL) Mode-2 Connectionless | Technology |
| COMI-B3/2 | SATCOM Class A voice and data | Technology |
| COMI-B3/3 | L-band Digital Aeronautical Communication System (LDACS) | Technology |
| COMI-B3/4 | Links meeting requirements for safety critical communication | Technology |


| COMI | | Applicability | Priority | Performance Indicators/Supporting Metrics |
|---|---|---|---|---|
| **COMI B0/1** | Aircraft Communication Addressing and Reporting System (ACARS) | | Priority 2 | |
| **COMI B0/2** | Aeronautical Telecommunication Network/Open System Interconnection (ATN/OSI) | | Priority 2 | |
| **COMI B0/3** | VHF Data Link (VDL) Mode 0/A | | Priority 2 | |
| **COMI B0/4** | VHF Data Link (VDL) Mode 2 Basic | | Priority 2 | |
| **COMI B0/5** | Satellite communications (SATCOM) Class C Data | | Priority 2 | |
| **COMI B0/6** | High Frequency Data Link (HFDL) | | Priority 2 | |


| COMI | | Applicability | Priority | Performance Indicators/Supporting Metrics |
|---|---|---|---|---|
| **COMI B1/1** | Ground-Ground Aeronautical Telecommunication Network/Internet Protocol Suite (ATN/IPS) | All States | Priority 1 | Indicator1: % of States that established National IP Network for voice and data communication<br><br>Indicator 2: % of States that joined the MID IP Network |
| **COMI B1/2** | VHF Data Link (VDL) Mode 2 Multi-Frequency | | Priority 2 | |
| **COMI B1/3** | SATCOM Class B Voice and Data | | Priority 2 | |
| **COMI B1/4** | Aeronautical Mobile Airport Communication System (AeroMACS) Ground-Ground | | Priority 2 | |

# QUESTION


# ASBU Threads

- Technology
- Information
- Operational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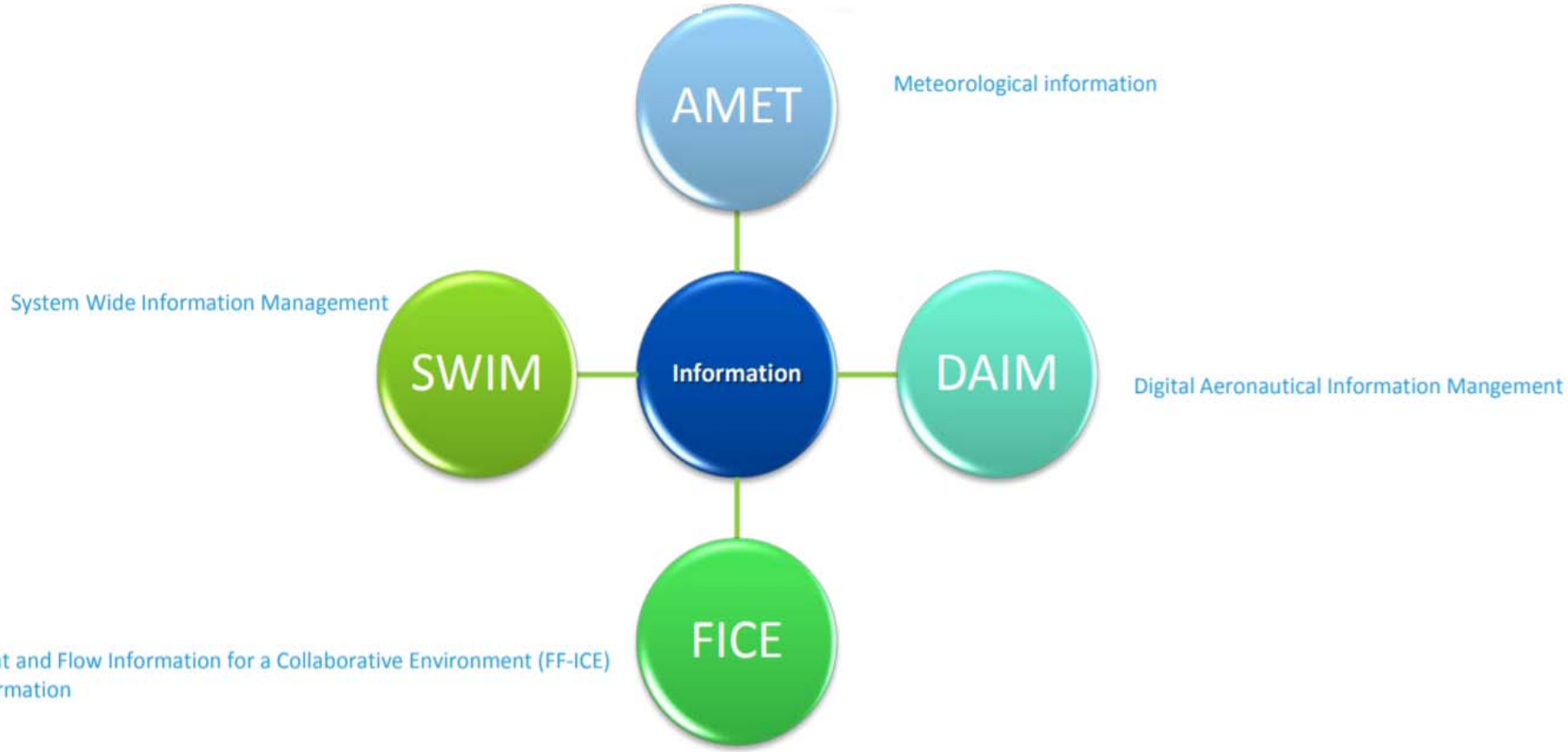
AMET
Meteorological information
System Wide Information Management
SWIM
Information
DAIM
Digital Aeronautical Information Mangement
FICE
Flight and Flow Information for a Collaborative Environment (FF-ICE) Information

