



Agenda Item 3

Air Navigation Matters

3.3 Specific Developments in Air Navigation

- **ATM**

**IMPLEMENTATION OF REDUCED LATERAL AND LONGITUDINAL SEPARATION
MINIMA IN NEW YORK OCEANIC AIRSPACE**

(Presented by the United States)

SUMMARY	
The United States is progressing plans to implement the 50 Nautical Mile (NM) longitudinal, 30 NM lateral and 30 NM longitudinal separation minima between suitably equipped and authorized aircraft pairs in the New York Oceanic Flight Information Region. This working paper provides the Proposal for Amendment to the Caribbean and North Atlantic Regional Supplementary Procedures (ICAO Doc 7030), a draft Concept of Operations (CONOPS), the Know Your Airspace document for New York Airspace and the project task list for review and comment by the meeting.	
References:	
• ICAO Doc 7030 - Regional Supplementary Procedures	
Strategic Objectives	<i>This working paper is related to Strategic Objective A.</i>

1. Introduction

1.1 The United States has progressed plans to implement the 50 Nautical Mile (NM) longitudinal, 30 NM lateral and 30 NM longitudinal separation minima between suitably equipped and authorized aircraft pairs in the New York Oceanic Flight Information Region (FIR).

1.2 The United States is conducting analyses and studies for implementing the separation minima in the New York Oceanic FIR in accordance with the provisions in Chapter 5 (Separation Methods and Minima) of the Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) and the guidance provided in the Performance-based Navigation (PBN) Manual (Doc 9613).

1.3 This paper provides the Proposal for Amendment (PfA) to the Caribbean Regional Supplementary Procedures (ICAO Doc 7030) (Appendix A), North Atlantic Regional Supplementary Procedures (Appendix B) and a draft Concept of Operations (CONOPS) (Appendix C). In addition, it formally confirms the intent of the United States to work harmoniously with all air navigation service providers (ANSPs) in the implementation of reduced lateral and longitudinal separation minima in North Atlantic (NAT) and Caribbean (CAR) oceanic airspace. In addition, Appendix D presents the New York Know Your Airspace study and Appendix E presents the Separation Reduction Task List.

2. Discussion

2.1 The United States has been applying the 50NM longitudinal, 30 NM lateral and 30 NM longitudinal separation minima in Pacific oceanic airspace since December 2005. The United States intends to utilize the current, globally recognized, endorsed and authorized ICAO separation minima as documented in the PANS ATM, in paragraphs 5.4.1.2 and 5.4.2.6.3.

- a) The 50NM longitudinal minima is currently being applied in the Anchorage Continental, Anchorage Oceanic, Auckland Oceanic, Nadi, Oakland Oceanic, Tahiti, Brisbane, Fukuoka, Ho Chi Minh, Hong Kong, Honiara, Kuala Lumpur, Melbourne, Nauru, New Zealand, Port Moresby, Sanya and Singapore FIRs. For flights in the EUR/SAM corridor (Canarias (southern sector), the minima is being applied in the Dakar Oceanic, Recife and Sal Oceanic FIRs.
- b) The 30 NM lateral and 30 NM longitudinal minima are currently being applied in Australian Eastern Oceanic airspace, the Auckland Oceanic FIR, Honiara FIR, Nauru FIR, Nadi FIR, Oakland Oceanic FIR, Bangkok, Brisbane, Chennai, Colombo, Delhi, Dhaka, Fukuoka, Hanoi, Ho Chi Minh, Hong Kong, Honiara, Incheon, Jakarta, Karachi, Kolkata, Kota Kinabalu, Kuala Lumpur, Lahore, Madras, Male, Manila, Melbourne, Mumbai, Muscat, Nauru, New Zealand, Phnom Penh, Port Moresby, Singapore, Taipei, Tehran, Ujung Pandang, Vientiane and Yangon FIRs. Anchorage Oceanic and Continental FIRs will implement these minima by summer 2012.

2.2 It is the opinion of the United States that, by applying these globally accepted separation minima, the planned application in the New York Oceanic FIR would continue the global harmonization of longitudinal and lateral applications. The United States further emphasizes that one of the aspects of the ICAO PBN concept was to allow ANSPs to provide performance-based services according to operator and provider.

2.3 The United States wishes to affirm that if an adjacent ANSP requires a larger separation minimum than that being applied in the New York oceanic airspace, aircraft will be transitioned to the larger minimum prior to entering an adjacent FIR. This is currently the standard operating procedure and will continue to be so following separation reductions.

2.4 The planned implementation date is now the fourth quarter 2013. A final version of the CONOPS, refined Task List and additional documentation will be made available to future relevant meetings.

3. Action by the Meeting

3.1 The E/CAR WG is invited to:

- a) Note the information provided in this paper;
- b) Provide comments on the Proposals for Amendment to the CAR and NAT Regional Supplementary Procedures; and
- c) Discuss any concerns relating to the implementation of the reduced separation minima in the New York Oceanic FIR.

— — — — —

APPENDIX A

PROPOSAL FOR AMENDMENT OF THE REGIONAL SUPPLEMENTARY PROCEDURES CARIBBEAN (CAR) REGION (Doc. 7030/5)

(Serial No.: XXX – CAR 4-1)

a) **Regional Supplementary Procedures:**

CAR

b) **Proposed by:**

United States

c) **Proposed amendment:**

Editorial Note: Amendments are arranged to show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

Amend the following in the CAR SUPPS, Chapter 4.

Chapter 4. NAVIGATION

4.1 PERFORMANCE-BASED NAVIGATION (PBN)

Note.— As the Caribbean (CAR) Region transitions to PBN as contained in the Performance-based Navigation (PBN) Manual (Doc 9613), the contents of 4.1 will be amended.

4.1.1 Area navigation (RNAV) specifications

4.1.1.1 RNAV 10 (RNP 10)

Note. — RNAV 10 retains the RNP 10 designation, as specified in the Performance-based Navigation (PBN) Manual (Doc 9613), 1.2.3.5.

Area of applicability

4.1.1.1.1 A lateral separation minimum of 93 km (50 NM) may be applied between flights operating on oceanic routes or areas:

- a) within the control area of the San Juan FIR, the Atlantic portion of the Miami Oceanic control area or the West Atlantic Route System (WATRS); and
- b) outside WATRS within the control area of the New York Oceanic FIR, except minimum lateral separation between aircraft transitioning from airspace in the New York Oceanic FIR/CTA to MNPS airspace shall be 110 km (60 NM).

Note.— The WATRS area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic control area/FIR boundary to the Miami Oceanic control area/FIR boundary, thence southbound along the Miami Oceanic control area/FIR boundary to the point of beginning.

Note. — The NAT MNPS are set forth in NAT SUPPS, 4.3. NAT MNPS airspace is identified in NAT SUPPS, 4.3.1.1.

4.1.1.1.2 A longitudinal separation minimum of 93 km (50 NM) derived by RNAV may be applied between flights operating within the control area of the New York Oceanic FIR provided that the communications and surveillance requirements in paragraph 6.2.1.1 are met.

Means of compliance

4.1.1.1.2.3 For application of 4.1.1.1.1 and 4.1.1.1.2, operators and civil aviation authorities must follow the provisions listed below.

4.1.1.1.3.4 The aircraft and operator must be approved RNP 10 or RNP 4 by the State of the Operator or the State of Registry, as appropriate. RNP 10 is the minimum navigation specification for the application of 93 km (50 NM) lateral and/or 93 km (50 NM) longitudinal separation.

4.1.1.1.4.5 States shall ensure, when granting approval for RNP 10 or RNP 4, that operators establish programmes to mitigate the occurrence of large lateral track errors due to equipment malfunction or operational error.

Note. — The Performance-based Navigation (PBN) Manual (Doc 9613) provides guidance on aircraft, operations and maintenance programmes for the initial achievement and continued compliance with the authorized navigation specification.

4.1.2 Required navigation performance (RNP) specifications

4.1.2.1 RNP 4

~~NIL.~~

Area of applicability

4.1.2.1.1 A lateral separation minimum of 55.5 km (30 NM) may be applied between flights operating within the control area of the New York Oceanic FIR provided the provisions for communications and surveillance in paragraph 6.2.1.1 are met.

4.1.2.1.2 A longitudinal separation minimum of 55.5 km (30 NM) may be applied between flights operating within the control area of the New York Oceanic FIR provided the provisions for communications and surveillance in paragraph 6.2.2.1 are met.

Means of compliance

4.1.2.1.3 Aircraft must be approved RNP 4 by the State of Registry or the State of the Operator.

Amend the following in the CAR SUPPS, Chapter 6.

Chapter 6. AIR TRAFFIC SERVICES

6.2 SEPARATION

6.2.1 Lateral

(A11 – Attachment B; P-ATM – Chapters 5 and 15)

6.2.1.1 Minimum lateral separation shall be:

- a) 55.5 km (30 NM) between aircraft operating within the control area of the New York Oceanic FIR meeting the provisions in 4.1.2.1 and the provisions listed below, except minimum lateral separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR/CTA to other MNPS airspace shall be 110 km (60 NM).
 - 1) the aircraft are approved by the State of Registry or the State of the Operator to RNP 4;
 - 2) direct controller-pilot data link communications (CPDLC) are maintained;
 - 3) surveillance is maintained using an automatic dependent surveillance (ADS) system; and
 - 4) an ADS lateral deviation change event contract is established, with a lateral deviation threshold of 9.3 km (5 NM).
- ab) 93 km (50 NM) between aircraft approved RNP 10 or RNP 4 meeting the provisions in 4.1.1.1;
- bc) 110 km (60 NM) between aircraft which meet the North Atlantic minimum navigation performance specifications (MNPS) which, while operating in the control area of San Juan FIR, are in transit to or from the NAT MNPS airspace;

Note. — The NAT MNPS area is set forth in NAT SUPPS, Chapter 4.
- ed) 167 km (90 NM) between aircraft not approved RNP 10 or RNP 4 operating between the United States, Canada or Bermuda and points in the CAR Region in the control areas of San Juan and New York Oceanic FIRs and the Atlantic portion of the Miami Oceanic control area;
- de) 185 km (100 NM) west of 60°W (only in oceanic areas) between aircraft not covered in a), b), ~~or c)~~, or d) above, and between aircraft in the control area of Piarco FIR west of 55°W; and
- ef) 223 km (120 NM) between aircraft operating east of 60°W in the New York Oceanic FIR, and between aircraft in the control area of Piarco FIR east of 55°W;

except that lower minima in 5.4.1.2 of the PANS-ATM may be applied, or further reduced in accordance with 5.11 of the PANS-ATM, when the conditions specified in the relevant PANS-ATM provisions are met (see 5.4).

6.2.2 Longitudinal (P-ATM, Chapter 5)

6.2.2.1 Between turbo-jet aircraft ~~at or above FL 280 on oceanic published routes operating in the West Atlantic Route System (WATRS), or at or above FL 280 operating west of 60°W when transitioning to or from the WATRS area, New York Oceanic FIR/CTA,~~ the longitudinal separation shall be in accordance with the PANS-ATM, 5.4.2.4 ~~or 5.4.2.5.~~

~~Note. — The WATRS area is defined as beginning at a point 27°00'N/77°00'W direct to 20°00'N/67°00'W direct to 18°00'N/62°00'W direct to 18°00'N/60°00'W direct to 38°30'N/60°00'W direct to 38°30'N/69°15'W, thence counterclockwise along the New York Oceanic control area/FIR boundary to the Miami Oceanic control area/FIR boundary, thence southbound along the Miami Oceanic control area/FIR boundary to the point of beginning.~~

6.2.2.2 Between turbo-jet aircraft operating at or above FL 200 and west of 60°W within the Houston Oceanic, applicable parts of Mexico FIR (Merida and Monterrey CTAs), Miami Oceanic and San Juan CTA/FIR control areas, the longitudinal separation with Mach number technique applied in accordance with the relevant provisions of the PANS ATM, 5.4.2.4, shall be:

- a) 15 minutes; or
- b) this separation may be reduced to:
 - 1) 10 minutes at the entry point into oceanic controlled airspace, if the preceding aircraft is maintaining a speed of at least Mach 0.03 greater than that of the following aircraft; or
 - 2) 5 minutes at the entry point into oceanic controlled airspace, if the preceding aircraft is maintaining a speed of at least Mach 0.06 greater than that of the following aircraft.

6.2.2.3 Between aircraft operating below FL 200 west of 55°W and between aircraft operating at all levels east of 55°W within the San Juan and Piarco FIRs and the Paramaribo and Rochambeau upper flight information regions (UIRs), 20-minute longitudinal separation shall be applied. This minimum may also be applied if the aircraft have not reported over the same reporting point when it is possible to ensure, by radar or other means approved by the State, that the appropriate time interval will exist at the common point from which they follow either the same track or continuously diverging tracks.

6.2.2.4 Between turbo-jet aircraft meeting the MNPS and operating in the New York Oceanic control area wholly or partly in MNPS airspace, the minimum longitudinal separation with Mach number technique shall be in accordance with the PANS-ATM, 5.4.2.4. In cases where the aircraft concerned have reported over a common point and follow continuously diverging tracks until some other form of separation is provided:

- a) at least 10-minute longitudinal separation shall exist at the point where the tracks diverge; or

- b) at least 5-minute longitudinal separation will exist where lateral separation is achieved; and
- c) lateral separation will be achieved at or before the next significant point (normally 10 degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or within 1 112 km (600 NM) of the common point, whichever is estimated to occur first.

6.2.2.5 For turbo-jet aircraft meeting the MNPS and operating in the New York Oceanic control area wholly or partly in MNPS airspace but not meeting the requirements of 6.2.2.4, 15-minute longitudinal separation shall be applied.

