

SESAAR		Active							LOC/APT	
ATC26		Point Merge in complex TMA								
REG	ASP	MIL	APO	USE	INT	IND	NM	MET	AIS	USP

## Subject matter and scope

Terminal Control (TC) Approach operations currently employ "Open-loop" techniques to sequence and space the arrival traffic. This entails the use of tactical vectors: heading, speed and vertical altitude intervention, to merge traffic onto the line of the Final Approach ILS (Instrument Landing System).

Point Merge is a method of merging arrival flows with existing technology including PBN. Under a Point Merge System, the aircraft are merged to a point using "Closed-loop" techniques. This technique allows controllers to sequence and merge arrivals without vectoring, while enabling continuous descent operations and maintaining runway throughput, even under high traffic.

This concept builds on previous concept development and implementation by further developing it to cater for a Point Merge centric PBN route structure and operating method for Very High Capacity (VHC) or High Capacity (HC) needs TMAs.

This concept provides a Point Merge centric PBN route structure and operating method for a complex TMA. Therefore, the concept is centred on Point Merge procedures but also incorporates aspects of PBN route structures for Arrivals & Departures so that a fully effective concept for TMA airspace is developed.

**NOTE:** Point Merge usually relies on existing technology on-board aircraft such as PBN navigation specification. More stringent navigation specifications (RNP x) may be used if deemed necessary depending on local/specific requirements (e.g. airspace complexity, terrain clearance, runway spacing in case of independent parallel approaches, etc...).

**NOTE FOR MILITARY AUTHORITIES:** It is the responsibility of each military authority to review this Objective IN ITS ENTIRETY and address each of the SLoAs that the military authority considers RELEVANT for itself. This has to be done on top and above of the review of "MIL" SLoAs which identify actions EXCLUSIVE to military authorities.

## Applicability Area(s) & Timescale(s)

<b>Applicability Area</b> (Subject to local needs)				
<b>Timescales:</b>	<b>From:</b>	<b>By:</b>	<b>Applicable to:</b>	
IOC used for Analytics functioning only - not for implementation planning	01/07/2022		Applicability Area	
FOC used for Analytics functioning only - not for implementation planning		31/12/2030	Applicability Area	

## References

### European ATM Master Plan

OI step -	<a href="#">[AOM-0601]-Terminal Airspace Organisation Adapted through Use of Best Practice</a>									
Enablers -	MIL-STD-01	MIL-STD-02	PRO-021							

Legend:	WXYZ-001	Covered by SLoA(s) in this objective	WXYZ-002 zzz	Covered by SLoA(s) in another objective Objective covering the enabler	WXYZ-003	Not covered in the Implementation Plan
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### Applicable legislation

-none-
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### Essential Operational Changes

Airport and TMA performance
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### SESAAR Solution

#107 - Point Merge in complex TMA
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### ICAO GANP - ASBUs

RSEQ-B0/3	Point merge
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**Deployment Programme**

- none -	
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**European Plan for Aviation Safety**

- none -	
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**Operating Environments**

Terminal Airspace
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**Stakeholder Lines of Action (SLoAs)**

SloA ref.	Title	From	By
ATC26-ASP01	Develop and publish Point Merge procedures		
ATC26-ASP02	Adapt ATM systems to support Point Merge procedures		
ATC26-ASP03	Safety assessment		
ATC26-ASP04	Training		
ATC26-ASP05	Operational use		
ATC26-USE01	Train flight crews in Point Merge procedures		

Description of finalised and deleted SLoAs is available on the eATM Portal @ [https://www.eatmportal.eu/working/depl/essip\\_objectives](https://www.eatmportal.eu/working/depl/essip_objectives)

**Expected Performance Benefits**

<b>Safety:</b>	TMA safety levels were maintained at current day levels or improved through: a reduction of tactical vectoring; single leg design allowing descent-enabled management of traffic not adequately spaced in the horizontal plane; increased situational awareness
<b>Capacity:</b>	Point Merge enables a significant reduction in ATC tactical interventions, hence in controller's workload, R/T occupancy and communications task load leading to possible increases of the terminal airspace capacity
<b>Operational Efficiency:</b>	-
<b>Cost Efficiency:</b>	-
<b>Environment:</b>	Point Merge offers both the path stretching capability required to build the sequence in dense terminal areas, and, once aircraft are directed to the merge point, the necessary predictability to support continuous descent operations. It also enables a better flow segregation – including departures, which may in turn facilitate Continuous Climb Operations (CCOs)
<b>Security:</b>	-

