Summary Table of Aviation System Block Upgrades (ASBU) Block 0 Modules

National ASBU implementation Plan- Guidance on Elements, Equipage and Measurement

EXPANATORY NOTES

Introduction: This document discusses ASBU Block 0 Modules, lists the elements it covers, identifies the equipage required both in the aircraft and on the ground, suggests ways to monitor implementation progress and explain qualitative benefits related to main five Key Performance Areas (KPAs). This document serves as a part of guidance material to States in the development of National ASBU implementation Plan.

<table>
<tr><td colspan="3"><u>Title of the Module</u>:
This box explains the title of the Module</td></tr>
<tr><td><u>Elements:</u>
The elements of the Module are listed under this box.
Should there be elements that are not reflected in the ASBU Module but at the same time they are closely linked to the module, those elements are also specified. For example, in ASBU B0-80/Airport CDM Module/ACDM, the elements aerodrome certification and data link applications-D-VOLMET, D-ATIS, D-FIS are not included; Similarly in ASBU B0-30/AIM/DATM Module, the elements WGS-84 and eTOD are not reflected.</td><td><u>Equipage/Air</u>

This box describes what equipage is required in the aircraft for the elements of this module</td><td><u>Equipage/Ground</u>

This box describes what equipage is required on the ground for the elements of this module</td></tr>
<tr><td colspan="3">Implementation monitoring and intended performance impact
This box explains implementation progress of the Module and identifies qualitative performance benefits associated with five main KPAs only. This box contains two items.
a) Indicators for monitoring the status of implementation the module;
b) Qualitative performance benefits that allow assessing the benefits accrued as a result of implementation of that module. The benefits or expectations, also known as Key Performance Areas (KPAs are interrelated and cannot be considered in isolation since all are necessary for the achievement of the objectives established for the system as a whole. It should be noted that while safety is the highest priority, the eleven KPAs shown below are in alphabetical order as they would appear in English. They are access/equity; capacity; cost effectiveness; efficiency; environment; flexibility; global interoperability; participation of ATM community; predictability; safety; and security. However, out of these eleven KPAs, for the present, under this box only five have been selected for reporting through Air Navigation Report Form (ANRF), which are Access & Equity, Capacity, Efficiency, Environment and Safety.</td></tr>
<tr><td colspan="3">List of Performance (Benefit) Metrics for ASBU Modules - Examples
It is not necessary that every module contributes to all of the five KPAs. Consequently, a limited number of metrics per type of KPA, serving as an example to measure the module(s)' implementation benefits, without trying to apportion these benefits between module, have been identified on page 20. For the family of ASBU modules selected for air navigation implementation, States/Region to choose the applicable performance (benefit) metrics from the list available on page 20. This approach would facilitate States in collecting data for the chosen performance metrics. States/Region, however, could add new metrics for different KPAs based on maturity of the system and ability to collect relevant data..</td></tr>
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Performance Improvement Area 1:
Airport Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-65/APTA: Optimization of Approach Procedures Including Vertical Guidance</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. APV with Baro VNAV
2. APV with SBAS
3. APV with GBAS</td><td colspan="2"><u>Equipage/Air</u>
- Basic IFR GNSS avionics integrated with Baro VNAV functionality
- SBAS avionics
- GBAS avionics</td><td colspan="2"><u>Equipage/Ground</u>
- SBAS (reference stations, master stations, GEO satellites)
- GBAS</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator:
Percentage of international aerodromes having instrument runways provided with APV on the basis of Baro VNAV/SBAS/GBAS</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Increased aerodrome accessibility
.</td><td><u>KPA-Capacity</u>
Increased runway capacity</td><td><u>KPA-Efficiency</u>
Reduced fuel burn due to lower minima, fewer diversions, cancellations, delays</td><td><u>KPA-Environment</u>
Reduced emissions due to reduced fuel burn.</td><td><u>KPA-Safety</u>
Increased safety through stabilized approach paths.</td></tr>
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Performance Improvement Area 1:
Airport Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-70/WAKE: Increased Runway Throughput through optimized Wake Turbulence Separation</td></tr>
<tr><td colspan="2"><u>Elements</u>
1. Revision of current ICAO wake separation minima
2. Increasing International aerodrome Arrival Operational Capacity
3. Increasing International aerodrome Departure Operational Capacity</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- A support tool to aid in the application of the new set of 6 categories of ICAO wakes separation.
- Wind sensors and automation support is needed for element 3</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator:
Percentage of international aerodromes applying the 6 categories of wake vortex separation.</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Aerodrome capacity and departure/arrival rates will increase as the wake categories are increased from 3 to 6</td><td><u>KPA-Efficiency</u>
Not Applicable</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
Not Applicable</td></tr>
</table>