6.2.2.6 Between aircraft operating outside MNPS airspace in the New York Oceanic control area the minimum longitudinal separation shall be:

- a) 93 km (50 NM) derived by RNAV between aircraft meeting the provisions in 4.1.1.1, and those listed below except minimum longitudinal separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR/CTA to other MNPS airspace shall be in accordance with the provisions of paragraph 6.2.2.4 a) b) and c). The following provisions are applicable:
 - 1) the aircraft are approved by the State of Registry or the State of the Operator to RNP 10;
 - 2) direct controller-pilot data link communications (CPDLC) are maintained;
 - 3) surveillance is maintained using an automatic dependent surveillance (ADS) system; and

Note. — ADS is required for the application of this minimum; therefore, the applicable provisions will be those of the PANS-ATM, 5.4.2.6.1 to 5.4.2.6.3, and 5.4.2.6.4.

- b) 55.5 km (30 NM) between aircraft meeting the provisions in 4.1.2.1 and those listed below, except minimum longitudinal separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR to other MNPS airspace shall be in accordance with the provisions of paragraph 6.2.2.1. The following provisions are applicable:
 - 1) the aircraft are approved by the State of Registry or the State of the Operator to RNP 4;
 - 2) direct controller-pilot data link communications (CPDLC) are maintained; and
 - 3) surveillance is maintained using an automatic dependent surveillance (ADS) system; and

Note. — ADS is required for the application of this minimum; therefore, the applicable provisions will be those of the PANS-ATM, 5.4.2.6.1 to 5.4.2.6.3, and 5.4.2.6.4.

- ac) 15 minutes between turbo-jet aircraft, provided the Mach number technique is applied and, whether in level, climbing or descending flight:
 - 1) the aircraft concerned have reported over a common point and follow the same track or continuously diverging tracks until some other form of separation is provided; or
 - 2) if the aircraft have not reported over a common point, it is possible to ensure, by radar or other means approved by the State, that the appropriate time interval will exist at the common point from which they follow either the same track or continuously diverging tracks;
- bd) 10 or 5 minutes only when it is possible to ensure, by radar or other means approved by the State, that the required time interval exists and will exist at the common point, provided the preceding aircraft is maintaining a greater Mach number than the following aircraft in accordance with the following:
 - 1) 10 minutes if the preceding aircraft is maintaining a speed of at least Mach 0.03 greater than that of the following aircraft; and
 - 2) 5 minutes if the preceding aircraft is maintaining a speed of at least Mach 0.06 greater than that of the following aircraft;
- ee) 20 minutes between turbo-jet aircraft not covered by a) and b);
- ef) 20 minutes between other than turbo-jet aircraft operating along routes extending between the United States, Canada or Bermuda and Caribbean terminals, or between the United States or Canada and Bermuda; and
- eg) 30 minutes between other than turbo-jet aircraft not covered in d).

d) **Date when proposal received:**

XXX

e) **Proposers reason for amendment:**

- 1) In accordance with ICAO Doc 4444, the internationally agreed data-link-based separation minima values available for application in oceanic and remote airspace are 50NM longitudinal, 30NM longitudinal and 30NM lateral. Specifics for 30NM lateral separation are provided in paragraph 5.4.1.2.1.6, “Lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes,” with references to pertinent ICAO documents cited therein. Paragraph 5.4.2.6.4, “Longitudinal Distance-Based Separation Minima in an RNP RNAV Environment Using ADS-C” provides the corresponding details for the 50 NM and 30NM longitudinal separation minima, again with references to other relevant ICAO documents.
- 2) In non-radar oceanic airspace where traffic is increasing by approximately five percent a year, flight efficiency (e.g., user preferred routes and altitude profiles) is dependent on

reductions in the horizontal separation standards. ICAO has developed guidelines for oceanic separation standards of 50NM longitudinal, 30NM longitudinal and 30NM lateral provided a set of requirements are met or exceeded. These requirements include that aircraft be authorized for RNP-10 or RNP-4, direct pilot-controller communication or CPDLC, and ADS-C position reports.

- 3) The use of these separation standards has been implemented within the Australian Eastern Oceanic airspace, Auckland Oceanic FIR, Honiara FIR, Nauru FIR, Nadi FIR and the Oakland Oceanic FIR. In December 2005, 30NM longitudinal and 30NM lateral operational trials began in Oakland Air Route Traffic Control Center (ARTCC) Oceanic Control Sector 3. Effective June 2007, Oakland ARTCC has applied 30NM longitudinal and 30NM lateral separation to pairs of suitably equipped aircraft throughout the Oakland Oceanic FIR.
- 4) This amendment proposes to allow 50NM longitudinal, 30NM longitudinal and 30NM lateral to be applied in the New York Oceanic FIR.
- 5) The application of the reduced minima is to enable level changes to transition through or to transition to the level of a longitudinally adjacent aircraft not presently available with the 10-minute longitudinal separation standard with Mach Number Technique (MNT) now in place. A level change is known to provide reduced fuel burn if an aircraft is transitioning in order to operate at a level recommended, for example, by the aircraft's flight management system; facilitating more level changes thus results in greater overall system fuel efficiency. A level change initiated by air traffic control (ATC) in the New York Oceanic FIR could reduce operational complexity at intersections of published routes in WATRS airspace, for example, thereby reducing controller workload relative to the present system; facilitating more level changes thus results in lowered operational complexity.
- 6) The ICAO Review of the General Concept of Separation Panel (RGCSPP), later to be subsumed under the Separation and Airspace Safety Panel (SASP) and the North Atlantic System Planning Group (NAT SPG) have adopted a Target Level of Safety (TLS) of 5×10^{-9} fatal accidents per flight hour per dimension to pertain for implementation of separation reductions after the year 2000. As a consequence, The FAA William J. Hughes Technical Center (WJHTC) assessed the lateral separation minimum against this TLS. The resulting "Safety Assessment to Support Use of 30 NM Lateral Separation Standard in the New York Airspace" was developed. When separation of 50NM longitudinal, 30NM longitudinal and 30NM lateral is initially implemented in the New York Oceanic airspace, the risk estimate is expected to be below the TLS recommended for use by the regional planning group. The assessment shows that given prevailing conditions and expected performance, the separation reduction in the New York Oceanic airspace will meet international guidelines for implementation.

f) **Proposed implementation date of the amendment:**

Upon approval by the Council.

g) **Action by the Secretary General:**

The proposal has been circulated to the following States and international organizations.

XXX

h) **Secretariat's comments:**

APPENDIX B

PROPOSAL FOR AMENDMENT OF THE REGIONAL SUPPLEMENTARY PROCEDURES NORTH ATLANTIC (NAT) REGION (Doc. 7030/5)

(Serial No.: XXX – NAT 4-1)

a) **Regional Supplementary Procedures:**

NAT

b) **Proposed by:**

United States

c) **Proposed amendment:**

Editorial Note: Amendments are arranged to show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

Amend the following in the NAT SUPPS, Chapter 4.

Chapter 4. NAVIGATION

4.1 PERFORMANCE-BASED NAVIGATION (PBN)

Note.— As the North Atlantic (NAT) Region transitions to PBN as contained in the Performance-based Navigation (PBN) Manual (Doc 9613), the contents of 4.1 will be amended.

4.1.1 Area navigation (RNAV) specifications

4.1.1.1 RNAV 10 (RNP 10)

Note. — RNAV 10 retains the RNP 10 designation, as specified in the Performance-based Navigation (PBN) Manual (Doc 9613), 1.2.3.5.

Area of applicability

4.1.1.1.1 A lateral separation minimum of 93 km (50 NM) may be applied between flights operating within the control area of the New York Oceanic FIR.

4.1.1.1.2 A longitudinal separation minimum of 93 km (50 NM) derived by RNAV may be applied between flights operating within the control area of the New York Oceanic FIR provided the communications and surveillance requirements in paragraph 6.2.1.1 are met.

Means of compliance

4.1.1.1.2³ For application of 4.1.1.1.1 and 4.1.1.1.2, operators and civil aviation authorities must follow the provisions listed below.

4.1.1.1.3⁴ The aircraft and operator must be approved RNP 10 or RNP 4 by the State of the Operator or the State of Registry, as appropriate. RNP 10 is the minimum navigation specification for the application of 93 km (50 NM) lateral and/or 93 km (50 NM) longitudinal separation.

4.1.1.1.4⁵ States shall ensure, when granting approval for RNP 10 or RNP 4, that operators establish programmes to mitigate the occurrence of large lateral track errors due to equipment malfunction or operational error.

Note. — The Performance-based Navigation (PBN) Manual (Doc 9613) provides guidance on aircraft, operations and maintenance programmes for the initial achievement and continued compliance with the authorized navigation specification.

4.1.2 Required navigation performance (RNP) specifications

4.1.2.1 RNP 4

~~Nil.~~

Area of applicability

4.1.2.1.1 A lateral separation minimum of 55.5 km (30 NM) may be applied between flights operating within the control area of the New York Oceanic FIR provided the provisions for communications and surveillance in paragraph 6.2.1.1 are met.

4.1.2.1.2 A longitudinal separation minimum of 55.5 km (30 NM) may be applied between flights operating within the control area of the New York Oceanic FIR provided the provisions for communications and surveillance in paragraph 6.2.2.1 are met.

Means of compliance

4.1.2.1.3 Aircraft must be approved RNP 4 by the State of Registry or the State of the Operator.

Amend the following in the NAT SUPPS, Chapter 6.

Chapter 6. AIR TRAFFIC SERVICES

6.2 SEPARATION

6.2.1 Lateral

(A11 – Attachment B; P-ATM – Chapter 5)

6.2.1.1 Minimum lateral separation shall be:

- a) 55.5 km (30 NM) between aircraft operating within the control area of the New York Oceanic FIR meeting the provisions in 4.1.2.1 and the provisions listed below, except minimum lateral separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR/CTA to other MNPS airspace shall be 110 km (60 NM).
 - 1) the aircraft are approved by the State of Registry or the State of the Operator to RNP 4;
 - 2) direct controller-pilot data link communications (CPDLC) are maintained;
 - 3) surveillance is maintained using an automatic dependent surveillance (ADS) system; and
 - 4) an ADS lateral deviation change event contract is established, with a lateral deviation threshold of 9.3 km (5 NM).

Note. — NAT MNPS airspace is defined in 4.1.1.5.1.1.

- ab) 93 km (50 NM) between aircraft meeting the provisions in 4.1.1.1, except minimum lateral separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR/CTA to other MNPS airspace shall be 110 km (60NM);

~~Note. — NAT MNPS airspace is defined in 4.1.1.5.1.1.~~

- bc) 110 km (60 NM) between aircraft which meet the minimum navigation performance specifications (MNPS) provided that a portion of the route of the aircraft is within, above, or below MNPS airspace;
- ed) 167 km (90 NM) between aircraft operating outside the MNPS airspace and at least one aircraft does not meet the MNPS:
 - 1) between the Iberian Peninsula and the Azores Islands; and
 - 2) between Iceland and points in Scandinavia and in the United Kingdom;
- de) 167 km (90 NM) between aircraft not approved RNP 10 or RNP 4 operating

outside MNPS airspace where no portion of the route of the aircraft is within, above, or below MNPS airspace:

- 1) between the United States/Canada and Bermuda; and
- 2) west of 55°W between the United States, Canada or Bermuda and points in the CAR Region;

Note. — MNPS airspace is defined in 4.1.1.5.1.1

e) 223 km (120 NM) between other aircraft;

except that lower minima in 5.4.1.2 of the PANS-ATM may be applied, or further reduced in accordance with 5.11 of the PANS-ATM, when the conditions specified in the relevant PANS-ATM provisions are met (see 5.4).

6.2.1.2 In the practical application of the minima in 6.2.1.1 a), b), c) d), e) and f) tracks may be spaced with reference to their difference in latitude, using one degree instead of 110 km (60 NM); one and one-half degrees instead of 167 km (90 NM); and two degrees instead of 223 km (120 NM), provided that in any interval of ten degrees of longitude, the change in latitude of at least one of the tracks does not exceed:

- a) three degrees at or south of 58°N;
- b) two degrees north of 58°N and south of 70°N; and
- c) one degree at or north of 70°N and south of 80°N.

At or north of 80°N, or where the above rates of change of latitude are exceeded, the required lateral separation must be ensured by reference to the track spacing expressed in nautical miles.

6.2.2 Longitudinal (P-ATM, Chapter 5)

6.2.2.1 Minimum longitudinal separation between turbo-jet aircraft shall be:

- a) 15 minutes; or
- b) 10 minutes, provided the Mach number technique is applied whether in level, climbing or descending flight; and the aircraft concerned have reported over a common point to follow continuously diverging tracks until some other form of separation is provided; and:
 - 1) at least 10-minute longitudinal separation exists at the point where the tracks diverge; and
 - 2) at least 5-minute longitudinal separation exists where lateral separation is achieved; and
 - 3) lateral separation will be achieved at or before the next significant point

— B5 —

(normally ten degrees of longitude along track(s)) or, if not, within 90 minutes of the time the second aircraft passes the common point or within 1 112 km (600 NM) of the common point, whichever is estimated to occur first.