**Detailed SLoA Descriptions**

<b>ATC26-ASP01</b>	<b>Develop and publish Point Merge procedures</b>	<b>From:</b> -	<b>By:</b> -
<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	As any terminal airspace procedure, Point Merge procedures are expected to be published in the form of a PBN STAR or transition, and detailed in an official aeronautical publication (AIP) or a supporting information circular (AIC) by the concerned air navigation service provider. It is recommended to include among others an explicit mention that pilots shall expect to be directed to the merge point at any time while flying along a sequencing leg It is strongly recommended to follow the design guidelines as described in the Operational services and environment definition document (OSED) for "Point Merge" introduced in the Quick Guide.		
<b>Supporting material(s):</b>	SJU - SESAR Solution 107: Data Pack for Point Merge in complex TMA Url : <a href="https://www.sesarju.eu/sesar-solutions/point-merge-complex-terminal-airspace">https://www.sesarju.eu/sesar-solutions/point-merge-complex-terminal-airspace</a> EUROCONTROL - Point Merge implementation - A quick guide - Edition 1.4 / 05/2021 Url : <a href="https://www.eurocontrol.int/publication/point-merge-implementation">https://www.eurocontrol.int/publication/point-merge-implementation</a> EUROCONTROL - Point merge integration of arrival flows enabling extensive RNAV application and continuous descent (reference manual) - OSED - Edition 2.0 / 07/2010 Url : <a href="https://www.eurocontrol.int/publication/point-merge-integration-arrival-flows-enabling-extensive-rnav-application-and">https://www.eurocontrol.int/publication/point-merge-integration-arrival-flows-enabling-extensive-rnav-application-and</a>		
<b>ATM Master Plan relationship:</b>	<a href="#">[PRO-021]-ATC Procedures to facilitate the design and utilization of more noise sensitive and efficient SID/STAR routings including CDA and to integrate P-RNAV or RNAV with APV/Baro VNAV capabilities into the TMA route structure</a>		
<b>Finalisation criteria:</b>	1 - Point Merge procedures are published.		
<b>ATC26-ASP02</b>	<b>Adapt ATM systems to support Point Merge procedures</b>	<b>From:</b>	<b>By:</b>