| | B0 | B1 | B2 | B3 | B4 |
|---|---|---|---|---|---|
| **ACAS** | | X | X | | |
| Airborne Collision avoidance System | X | | X | | |
| **ACDM** | X | X | X | X | |
| Airport Collaborative Decision Making | X | X | | | |
| **AMET** | X | X | X | X | X |
| Advance MET Information | X | X | | X | |
| **APTA** | X | X | X | | |
| Airport Accessibility | X | X | | | |
| **ASEP** | | | | | |
| Airborne Separation | X | X | X | | |
| **ASUR** | X | X | X | X | X |
| Alternative Surveillance | X | | | | |
| **CCO** | | | | | |
| Continuous Climb Operation | X | | | | |
| **CDO** | | | | | |
| Continuous Descent Operation | X | X | X | | |
| **COMI** | X | X | X | X | |
| COM Infrastructure | | | | | |
| **COMS** | X | X | X | X | |
| COM Services/systems | | | | | |
| **CSEP** | | X | X | X | X |
| Cooperative Separation | | | | | |
| **DAIM** | | X | X | | |
| Digital Aeronautical Information Management | X | X | | | |
| **FICE** | X | | X | X | X |
| Flight & Flow in Collaborative Environment | X | X | X | X | |

| | B0 | B1 | B2 | B3 | B4 |
|---|---|---|---|---|---|
| **FRTO** | X | X | X | | |
| Free Route Operations | X | X | | | |
| **GADS** | | X | X | | |
| Global Aeronautical Distress and Safety System (GADSS) | | | | | |
| **NAVS** | X | X | X | | |
| Navigation Systems | | | | | |
| **NOPS** | X | X | X | X | |
| Network Operations | X | X | X | X | |
| **OPFL** | X | X | | | |
| Optimum Flight Levels | X | | | | |
| **RATS** | | X | | | |
| Remote ATS | | X | | | |
| **RPAS** | | | | | |
| Remotely Piloted Aircraft System | | X | X | X | |
| **RSEQ** | X | X | X | X | |
| Runway Sequencing | X | X | X | X | |
| **SNET** | X | X | | | |
| Ground-based Safety Nets | X | X | | | |
| **SURF** | X | X | X | X | |
| Surface Operations | X | X | X | | |
| **SWIM** | | | X | X | |
| System-Wide Information Management | | X | X | | |
| **TBO** | X | X | X | X | X |
| Trajectory-based Operations | X | X | | X | |
| **WAKE** | | | X | X | X |
| Wake Turbulence Separations | | X | X | X | |


## 3 Changes of the GANP

Green: 2019
Blue: 2016

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| Thread | Block 0 | Block 1 | Block 2 | Block 3 |
|---|---|---|---|---|
| AMET | B0-AMET | B1-AMET | - | B3-AMET |
| DATM | B0-DATM | B1-DATM | - | - |
| FICE | B0-FICE | B1-FICE | B2-FICE | B3-FICE |
| SWIM | - | B1-SWIM | B2-SWIM | - |

GANP 2016

| Thread | Block 0 | Block 1 | Block 2 | Block 3 | Block 4 |
|---|---|---|---|---|---|
| AMET | B0-AMET | B1-AMET | B2-AMET | B3-AMET | B4-AMET |
| DATM | - | B1-DAIM | B2-DAIM | - | |
| FICE | B0-FICE | | B2-FICE | B3-FICE | B4-FICE |
| SWIM | - | - | B2-SWIM | B3-SWIM | |

GANP 2019

2013 2019 2025 2031 xxx

October 2020

ICAO CAPACITY & EFFICIENCY

2016–2030
Global Air Navigation Plan

ICAO UNITING AVIATION


| B0-DAIM (GANP 2019) | B1-DAIM (GANP 2019) | B2-DAIM (GANP 2019) | B3-DAIM (GANP 2019) | B4-DAIM (GANP 2019) |
|---|---|---|---|---|
| NIL | 1. Provision of quality-assured aeronautical data and information<br>2. Provision of digital Aeronautical Information Publication (AIP) data sets<br>3. Provision of digital terrain data sets<br>4. Provision of digital obstacle data sets<br>5. Provision of digital aerodrome mapping data sets<br>6. Provision of digital IFP data sets<br>7. NOTAM mprovements | 1. Dissemination of AI in SWIM environment<br>2. AIM data requirements to support network operation<br>3. AIM information requirements to support high airspace operation<br>4. AIM information requirements tailored to UTM<br>5. NOTAM replacement | NIL | NIL |

~~B0-DATM (GANP 2016)~~

~~1. WGS-84~~
~~2. QMS~~
~~3. AIRAC~~
~~4. AIXM AIS Database~~
~~5. eAIP~~
~~6. Terrain & Obstacle Datasets (area 1 & 4)~~


| | |
|---|---|
| DAIM-B1/1 | Provision of quality-assured aeronautical data and information |
| DAIM-B1/2 | Provision of digital Aeronautical Information Publication (AIP) data sets |
| DAIM-B1/3 | Provision of digital terrain data sets |
| DAIM-B1/4 | Provision of digital obstacle data sets |
| DAIM-B1/5 | Provision of digital aerodrome mapping data sets |
| DAIM-B1/6 | Provision of digital instrument flight procedure data sets |
| DAIM-B1/7 | NOTAM improvements |

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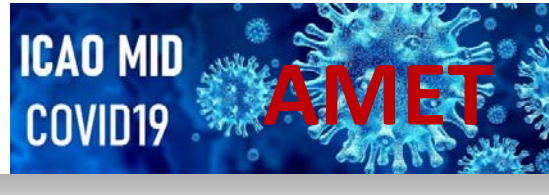
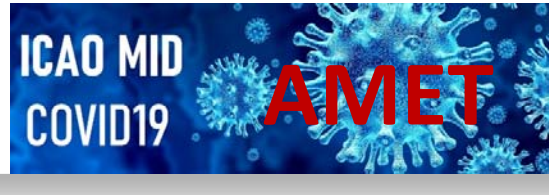
| B0-FICE (GANP 2019) | B1-FICE (GANP 2019) | B2-FICE (GANP 2019) | B3-FICE (GANP 2019) | B4-FICE (GANP 2019) |
|---|---|---|---|---|
| Automated basic inter facility data exchange (AIDC) | NIL | 1. Planning Service<br>2. Filing Service<br>3. Trial Service<br>4. Flight Data Request Service<br>5. Notification Service<br>6. Publication Service<br>7. Flight information management service for higher airspace operations<br>8. Flight information management service for low-altitude operations<br>9. Flight information management support for inflight re-planning | Flight information management services for enhanced trajectory operations | 1. integrated flight information management system for end-to-end global flight planning<br>2. Real-Time Participation of operators in flight information |