Note. — The minima contained in 6.2.2.1 b) are in addition to those found in the PANS-ATM, 5.4.2.4.

c) 93 km (50 NM) derived by RNAV between aircraft operating within the control area of the New York Oceanic FIR meeting the provisions in 4.1.1.1, and those listed below except minimum longitudinal separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR/CTA to other MNPS airspace shall be in accordance with the provisions of paragraph 6.2.2.1 a) and b). The following provisions are applicable:

- 1) the aircraft are approved by the State of Registry or the State of the Operator to RNP 10;
- 2) direct controller-pilot data link communications (CPDLC) are maintained;
- 3) surveillance is maintained using an automatic dependent surveillance (ADS) system; and

Note. — ADS is required for the application of this minimum; therefore, the applicable provisions will be those of the PANS-ATM, 5.4.2.6.1 to 5.4.2.6.3, and 5.4.2.6.4.

d) 55.5 km (30 NM) between aircraft operating within the control area of the New York Oceanic FIR meeting the provisions in 4.1.2.1 and those listed below, except minimum longitudinal separation between aircraft transitioning from MNPS airspace in the New York Oceanic FIR/CTA to other MNPS airspace shall be in accordance with the provisions of paragraph 6.2.2.1. The following provisions are applicable:

- 1) the aircraft are approved by the State of Registry or the State of the Operator to RNP 4;
- 2) direct controller-pilot data link communications (CPDLC) are maintained; and
- 3) surveillance is maintained using an automatic dependent surveillance (ADS) system; and

Note. — ADS is required for the application of this minimum; therefore, the applicable provisions will be those of the PANS-ATM, 5.4.2.6.1 to 5.4.2.6.3, and 5.4.2.6.4.

6.2.2.2 Minimum longitudinal separation between non-turbo-jet aircraft shall be:

- a) 30 minutes; and
- b) 20 minutes in the West Atlantic route system (WATRS) area.

Note. — The WATRS area is defined beginning at a point 2700N 7700W direct to 2000N 6700W direct to 1800N 6200W direct to 1800N 6000W direct to 3830N 6000W direct to 3830N 6915W, thence counterclockwise along the New York Oceanic control area/FIR boundary to the Miami Oceanic control area/FIR boundary, thence southbound along the Miami Oceanic control area/FIR boundary to the point of beginning.

d) **Date when proposal received:**

XXX

e) **Proposers reason for amendment:**

- 1) In accordance with ICAO Doc 4444, the internationally agreed data-link-based separation minima values available for application in oceanic and remote airspace are 50NM longitudinal, 30NM longitudinal and 30NM lateral. Specifics for 30NM lateral separation are provided in paragraph 5.4.1.2.1.6, “Lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes,” with references to pertinent ICAO documents cited therein. Paragraph 5.4.2.6.4, “Longitudinal Distance-Based Separation Minima in an RNP RNAV Environment Using ADS-C” provides the corresponding details for the 50 NM and 30NM longitudinal separation minima, again with references to other relevant ICAO documents.
- 2) In non-radar oceanic airspace where traffic is increasing by approximately five percent a year, flight efficiency (e.g., user preferred routes and altitude profiles) is dependent on reductions in the horizontal separation standards. ICAO has developed guidelines for oceanic separation standards of 50NM longitudinal, 30NM longitudinal and 30NM lateral provided a set of requirements are met or exceeded. These requirements include that aircraft be authorized for RNP-10 or RNP-4, direct pilot-controller communication or CPDLC, and ADS-C position reports.
- 3) The use of these separation standards has been implemented within the Australian Eastern Oceanic airspace, Auckland Oceanic FIR, Honiara FIR, Nauru FIR, Nadi FIR and the Oakland Oceanic FIR. In December 2005, 30NM longitudinal and 30NM lateral operational trials began in Oakland Air Route Traffic Control Center (ARTCC) Oceanic Control Sector 3. Effective June 2007, Oakland ARTCC has applied 30NM longitudinal and 30NM lateral separation to pairs of suitably equipped aircraft throughout the Oakland Oceanic FIR.
- 4) This amendment proposes to allow 50NM longitudinal, 30NM longitudinal and 30NM lateral to be applied in the New York Oceanic FIR.
- 5) The application of the reduced minima is to enable level changes to transition through or to transition to the level of a longitudinally adjacent aircraft not presently available with the 10-minute longitudinal separation standard with Mach Number Technique (MNT) now in place. A level change is known to provide reduced fuel burn if an aircraft is transitioning in order to operate at a level recommended, for example, by the aircraft’s flight management system; facilitating more level changes thus results in greater overall system fuel efficiency. A level change initiated by air traffic control (ATC) in the New York Oceanic FIR could reduce operational complexity at intersections of published

— B7 —

routes in WATRS airspace, for example, thereby reducing controller workload relative to the present system; facilitating more level changes thus results in lowered operational complexity.

- 6) The ICAO Review of the General Concept of Separation Panel (RGCSP), later to be subsumed under the Separation and Airspace Safety Panel (SASP) and the North Atlantic System Planning Group (NAT SPG) have adopted a Target Level of Safety (TLS) of 5×10^{-9} fatal accidents per flight hour per dimension to pertain for implementation of separation reductions after the year 2000. As a consequence, The FAA William J. Hughes Technical Center (WJHTC) assessed the lateral separation minimum against this TLS. The resulting “Safety Assessment to Support Use of 30 NM Lateral Separation Standard in the New York Airspace” was developed. When separation of 50NM longitudinal, 30NM longitudinal and 30NM lateral is initially implemented in the New York Oceanic airspace, the risk estimate is expected to be below the TLS recommended for use by the regional planning group. The assessment shows that given prevailing conditions and expected performance, the separation reduction in the New York Oceanic airspace will meet international guidelines for implementation.

f) **Proposed implementation date of the amendment:**

Upon approval by the Council.

g) **Action by the Secretary General:**

The proposal has been circulated to the following States and international organizations.

XXX

h) **Secretariat's comments:**

— — — — —

APPENDIX C

DRAFT

PLANNED CONCEPT OF OPERATIONS FOR THE APPLICATION OF 30NM OR 50NM LONGITUDINAL AND 30NM LATERAL SEPARATION IN THE NEW YORK OCEANIC CONTROL AREA (CTA)/FLIGHT INFORMATION REGION (FIR) (19 April 2012)

1. Introduction

1.1. New York Air Route Traffic Control Center (ARTCC) plans to implement the 30 Nautical Mile (NM) longitudinal, 50NM longitudinal and 30NM lateral separation minima in the New York Oceanic Control Area (CTA)/Flight Information Region (FIR). The New York Oceanic CTA/FIR crosses the boundary of two ICAO regions, the North Atlantic (NAT) and the Caribbean (CAR). The United States Federal Aviation Administration (FAA) will seek approval from both regions in order to implement in all of the airspace.

1.2. These minima may be implemented simultaneously or in a phased approach. The implementation of these separation minima is intended to take advantage of existing minima and to make more optimal altitudes and routes available for the operators as soon as possible. The 30NM longitudinal and 30NM lateral separation minima may be applied to aircraft authorized for the most advanced Required Navigation Performance (RNP) 4, while the 50NM longitudinal minima can be applied to any combination of RNP4 and RNP10 authorized aircraft with CPDLC and ADS-C. New York ARTCC plans to implement these separation minima simultaneously in order to combine training and limit disruptions to the operation. The simultaneous implementation may cause issues in the post implementation monitoring; in the event of an error, an analysis will need to be conducted to determine which minima the controller attempted to apply.

1.3. New York ARTCC will apply these separation minima between suitably equipped aircraft pairs. At this time, there are no plans to restructure the routes, nor will aircraft be loaded on tracks 30NM or 50NM in trail. The controller will apply the separation minima only as opportunities present themselves. It is the opinion of the FAA that the current communication reliability does not meet the requirements to safely establish and load tracks at these reduced separation minima.

1.4. New York ARTCC utilizes the Ocean21 automation system which identifies suitably equipped aircraft for the controller, provides decision support for establishing the separation minima for all pairs of aircraft along a cleared profile, provides aircraft profile conformance monitoring and is capable of protecting 4 dimensional protection of individual aircraft profiles. The system deciphers flight plan information to determine which separation minima may be applied to a particular aircraft based on filed aircraft equipment. Furthermore, Ocean21 is fully Future Air Navigation Service (FANS) capable and is able to apply conflict prediction and reports logic in situations where ADS-C and CPDLC connections are required for reduced longitudinal and Lateral separation minima. The system is capable of determining separation minima which may be applied between aircraft with different equipment and speeds. The system is adept at protecting random routes of an individual aircraft, and is able to issue conflict warnings in excess of two hours ahead of the event depending on local adaptation. Ocean21 can also be adapted with the separation minima applied by adjacent air traffic control (ATC) facilities, and to warn the controller when a conflict will occur based on the adjacent ATC facility's requirements. This allows controllers to effectively plan for transitions to adjacent FIRs.

2. Lateral separation minima to be applied

2.1. 30NM lateral separation will be applied in accordance with ICAO procedures stipulated in Doc 4444 between aircraft authorized and using Automatic Dependent Surveillance – Contract (ADS-C) for surveillance and Controller Pilot Data Link Communication (CPDLC) for communication with New York ARTCC, and approved for RNP4 operations for navigation that are operating above the floor of controlled airspace throughout the New York Oceanic CTA.

Separation Minimum	Navigation Requirement	Communications Requirement	Surveillance Requirements
30NM lateral	RNP4	DCPC or CPDLC	ADS-C system in which a periodic contract and waypoint change and lateral deviation event contracts are applied as prescribed by Doc 4444

Table 1. CNS Requirements for 30NM Lateral Separation from ICAO Doc 4444

3. Longitudinal separation minima to be applied

3.1. 50NM longitudinal separation will be applied between aircraft using ADS-C and CPDLC for communication with New York ARTCC, and authorized for RNP4 and RNP10 operations that are operating above the floor of controlled airspace throughout the New York Oceanic CTA.

Separation Minimum	Navigation Requirement	Communications Requirement	Maximum ADS-C periodic reporting interval
50NM longitudinal	RNP10	DCPC or CPDLC as prescribed by Doc 4444	27 minutes
50NM longitudinal	RNP4	DCPC or CPDLC as prescribed by Doc 4444	32 minutes if both aircraft are approved for RNP4 operations

Table 2. CNS Requirements for 50NM Longitudinal Separation from ICAO Doc 4444

3.2. 30NM longitudinal separation will be applied between aircraft authorized and using ADS-C and CPDLC for communication with New York ARTCC, and authorized for RNP4 operations that are operating above the floor of controlled airspace throughout the New York Oceanic CTA.

Separation Minimum	Navigation Requirement	Communications Requirement	Maximum ADS-C periodic reporting interval
30NM longitudinal	RNP4	CPDLC meeting regional goals	14 minutes

Table 3. CNS Requirements for 30NM Longitudinal Separation from ICAO Doc 4444

3.3. 50NM longitudinal separation will be applied between aircraft using ADS-C and CPDLC for communication with New York ARTCC, and authorized for RNP4 and RNP10 operations that are operating above the floor of controlled airspace throughout the New York Oceanic CTA.

4. Benefits to the Operator for obtaining RNP4 or RNP10 Authorization and Utilizing ADS-C and CPDLC Equipment

4.1. For these reduced separation minima to be applied, operators flying within the New York Oceanic CTA must be approved for RNP4 or RNP10 operations and authorized to utilize ADS-C and CPDLC equipment for communication with ATC. Aircraft that are appropriately equipped will have a better opportunity to obtain their preferred route and altitude because they will be eligible for the reduced lateral or longitudinal separation minima. Additionally, controllers will be better able to respond to in-flight change requests for deviation from clearance.

4.2. The application of the reduced separation minima will provide opportunities for an appropriately equipped aircraft to change flight levels in order to transition through, or transition to, the level of an adjacent aircraft. In terms of economic benefits to operators, a flight level change is likely to provide reduced fuel burn if an aircraft is transitioning in order to operate at a level recommended, for example, by the aircraft's flight management system, resulting in greater overall system fuel efficiency.

4.3. In February 2013, the ICAO North Atlantic Region will begin transitioning to mandatory use of both ADS-C and CPDLC. This action along with planned improvements to incorporate performance-based navigation into the NAT Regional airspace provides the foundation for supporting reduced separation minima in accordance with ICAO global and regional planning. On that date, data link equipage and operation is planned to be mandated for operation on two core OTS tracks between FL 360-390 (inclusive). In Feb 2015, this mandate is planned to be expanded to yet-to-be-defined portions of NAT MNPS airspace. This mandate will not be applied in New York Oceanic airspace until rulemaking is completed.

5. Provisions for accommodating aircraft not eligible for 30NM or 50NM longitudinal and/or 30NM lateral separation

5.1. The airspace will not be "exclusionary" at the time of implementation subject only to ADS-C, CPDLC RNP equipped aircraft. Aircraft not authorized for RNP4 or RNP10 operations, and not communicating with ADS-C and CPDLC will still be allowed to fly within the New York Oceanic CTA unrestricted; however, these reduced separation minima will not be applied to those aircraft. Aircraft that flight plan on the published routes will, by definition, conform to the basic lateral separation minimum. Their operations will not be constrained by aircraft using more advanced CNS, at least initially. When developing a clearance for an advanced CNS systems aircraft, the lesser aircraft will have a separation at least the minimum associated with its systems in at least one of the physical dimensions. Thus, those operations should not be limited by the inclusion of more advanced CNS aircraft.

5.2. The FAA is investigating the possibility of putting forth a regulatory change that would be effective on a date to be determined after Feb 2013. The goal of the change would be to maximize operational efficiency by requiring aircraft to be authorized for RNP10 or RNP4 and ADS-C and CPDLC data link usage for cruise operations in New York oceanic airspace between FL 290-410 (inclusive). The content of and effective date for the change will be established after the necessary U.S. national coordination required by the rulemaking process.

6. Concept for transfer of control into adjacent FIRs not controlled by the U.S.

6.1. Lateral - New York ARTCC will continue to provide at least the minimum separation when transferring aircraft control to adjacent ATC facilities. It should be noted that New York currently provides 50NM lateral separation between RNP10 aircraft, and routinely transitions aircraft to a larger separation minima in order to accommodate the separation minima of adjacent air traffic service providers.