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<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	<p>In principle, no new specific ground tool nor system is required. However some adaptations of the ATM systems might be required. They could address:</p> <ul style="list-style-type: none"> <li>• Simple visual markings on the controllers display (e.g. range rings centered on the merge point) to adequately support the operating method.</li> <li>• Trajectories displayed on the controller's screen</li> <li>• Adaptation of the conflict detection systems and safety nets</li> </ul>		
<b>Supporting material(s):</b>	<p>SJU - SESAR Solution 107: Data Pack for Point Merge in complex TMA            Url : <a href="https://www.sesarju.eu/sesar-solutions/point-merge-complex-terminal-airspace">https://www.sesarju.eu/sesar-solutions/point-merge-complex-terminal-airspace</a>            EUROCONTROL - Point Merge supporting documentation            Url : <a href="https://www.eurocontrol.int/concept/point-merge">https://www.eurocontrol.int/concept/point-merge</a></p>		
<b>Finalisation criteria:</b>	1 - ATM systems adapted as necessary.		
<b>ATC26-ASP03</b>	<b>Safety assessment</b>	From:	By:
		-	-
<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	<p>A safety assessment of the changes shall be developed and delivered to the competent authority. The safety assessment should address at least:</p> <ul style="list-style-type: none"> <li>• The need for airspace redesign in the TMA</li> <li>• The operational procedure requirements</li> <li>• The display of the appropriate information on the controller's screen</li> <li>• The handling of the mixed equipage traffic</li> </ul>		
<b>Supporting material(s):</b>	<p>EUROCONTROL - Point Merge supporting documentation            Url : <a href="https://www.eurocontrol.int/concept/point-merge">https://www.eurocontrol.int/concept/point-merge</a>            SJU - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA 07/2013            Url : <a href="https://www.sesarju.eu/sites/default/files/documents/solution/Sol107_5_Point_Merge_Complex_TMA_Safety_and_Performance_Requirements.pdf">https://www.sesarju.eu/sites/default/files/documents/solution/Sol107_5_Point_Merge_Complex_TMA_Safety_and_Performance_Requirements.pdf</a></p>		
<b>Finalisation criteria:</b>	1 - Safety assessment has been developed and delivered to the competent authority.		
<b>ATC26-ASP04</b>	<b>Training</b>	From:	By:
		-	-
<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	<p>All relevant staff shall be duly trained.            Existing and new Controllers will need to be trained to use the Point Merge procedures with PBN route structures            From a controller's perspective, one important constraint lies in the risk of loss of controller's vectoring skills, which shall then be mitigated through recurrent training. The risk of a decrease in air traffic controllers' vigilance for the monitoring task shall also be highlighted during training.</p>		
<b>Supporting material(s):</b>	<p>EUROCONTROL - Point Merge supporting documentation            Url : <a href="https://www.eurocontrol.int/concept/point-merge">https://www.eurocontrol.int/concept/point-merge</a>            SJU - Operational Service and Environment Definition (OSED) for Point Merge in Complex TMA            Url : <a href="https://www.sesarju.eu/sites/default/files/documents/solution/Sol107%204%20Point%20Merge%20Complex%20TMA_OSED.pdf">https://www.sesarju.eu/sites/default/files/documents/solution/Sol107%204%20Point%20Merge%20Complex%20TMA_OSED.pdf</a></p>		
<b>Finalisation criteria:</b>	1 - Training has been completed.		
<b>ATC26-ASP05</b>	<b>Operational use</b>	From:	By:
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<b>Action by:</b>	<b>ANS Providers</b>		
<b>Description &amp; purpose:</b>	<p>Once the procedures are in place, systems have been upgraded, safety assessment delivered and approved, training has been completed, Point Merge is ready for operational use.</p>		
<b>Supporting material(s):</b>	<p>SJU - SESAR Solution 107: Data Pack for Point Merge in complex TMA            Url : <a href="https://www.sesarju.eu/sesar-solutions/point-merge-complex-terminal-airspace">https://www.sesarju.eu/sesar-solutions/point-merge-complex-terminal-airspace</a>            EUROCONTROL - Point Merge supporting documentation            Url : <a href="https://www.eurocontrol.int/concept/point-merge">https://www.eurocontrol.int/concept/point-merge</a></p>		
<b>Finalisation criteria:</b>	1 - Point Merge operations are put into service.		
<b>ATC26-USE01</b>	<b>Train flight crews in Point Merge procedures</b>	From:	By:
		-	-
<b>Action by:</b>	<b>Airspace Users</b>		

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<b>Description &amp; purpose:</b>	Training/briefing requirements for pilots are mainly driven by standard PBN implementation considerations. However, a few specific aspects may need to be addressed in certain cases. For instance, when a PBN arrival procedure followed by a precision approach (typically ILS) is interrupted with ATC vectors, pilots used to a vectoring environment may tend to remove the remaining points in the procedure until the runway threshold from the active flight plan in their Flight Management System. This may be done routinely in order to prepare for ILS capture and/or clean the flight plan should a missed approach need to be initiated. However, such waypoint deletion shall be avoided if the intent is to resume the PBN procedure. This may also have further safety implications in case of parallel approaches. Pilot's briefing and/or procedure publication shall highlight this constraint.
<b>Supporting material(s):</b>	EUROCONTROL - Point Merge supporting documentation Url : <a href="https://www.eurocontrol.int/concept/point-merge">https://www.eurocontrol.int/concept/point-merge</a>
<b>Finalisation criteria:</b>	1 - Training manuals have been updated to include Point Merge procedures. 2 - The aircrew has been trained accordingly.

