

NAT SPG Conclusion 51/01 – Additional targets to the list of safety key performance indicators for the ICAO NAT Region

That the list of Key Performance Indicators (KPI) in the *NAT SPG Handbook* (NAT Doc 001) in the area of safety for the ICAO NAT Region be augmented with the following targets:

<i>Key Performance Indicator</i>	<i>Target</i>
(i) number of hull loss events:	0
(ii) number of Airborne Collision Avoidance System (ACAS) Resolution Advisory (RA) events:	0
(v) number of minutes that data link equipped aircraft spend at the wrong flight level:	a10% reduction in comparison with a rolling average of the previous 3 years;
(vi) number of minutes that non data link equipped aircraft spend at the wrong flight level:	a10% reduction in comparison with a rolling average of the previous 3 years;
(viii) number of Gross Navigation Error (GNE) events involving data link equipped aircraft:	5;
(ix) number of GNE events involving non data link equipped aircraft:	a 10% reduction in comparison with a rolling average of the previous 3 years;
(xi) number of losses of separation:	a 10% reduction in comparison with a rolling average of the previous 3 years.

NAT Safety Key Performance Indicators

<i>Safety Key Performance Indicator</i>	<i>Target</i>
(i) number of hull loss events:	0
(ii) number of Airborne Collision Avoidance System (ACAS) Resolution Advisory (RA) events:	0
(iii) Number of Large Height Deviation (LHD) events involving data link equipped aircraft;	Not exceeding 85 events per year by 2018 (total LHDs)
(iv) Number of LHD events involving non data link equipped aircraft;	Eliminate LD LHD events by end of 2018 (total LHDs)
(v) number of minutes that data link equipped aircraft spend at the wrong flight level:	a10% reduction in comparison with a rolling average of the previous 3 years;
(vi) number of minutes that non data link equipped aircraft spend at the wrong flight level:	a10% reduction in comparison with a rolling average of the previous 3 years;
(vii) Performance in the vertical dimension against the vertical Target Level of Safety (TLS)**	5×10^{-9} fapfh3
(viii) number of Gross Navigation Error (GNE) events involving data link equipped aircraft:	5
(ix) number of GNE events involving non data link equipped aircraft:	a 10% reduction in comparison with a rolling average of the previous 3 years;
(x) Performance in the lateral dimension against the lateral TLS	20×10^{-9} fapfh6
(xi) number of losses of separation:	a 10% reduction in comparison with a rolling average of the previous 3 years.



European and North
Atlantic Office

NAT DOC 009

SERVICE DEVELOPMENT ROADMAP

North Atlantic Region

First Edition - 2013

Prepared by the ICAO European and North Atlantic Office

on behalf of the North Atlantic Systems Planning Group (NAT SPG)

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RECORD OF AMENDMENTS

Amendments to the NAT SDR are approved by the North Atlantic Implementation Management Group (NAT IMG) on behalf of the NAT SPG. The space below is provided to keep a record of such amendments.