6.2. Longitudinal - New York ARTCC will continue to provide the appropriate longitudinal minima (e.g., 10 minutes for flights operating at the same Mach speed, “Rule of 11”, etc.) when transferring control to adjacent air traffic service providers.

6.3. As noted earlier, the Ocean21 automation system software will be adapted for the separation minima found in Doc 4444 applied by adjacent ATC facilities, and the software will be reprogrammed when separation minima change providing the controller planning and decision-support for the transition of aircraft across the FIR boundary.

7. ICAO Flight Plan Planning Requirements

7.1. In order to inform New York Oceanic Control that an aircraft is approved for RNP4 or RNP10 and data link operations, and eligible for the application of 30NM lateral separation and/or 30NM or 50NM longitudinal separation, operators must comply with the flight planning requirements established in Amendment 1 to ICAO Doc 4444 and:

- a. Annotate ICAO Flight Plan Item 10 (Communication, Navigation and Approach Equipment) with the letters “R”, “Z”, applicable “J” codes and ADS-C capabilities; and
- b. Annotate Item 18 (Other Information) with “PBN/A1” (RNAV/RNP10) or “PBN/L1” (RNP4), as appropriate.

7.2. ADS-C periodic rates are established by contract with the individual aircraft. The Ocean21 system implements this based on the RNP value entered in the ICAO flight plan and established by Collision Risk Modeling (CRM). This is to ensure that the proper reporting interval exists to meet the minimum CNS requirements of the separation minima as described in ICAO Doc 4444 and summarized above in Tables 1, 2 and 3. CRM may establish that a short interval is required.

Note: For more details on the ICAO flight plan, see

http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/flight_plan_filing/General/ICAO_2012

8. ADS-C and CPDLC Usage

8.1. The FANS LOGON for New York Oceanic is KZWW. Proper procedures for logging onto KZWW can be found in the following documents:

- a. Global Operational Data Link Document (GOLD)
http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/data_link/

- b. FAA International Notices to Airmen (NOTAM)
http://www.faa.gov/air_traffic/publications/notices
- c. NOTAMs published by New York ARTCC

9. Concept for Implementation of Separation Reductions

9.1. At this time, the FAA does not have sufficient confidence in the availability of the satellite system to ensure efficiencies for fully loaded tracks. For this reason, the implementation will not include addition of a route structure.

9.2. Application of reduced lateral separation

9.2.1. The initial implementation of 30 NM lateral separation is intended to facilitate more weather deviation clearances. The following data indicates that there will be a substantial number of opportunities to issues weather deviation clearances where in the past they were denied.

9.2.2. During the 8-month period from April to November 2011, there were 10,516 weather deviation requests observed in New York oceanic airspace. Of these, approximately 90% received a clearance response. 82% of the clearances granted the request, and 8% were for a magnitude different, typically higher, than the request. Air traffic control (ATC) was unable to issue a clearance to approximately 3% of the requests; however, most of those flights received an alternate option to assist in deviating around the weather. Approximately 1% of the clearance requests were a second request before a clearance was issued to the first request - sometimes for the same magnitude, sometimes higher. The remaining 6% had another type of response or no response observed.

9.2.3. The magnitudes of the requests range from 5 NM to 120 NM. Approximately 68.4% were 20 NM or less. Below is a chart showing the distribution of deviation requests by magnitude for New York oceanic airspace during the period from April to November 2011. The categories are shown in 5 NM intervals, but the vast majority of requests were in increments of 5 NM (5, 10, 15 etc.).



9.3. Application of reduced longitudinal separation

9.3.1. Upon initial implementation, it is expected that the operator fleet in New York Oceanic will be of mixed equipage – some operators will meet the requirements for 50 NM longitudinal separation and some will meet the requirements for 30 NM longitudinal separation. 50 NM longitudinal separation requires RNP10 authorization along with CPDLC and ADS-C. The periodic report interval will be 20 minutes. 30 NM longitudinal separation requires RNP4 authorization along with CPDLC and ADS-C. The periodic report interval has yet to be determined and will be based on the outcome of the safety analysis. Based on recent safety analysis of 30 NM longitudinal separation conducted for portions of the Pacific airspace, it is anticipated that the reporting rate will be less than 14 minutes, and likely in the vicinity of 10 minutes. It will be at the discretion of the operators as to what authorization they will seek and what benefits they will capture. Ocean21 will apply the longitudinal minimum that is appropriate for each aircraft pair to gain the maximum operational benefit for the operator/aircraft and for overall system efficiency.

9.3.2 The longitudinal separation reduction will initially be used for climbing and descending aircraft through another aircraft's altitudes. There will be some instances when the minima is applied in level flight, but the tracks will continue to be loaded for the 10 minute separation minima.

9.3.3. Implementation of both the 30 NM and the 50 NM minima are planned to accommodate the different traffic flow characteristics. It is anticipated that some operators will not find it cost beneficial to fully equip and obtain operational authorizations necessary (FANS 1/A - RNP4, CPDLC and ADS-C) to meet the 30 NM longitudinal separation minimum. Under this scenario there will be opportunities for air traffic control to apply the 50 NM longitudinal separation minimum, and provide benefits to those operators as well.

10. Concept for use of Ocean21 in New York Oceanic Airspace

10.1. Ocean21 is an automated decision support tool to establish, monitor and maintain separation between aircraft and between aircraft and airspace. Ocean21 automatically sets up ADS contracts for position reporting based on aircraft equipage. If an ADS position report is not received within 3 minutes of the designated time, Ocean21 automatically sends a demand request for a replacement position report. If after another 3 minutes a report is not received, Ocean 21 changes the eligibility of the aircraft to a greater separation minima (e.g. 30 NM to 50 NM, or 50 NM to 10 minutes). This action generates a conflict warning to the controller. The controller then must establish an alternate eligible form of separation within 7 ½ minutes. In the example of 30 NM longitudinal separation, when the position report interval is exceeded, the system would step up to the next eligible separation which is 50 NM longitudinal. This minima has a longer reporting interval requirement. If the longer interval is again exceeded Ocean21 will step up to the next minima which is 10 minutes.

10.2. Ocean21 also provides the New York Oceanic air traffic controller with a set of automated tools to assist in assuring that the correct separation is applied between aircraft with a mix of navigation capabilities (i.e., RNP4/RNP10, Minimum Navigation Performance Specifications (MNPS), etc.). These tools include automated Conflict Prediction and Reporting (CPAR), Air Traffic Services Inter-Facility Data Communications (AIDC), automated FANS LOGON and contract establishment, graphic dynamic

situation display to the controller, and interactive electronic flight strips, aircraft labels, conformance checking and alerting and aircraft position symbols.

10.3. The New York Oceanic CTA/FIR does not have any exclusionary airspace and places no constraints at this time on the use of routes or altitudes due to equipment limitations. This policy of mixed equipage operations will continue to exist with the implementation of 30NM/50NM longitudinal and 30NM lateral. All current forms of separation will continue to be applied throughout the transit of the airspace. This may change in the future dependent on a benefits case required for rulemaking.

10.4. 30NM/50NM longitudinal and 30NM lateral will only be applied to suitably equipped pairs of aircraft that meet all of the requirements for the minima and are logged-in to the communications/surveillance system through a communications service provider.

11. Aircraft and air traffic service provider requirements for operation in airspace adjacent to the New York ARTCC Oceanic CTA

11.1. No changes resulting from this implementation will be required by adjacent air traffic service providers.

11.2. No changes resulting from this implementation will be required by aircraft operating in airspace adjacent to the New York Oceanic CTA.

12. Aircraft and air traffic service provider benefits as a result of the application of these minima in the New York ARTCC Oceanic CTA

12.1. Air traffic service providers controlling the airspace adjacent to the New York Oceanic CTA will see an increase in the acceptance rate of aircraft inbound to New York oceanic airspace due to the more efficient use of the airspace resulting from this reduction in separation minima. For example, envision a scenario where two aircraft eligible for the reduced separation minima are entering New York oceanic airspace from two adjacent ATC facilities. If minima separation is required, one of the aircraft may be required to make a route or altitude change; however with the application of the reduced separation minima, neither aircraft may have its route or altitude amended.

12.2. Aircraft transitioning to, or operating within, the New York Oceanic CTA are likely to have a greater opportunity for ATC approval of a route, altitude or speed change request as a result of the reduced separation minima.

13. Implementation Date

13.1. The targeted implementation date for these reduced separation minima is 12 December 2013.

APPENDIX D

Know Your Airspace Analysis for the New York Oceanic Airspace

A Study of the Operators, Aircraft, and Traffic Characteristics

**FAA Technical Center
Atlantic City, NJ
February 2012**

1. Introduction

1.1. This report contains an analysis of operations conducted within the oceanic portion of the New York flight information region (FIR). This airspace, highlighted in Figure 1, is referred to as the New York oceanic airspace. The coordinates defined to depict this airspace are contained in **Appendix A**.

1.2. The purpose of this report is to provide analysts and airspace planners involved with the proposed separation reduction in New York oceanic airspace with information pertaining to the characteristics of airspace operations and navigation capabilities. Additionally, this analysis will provide the basis for evaluating key parameters used in the collision risk model that will be used to assess the risk associated with the proposed airspace changes.

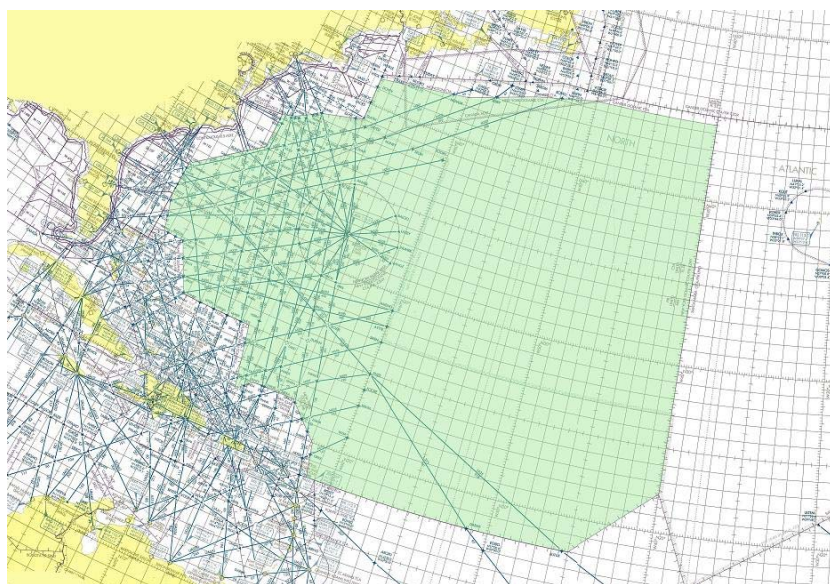


Figure 1. Chart highlighting the New York oceanic airspace

2. Background

2.1. The Ocean21 system became fully operational in New York oceanic airspace on 6 June 2006. The Ocean21 system was developed by the FAA under the Advanced Technologies and Oceanic Procedures (ATOP) program. The Ocean21 system features a fully integrated conflict probe, data link communications, and automatic processing of mixed mode position reporting such as radar, high frequency radio, digital data communications, and automatic dependent surveillance. Figure A1 in Appendix A illustrates the coverage of Ocean21 in and around the New York flight information region (FIR) with aircraft position data extracted from Ocean21.

2.2. With the foundation of an automated air traffic control (ATC) decision-support system, the United States FAA has begun conducting studies to explore the potential implementation of 50 nm longitudinal, 30 nm lateral and 30 nm longitudinal separation minima in the New York oceanic FIR (reference 1). In order to determine if the risk associated with these proposed separation reductions is acceptable, in terms of the applicable Target Level of Safety (TLS), the

FAA is undertaking a safety assessment based on the internationally accepted collision risk modeling methodology.

3. Data Sources

3.1. This section provides a summary of the data sources used for the KYA analysis presented in this report. These data are obtained from the Ocean21 system at New York air route traffic control center (ARTCC).

3.2. Since the Ocean21 automation system became fully operational in June 2006 at the New York oceanic ARTCC (ZNY), operations experts at the Technical Center have archived the Ocean21 data using a system maintenance tool developed for data reduction and analysis (DR&A). These archives include ICAO and NAS flight plans, and messages transmitted via automatic dependent surveillance – contract (ADS-C) systems, controller pilot data link communication (CPDLC) systems and third party high frequency voice (HF).

3.3. As a complement to the DR&A data, a script program developed by the Ocean21 operations specialists at Oakland ARTCC is run at New York air route traffic control center (ARTCC) each day against the live Ocean21 system data to extract additional information from the ADS-C and CPDLC transactions. These additional data are referred to as the "antennae" data and contain information necessary for completing post-implementation data link performance monitoring as prescribed in the International Civil Aviation Organization (ICAO) document, Global Operational Data Link Document (GOLD) (reference 2).

3.4. *Ocean21 Archived Data*

3.4.1. Among the various data contained in the Ocean21 DR&A archives are the aircraft flight plans and data link position reports sent via HF, CPDLC, and ADS-C. In combination, these data are used to identify unique operations in New York oceanic airspace. A sample of Ocean21 DR&A data for the one year period from 1 September 2010 to 31 August 2011 was compiled for the analysis presented in this report. Due to data collection issues, data is missing for the 4 days from 29 January to 1 February 2011.

3.4.2. Table 1 shows examples of the Ocean21 DR&A message types used for this analysis. The three types of ADS-C position reports are described in addition to a CPDLC position report, an HF position report, and an ICAO flight plan message.