~~B1-FICE (GANP 2016)~~


## FICE-B0/1 Automated basic inter facility data exchange (AIDC)




| B0-AMET (GANP 2019) | B1-AMET (GANP 2019) | B2-AMET (GANP 2019) | B3-AMET (GANP 2019) | B4-AMET (GANP 2019) |
|---|---|---|---|---|
| 1. Meteorological observations products<br>2. Meteorological forecast and warning products<br>3. Climatological and historical meteorological products<br>4. Dissemination of meteorological products | 1. Meteorological observations information<br>2. Meteorological forecast and warning information<br>3. Climatological and historical meteorological information<br>4. Dissemination of meteorological information | 1. Meteorological observations information<br>2. Meteorological forecast and warning information<br>3. Climatological and historical meteorological information<br>4. Meteorological information service in SWIM | 1. Meteorological observations information<br>2. Meteorological forecast and warning information<br>3. Climatological and historical meteorological information<br>4. Meteorological information service in SWIM | 1. Meteorological observations information<br>2. Meteorological forecast and warning information I<br>3. Climatological and historical meteorological information<br>4. Meteorological information service in SWIM |




| | |
|---|---|
| AMET-B0/1 | Meteorological observations products |
| AMET-B0/2 | Meteorological forecast and warning products |
| AMET-B0/3 | Climatological and historical meteorological products |
| AMET-B0/4 | Dissemination of meteorological products |
| AMET-B1/1 | Meteorological observations information |
| AMET-B1/2 | Meteorological forecast and warning information |
| AMET-B1/3 | Climatological and historical meteorological information |
| AMET-B1/4 | Dissemination of meteorological information |

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| B0-SWIM (GANP 2019) | B1-SWIM (GANP 2019) | B2-SWIM (GANP 2019) | B3-SWIM (GANP 2019) | B4-SWIM (GANP 2019) |
|---|---|---|---|---|
| NIL | NIL | 1. Information service provision<br>2. Information service consumption<br>3. SWIM registry<br>4. Air/Ground SWIM for non-safety critical information<br>5. Global SWIM processes | 1. Air/Ground SWIM for safety critical information | NIL |

~~B1-SWIM (GANP 2016)~~

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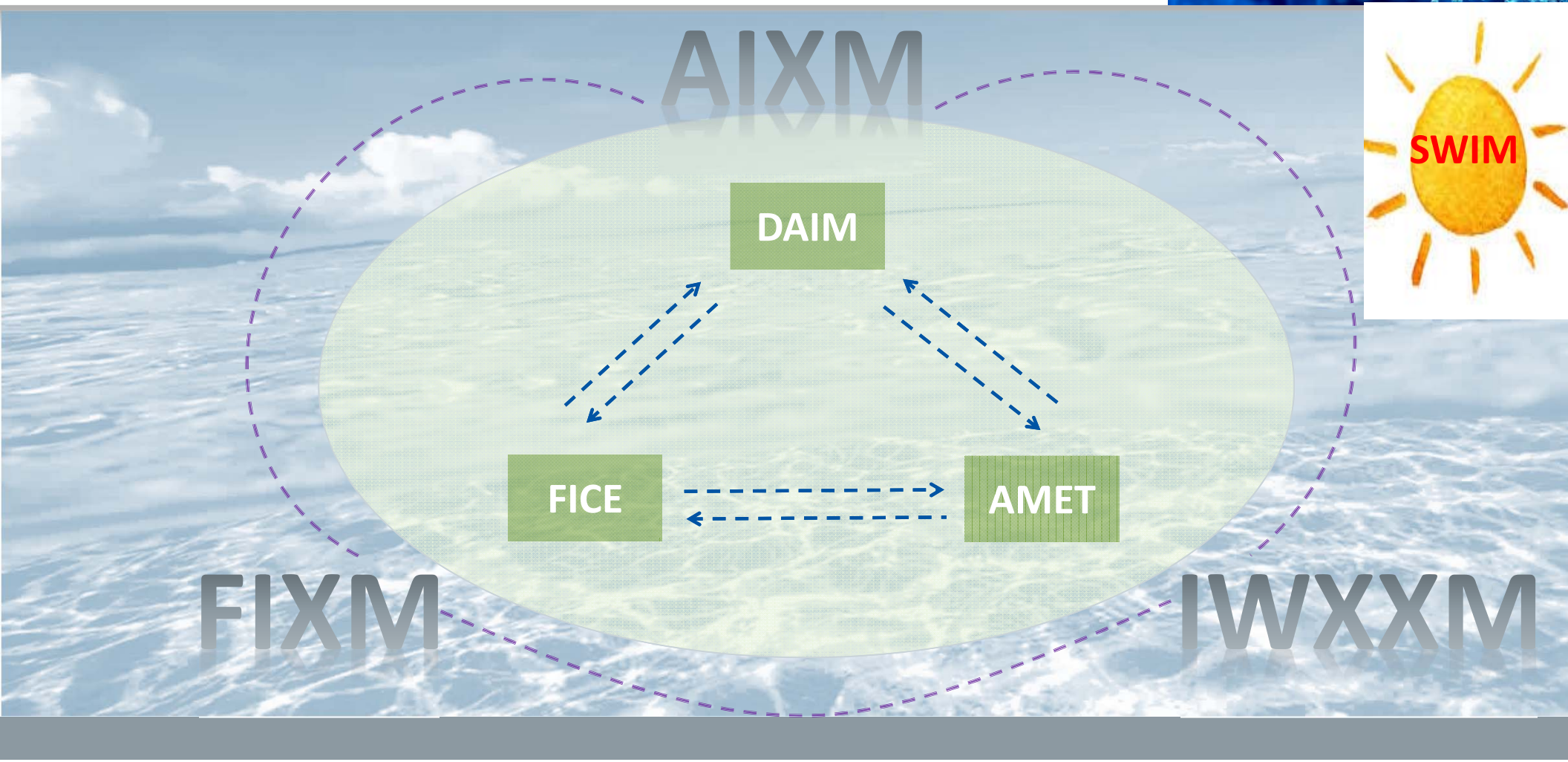
# The Road towards SWIM