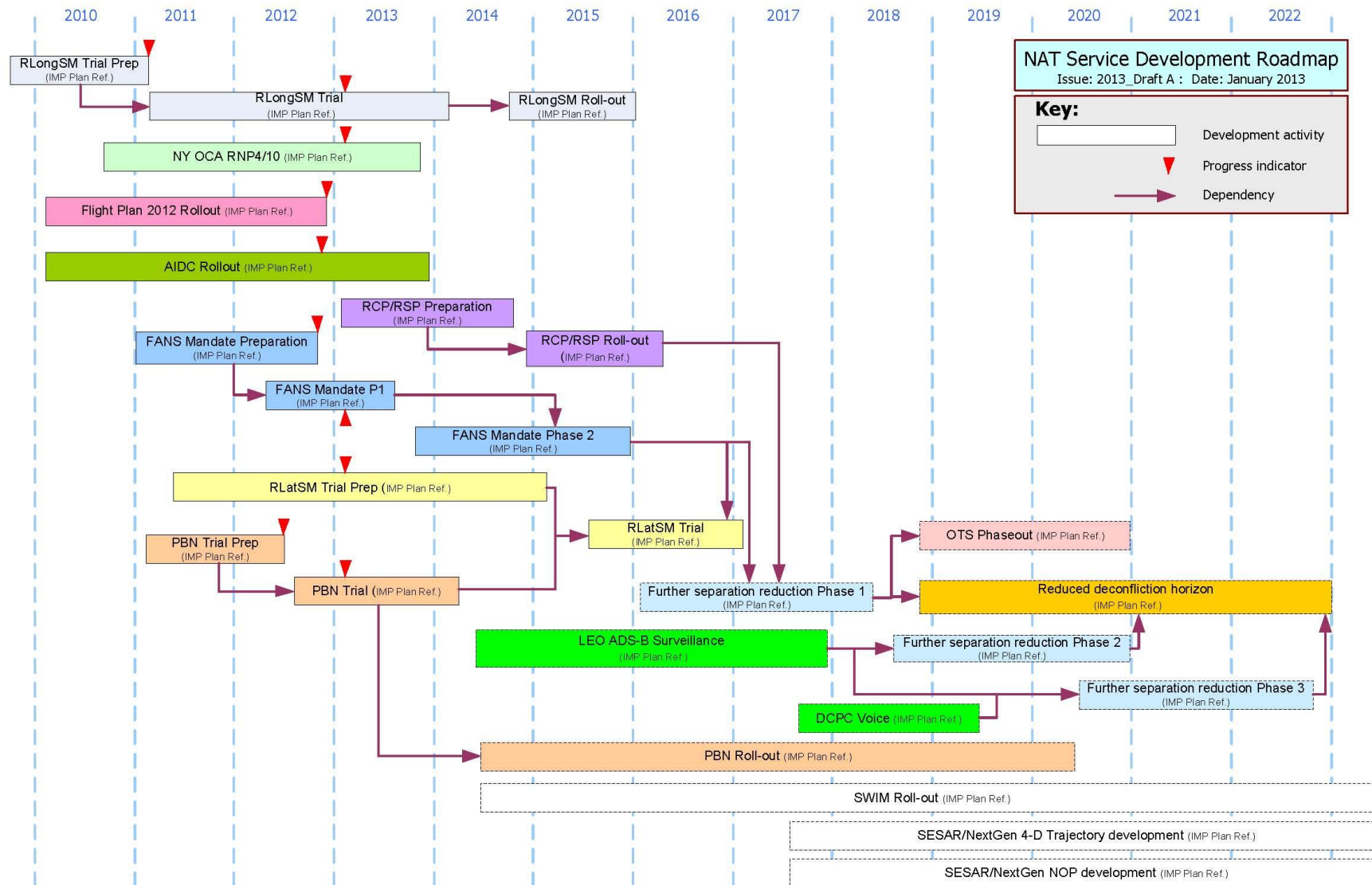
Amendments to the NAT SDR containing the following changes:

FOREWORD

The NAT Service Development Roadmap provides a high-level view of the long-term plans for service development in the North Atlantic (NAT) Region. The executive summaries map these plans with the appropriate modules of the fourth edition of the ICAO Global Air Navigation Plan (GANP) (Doc 9750) and associated Aviation System Block Upgrades (ASBU) and identify the NAT regional priorities.

The NAT Service Development Roadmap is maintained electronically as a living document.

PART 1 - NAT SERVICE DEVELOPMENT ROADMAP – 2013



PART 2 - NAT SDR – DRAFT EXECUTIVE SUMMARIES

The executive summaries map the NAT plans with the appropriate modules of the fourth edition of the ICAO Global Air Navigation Plan (GANP) and associated Aviation System Block Upgrades (ASBU) and identify NAT Regional priorities.

Reduced Longitudinal Separation of 5 minutes between FANS equipped aircraft (RLongSM)

RLongSM allows for the application of 5 minutes longitudinal separation between aircraft providing position reports using Automatic Dependent Surveillance – Contract (ADS-C). ADS-C reports must be provided in accordance with a periodic contract with a maximum reporting interval of 18 minutes. Aircraft must also be equipped with Controller Pilot Data Link Communications.

RLongSM may be applied between a suitably equipped aircraft climbing/descending TO or THROUGH the flight level of another suitably equipped aircraft. RLongSM may also be applied between pairs of suitably equipped aircraft operating at the same flight level, where the following aircraft is faster than the leading aircraft.

The goal of the RLongSM validation trial is to provide the necessary data so as to support the development of global provisions. The application of RLongSM in the ICAO NAT Region will continue on a trial basis until global provisions have been promulgated. The applicability of Required Communication Performance (RCP) and Required Surveillance Performance (RSP) specifications is in accordance with NAT SPG Conclusion 48/7.

RLongSM provides fuel saving and environmental benefits to operators as aircraft have a greater probability of flying closer to their optimum profile.