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Performance Improvement Area 1:
Airport Operations

<table>
<tr><td colspan="5"><u>Title of the Module:</u>
B0-75/SURF: Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)</td></tr>
<tr><td colspan="2"><u>Elements</u>
1. Surveillance
2. Alerting systems
3. (Not included in the Module but added here as they are closely linked to this Module) Visual aids for navigation and Wild life strike hazard reduction</td><td><u>Equipage/Air</u>
- ADS-B / SSR transponder system</td><td colspan="2"><u>Equipage/Ground</u>
- SMR/SSR Mode S/ ADS B/ Multilateration
- Surveillance display with alerting functionalities in the tower.
- A cooperative transponder system for vehicles
- Visual aids for navigation</td></tr>
<tr><td colspan="5">Implementation monitoring and intended performance impact</td></tr>
<tr><td><u>Implementation progress</u></td><td colspan="4">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td>1. Indicator:
Percentage of international aerodromes with SMR/ SSR Mode S/ ADS-B Multilateration

2. Indicator:
Percentage of international aerodromes with a cooperative transponder systems on vehicles

3. Indicator:
Percentage of international aerodromes complying with visual aid requirements as per Annex 14</td><td><u>KPA-Access/Equity</u>
Improves KPA-Access/Equity to portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft. Ensures equity in ATC handling of surface traffic regardless of the traffic’s position on the international aerodrome.</td><td><u>KPA-Capacity</u>
Sustained level of aerodrome capacity during periods of reduced visibility</td><td><u>KPA-Efficiency</u>
Reduced taxi times through diminished requirements for intermediate holdings based on reliance on visual surveillance only. Reduced fuel burn.</td><td><u>KPA-Environment</u>
Reduced emissions due to reduced fuel burn</td><td><u>KPA-Safety</u>
Reduced runway incursions. Improved response to unsafe situations. Improved situational awareness leading to reduced ATC workload.</td></tr>
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Performance Improvement Area 1:
Airport Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-80/ACDM; Improved Airport Operations through Airport-CDM</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. Airport –CDM
2.(Not included in the Module but added here as they are closely linked to this Module) Aerodrome certification, Aerodrome emergency planning, Airport planning and Heliport operations</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- Interconnection of ground systems of different partners for Airport-CDM
- Rescue and Fire Fighting (RFF) Equipment as per Annexe 14</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator:
percentage of international aerodromes with Airport-CDM