| DAIM | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| DAIM B1/1 | Provision of quality-assured aeronautical data and information | 1 | All States | Supporting Metrics:<br>1. Number of States that have implemented QMS for AIS/AIM<br>2. Number of States that have implemented WGS-84 for horizontal plan (ENR, Terminal, AD) and have implemented WGS-84 Geoid Undulation<br>3. Number of States that have implemented an AIXM-based AIS database (AIXM V5.1+)<br>4. Number of States that have established formal arrangements with at least 50% of their AIS data originators |
| DAIM B1/2 | Provision of digital Aeronautical Information Publication (AIP) data sets | | Priority 2 | |
| DAIM B1/3 | Provision of digital terrain data sets | 1 | All States | 1. Indicator: % of States that provide required Terrain digital datasets<br>2. Supporting Metric: Number of States that provide required Terrain digital datasets |


| DAIM | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| DAIM B1/4 | Provision of digital obstacle data sets | 1 | All States | 1. Indicator: % of States that provide required Obstacle digital datasets<br>2. Supporting Metric: Number of States that provide required Obstacle digital datasets |
| DAIM B1/5 | Provision of digital aerodrome mapping data sets | | Priority 2 | |
| DAIM B1/6 | Provision of digital instrument flight procedure data sets | | Priority 2 | |
| DAIM B1/7 | NOTAM improvements | | Priority 2 | |


| FICE | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| FICE B0/1 | Automated basic inter facility data exchange (AIDC) | 1 | As per the AIDC/OLDI Applicability Table | 1. Indicator: % of priority 1 AIDC/OLDI Interconnection have been implemented<br><br>1. Supporting metric: Number of AIDC/OLDI interconnections implemented between adjacent ACCs. |

| AMET | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| AMET B0/1 | Meteorological observations products | 1 | All the States | Indicator: % of States that provides the following Meteorological observations products, as required:<br>1. Automatic Weather Observation System (AWOS) information (including real-time exchange of wind and RVR data)<br>2. Local reports (MET REPORT / SPECIAL)<br>3. Aerodrome reports (METAR / SPECI)<br>4. Lightning information<br>5. Ground-based weather radar information<br>6. Meteorological satellite imagery<br>7. Aircraft meteorological report (ie. ADS-B, AIREP, AMDAR etc.)<br>8. Vertical wind and temperature profiles<br>9. Wind shear alerts<br>Supporting metric: number of States that provides the above Meteorological observations products, as required. |


| AMET | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| AMET B0/2 | Meteorological forecast and warning products | 1 | All the States | Indicator: % of States that provides the following Meteorological forecast and warning products, as required.<br>1. World Area Forecast System (WAFS) gridded products<br>2. Significant Weather (SIGWX)<br>3. Low-level Area Forecast (GAMET)<br>4. Aerodrome Forecast (TAF)<br>5. Trend Forecast (TREND)<br>6. Take-off Forecast<br>7. AIRMET<br>8. SIGMET<br>9. Aerodrome Warning<br>10. Wind Shear Warning<br>Supporting metric: number of States that provides the above Meteorological forecast and warning products, as required. |


| AMET | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| AMET B0/3 | Climatological and historical meteorological products | 1 | All the States | Indicator: % of States that provides Climatological and historical meteorological products, as required.<br>Supporting metric: number of States that provide Climatological and historical meteorological products, as required. |
| AMET B0/4 | Dissemination of meteorological products | 1 | All the States | Indicator: % of States disseminating Meteorological products using a variety of formats and means (TAC, Gridded, Graphical,<br>BUFR code, IWXXM)<br>Supporting metric: number of States that disseminating Meteorological products using the above formats and means. |
| AMET B1/1 | Meteorological observations information | 2 | | |


| AMET | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| AMET B1/2 | Meteorological forecast and warning information | 2 | | |
| AMET B1/3 | Climatological and historical meteorological information | 2 | | |
| AMET B1/4 | Dissemination of meteorological information | 2 | | |

# QUESTION


# ASBU Elements

- Technology Elements
- Information Elements
- Operational Elements

# Operational Elements


## 1) APTA: Airport Accessibility: Improve arrival and departure OPS B0

**APTA**

| | | |
|---|---|---|
| APTA-B0/1 | PBN Approaches (with basic capabilities) | Operational |
| APTA-B0/2 | PBN SID and STAR procedures (with basic capabilities) | Operational |
| APTA-B0/3 | SBAS/GBAS CAT I precision approach procedures | Operational |
| APTA-B0/4 | CDO (Basic) | Operational |
| APTA-B0/5 | CCO (Basic) | Operational |
| APTA-B0/6 | PBN Helicopter Point in Space (PinS) Operations | Operational |
| APTA-B0/7 | Performance based aerodrome operating minima – Advanced aircraft | Operational |
| APTA-B0/8 | Performance based aerodrome operating minima – Basic aircraft | Operational |

# Operational Elements


## 1) APTA B1:

**APTA**

| | | |
|---|---|---|
| APTA-B1/1 | PBN Approaches (with advanced capabilities) | Operational |
| APTA-B1/2 | PBN SID and STAR procedures (with advanced capabilities) | Operational |
| APTA-B1/3 | Performance based aerodrome operating minima – Advanced aircraft with SVGS | Operational |
| APTA-B1/4 | CDO (Advanced) | Operational |
| APTA-B1/5 | CCO (Advanced) | Operational |


