Deployment Scenario Title	Efficient aircraft separation during take-off and final approach
Deployment Scenario Description	Efficient aircraft separation during take-off and final approach: this deployment scenario addresses solutions aimed at optimising wake turbulence separation minima for arrivals and departures, to increase airport runway throughput by exploiting wake separation reductions based on weather, static aircraft characteristics, ATCO separation delivery support tools, wake risk monitoring and awareness functions (ground and airborne), wake vortex decay enhancing devices and minimum pair-wise separations based on required surveillance performance.
Essential Operational Change	Airport and TMA performance
Maturity	In development phase: Key Solutions Approaching Maturity

Applicable Operating Environment			
Airport	Terminal Airspace	En-Route	Network

Timeline																				
2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
									Deployment											
												Benefit								

Performance Contribution of the DS				
Capacity	Safety	Environment	Cost-efficiency	Operational efficiency

Stakeholders affected (at least one enabler to be deployed)						
ANSP		AO		AU		Network Manager
Civil	Military	Civil	Military	Civil	Military	
TWR, APP, ENR, CNS, MET	TWR, APP, ENR, CNS, MET	APT Operator	APT Operator	Scheduled, BA Fixed, BA Rotorcraft, GA, FOC	Transport, Fighter, WOC	Network Manager

SESAR Solutions			
Solution Code	Solution Title	Solution Description	Related Elements
PJ.02-01	Wake Turbulence Separation Optimization	PJ02-01 Solution aims to optimize wake turbulence separation minima for arrivals and departures...	SOL PJ OI DS EOC ICAO
PJ.02-03	Minimum-Pair separations based on RSP	Minimum Pair Separations based on Required Surveillance Performance (RSP) aims the application...	PJ OI DS EOC ICAO

Operational Improvement Steps			
OI Step Code	**OI Step Title**	**OI Step Description**	**Related Elements**
AO-0304	Weather-Dependent Reductions of Wake Turbulence Separations for Departures	Optimization of the ICAO wake turbulence separation by use of weather-dependent separation (WDS)...	SOL OI EN DS ICAO
AO-0306	Wake Turbulence Separations (for Arrivals) based on Static Aircraft Characteristics	Optimization of the ICAO wake turbulence separation classes by use of longitudinal wake...	SOL OI EN DS ICAO
AO-0309	Minimum Radar Separations based upon Required Surveillance Performance (RSP)	The runway capacity is improved thanks to the application (by ATC) of a non-wake turbulence...	SOL EN DS ICAO
AO-0310	Weather-Dependent Reductions of Wake Turbulence Separations for Final Approach	Optimization of the ICAO wake turbulence separation by use of weather-dependent separation (WDS)...	SOL OI EN DS ICAO
AO-0323	Wake Turbulence Separations (for Departures) based on Static Aircraft Characteristics	Optimization of the ICAO wake turbulence separation classes by use of longitudinal wake...	SOL OI EN DS ICAO
AO-0325	Reduction of Wake Turbulence Risk considering Acceleration of Wake Vortex Decay in Ground Proximity	Thanks to acceleration of wake vortex decay in ground proximity (e.g. with decay enhancing...	SOL EN DS
AO-0327	Reduction of Wake Turbulence Risk through Wake Risk Monitoring	In the cockpit, detection of wake encounters using on-board data and traffic positions broadcast...	SOL EN DS ICAO
AO-0328	Optimised Runway Delivery on Final Approach	The ATCO is able to efficiently deliver any separation (defined in time or distance) down to...	SOL OI EN DS ICAO
AO-0329	Optimised Separation Delivery for Departure	The ATCO is able to efficiently deliver airborne separation (defined in time or distance) after...	SOL OI EN DS ICAO

Enablers						
Required/ Optional	**New/ Inherited**	**Develop/ Use**	**Enabler Code**	**Enabler Title**	**Enabler Description**	**Related Elements**
🔒			A/C-30c	Onboard Detection of Wake Turbulence Encounters	This Enabler covers an airborne function to automatically and objectively identify in-service...	STK OI DS
→			A/C-48a	Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B	Air broadcast of aircraft position/vector (ADS-B OUT) compliant with DO260B	STK OI EN DS
🔒			AERODROME-ATC-19	Runway Usage Management sub-system capable of processing initial departure path wind conditions information	Runway Usage Management sub-system enhanced for processing initial departure path wind conditions...	STK OI EN DS
🔒			AERODROME-ATC-42a	Airport ATC tool to support static pair-wise wake separation (S-PWS) in final approach	Airport ATC too (Runway Usage Management sub-system) enhanced for processing static pair-wise...	STK OI EN DS
🔒			AERODROME-ATC-68	ATC System to support Optimised Runway Delivery on Final Approach	System and HMI allowing the tower runway controller to efficiently deliver any separation...	STK OI DS