2. Indicator:
Percentage of certified international aerodromes

3. Indicator:
Percentage of international aerodromes with RFF equipment as per Annex 14</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Enhances equity on the use of aerodrome facilities.</td><td><u>KPA-Capacity</u>
Enhanced use of existing Implementation of gate and stands (unlock latent capacity).
Reduced workload, better organization of the activities to manage flights.</td><td><u>KPA-Efficiency</u>
Improved operational efficiency (fleet management); and reduced delay.
Reduced fuel burn due to reduced taxi time and lower aircraft engine run time.</td><td><u>KPA-Environment</u>
Reduced emissions due to reduced fuel burn</td><td><u>KPA-Safety</u>
Not Applicable</td></tr>
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Performance Improvement Area 1:
Airport Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-15/RSEQ: Improve Traffic Flow Through Runway Sequencing (AMAN/DMAN)</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. AMAN
2. DMAN</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- Automation support</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator:
Percentage of international aerodromes with AMAN/DMAN</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Time-based metering will optimize usage of terminal airspace and runway capacity.</td><td><u>KPA-Efficiency</u>
Efficiency is positively impacted as reflected by increased runway throughput and arrival rates.</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
Not Applicable</td></tr>
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Performance Improvement Area 2:
Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-25/FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. AIDC
2. (Not included in the Module but added here as they are closely linked to this Module) AMHS/IPS</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- A set of AIDC messages in FDPS
- AFTN (AMHS/IPS)</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u></td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Reduced controller workload and increased data integrity supporting reduced separations translating directly to cross sector or boundary capacity flow increases.</td><td><u>KPA-Efficiency</u>
The reduced separation can also be used to more frequently offer aircraft flight levels closer to the optimum; in certain cases, this also translates into reduced en-route holding.</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
Better knowledge of more accurate flight plan information.

.</td></tr>
<tr><td>1. Indicator:
Percentage of ATS units with AIDC

2. Indicator:
States implementing AMHS/IPS</td><td></td><td></td><td></td><td></td><td></td></tr>
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Performance Improvement Area 2:
Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-30/DAIM; Service Improvement through Digital Aeronautical Information Management</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. AIXM
2. eAIP
3. Digital NOTAM
4.(Not included in the Module but added here as they are closely linked to this Module) WGS-84; eTOD; and QMS for AIM</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
AIXM; eAIP and Digital NOTAM
WGS-84; eTOD; QMS for AIM
The aeronautical information is made available to external users via either a subscription to an electronic access or physical delivery; The electronic access can be based on Internet protocol services.</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u></td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Not Applicable</td><td><u>KPA-Efficiency</u>
Not Applicable</td><td><u>KPA-Environment</u>
Reduced amount of paper for promulgation of information</td><td><u>KPA-Safety</u>
Reduction in the number of possible inconsistencies</td></tr>
<tr><td>1. Indicator:
States implementing AIXM; eAIP, Digital NOTAM
WGS-84; eTOD; QMS for AIM</td><td></td><td></td><td></td><td></td><td></td></tr>
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Performance Improvement Area 2:
Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-105/AMET: Meteorological information supporting enhanced operational efficiency and safety</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. WAFS-IAVW-TCW
2. Aerodrome warning, wind shear warning and alerts
3. SIGMET information</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- Connection to the AFS satellite and public Internet distribution systems
- Connection to the AFTN
- Local arrangements for reception of aerodrome warning ,wind shear warning and alerts</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1 Indicator:
States implementation of SADIS 2G satellite broadcast and/or Secure SADIS FTP service.

2. Indicator:
States implementation of WAFS Internet File Service (WIFS)</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Optimized usage of airspace and aerodrome capacity due to MET support</td><td><u>KPA-Efficiency</u>
Reduced arrival/departure holding time, thus reduced fuel burn due to MET support</td><td><u>KPA-Environment</u>
Reduced emissions due to reduced fuel burn due to MET support</td><td><u>KPA-Safety</u>
Reduced incidents/accidents in flight and at international aerodromes due to MET support.</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-10/FRTO: Improved Operations through Enhanced En-Route Trajectories</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. Airspace planning
2. Flexible Use of airspace
3. Flexible Routing</td><td colspan="2"><u>Equipage/Air</u>
- FANS 1/A and ACARS</td><td colspan="2"><u>Equipage/Ground</u>
- CDM through Internet portal</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td><u>Implementation progress</u></td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td rowspan="2">1. Indicator: Percentage of time segregated airspaces are available for civil operations in the State