# 2) FRTO: Free-Route Operations:

## Improved operations through enhanced en-route trajectories B0

| FRTO | | |
|---|---|---|
| FRTO-B0/1 | Direct routing (DCT) | Operational |
| FRTO-B0/2 | Airspace planning and Flexible Use of Airspace (FUA) | Operational |
| FRTO-B0/3 | Pre-validated and coordinated ATS routes to support flight and flow | Operational |
| FRTO-B0/4 | Basic conflict detection and conformance monitoring | Operational |

# Operational Elements


## 2) FRTO B1:

**FRTO**

| | | |
|---|---|---|
| FRTO-B1/1 | Free Route Airspace (FRA) | Operational |
| FRTO-B1/2 | Required Navigation Performance (RNP) routes | Operational |
| FRTO-B1/3 | Advanced Flexible Use of Airspace (FUA) and management of real time airspace data | Operational |
| FRTO-B1/4 | Dynamic sectorization | Operational |
| FRTO-B1/5 | Enhanced Conflict Detection Tools and Conformance Monitoring | Operational |
| FRTO-B1/6 | Multi-Sector Planning | Operational |
| FRTO-B1/7 | Trajectory Options Set (TOS) | Operational |

ICAO UNITING AVIATION **Operational Elements**


# 2) MID Air Navigation strategy (initial draft), APTA Thread:

| APTA | | Applicability | Priority | Performance Indicators/Supporting Metrics | Targets | Time lines |
|---|---|---|---|---|---|---|
| APTA B0/1 | PBN Approaches (with basic capabilities) | All RWYs ENDs at International Aerodromes | Priority 1 | Indicator: % of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV)<br>Supporting metric: Number of runways ends at international aerodromes provided with Baro-VNAV approach procedures (LNAV/VNAV) | | |
| APTA B0/2 | PBN SID and STAR procedures (with basic capabilities) | All RWYs ENDs at International Aerodromes | Priority 1 | Indicator: % of runway ends at international aerodromes provided with PBN SID and STAR (basic capabilities).<br>Supporting Metric: Number of runways ends at international aerodromes provided with PBN SIDs and STAR (basic capabilities). | | |
| APTA B0/3 | SBAS/GBAS CAT I precision approach procedures | AT the state discretion's | Priority 2 | | | |
| APTA B0/4 | CDO (Basic) | OBBI, HESH, HEMA, HEGN, OIIE, OIKB, OIFM, OJAI, OJAQ, OKBK, OLBA, OOMS, OTHH, OEJN, OEMA, OEDF, OERK, HSSS, HSPN, OMAA, OMDB, OMDW, OMSJ | Priority 1 | Indicator: % of International Aerodromes/TMA with CDO implemented as required.<br>Supporting Metric: Number of International Aerodromes/TMAs with CDO implemented as required. | | |
| APTA B0/5 | CCO (Basic) | OBBI, HESN, HESH, HEMA, HEGN, HELX, OIIE, OIKB, OIFM, ORER, ORNI, OJAM, OJAI, OJAQ, OKBK, OLBA, OOMS, OOSA, OTHH, OEJN, OEMA, OEDF, OERK, HSNN, HSOB, HSSS, HSPN, OMAA, OMDB, OMDW, OMSJ | Priority 1 | Indicator: % of International Aerodromes/TMA with CCO implemented as required.<br><br>Supporting Metric: Number of International Aerodromes/TMAs with CCO implemented as required. | | |
| APTA B0/6 | PBN Helicopter Point in Space (PinS) Operations | AT the state discretion's | Priority 2 | | | |
| APTA B0/7 | Performance based aerodrome operating minima – Advanced aircraft | TBD | New element Priority 1 with applicability area | Indicator: % of International Aerodromes with PB AOM implemented for Advanced aircraft as required.<br><br>Supporting Metric: Number of International Aerodromes with PB AOM implemented for Advanced aircraft as required. | | |
| APTA B0/8 | Performance based aerodrome operating minima – Basic aircraft | AT the state discretion's | Priority 2 | | | |
| APTA B1/1 | PBN Approaches (with advanced capabilities) | AT the state discretion's | Priority 2 | | | |
| APTA B1/2 | PBN SID and STAR procedures (with advanced capabilities) | AT the state discretion's | Priority 2 | | | |
| APTA B1/3 | Performance based aerodrome operating minima – Advanced aircraft with SVGS | AT the state discretion's | Priority 2 | | | |
| APTA B1/4 | CDO (Advanced) | AT the state discretion's | Priority 2 | | | |
| APTA B1/5 | CCO (Advanced) | AT the state discretion's | Priority 2 | | | |


# 2) MID Air Navigation strategy (initial draft) FRTO Thread:

| FRTO | | Applicability | Priority | Performance Indicators/Supporting Metrics | Targets | Timelines |
|---|---|---|---|---|---|---|
| FRTO B0/1 | Direct routing (DCT) | AT the state discretion's | Priority 2 | | | |
| FRTO B0/2 | Airspace planning and Flexible Use of Airspace (FUA) Level 1 Strategic | All States | Priority 1 | Indicator: % of States that have implemented FUA.<br>Supporting metric*: number of States that have implemented FUA. | | |
| | Airspace planning and Flexible Use of Airspace (FUA) Level 2 Pre-tactical | All States | Priority 1 | Indicator: % of States that have implemented FUA Level 1<br>Supporting metric*: number of States that have implemented FUA Level 1 | | |
| | Airspace planning and Flexible Use of Airspace (FUA) Level 3 Tactical | All States | Priority 1 | Indicator: % of States that have implemented FUA Level 2<br>Supporting metric*: number of States that have implemented FUA Level 2 | | |
| FRTO B0/3 | Pre-validated and coordinated ATS routes to support flight and flow | AT the state discretion's | Priority 2 | Indicator: % of States that have implemented FUA Level 3<br>Supporting metric*: number of States that have implemented FUA Level 3 | | |
| FRTO B0/4 | Basic conflict detection and conformance monitoring | In high traffic density areas | Priority 1 | Indicator: % of States that have implemented conflict detection tools (Medium Term Conflict Detection Tool- MTCD) and conformance monitoring warnings.<br>Supporting metric*: number of States that have implemented conflict detection tools (Medium Term Conflict Detection Tool- MTCD) and conformance monitoring warnings. | | |
| FRTO B1/1 | Free Route Airspace (FRA) | AT the state discretion's | Priority 2 | | | |
| FRTO B1/2 | Required Navigation Performance (RNP) routes | AT the state discretion's | Priority 2 | | | |
| FRTO B1/3 | Advanced Flexible Use of Airspace (FUA) and management of real time airspace data | AT the state discretion's | Priority 2 | | | |
| FRTO B1/4 | Dynamic sectorization | AT the state discretion's | Priority 2 | | | |
| FRTO B1/5 | Enhanced Conflict Detection Tools and Conformance Monitoring | AT the state discretion's | Priority 2 | | | |
| FRTO B1/6 | Multi-Sector Planning | AT the state discretion's | Priority 2 | | | |
| FRTO B1/7 | Trajectory Options Set (TOS) | AT the state discretion's | Priority 2 | | | |