Enablers						
Required/ Optional	New/ Inherited	Develop/ Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			AERODROME-ATC-69	ATC system to support optimised departure separation	System and HMI allowing the tower runway controller to efficiently deliver departure separation...	STK OI DS
→			AIRPORT-08	Decay Enhancing Devices	Decay enhancing devices (e.g. plate lines) are implemented in appropriate location on arrival...	STK OI DS
🔒			APP ATC 74	ATC System Support for Reduced, Weather-Dependent Separation Standards in Final Approach	Enhance arrival manager (AMAN), operational supervision, support functions and controller HMI to...	STK OI EN DS
→			APP ATC 99	ATC System to use Real-Time Meteo Information Received From Met Systems	The ATC system uses accurate short term weather forecast information from nowcasting and use of...	STK OI EN DS
🔒			METEO-03	Provision and monitoring of real-time airport weather information (PCP)	ATM-MET ground based sub-system dedicated to acquire, collect, combine, provide and monitor...	STK OI EN DS PCP ⚙
🔒			METEO-04b	Generate and provide MET information services relevant for Airport and final approach related operations (PCP)	ATM-MET system acquiring, generating, assembling and providing Meteorological (MET) information...	STK OI EN DS PCP
🔒			APP ATC 118	ATC System to support static pair-wise wake separation (S-PWS) on approach	Arrival manager enhanced to support reduced, pairwise separation for aircraft on final approach,...	STK OI EN DS
🔒			APP ATC 120	ATC System to support Optimised Runway Delivery on Final Approach	System and HMI allowing approach controller to efficiently deliver any separation (defined in...	STK OI DS
🔒			APP ATC 159	Approach ATC system updated for Minimum Separation Based on Required Surveillance Performance (separation delivery)	Approach ATC system updated to provide the ATCO with: - visual assistance of the minimum...	STK OI EN DS
🔒			CTE-S01	Secondary SUR Radars	Independent Cooperative Surveillance sensors (Secondary SUR Radars) for En	STK OI EN DS ⚙
🔒			CTE-S01a	SSR Mode A/C/S	Independent Cooperative Surveillance using Secondary Surveillance Radar, including mode A/C and ...	STK OI EN DS ⚙
🔒			CTE-S02	Primary SUR sensor	Independent Non Cooperative Surveillance sensors	STK OI DS ⚙
🔒			CTE-S02a	Primary Surveillance Radar	Independent Non Cooperative Surveillance using Primary Surveillance Radar for En-route and TMA.	STK OI EN DS ⚙
🔒			METEO-03	Provision and monitoring of real-time airport weather information (PCP)	ATM-MET ground based sub-system dedicated to acquire, collect, combine, provide and monitor...	STK OI EN DS PCP ⚙

Enablers						
Required/ Optional	New/ Inherited	Develop/ Use	Enabler Code	Enabler Title	Enabler Description	Related Elements
🔒			METEO-04b	Generate and provide MET information services relevant for Airport and final approach related operations (PCP)	ATM-MET system acquiring, generating, assembling and providing Meteorological (MET) information...	STK OI EN DS PCP
→			METEO-05b	Generate and provide MET information relevant for TMA and En-route related operations (PCP)	ATM-MET system acquiring, generating, assembling and providing Meteorological (MET) information...	STK OI EN DS PCP
🔒			PRO-257	ATC Procedure to apply spacing minimum down to 2 NM	ATC Procedure to apply spacing minimum down to 2 NM	STK OI EN DS
→			A/C-37a	Downlink of trajectory data according to contract terms (ADS-C) compliant to ATN baseline 2 (FANS 3/C)	Downlink of trajectory data (waypoints or pseudo waypoints with associated constraints and/or...	STK OI EN DS PCP
→			A/C-47	On-board management of meteorological data from on-board sensors for sharing and integration by ATM and ATM-MET systems	On-board management of meteorological data acquired or derived from on-board sensor for the...	STK OI EN DS
→			A/C-48b	Air broadcast of aircraft data (ADS-B OUT) compliant with new DO260C standard	Air broadcast of aircraft data (ADS-B OUT) compliant with new DO260C (e.g. additional 4DT data to...	STK OI EN
→			AERODROME-ATC-17	Airport ATC tool to Support Time-Based Separation in Final Approach	Surface movement control workstation equipped with tool that provide the tower runway controller...	STK OI DS PCP
→			AERODROME-ATC-55	Airport ATC analyser tool for predicting ROT	Provide enhanced Runway Capacity analyser tool for predicting Final Approach speed profile and...	STK OI EN DS
→			AERODROME-ATC-59	Enhanced Surveillance data processing on Airport Surface (APT)	The new surveillance functionalities to assure the validity of the ADS-B derived data and to...	STK OI DS
→			AERODROME-ATC-60	Airport ATC system to monitor wake turbulence risk using ground-based LIDAR/Radar	Airport ATC system that monitors wake turbulence risk using ground-based LIDAR/Radar.	STK OI
→			AERODROME-ATC-93	Aerodrome ATC system to support optimised runway separation delivery in mixed mode operations	System and HMI allowing the tower controller for more efficient coordination of gap spacing in...	STK OI EN
→			APP ATC 156	ATC System to Support Time-Based Separation in Final Approach	Provide technical functionality to calculate the headwind independent time based separation to be...	STK OI DS PCP
→			CTE-S04a	Wide Area Multilateration (WAM)	Wide Area Multilateration technology for the provision of independent cooperative surveillance in...	STK OI EN DS ⚙
→			SWIM-APS-07a	Stakeholder systems consumption of G/G Meteorological Information services	Provisions of system functionality by the Airport / Airport ATC (and potential other)...	STK OI EN DS PCP S