2. Indicator:
Percentage of PBN routes implemented</td><td><u>KPA-Access/Equity</u>
Better access to airspace by a reduction of the permanently segregated volumes of airspace.</td><td><u>KPA-Capacity</u>
Flexible routing reduces potential congestion on trunk routes and at busy crossing points. The flexible use of airspace gives greater possibilities to separate flights horizontally. PBN helps to reduce route spacing and aircraft separations.</td><td><u>KPA-Efficiency</u>
In particular the module will reduce flight length and related fuel burn and emissions. The module will reduce the number of flight diversions and cancellations. It will also better allow avoiding noise sensitive areas.</td><td><u>KPA-Environment</u>
Fuel burn and emissions will be reduced.</td><td><u>KPA-Safety</u>
Not Applicable</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-35/NOPS: Improved Flow Performance through Planning based on a Network-Wide view</td></tr>
<tr><td colspan="2"><u>Elements:</u>
Air Traffic Flow Management</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- System software for ATFM</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator:
Percentage of ATS units using ATFM services.</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Improved Access and equity in the use of airspace or aerodrome by avoiding disruption of air traffic. ATFM processes take care of equitable distribution of delays.</td><td><u>KPA-Capacity</u>
Better utilization of available capacity, ability to anticipate difficult situations and mitigate them in advance.</td><td><u>KPA-Efficiency</u>
Reduced fuel burn due to better anticipation of flow issues; Reduced block times and times with engines on.</td><td><u>KPA-Environment</u>
Reduced fuel burn as delays are absorbed on the ground, with shut engines; or at optimum flight levels through speed or route management.
.</td><td><u>KPA-Safety</u>
Reduced occurrences of undesired sector overloads</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-84/ASUR: Initial capability for ground surveillance</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. ADS-B
2. Multilateration</td><td colspan="2"><u>Equipage/Air</u>
- ADS-B OUT.
- Mode S radar transponders for Multilateration</td><td colspan="2"><u>Equipage/Ground</u>
- FDPS and SDPS
- ADS-B
- Multilateration</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator: Percentage of international aerodromes with ADS-B/MLAT</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Typical separation minima are 3 NM or 5 NM enabling an increase in traffic density compared to procedural minima. TMA surveillance performance improvements are achieved through high accuracy, better velocity vector and improved coverage.</td><td><u>KPA-Efficiency</u>
Not Applicable</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
Reduction of the number of major incidents. Support to search and rescue.</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-85/ASEP: Air Traffic Situational Awareness(ATSA)</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. ATSA-AIRB
2. ATSA-VSA</td><td colspan="2"><u>Equipage/Air</u>
- ADS-B OUT
- ADS-B IN
- Traffic display</td><td colspan="2"><u>Equipage/Ground</u>
- Nil</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td><u>Implementation progress</u></td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td rowspan="2">1. Indicator: Percentage of aircraft with ADS-B OUT

2. Indicator: Percentage of aircraft with ADS-B IN</td><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Not Applicable</td><td><u>KPA-Efficiency</u>
Improved situational awareness in identifying level change opportunities with current separation minima (AIRB) and improved visual acquisition (VSA).</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
Improved situational awareness and reduced likelihood of wake turbulence encounters and missed approaches.</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-86/OPFL: Improved KPA-Access/Equity to Optimum Flight Levels through Climb/Descent Procedures using ADS-B</td></tr>
<tr><td colspan="2"><u>Elements:</u>
ITP using ADS-B</td><td colspan="2"><u>Equipage/Air</u>
- ADS-B IN
- ADS-B OUT</td><td colspan="2"><u>Equipage/Ground</u>
- Conflict probe logics</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator: Percentage of aircraft used ITP</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Improvement in capacity on a given air route.</td><td><u>KPA-Efficiency</u>
Increased efficiency on oceanic and potentially continental en-route</td><td><u>KPA-Environment</u>
Reduced emissions</td><td><u>KPA-Safety</u>
A reduction of possible injuries for cabin crew and passengers.</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-101/ACAS: ACAS Improvements</td></tr>
<tr><td colspan="2"><u>Elements:</u>
ACAS II (TCAS version 7.1)</td><td colspan="2"><u>Equipage/Air</u>
- TCAS V7.1</td><td colspan="2"><u>Equipage/Ground</u>
Nil</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td><u>Implementation progress</u></td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td rowspan="2">1. Indicator: Percentage of aircraft with ACAS, logic Version 7.1</td><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Not Applicable</td><td><u>KPA-Efficiency</u>
ACAS improvement will reduce unnecessary resolution advisory (RA) and then reduce trajectory deviations.</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
ACAS increases safety in the case of breakdown of separation.</td></tr>
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Performance Improvement Area 3:
Optimum Capacity and Flexible Flights – Through Global Collaborative ATM