| | B0 | B1 | B2 | B3 | B4 |
|---|---|---|---|---|---|
| **ACAS** Airborne Collision avoidance System | X | X | X | | |
| **ACDM** Airport Collaborative Decision Making | X | X | X | X | |
| | X | X | | | |
| **AMET** Advance MET Information | X | X | X | X | X |
| | X | X | | X | |
| **APTA** Airport Accessibility | X | X | X | | |
| | X | X | | | |
| **ASEP** Airborne Separation | | | | | |
| | X | X | X | | |
| **ASUR** Alternative Surveillance | X | X | X | X | X |
| | X | | | | |
| **CCO** Continuous Climb Operation | | | | | |
| | X | | | | |
| **CDO** Continuous Descent Operation | | | | | |
| | X | X | X | | |
| **COMI** COM Infrastructure | X | X | X | X | |
| | | | | | |
| **COMS** COM Services/systems | X | X | X | X | |
| | | | | | |
| **CSEP** Cooperative Separation | | X | X | X | X |
| | | | | | |
| **DAIM** Digital Aeronautical Information Management | | X | X | | |
| | X | X | | | |
| **FICE** Flight & Flow in Collaborative Environment | X | | X | X | X |
| | X | X | X | X | |

| | B0 | B1 | B2 | B3 | B4 |
|---|---|---|---|---|---|
| **FRTO** Free Route Operations | X | X | X | | |
| | X | X | | | |
| **GADS** Global Aeronautical Distress and Safety System (GADSS) | | X | X | | |
| | | | | | |
| **NAVS** Navigation Systems | X | X | X | | |
| | | | | | |
| **NOPS** Network Operations | X | X | X | X | |
| | X | X | X | X | |
| **OPFL** Optimum Flight Levels | X | X | | | |
| | X | | | | |
| **RATS** Remote ATS | | X | | | |
| | | X | | | |
| **RPAS** Remotely Piloted Aircraft System | | | | | |
| | | X | X | X | |
| **RSEQ** Runway Sequencing | X | X | X | X | |
| | X | X | X | X | |
| **SNET** Ground-based Safety Nets | X | X | | | |
| | X | X | | | |
| **SURF** Surface Operations | X | X | X | X | |
| | X | X | X | | |
| **SWIM** System-Wide Information Management | | | X | X | |
| | | X | X | | |
| **TBO** Trajectory-based Operations | X | X | X | X | X |
| | X | X | | X | |
| **WAKE** Wake Turbulence Separations | | | X | X | X |
| | | X | X | X | |


## 3 Changes to ASBU Modules

Green: 2019 (sixth edition)
Blue: 2016 (fifth edition)

# Operational Elements


## --) ACAS: Airborne Collision Avoidance System

| | | |
|---|---|---|
| ACAS-B1/1 | ACAS Improvements | Operational |
| ACAS-B2/1 | New collision avoidance system | Operational |
| ACAS-B2/2 | New collision avoidance capability as part of an overall detect and avoid system for RPAS | Operational |

| ACAS | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| B1/1 | ACAS improvements operational | 1 | All states | Indicator: % of States requiring carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons<br><br>Supporting metric: Number of States requiring carriage of ACAS (TCAS v 7.1) for aircraft with a max certificated take-off mass greater than 5.7 tons |

*The performance indicator/ supporting metric, target and timeline for this element will be discussed during the ATM SG/6*

# Operational Elements


## --) NOPS: Network OPerationS

| | | |
|---|---|---|
| NOPS-B0/1 | Initial integration of collaborative airspace management with air traffic flow management | Operational |
| NOPS-B0/2 | Collaborative Network Flight Updates | Operational |
| NOPS-B0/3 | Network Operation Planning basic features | Operational |
| NOPS-B0/4 | Initial Airport/ATFM slots and A-CDM Network Interface | Operational |
| NOPS-B0/5 | Dynamic ATFM slot allocation | Operational |
| NOPS-B1/1 | Short Term ATFM measures | Operational |
| NOPS-B1/10 | Collaborative Trajectory Options Program (CTOP) | Operational |
| NOPS-B1/2 | Enhanced Network Operations Planning | Operational |
| NOPS-B1/3 | Enhanced integration of Airport operations planning with network operations planning | Operational |
| NOPS-B1/4 | Dynamic Traffic Complexity Management | Operational |
| NOPS-B1/5 | Full integration of airspace management with air traffic flow management | Operational |
| NOPS-B1/6 | Initial Dynamic Airspace configurations | Operational |
| NOPS-B1/7 | Enhanced ATFM slot swapping | Operational |