Table 1. Examples of Ocean21 message types used for KYA analysis

Message Type and Description	Example
ADS-C Position Report Type: BASIC periodic report (BAS) Contains aircraft position report and other information, as specified in the periodic contract with ATC	Position report : “BAS: Pos = lat/long Alt = n1 feet Time = hh:mm:ss Multiple NAV units Accuracy < 0.25 nm TCAS is ON” Next and next+1 waypoints: “PRR: Pos = lat/long Alt = n2 feet ETA= hh:mm:ss Pos = lat/long Alt = n3 feet” Earth-referenced current flight data: “ERF: Track = m degrees GS (groundspeed) = v knots VR (vertical rate) = k ft/min” Aircraft-referenced current flight data: “ARF: Heading = n degrees Speed = r Mach VR (vertical rate) = k ft/min” Meteorological data: “MET: Wind dir = j degrees Wind spd = r knots Temp = d C”
ADS-C Position Report Type: Waypoint change (WPC) Contains aircraft position report for waypoints defined in its flight plan, as specified in the event contract with ATC	“WPC: Pos = lat/long Alt = n1 feet Time = hh:mm:ss Multiple NAV units Accuracy < 0.25 nm TCAS is ON PRR: Pos = lat/long Alt = n2 feet ETA= hh:mm:ss Pos = lat/long Alt = n3 feet”
ADS-C Position Report	“LDC: Pos = lat/long

Message Type and Description	Example
Type: Lateral deviation (LDC) Contains position information of aircraft when a lateral deviation is detected from the aircraft's planned routing that is greater than the distance specified in the event contract (typically 5nm)	Alt = n1 feet Time = hh:mm:ss Multiple NAV units Accuracy < 0.25 nm TCAS is ON"
HF Position Report Contains position report sent via HF as coordinated and transcribed by third party voice operator	FI CAL005/OV 35N150W 0155 F320/EO 33N160W 0256/NP 32N170W
CPDLC Position Report Contains position report submitted via CPDLC	POSITION REPORT Pos: 2504N14325W Time: 0018 Alt: F390 Next Fix: FABBO Time at Next Fix: 0056 Next Fix Plus One: FANTO Time at Destination: 0227 Temp: -52 C Winds: 300 Degrees at: 032 Knots Speed: M084 ReportedWaypointPosition : FADER ReportedWaypointTime: 0016 ReportedWaypointAltitude: F390 DEVIATING R 001 NM OF ROUTE
ICAO Flight Plan Contains ICAO flight plan filed with ATC and used by Ocean21	FPL-UAL830-IS -B772/H-SXWDHIJRYZ/CD -RJGG0655 -N0497F330 DCT CBE DCT KAZKI DCT KZE/M084F330 DCT PETAL OTR14 VACKY OTR13 SEALS DCT 35N150E/M084F350 35N160E 37N170E 40N180E 42N170W 42N160W/M084F370 42N150W 42N140W 41N130W DCT UNVER/N0482F370 DCT ENI J 143 PYE GOLDN4 -KSFO0827 KOAK -EET/KZAK0217 KZOA0739 REG/N798UA SEL/ASFK DAT/SV NAV/RNP 10 RALT/RJAA PMDY PACD CYVR RMK/TCAS EQUIPPED 180 MIN ACFT

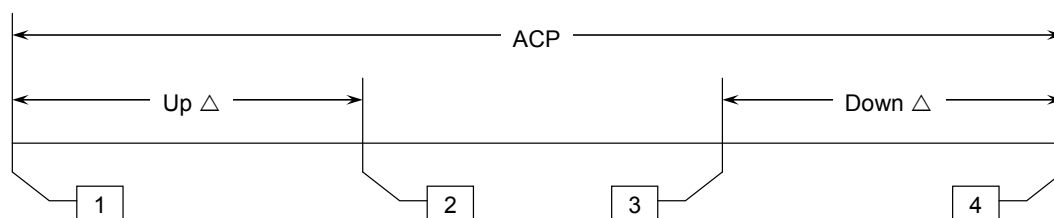
3.5. Ocean21 “Antennae” Data

3.5.1. The “antennae” data are used to measure the required communication performance (RCP) and required surveillance performance (RSP) for data link operations as described in the GOLD. A two-year sample of the “antennae” data was compiled for the period from 1 January 2010 to 31 December 2011 to assess the data link performance in New York oceanic airspace.

3.5.2. The surveillance performance is assessed using the ADS-C downlink messages. The ADS-C downlink message fields contained in the “antennae” data include the date, aircraft registration number, aircraft type, data link service provider and ground station used for the message transmission and the downlink transit time. The transit time is calculated from the position time internal to the ADS-C position report and the Ocean21 receipt time by the air navigation service provider (ANSP).

3.5.3. The RCP is assessed using the CPDLC transactions involving uplink transmissions related to communication transfer and ATC intervention, such as climb clearances, and the corresponding WILCO response messages. The RCP transaction fields include the date, aircraft registration number, aircraft type, data link service provider and ground station used for the message transaction, the timestamp of the uplink message sent by ATC, the message assurance (MAS) receipt time of the uplink message and the Ocean21 receipt time of the WILCO response.

3.5.4. The three times are used to calculate the time measurements needed to assess RCP: the actual communication performance (ACP), the actual communication technical performance (ACTP) and the pilot operational response time (PORT). Figure 2 shows how the ACP, ACTP and PORT are estimated.



1. Uplink Sent. This is the date/time that the CPDLC clearance was sent to the aircraft.
2. MAS Received. This is the date/time that the MAS for the CPDLC clearance was received.
3. WILCO Sent. This is the date/time that the WILCO reply is transmitted.
4. WILCO Received. This is the date/time that the WILCO reply for the CPDLC clearance was received.

The measurements (in seconds) are calculated as follows:

$$\begin{aligned}
 \text{ACP} &= (\text{WILCO_Received}) - (\text{Uplink_Sent}) \\
 \text{ACTP} &\cong \left(\left(\frac{\text{Up}\Delta}{2} \right) + (\text{Down}\Delta) \right) \\
 \text{PORT} &\cong \text{ACP} - \text{ACTP}
 \end{aligned}$$

Figure 2. CPDLC transaction calculations

4. Analysis Results

4.1. The Ocean21 DR&A traffic sample was analyzed in terms of daily traffic levels, operators, fleet composition, flight level utilization, entry time distribution, and city pairs and corresponding traffic flows. The results of this analysis are presented in the following sections.

4.2. The total traffic population was first broken down by type of operation, i.e. commercial, international general aviation (IGA), and military (State) aircraft. For the sample period from 1 September 2010 to 31 August 2011, approximately 91.5 percent of the total operations were commercial aircraft, 7 percent were IGA aircraft, and 1.5 percent were State aircraft.

4.3. Figure 3 illustrates the seasonal traffic patterns in the New York oceanic airspace. The traffic counts are shown for each month in the sample and are broken down by direction of flow. The spring months of March and April are shown to have the highest flight counts with an average of 622 flights per day. Conversely, the fall months of September and October are shown to have the lowest flight counts with an average of 430 flights per day. During the aggregate sample period of 361 days there was an average of 544 flights per day observed. Overall, the traffic is split relatively equally between the four directions of flow.

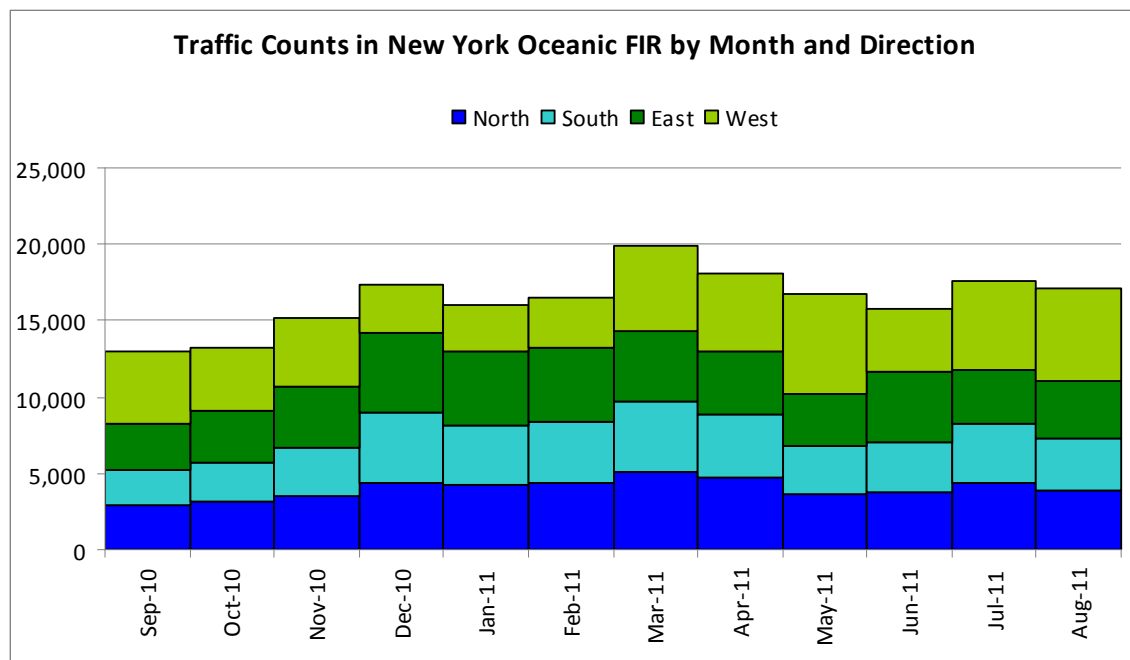


Figure 3. Traffic levels observed in New York oceanic airspace

4.4. Figure 4 shows the top 30 operators utilizing New York oceanic airspace in decreasing order of total operations observed in the sample. The top operator, Jetblue Airlines (JBU), accounts for approximately eleven percent of the observed operations in the sample and the combined top thirty operators account for approximately eighty percent of the total operations. The remaining twenty percent of the flights in the sample are attributed to 197 operators with

operations ranging from 1,202 to 1 during the sample period of 361 days. **Appendix B** contains the complete list of operators observed in the traffic sample.

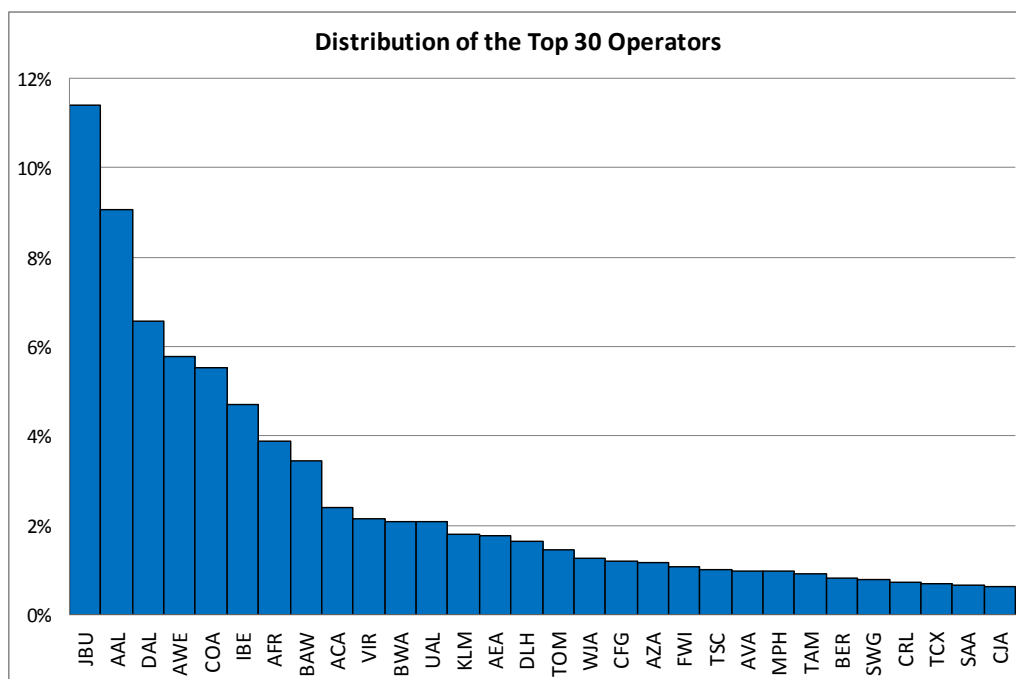


Figure 4. Top 30 operators in decreasing order of total operations

4.5. Figure 5 illustrates the top twenty aircraft types utilized in the New York oceanic airspace and their contribution to the total operations during the sample period in decreasing order of operations. The percentage shown at the top of each bar represents the contribution that each respective aircraft type makes to the overall traffic population. These twenty aircraft types account for approximately ninety percent of the total operations. The remaining ten percent are attributed to 183 additional aircraft types, which range from 1,460 to 1 in total operations during the sample period. **Appendix C** contains the complete list of aircraft types observed in the traffic sample.

4.6. Figure 5 also shows the proportion of each aircraft type that was observed using ADS-C in the one year traffic sample. The green portion of each bar shows how many of the flights for each respective aircraft type were observed using ADS-C, while the blue shows those not observed to be using ADS-C.

4.7. Approximately 30% of the operations in the one year traffic sample were observed to be using ADS-C. Of the top ten aircraft types, which contribute approximately 73% of the operations within New York oceanic airspace, eight were observed to be utilizing ADS-C in some portion of their operations. Of the top three aircraft types, contributing approximately 35% of the operations, only the B763 is observed to have ADS-C operations, with approximately 10% of its operations utilizing ADS-C.

4.8. The aircraft types with the highest percentage of operations observed utilizing ADS-C are B77W, B772 and A346, with 98%, 94% and 92%, respectively. Aircraft types A343, B744, A332 and A333 have approximately 60% or greater of the observed operations utilizing ADS-C.