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-102/SNET: Increased Effectiveness of Ground-Based Safety Nets</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. Short Term Conflict Alert (STCA)
2. Area Proximity Warning (APW)
3. Minimum Safe Altitude Warning (MSAW)</td><td colspan="2"><u>Equipage/Air</u>
- SSR Mode C/S transponder
- ADS-B OUT</td><td colspan="2"><u>Equipage/Ground</u>
- Short Term Conflict Alert,
- Area Proximity Warnings and
- Minimum Safe Altitude Warnings</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u></td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td rowspan="2">1. Indicator:
Percentage of ATS units with ground based safety nets</td><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Not Applicable</td><td><u>KPA-Efficiency</u>
Not Applicable</td><td><u>KPA-Environment</u>
Not Applicable</td><td><u>KPA-Safety</u>
Significant reduction of the number of major incidents</td></tr>
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Performance Improvement Area 4:
Efficient Flight Path – Through Trajectory-based Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-05/CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. CDO
2. PBN STARs</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- Nil</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator: Percentage of international aerodromes with CDO implemented

2. Indicator: Percentage of international aerodromes/TMAs with PBN STARs implemented</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Not Applicable</td><td><u>KPA-Efficiency</u>
Cost savings through reduced fuel burn. Reduction in the number of required radio transmissions.</td><td><u>KPA-Environment</u>
Reduced emissions as a result of reduced fuel burn</td><td><u>KPA-safety</u>
More consistent flight paths and stabilized approach paths. Reduction in the incidence of controlled flight into terrain (CFIT).</td></tr>
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Performance Improvement Area 4:
Efficient Flight Path – Through Trajectory-based Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-40/TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. ADS-C over oceanic and remote areas
2. Continental CPDLC</td><td colspan="2"><u>Equipage/Air</u>
- FANS 1/A; ATN B1</td><td colspan="2"><u>Equipage/Ground</u>
- ADS-C
- VDL Mode 2/Continental CPDLC</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator:
Number of ADS-C /CPDLC procedures available over oceanic and remote Areas</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
A better localization of traffic and reduced separation allow increased capacity. Reduced communication workload and better organization of controller tasks allowing increasing sector capacity.</td><td><u>KPA-Efficiency</u>
Routes/tracks and flights can be separated by reduced minima, allowing to apply flexible routings and vertical profiles closer to the user-preferred ones.</td><td><u>KPA-Environment</u>
Reduced emissions as a result of reduced fuel burn.</td><td><u>KPA-afety</u>
ADS-C based safety nets supports cleared level adherence monitoring, route adherence monitoring, danger area infringement warning and improved search and rescue. Reduced occurrences of misunderstandings; solution to stuck microphone situations.</td></tr>
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Performance Improvement Area 4:
Efficient Flight Path – Through Trajectory-based Operations

<table>
<tr><td colspan="6"><u>Title of the Module:</u>
B0-20/CCO: Improved Flexibility and Efficiency in Departure Profiles (CCO)</td></tr>
<tr><td colspan="2"><u>Elements:</u>
1. CCO
2. PBN SIDs</td><td colspan="2"><u>Equipage/Air</u>
- Nil</td><td colspan="2"><u>Equipage/Ground</u>
- Nil</td></tr>
<tr><td colspan="6">Implementation monitoring and intended performance impact</td></tr>
<tr><td rowspan="2"><u>Implementation progress</u>
1. Indicator: Percentage of international aerodromes with CCO implemented