# Operational Elements


## --) NOPS: Network OPerationS

| | | |
|---|---|---|
| NOPS-B1/8 | Extended Arrival Management supported by the ATM Network function | Operational |
| NOPS-B1/9 | Target Times for ATFM purposes | Operational |
| NOPS-B2/1 | Optimised ATM Network Services in the initial TBO context | Operational |
| NOPS-B2/2 | Enhanced dynamic airspace configuration | Operational |
| NOPS-B2/3 | Collaborative Network Operation Planning | Operational |
| NOPS-B2/4 | Multi ATFM slot swapping and Airspace Users priorities | Operational |
| NOPS-B2/5 | Further airport integration within Network Operation Planning | Operational |
| NOPS-B2/6 | ATFM adapted for cross-border Free Route Airspace (FRA) | Operational |
| NOPS-B2/7 | UTM Network operations | Operational |
| NOPS-B2/8 | High upper airspace network operations | Operational |
| NOPS-B3/1 | ATM Network Services in full TBO context | Operational |
| NOPS-B3/2 | Cooperative Network Operations Planning | Operational |
| NOPS-B3/3 | Innovative airspace architecture | Operational |


| NOPS | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| B0/1 | Initial integration of collaborative ASM with ATFM | 1 | All states | Indicator: % of States integrating collaborative ASM with ATFM |
| B0/2 | Collaborative Network Flight Updates | 2 | AT the state discretion's | |
| B0/3 | Network Operation Planning basic | 2 | AT the state discretion's | |
| B0/4 | Initial Airport/ATFM slots and A-CDM Network Interface | 2 | AT the state discretion's | |
| B0/5 | Dynamic ATFM slot allocation | 2 | AT the state discretion's | |

*The performance indicator/ supporting metric, target and timeline for each element will be discussed during the ATM SG/6 & ATFM TF/5*


| NOPS | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| B1/1 | Short Term ATFM measures | 2 | AT the state discretion's | |
| B1/2 | Enhanced Network Operations Planning | 2 | AT the state discretion's | |
| B1/3 | Enhanced integration of Airport operations planning with network operations planning | 2 | AT the state discretion's | |
| B1/4 | Dynamic Traffic Complexity Management | 2 | AT the state discretion's | |
| B1/5 | Full integration of ASM with ATFM | 2 | AT the state discretion's | |
| B1/6 | Initial Dynamic Airspace configurations | 2 | AT the state discretion's | |

*The performance indicator/ supporting metric, target and timeline for each element will be discussed during the ATM SG/6 ATFM TF/5*


| NOPS | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| B1/7 | Enhanced ATFM slot swapping | 2 | AT the state discretion's | |
| B1/8 | Extended Arrival Management supported by the ATM Network function | 2 | AT the state discretion's | |
| B1/9 | Target Times for ATFM purposes | 2 | AT the state discretion's | |
| B1/10 | Collaborative Trajectory Options Program (CTOP) | 2 | AT the state discretion's | |

*The performance indicator/ supporting metric, target and timeline for each element will be discussed during the ATM SG/6 & ATFM TF/5*

# Operational Elements


## --) SNET: Ground-based Safety NETwork

| | | |
|---|---|---|
| SNET-B0/1 | Short Term Conflict Alert (STCA) | Operational |
| SNET-B0/2 | Minimum Safe Altitude Warning (MSAW) | Operational |
| SNET-B0/3 | Area Proximity Warning (APW) | Operational |
| SNET-B0/4 | Approach Path Monitoring (APM) | Operational |
| SNET-B1/1 | Enhanced STCA with aircraft parameters | Operational |
| SNET-B1/2 | Enhanced STCA in complex TMAs | Operational |


| SNET | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| B0/1 | Short Term Conflict Alert (STCA) | 1 | All states | Indicator: % of States that have implemented STCA |
| B0/2 | Minimum Safe Altitude Warning (MSAW) | 1 | All states | Indicator: % of States that have implemented Minimum safe altitude warning (MSAW) |
| B0/3 | Area Proximity Warning (APW) | 1 | TBD | Indicator: % of States having implemented APW. |

*The performance indicator/ supporting metric, target and timeline for each element will be discussed during the ATM SG/6*


| SNET | | Priority | Applicability | Performance Indicator |
|---|---|---|---|---|
| B0/4 | Approach Path Monitoring (APM) | 2 | AT the state discretion's | |
| B1/1 | Enhanced STCA with aircraft parameters | 2 | AT the state discretion's | |
| B1/2 | Enhanced STCA in complex TMA | 2 | AT the state discretion's | |

*The performance indicator/ supporting metric, target and timeline for each element will be discussed during the ATM SG/6*

# QUESTION

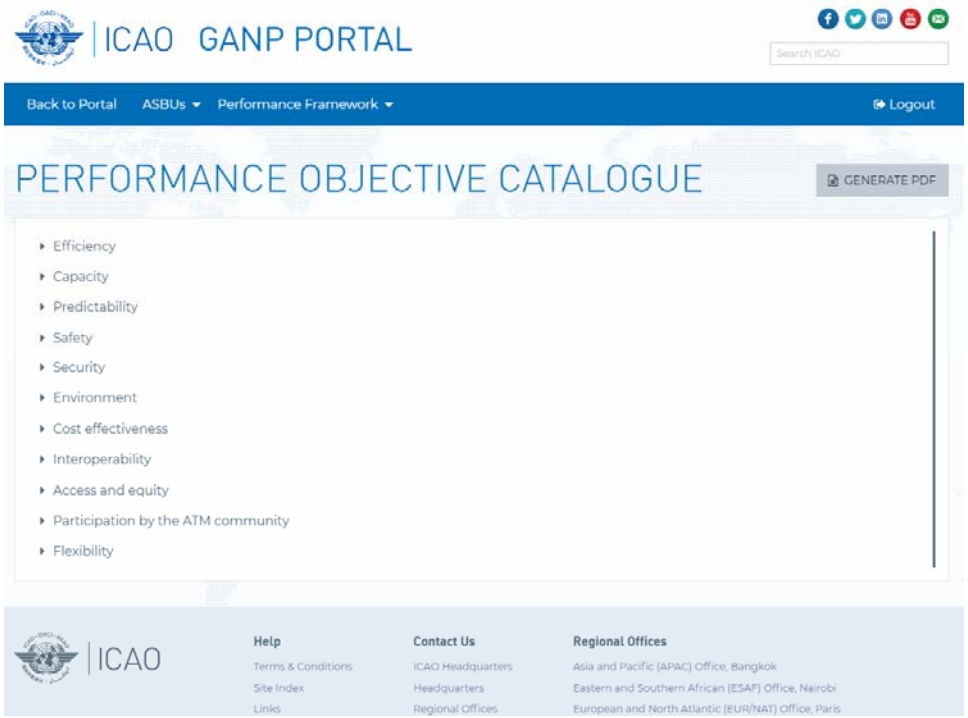

# GANP Performance Monitoring Framework

- KPAs
- KPIs
- Appropriate KPIs for the MID Region
- Open discussion for the SG meetings


## KPAs: The eleven KPAs of the GANP

A way of categorizing performance subjects related to high-level ambitions and expectations. ICAO has defined 11 KPAs:

Safety, Security, Environmental Impact, Cost Effectiveness, **Capacity**, Flight **Efficiency**, Flexibility, **Predictability**, Access And Equity, Participation By The ATM Community And Global Interoperability.