Key Dates

25 May 2010	RLongSM Validation Trial initiated in the Gander and Shanwick OCAs
June 2010	RLongSM Validation Trial suspended, due concerns about potential overload of Flight Data Processing Systems (FDPS)
21 March 2011	RLongSM Validation Trial re-initiated in the Gander and Shanwick OCAs

Supporting Documents

The following documents, related to the RLongSM initiative, are available on the ICAO EUR/NAT website via the following URL:

http://www.paris.icao.int/documents_open/files.php?subcategory_id=143

- Implementation Plan for the Trial Application of RLongSM in the NAT Region
- Success Criteria for the RLongSM Validation Trial
- SASP-WG/WHL/20 (May 2012) IP/09 - The Reduced Longitudinal Separation Minimum Concept
- SASP-WG/WHL/20 (May 2012) IP/10 - The Longitudinal Reich Collision Risk Model
- SASP-WG/WHL/20 (May 2012) - WP/24 Estimating the Longitudinal Separation Loss Distribution under Periodic Reporting using Waypoint Reporting Data
- SASP-WG/WHL/20 (May 2012) - WP/25 Collision Risk Estimates under Reduced Longitudinal Separation Minimum Operations
- SASP-WG/WHL/20 (Nov 2012) WP/29 - Longitudinal Collision Risk Estimates under the NAT RLongSM Operational Trial

Interdependencies

- Implementation of RCP and RSP

GANP ASBU modules

B0-FRTO

Improved Operations through Enhanced En-Route Trajectories

B0-NOPS

Improved Flow Performance through Planning based on a Network-Wide view

Reduced Lateral Separation Minima between FANS equipped aircraft (RLatSM)

RLatSM will allow aircraft to be separated laterally by a minimum of 25Nm at the same flight level, improving the efficiency of NAT operations. The practical application of this will be that flights are separated by ½ degree of latitude rather than the 1 degree currently applied between MNPS certified aircraft.

Flights will be issued clearances using RLatSM provided they are equipped with ADS-C/CPDLC, are RNP4 approved and are navigating using GNSS.

RLatSM is planned to be implemented using a three phased approach. Phase 1 is planned for 2015 by implementing ½ degree spacing between two core OTS tracks. In effect this will allow the creation of additional core track. Expansion into phase 2 will be subject to a proven business case, but it is anticipated that ½ degree separation would be applied throughout the whole OTS. The final phase would see ½ degree separation throughout the NAT region. The vertical extent of RLatSM airspace will be coincident with the vertical extent of the NAT FANS Mandate airspace in effect at the time.

Changes to ground systems will be required but RLatSM can be introduced with limited procedural changes to NAT operations, allowing flight profiles closer to optimum with reduced fuel burn and lower CO2 emissions.

Key Dates

2015 RlatSM Phase 1 introduction
Phases 2 and 3 dates are yet to be determined.

Supporting Documents

The following documents, related to the RLatSM initiative, are available on the ICAO EUR/NAT website via the following URL: http://www.paris.icao.int/documents_open/files.php?subcategory_id=143

- RLatSM Concept of Operations
- RLatSM Plan
- RLatSM Task List

Interdependencies

- FANS Mandate
- Introduction of RCP/RSP

GANP ASBU modules

B0-FRTO

Improved Operations through Enhanced En-Route Trajectories

B0-NOPS

Improved Flow Performance through Planning based on a Network-Wide view

FANS Mandate for the NAT Region

ADS-C and CPDLC data link systems are widely used in the NAT region and NAT SPG has endorsed a major safety initiative to mandate the use of ADS-C/CPDLC in the NAT. ADS-C enables conformance monitoring of flight profiles in the vertical and lateral plane giving controllers immediate warning when a flight deviates from a cleared profile and the ability to intervene quickly, with the potential to substantially reduce the incidence of Large Height Deviations. The use of ADS-C also greatly facilitates search and rescue operations and location of an aircraft following an accident in oceanic airspace.

ADS-C and CPDLC are also pre-requisites for RLongSM and RLatSM so increased equipage on aircraft enables the expansion of airspace within which these reduced separations can be applied.

It is acknowledged that aircraft equipage requires substantial investment and planning, thus it was decided to take a phased approach to the implementation of the FANS mandate. In February 2013 aircraft were mandated to operate ADS-C/CPDLC when flying on two designated OTS tracks between FL360 and FL390. The tracks designated as FANS tracks are those forecast to be the most heavily loaded. With all aircraft on these tracks ADS-C/CPDLC equipped, RLongSM can be applied between any aircraft and the associated efficiency benefits derived.