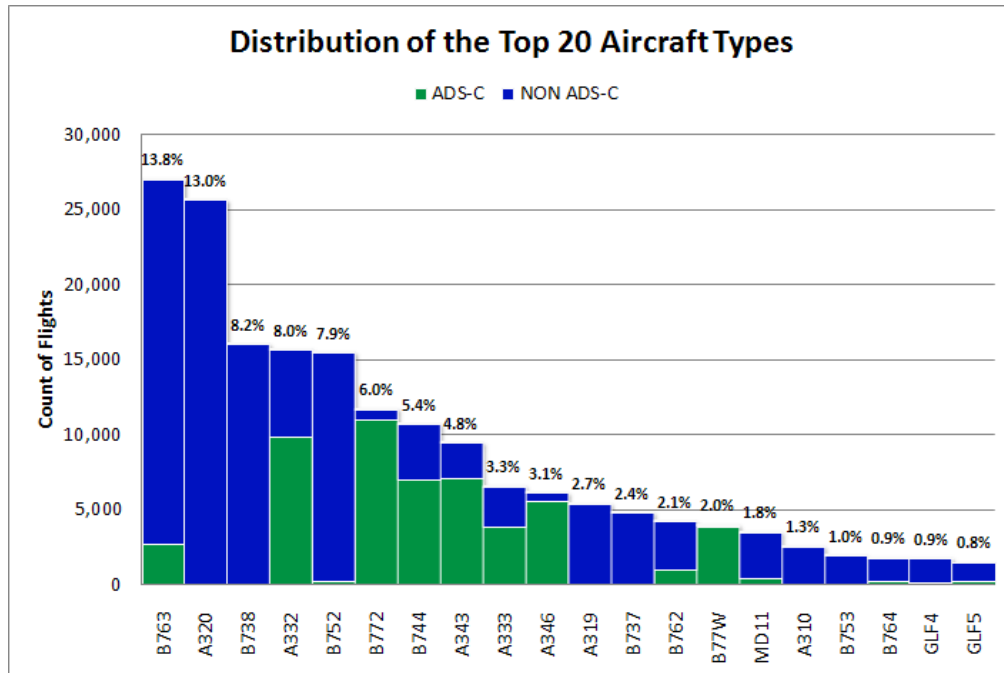


Figure 5. Top 20 aircraft types in decreasing order of total operations

4.9. Figure 6 shows the distribution of the top 20 operator/aircraft type combinations observed in the New York oceanic airspace, in decreasing order of operations. These operator/aircraft type combinations represent approximately forty-six percent of the operations observed during the 361 days in the traffic sample. The top two operator/aircraft type combinations, contributing approximately eleven percent and four percent, respectively to the total observed operations are Jet Blue Airlines (JBU)/A320, and American Airlines (AAL)/B752.

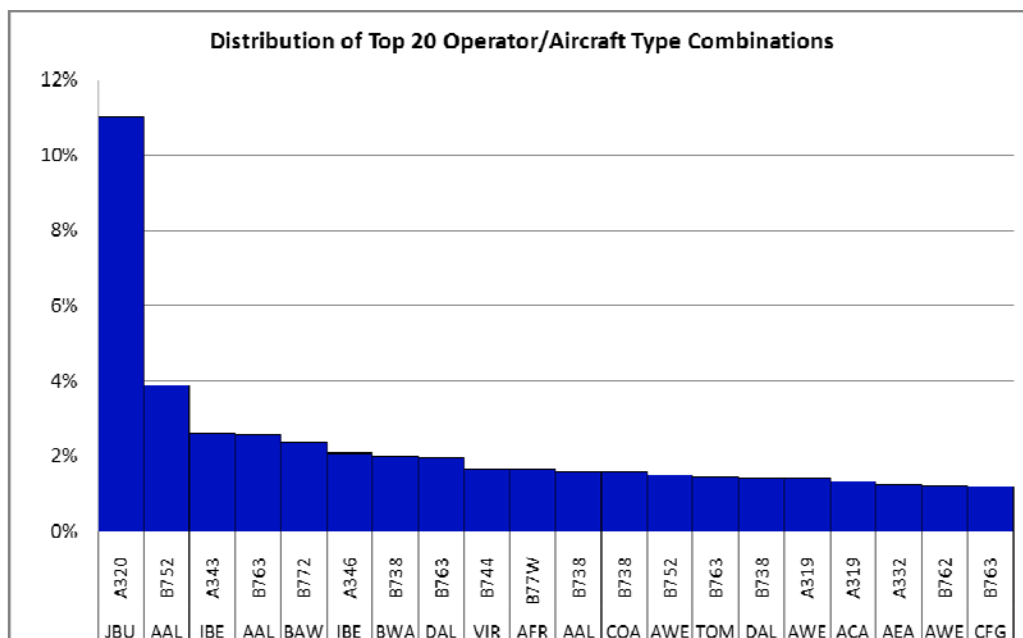


Figure 6. Top 20 operator/aircraft type combinations in decreasing order of total operations

4.10. Figure 7 shows the distribution of reported Mach speeds observed in the ADS-C position reports for the month of July 2011. This distribution applies only to the 30% of operations in New York oceanic airspace using ADS-C. The number of observations included in the distribution is shown in parentheses under the chart title. This figure illustrates the range of cruising Mach speeds seen in the data, however not in relative proportion to the general population. Of particular note is that there are two modes that the data appear to coalesce around, Mach 0.81 and Mach 0.84. Sample data can be extended to the general population by inference and may aid investigations of relative speed differences between aircraft.

4.11. As shown in Figure 5, the top 5 aircraft types, contributing approximately 50% of the operations within New York oceanic airspace are not well represented in Figure 7 as only 13% of the associated operations are observed utilizing ADS-C. Appendix D contains additional charts showing the distribution of observed Mach speeds for 12 of the top aircraft observed utilizing ADS-C.

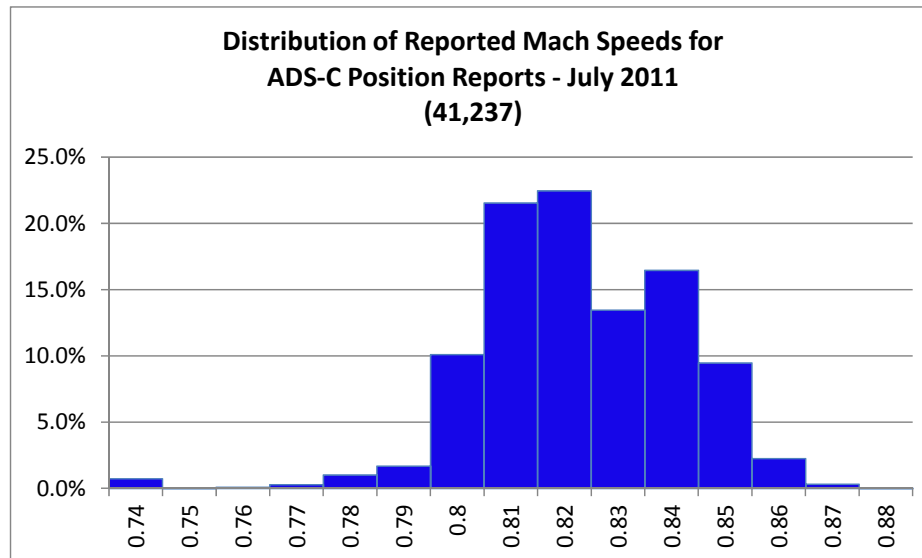


Figure 7. Distribution of Mach speeds observed in ADS-C reports

4.12. Figures 8 and 9 illustrate the flight level utilization in the New York oceanic airspace for northbound/southbound and eastbound/westbound operations, respectively. The practice of an alternating flight level allocation scheme can clearly be observed for northbound/southbound traffic in Figure 8. Overall, flight levels 360 and 370 are the most utilized at 16.6% and 16.8% of the total traffic, respectively.

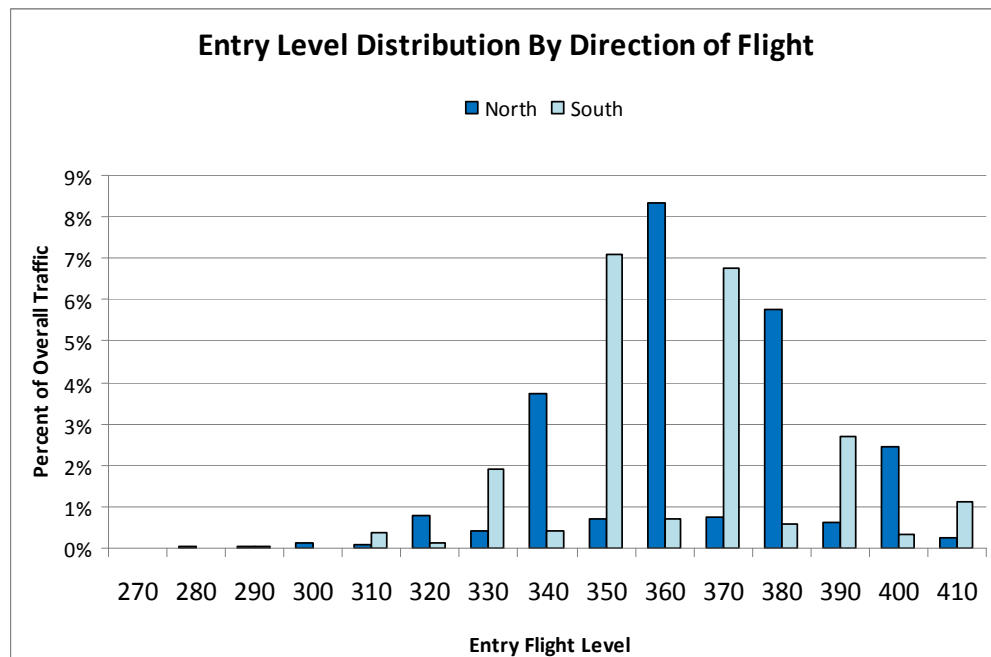


Figure 8. Flight level utilization by direction for northbound and southbound operations

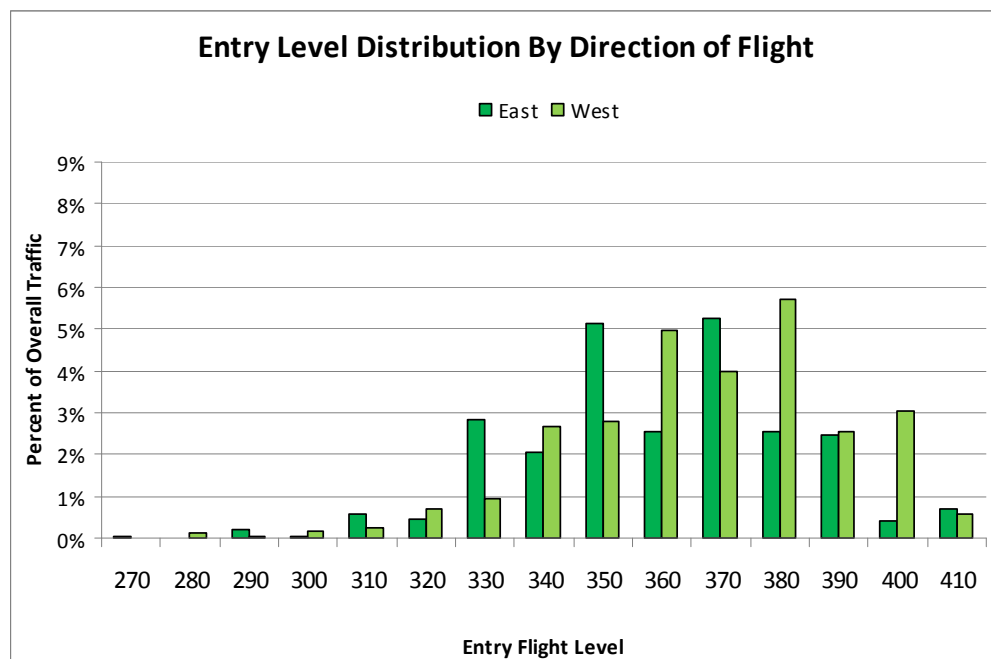


Figure 9. Flight level utilization by direction for eastbound and westbound operations

4.13. Figures 10 and 11 depict the entry time counts by direction of travel. Figure 10 contains the traffic counts by entry time and direction for northbound and southbound operations. Figure 11 contains traffic counts by entry time and direction for eastbound and westbound operations. The peak of for southbound traffic occurs around hours 1300-1500 UTC while the peak of the westbound traffic occurs around hours 1400-1600 UTC.