2. Indicator: Percentage of international aerodromes with PBN SIDs implemented</td><td colspan="5">Qualitative performance benefits associated with five main KPAs only</td></tr>
<tr><td><u>KPA-Access/Equity</u>
Not Applicable</td><td><u>KPA-Capacity</u>
Not Applicable</td><td><u>KPA-Efficiency</u>
Cost savings through reduced fuel burn and efficient aircraft operating profiles. Reduction in the number of required radio transmissions.</td><td><u>KPA-Environment</u>
Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted. Environmental benefits through reduced emissions.</td><td><u>KPA-Safety</u>
More consistent flight paths. Reduction in the number of required radio transmissions. Lower pilot and air traffic control workload</td></tr>
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LIST OF PERFORMANCE (BENEFIT) METRICS FOR ASBU MODULES - EXAMPLES

Key Performance Area	Related Performance Metrics
1. Access & Equity	1. KPA/Access: Number of international aerodromes with APV
	2. KPA/Access: Percentage of time Special Use Airspace (SUA) available to Civil Operations
	3. KPA/Access: Percentage of requested flight level versus cleared flight level
	4. KPA/Access: Number of access denials due to equipment failure
	5. KPA/Equity: Percentage of aircraft operators by class who consider that equity is achieved
	6. KPA/Equity: Percentage of different types of aircraft operating in a particular airspace or international aerodrome.
2. Capacity	1. Number of operations (arrivals+departures) per international aerodrome per day
	2. Average ATFM delay per flight at an international aerodrome
	3. Number of landings before and after APV per international aerodrome
	4. Average en-route ATFM delay generated by airspace volume
	5. Number of aircraft in a defined volume of airspace for a period of time
3. Cost effectiveness	1. IFR movements per ATCO hour on duty
	2. IFR flights (en-route) per ATCO hour duty
4. Efficiency	1. Kilograms of fuel saved per flight
	2. Average ATFM delay per flight at the international aerodrome
	3. Percentage of PBN routes
5. Environment	1. Kilograms of CO_2 emissions reduced per flight (= KGs fuel saved per flight x 3.157)
	2. The number of electronic pages dispatched
6. Flexibility	1. Number of backups available in emergency
	2. Number of changes approved to the flight plan
	3. Number of alternatives granted
7. Global Interoperability	1. Number of ATC automated systems that are interconnected
8. Participation of the ATM Community	1. Level of participation in meetings
	2. Level of responses to planning activities
9. Predictability	1. Arrival/departure delay (in minutes) at international aerodrome

Key Performance Area	Related Performance Metrics
10. Safety	1. Number of runway incursions per international aerodrome per year
	2. Number of incidents/accidents with MET conditions as a sole or as a contributory factor
	3. Number of ACAS RA events
	4. Number of CFIT accidents
	5.Number of missed approaches avoided due to use of CDO
11. Security	Not Applicable

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REFERENCE TABLE FOR THE NEW AND OLD ASBU MODULES NUMBERING

Old ASBU Modules Numbering System	New ASBU Modules Identifiers	
65	*APTA*	*Airport Accessibility*
70	*WAKE*	*Wake Turbulence Separation*
15	*RSEQ*	*Arrival/Departure Management*
75	*SURF*	*Surface Operations*
80	*ACDM*	*Airport Collaborative Decision Making*
81	*RTWR*	*Remote Aerodrome Control Towers*
25	*FICE*	*FF/ICE*
30	*DAIM*	*Digital Aeronautical Management*
31	*SWIM*	*System Wide Information Management*
105	*AMET*	*Advanced Meteorological Information*
10	*FRTO*	*Free Routing*
35	*NOPS*	*Network Operations*
84	*ASUR*	*Initial Surveillance*
85	*ASEP*	*Airborne Separation*

Old ASBU Modules Numbering System	New ASBU Modules Identifiers	Old ASBU Modules Numbering System
86	*OPFL*	*Optimum Flight Levels*
101	*ACAS*	*Airborne Collision Avoidance Systems*
102	*SNET*	*Ground-Based Safety Nets*
05	*CDO*	*Continuous Descent Operations*
40	*TBO*	*Trajectory-Based Operations*
20	*CCO*	*Continuous Climb Operations*
90	*RPAS*	*Remotely Piloted Aircraft Systems*

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