Further phases from 2015 onwards will see the extent of FANS mandated airspace expanded in the lateral and vertical planes until the majority of NAT airspace is included at FL290 and above. Progress through the planned phases will take into account aircraft equipage levels and reasonable accommodation for non-equipped aircraft.

It should be noted that aircraft equipped with ADS-C/CPDLC before 1st January 2014 are exempt from the 2014 European Data link Mandate for the life of the airframe.

Key Dates

February 2013	Introduction of Phase 1 of the FANS Mandate
2015	Progress to phase 2 of the Fans Mandate

Supporting Documents

The following documents, related to the FANS Mandate, are available on the ICAO EUR/NAT website via the following URL: http://www.paris.icao.int/documents_open/files.php?subcategory_id=143

- NAT Data link Mandate Implementation Plan

Interdependencies

- RLatSM

GANP ASBU modules

B0-TBO

Improved Safety and Efficiency through the initial application of Data Link En-Route Implementation of an initial set of data link applications for surveillance and communications in ATC.

B0-SNET (conformance monitoring)

Increased Effectiveness of Ground-based Safety Nets This module provides improvements to the effectiveness of the ground-based safety nets assisting the Air Traffic Controller and generating, in a timely manner, alerts of an increased risk to flight safety (such as short terms conflict alert, area proximity warning and minimum safe altitude warning).

Required Communications Performance/Required Surveillance Performance (RCP/RSP)

Current NAT separation standards are strategic in nature and are not subject to RCP/RSP, but any separation reductions will require to have RCP/RSP values applied. These values are given a numerical 'label' and their definitions are included in the Global Operational Data Link Document (GOLD).

RCP240 is the value attached to communications performance where communications are conducted using CPDLC. This relates to the controllers intervention capability and can be considered to be the number of seconds within which a message is dispatched to an aircraft and a reply received by the controller. Essentially this is the number of seconds within which this action can be expected to be completed most of the time.

RSP180 is the value attached to surveillance performance where this is conducted using ADS-C. The 180 value relates to the ADS-C report delivery from an aircraft.

The NAT Performance Based Communication and Surveillance Implementation Plan (NAT PBCS) sets out the requirements for NAT data link operations in relation to RLongSM and RLatSM. It includes requirements for ATS provision, operator authorisation and post implementation monitoring of actual communications and surveillance performance. The plan will be amended as required as other RCP/RSP applications are introduced in the NAT.

Key Dates

February 2013	Performance Based Communication and Surveillance Workshop held
2013	GOLD amended to incorporate the Performance Based Communication and Surveillance Manual.
2015	RCP/RSP implementation

Supporting Documents

The following documents, related to the RCP/RSP, are available on the ICAO EUR/NAT website via the following URL: http://www.paris.icao.int/documents_open/files.php?subcategory_id=143

- NAT Performance Based Communications and Surveillance Implementation Plan
- Presentation on RCP and RSP
- RCP and RSP Reference Document

Interdependencies

- RLatSM

GANP ASBU modules

B0-TBO

Improved Safety and Efficiency through the initial application of Data Link En-Route Implementation of an initial set of data link applications for surveillance and communications in ATC.

Performance Based Navigation (PBN)

The NAT Region was the first ICAO Region to implement separation standards with minimum navigation performance standards. This became known as MNPS airspace and aircraft must be suitably equipped and certified to fly in MNPS airspace. The Performance Based Navigation (PBN) concept has subsequently been developed to enable further reductions in separation standards and the NAT SPG has agreed that the NAT Region will transition to PBN airspace as described in the Performance Based Navigation (PBN) Manual (Doc 9613).

The planned evolution strategy is detailed in the MNPS to PBN Transition Plan for the ICAO NAT Region.

The plan covers the full range of tasks necessary to complete the transition including redefining the lateral and vertical limits of NAT PBN airspace, all necessary regulatory actions, transitioning the current MNPS approval system to an RNP based system, changes to ground systems, training and documentation.

The plan also considers which crew and operator procedures, in addition to navigation performance requirements, are necessary to support approval to fly in NAT PBN airspace.

Key Dates

2013	Aircraft certified for RNP10 and/or RNP4 can be issued an MNPS approval without further examination of the navigation component.
2015	MNPS approvals will be based on RNP10 or RNP4 specification. Aircraft with MNPS approvals can still operate in MNPS airspace.
2015	MNPS airspace redefined as PBN airspace.
2020	All aircraft in NAT PBN airspace will have approvals based on RNP10 or RNP4 specification. Aircraft with existing MNPS approvals may no longer operate in NAT PBN airspace.