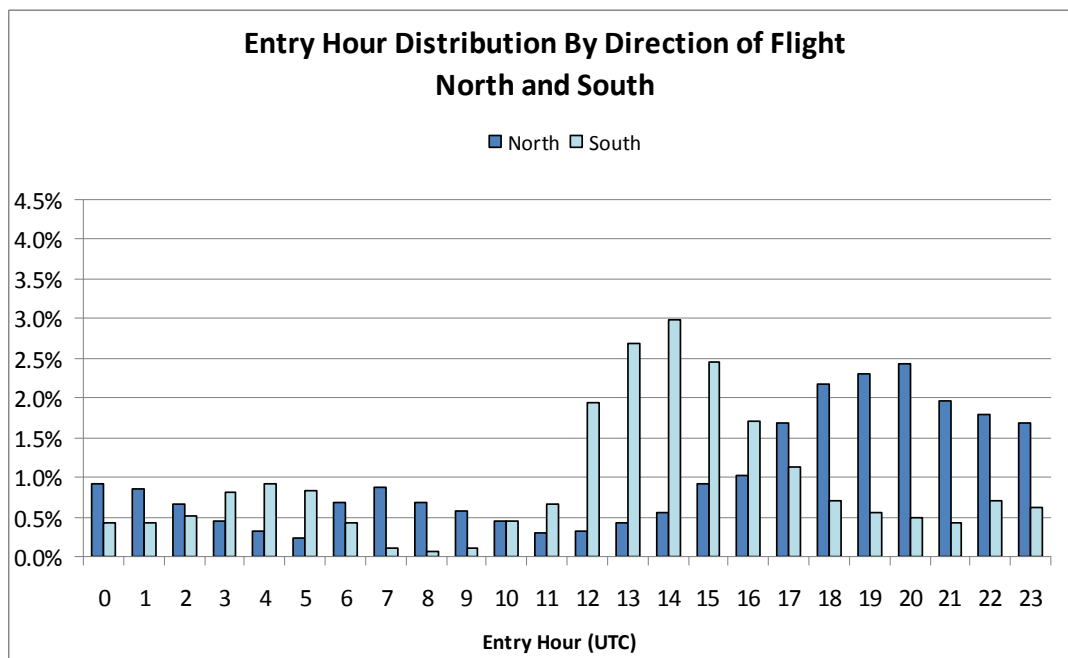


Figure 10. Entry hour distribution by direction for northbound and southbound operations

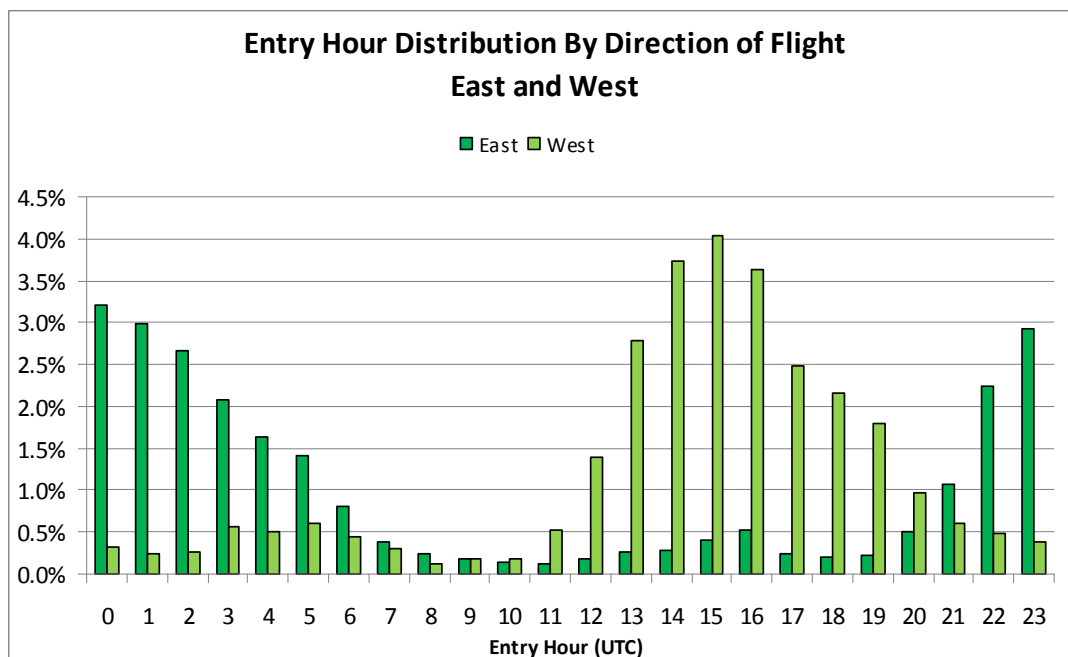


Figure 11. Entry hour distribution by direction for eastbound and westbound operations

Figure 12 identifies the top 25 city pairs (origin-destination pairs) in descending order of operations. These city pairs represent approximately 30 percent of the total operations, with the top occurring city pair, San Juan, Puerto Rico (TJSJ) to/from New York, New York, United States (KJFK) accounting for approximately three percent. The remaining 70 percent of the traffic is comprised of 3,959 city pairs, ranging from 1384 operations to 1 operation during the 365-day period. Appendix E provides the details of the top 80 percent of the city pairs.

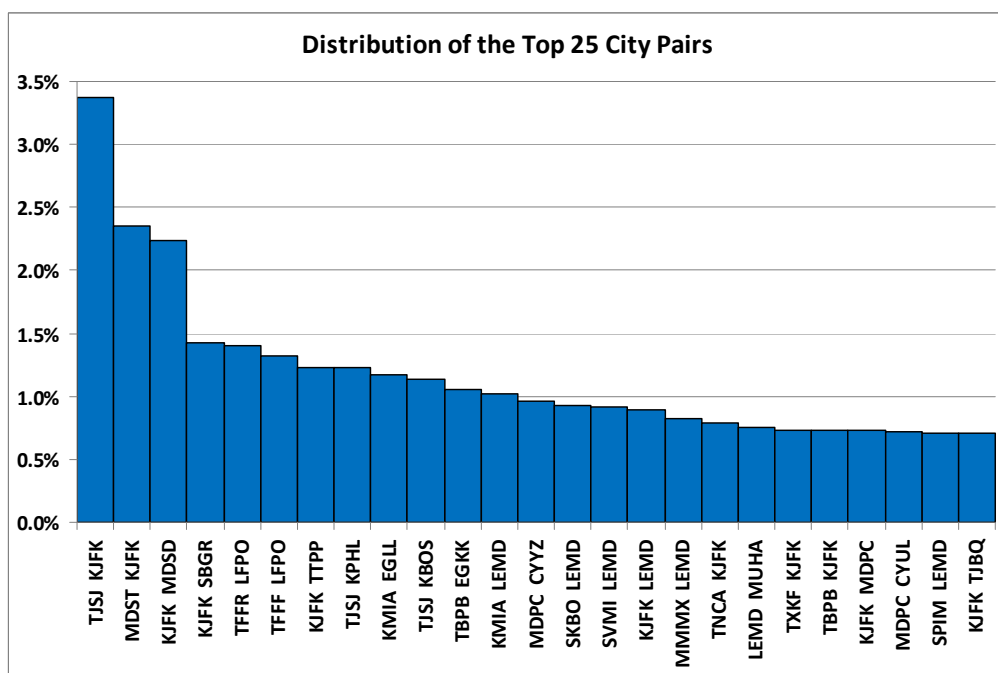


Figure 12. Top 25 city pairs in decreasing order of total operations

4.14. Table 2 lists the seven traffic flows identified as operating within the New York oceanic airspace. These flows were determined by plotting the city pairs from one month of the Ocean21 DR&A sample and observing the unique clusters of traffic. The color codes shown for each flow in Table 2 are used in the city pair plot pictured in Figure 13.

Table 2. Description of traffic flows identified in New York oceanic airspace

Descriptor	Description of Flow	Color Code
KMEX	United States/Canada to/from Mexico/South America/Caribbean	
NKEUR	Northeast United States/Canada (Latitude > 36°) to/from Europe (Latitude > 36°)	
KMID	Northeast United States/Canada to/from Middle East, North Africa, Italy (20° < Latitude ≤ 36°)	
KSAF	United States/Canada to/from South Africa (Latitude ≤ 20°)	
SKEUR	Southern United States (Latitude ≤ 36°) to/from Europe (Latitude > 36°)	
MEXEUR	Mexico/South America/Caribbean/Florida to/from Europe (Latitude > 36°)	
MEXMID	Mexico/South America/Caribbean/Florida, US to/from Middle East, North Africa, Italy (20° < Lat ≤ 36°)	

4.15. Figure 13 illustrates the seven traffic flows for 2 January 2011, which had the highest traffic count in the 361-day sample.

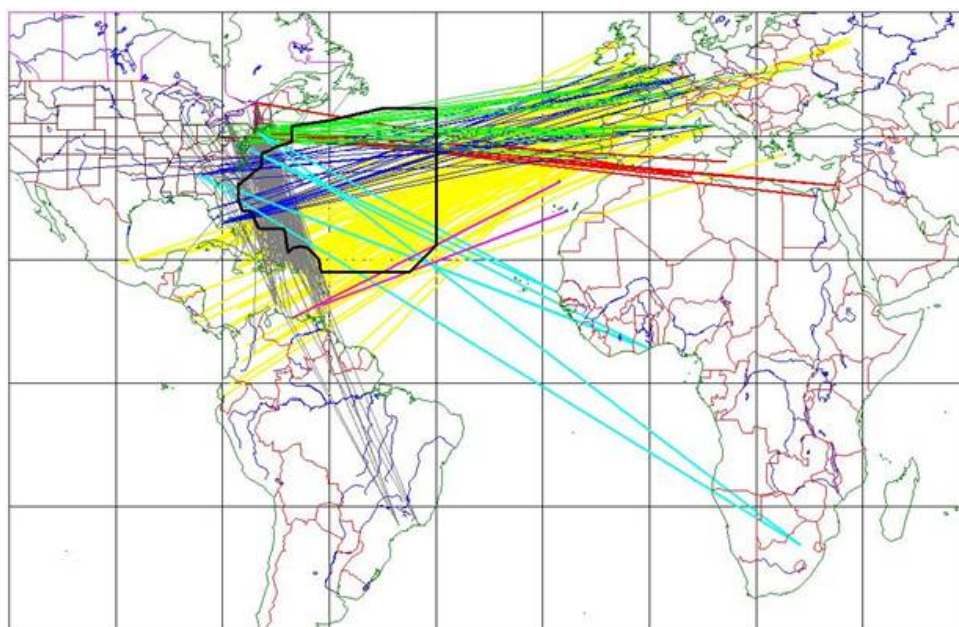
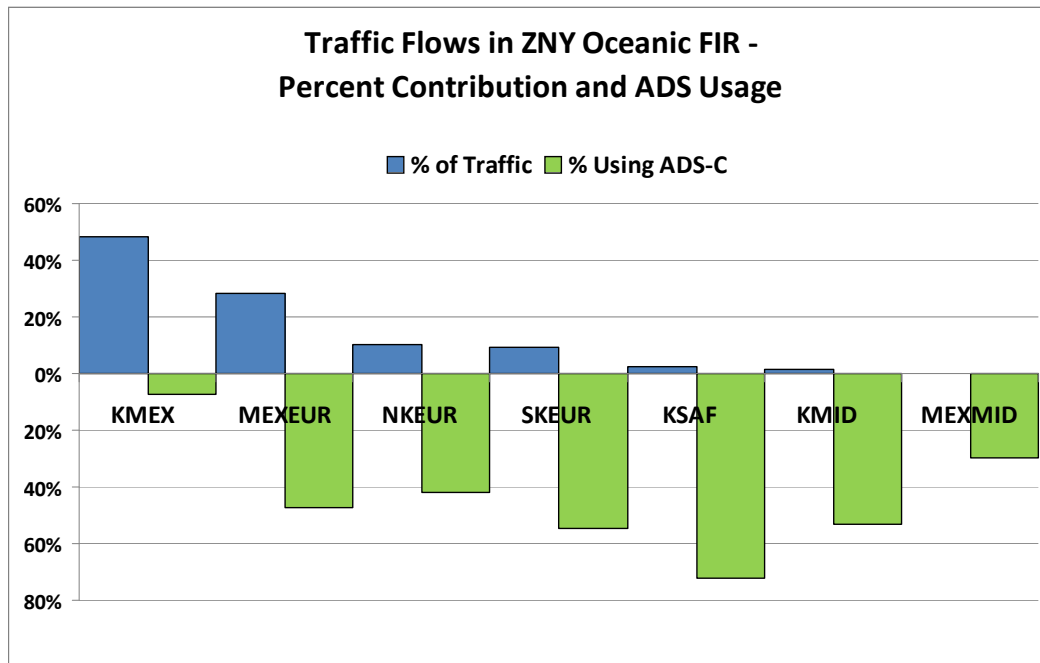


Figure 13. Plot of city pairs observed on 2 January 2011

4.16. Figure 14 shows the distribution of traffic by flow and the observed ADS-C usage within each flow. While the KMEX flow contains the most traffic, at approximately fifty percent, the flights within this flow show the lowest proportion of ADS-C usage.

**Figure 14.** Distribution of traffic and ADS-C usage by flow

4.17. Figure 15 summarizes the ADS-C usage and required navigation performance (RNP) filed in the flight plans within each of the traffic flows in New York oceanic airspace. As in Figure 14, the flows are represented in decreasing order of operations. North America to/from Europe (NKEUR) is shown to have the highest percentage of flights filing RNP4.

4.18. Table 3 summarizes the information depicted in Figures 14 and 15 and shows the ADS-C usage and RNP-filing for the aggregate New York oceanic airspace. Overall, approximately thirty percent of the aircraft traversing New York oceanic airspace are observed to be using ADS-C. Approximately ninety-two percent of the operations are filing RNP10 and nearly four and half percent are filing RNP4.

4.19. Within the North Atlantic (NAT) portion of the New York oceanic airspace (east of 60° W Longitude), approximately forty-nine percent were observed using ADS-C. Within the Western Atlantic Route System (WATRS) portion (west of 60° W Longitude), approximately twenty-six percent were observed using ADS-C.