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# KPIs

| | | |
|---|---|---|
| KPI01 | Departure punctuality | |
| KPI02 | Taxi-out additional time | |
| KPI03 | ATFM slot adherence | |
| KPI04 | Filed flight plan en-route extension | |
| KPI05 | Actual en-route extension | |
| KPI06 | En-route airspace capacity | |
| KPI07 | En-route ATFM delay | |
| KPI08 | Additional time in terminal airspace | |
| KPI09 | Airport peak capacity | |
| KPI10 | Airport peak throughput | |
| KPI11 | Airport throughput efficiency | |
| KPI12 | Airport/Terminal ATFM delay | |
| KPI13 | Taxi-in additional time | |
| KPI14 | Arrival punctuality | |
| KPI15 | Flight time variability | |
| KPI16 | Additional fuel burn | |
| KPI17 | Level-off during climb | |
| KPI18 | Level capping during cruise | |
| KPI19 | Level-off during descent | |

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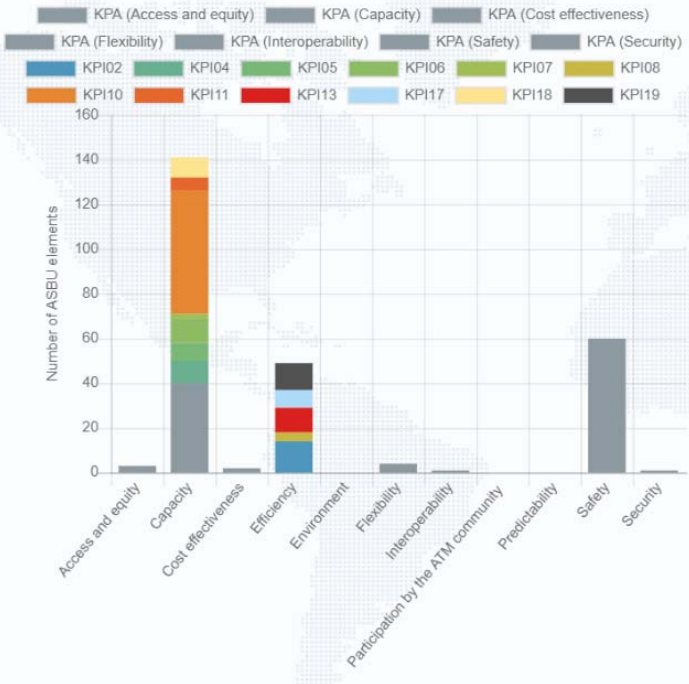
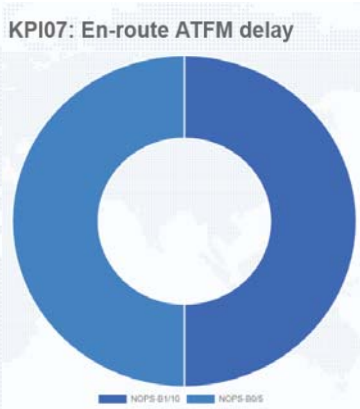
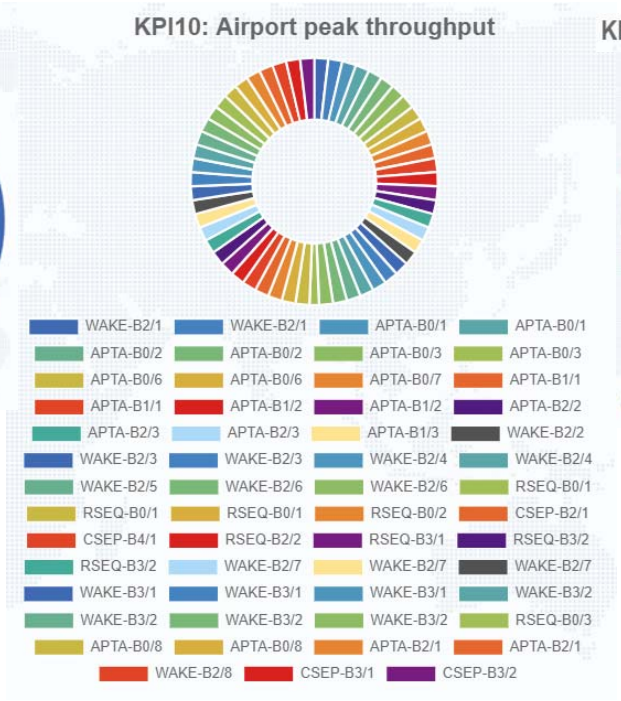
# PERFORMANCE DASHBOARD

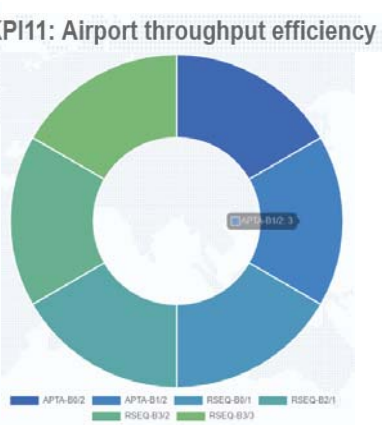
## KPA Dashboard




## KPI Dashboard




ICAO MID
COVID19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COVID19


ICAO MID
COVID19

# QUESTION

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ICAO MID COVID19