Supporting Documents

The following documents, related to PBN, are available on the ICAO EUR/NAT website via the following URL: http://www.paris.icao.int/documents_open/files.php?subcategory_id=143

- MNPS to PBN Transition Plan for the ICAO NAT Region

Interdependencies

- RLatSM

GANP ASBU modules

B0-FRTO

Improved Operations through Enhanced En-Route Trajectories

AIDC

Air Traffic Services Inter-Facility Data Communication (AIDC) is a ground/ground communications system which enables the transmission of ATS messages by data link. Data interchange between NAT facilities without the need for verbal co-ordination has been in existence for many years, but the current plan will ensure that all NAT providers are equipped to a common standard and to the highest level.

It is acknowledged that non-verbal data interchange, whereby a range of flight data messages can be shared, co-ordination offered and agreed and subsequent changes effected, provides major safety benefits by reducing inter-facility coordination errors. Analysis has shown that AIDC, at the level specified in the plan, would have played a role in mitigating a number of Large Height Deviations in the NAT over recent years with corresponding performance improvements against the NAT Target Levels of Safety.

NAT Doc 002, the North Atlantic Common Coordination Interface Control Document, defines message sets and procedures designed to meet today's needs and beyond.

Key Dates

15 Nov 2012	Publication of V1.3 of NAT Doc 002
End 2013	Completion of AIDC rollout in the NAT region.

Supporting Documents

The following documents, related to AIDC, are available on the ICAO EUR/NAT website via the following URL: http://www.paris.icao.int/documents_open/files.php?subcategory_id=143

- AIDC Implementation Plan

Interdependencies

Nil.

GANP ASBU modules

Performance Improvement Area 2:

Globally Interoperable Systems and Data – Through Globally Interoperable System Wide Information Management

Phase 1

Module B0-FICE

2013-2018

Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration Supports the coordination of ground-ground data communication between ATSU based on ATS Inter-facility Data Communication (AIDC) defined by ICAO Document 9694

Phase II

Module B1-FICE

2018-2023

Increased Interoperability, Efficiency and Capacity through FF-ICE, Step 1 application before Departure Introduction of FF-ICE step 1, to implement ground ground exchanges using common flight information reference model, FIXM, XML and the flight object used before departure.

Associated modules

B0-DATM

Service Improvement through Digital Aeronautical Information Management Initial introduction of digital processing and management of information, by the implementation of AIS/AIM making use of AIXM, moving to electronic AIP and better quality and availability of data.

B1-DATM

Service Improvement through Integration of all Digital ATM Information Implementation of the ATM information reference model integrating all ATM information using UML and enabling XML data representations and data exchange based on internet protocols with WXXM for meteorological information.

Additional modules to be considered

B0-AMET

Meteorological information supporting enhanced operational efficiency and safety Global, regional and local meteorological information provided by world area forecast centres, volcanic ash advisory centres, tropical cyclone advisory centres, aerodrome meteorological offices and meteorological watch offices in support of flexible airspace management, improved situational awareness and collaborative decision making, and dynamically-optimized flight trajectory planning.

B0-ASUR (as part of LEO ADS-B)

Initial Capability for Ground Surveillance Ground surveillance supported by ADS-B OUT and/or wide area multilateration systems will improve safety, especially search and rescue and capacity through separation reductions. This capability will be expressed in various ATM services, e.g. traffic information, search and rescue and separation provision.

B0-OPFL

Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B. This prevents an aircraft being trapped at an unsatisfactory altitude and thus incurring non-optimal fuel burn for prolonged periods. The main benefit of ITP is significant fuel savings and the uplift of greater payloads.

B0-ACAS

ACAS Improvements

To provide short term improvements to existing airborne collision avoidance systems (ACAS) to reduce nuisance alerts while maintaining existing levels of safety. This will reduce trajectory perturbation and increase safety in cases where there is a breakdown of separation.

B0-SNET (other than conformance monitoring using ADS)

Increased Effectiveness of Ground-based Safety Nets This module provides improvements to the effectiveness of the ground-based safety nets assisting the Air Traffic Controller and generating, in a timely manner, alerts of an increased risk to flight safety (such as short terms conflict alert, area proximity warning and minimum safe altitude warning).

B1-RPAS

Initial Integration of Remotely Piloted Aircraft (RPA) Systems into non-segregated airspace Implementation of basic procedures for operating RPA in non-segregated airspace including detect and avoid.

– END –