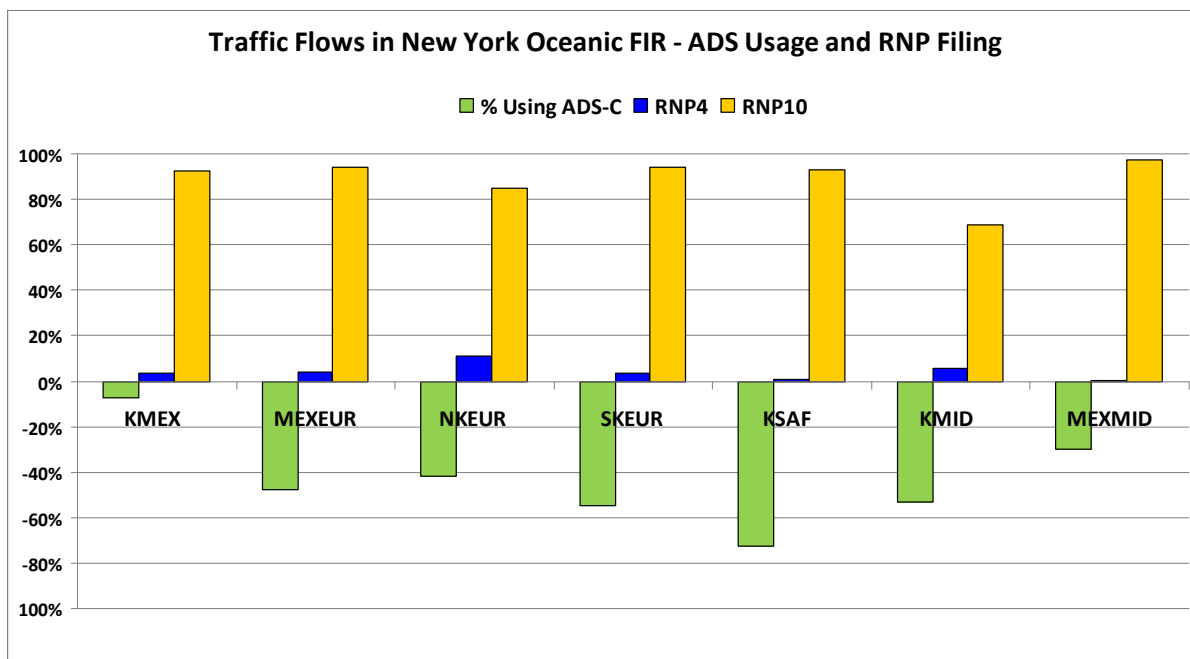


Figure 15. ADS-C usage and RNP filing by traffic flow

Table 3. Summary of ADS-C usage and RNP-filing by traffic flow

Flow Name	Number of Flights	% of Traffic	% Using ADS-C	Filed RNP10	Filed RNP4	Other RNP	Non RNP10	No Observed RNP in Flight Plan
KMEX	94,504	48.1%	7.3%	92.7%	3.7%	0.3%	0.2%	3.1%
MEXEUR	55,433	28.2%	47.5%	94.1%	3.8%	0.6%	0.0%	1.5%
NKEUR	19,812	10.1%	41.9%	84.8%	10.8%	2.4%	0.0%	2.0%
SKEUR	18,245	9.3%	54.9%	94.0%	3.3%	1.1%	0.0%	1.5%
KSAF	5,088	2.6%	72.4%	92.9%	0.8%	0.2%	0.0%	6.1%
KMID	3,046	1.5%	53.1%	68.5%	5.7%	21.4%	0.0%	4.3%
MEXMID	391	0.2%	29.7%	97.4%	0.5%	0.3%	0.0%	1.8%
<i>Total</i>	<i>196,519</i>	<i>--</i>	<i>29.0%</i>	<i>92.0%</i>	<i>4.4%</i>	<i>1.0%</i>	<i>0.1%</i>	<i>2.5%</i>

4.20. A 12-month sample of CPDLC messages was compiled from the Ocean21 DR&A data from July 2010 to June 2011. An average of 38,700 uplink CPDLC messages and 37,450 downlink CPDLC messages per month were observed in the New York FIR. Figures 16 and 17 show the top 20 uplink message types and top 20 downlink message types, respectively, observed in the 12-month sample by message element number. Tables 4 and 5 provide the translation for the message text associated with each message element number for the in Figures 16 and 17, respectively.

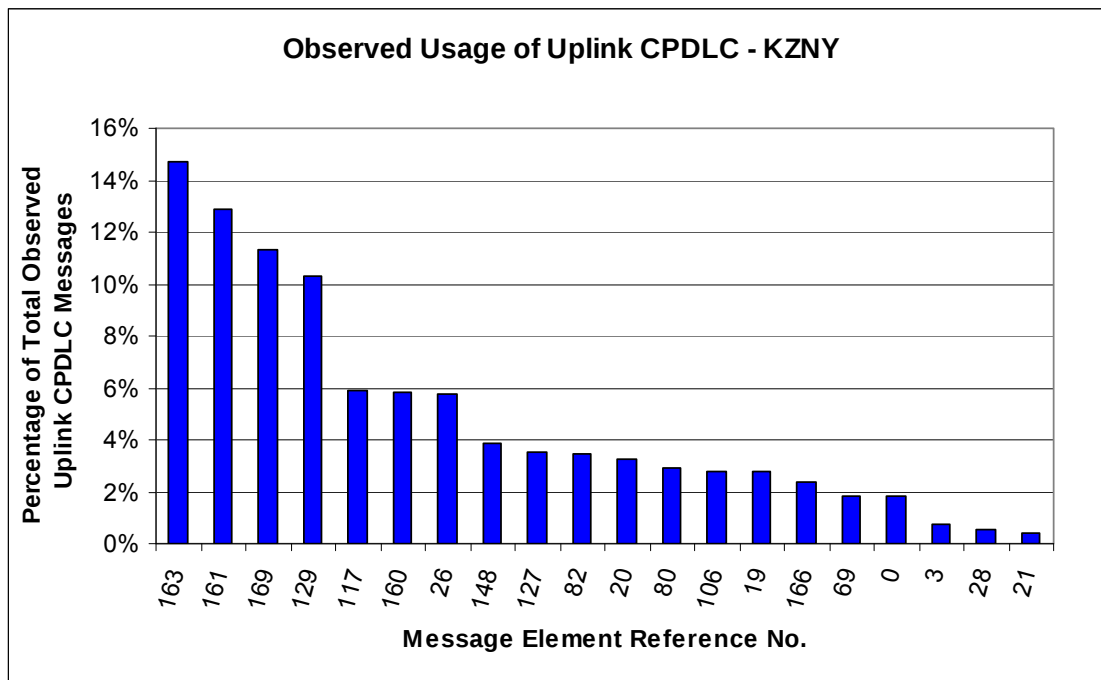
**Figure 16.** Top 20 uplink CPDLC message types observed for New York FIR

Table 4. Message text for top 20 uplink CPDLC message types

Uplink Message Element	Message Reference No.	Frequency Observed	Cumulative Frequency
[facility designation]	163	14.68%	14.68%
END SERVICE	161	12.91%	27.59%
[free text]	169	11.35%	38.94%
REPORT MAINTAINING [level]	129	10.32%	49.26%
CONTACT [unit name] [frequency]	117	5.89%	55.15%
NEXT DATA AUTHORITY [facility designation]	160	5.80%	60.95%
CLIMB TO REACH [level] BY [time]	26	5.79%	66.75%
WHEN CAN YOU ACCEPT [level]	148	3.88%	70.63%
REPORT BACK ON ROUTE	127	3.51%	74.14%
CLEARED TO DEVIATE UP TO [specified distance] [direction] OF ROUTE	82	3.45%	77.59%
CLIMB TO [level]	20	3.26%	80.85%
CLEARED [route clearance]	80	2.92%	83.76%
MAINTAIN [speed]	106	2.76%	86.52%
MAINTAIN [level]	19	2.75%	89.28%
DUE TO [traffic type] TRAFFIC	166	2.38%	91.65%
REJOIN ROUTE BY [time]	69	1.83%	93.49%
UNABLE	0	1.80%	95.29%
ROGER	3	0.71%	96.00%
DESCEND TO REACH [level] BY [time]	28	0.52%	96.52%
AT [time] CLIMB TO [level]	21	0.44%	96.97%

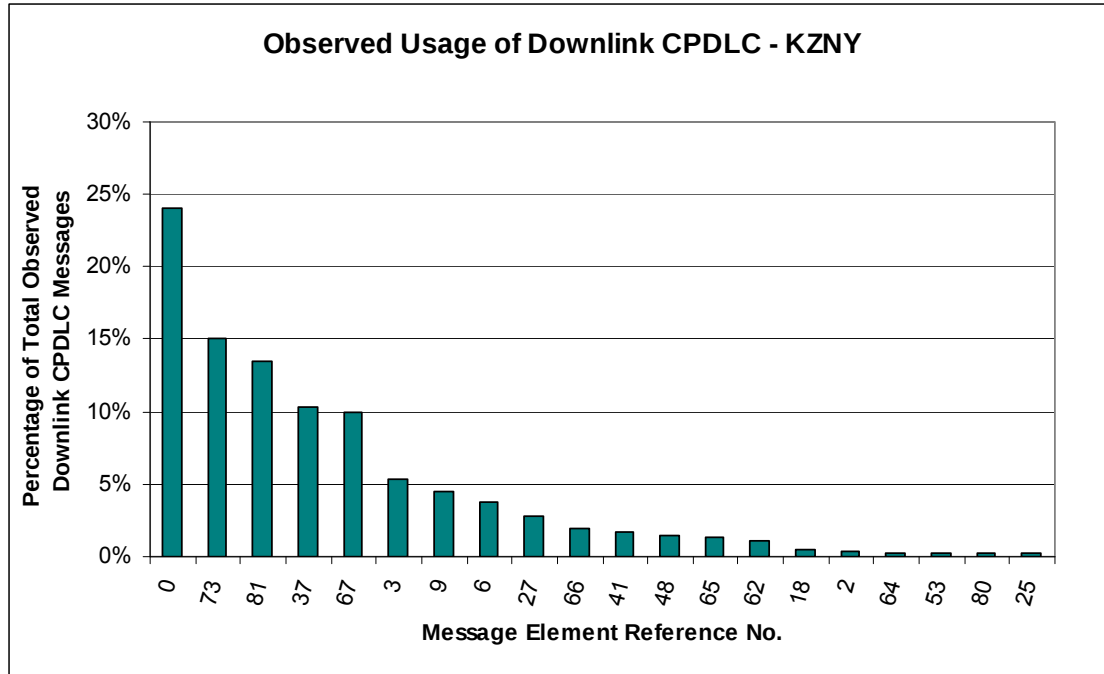


Figure 17. Top 20 downlink CPDLC message types observed for New York FIR

Table 5. Message text for top 20 downlink CPDLC message types

Downlink Message Element	Message Reference No.	Frequency Observed	Cumulative Frequency
WILCO	0	24.11%	24.11%
[version number]	73	15.11%	39.21%
WE CAN ACCEPT [level] AT [time]	81	13.42%	52.63%
MAINTAINING [level]	37	10.31%	62.94%
[free text]	67	9.97%	72.91%
ROGER	3	5.34%	78.24%
REQUEST CLIMB TO [level]	9	4.49%	82.73%
REQUEST [level]	6	3.72%	86.45%
REQUEST WEATHER DEVIATION UP TO [specified distance] [direction] OF ROUTE	27	2.74%	89.19%
DUE TO AIRCRAFT PERFORMANCE	66	1.96%	91.15%
BACK ON ROUTE	41	1.73%	92.88%
POSITION REPORT [position report]	48	1.42%	94.30%
DUE TO WEATHER	65	1.29%	95.59%
ERROR [error information]	62	1.13%	96.72%
REQUEST [speed]	18	0.54%	97.27%
STANDBY	2	0.37%	97.64%
[facility designation]	64	0.24%	97.87%
WHEN CAN WE EXPECT HIGHER LEVEL	53	0.22%	98.09%
DEVIATING UP TO [specified distance] [direction] OF ROUTE	80	0.22%	98.31%
REQUEST [clearance type] CLEARANCE	25	0.19%	98.50%

6. Observed Data Link Performance

6.1. As described in section 3.5, the GOLD (reference 2) provides the guidance material describing the required ADS-C and CPDLC data points to be extracted from the operational data for post-implementation data link monitoring, as well as the calculation process for the prescribed performance measures – the ACP, the ACTP, the PORT, and the surveillance latency.

6.2. In addition, the GOLD specifies the requirements for each performance measure at the 95% and 99.9% levels. According to the guidance in the GOLD, the ACP, ACTP and PORT for applicable CPDLC transactions are required to meet RCP240 criteria when sent via satellite and very high frequency (VHF), and are required to meet RCP400 criteria when sent via high frequency (HF). Similarly, the ADS-C downlink latency is required to meet RSP180 criteria for ADS-C downlink messages sent via satellite and VHF, and is required to meet RSP400 criteria when sent via HF. Table 6 outlines the requirements for these performance measures.

Table 6. Summary of performance requirements

Performance Measure	Percent of Messages Required to Meet Criteria	RSP180 Criteria (sec)	RSP400 Criteria (sec)	RCP240 Criteria (sec)	RCP400 Criteria (sec)
ADS-C Downlink Latency	95.0%	90	300	--	--
	99.9%	180	400	--	--
ACTP	95.0%	--	--	120	260
	99.9%	--	--	150	310
ACP	95.0%	--	--	180	320
	99.9%	--	--	210	370
PORT	95.0%	--	--	60	60

6.3. Figures 17, 18 and 19 present the ACTP, ACP and ADS-C downlink latency performance, respectively for the aggregate time periods from January to December 2010 and from January to December 2011 in the New York (ZNY) FIR. These figures show performance for all media combined, inclusive of satellite, VHF and HF. The number of transactions (ACP and ACTP) or messages (ADS-C) included in the analysis during each time period is shown for each respective FIR in the legend key of each figure.

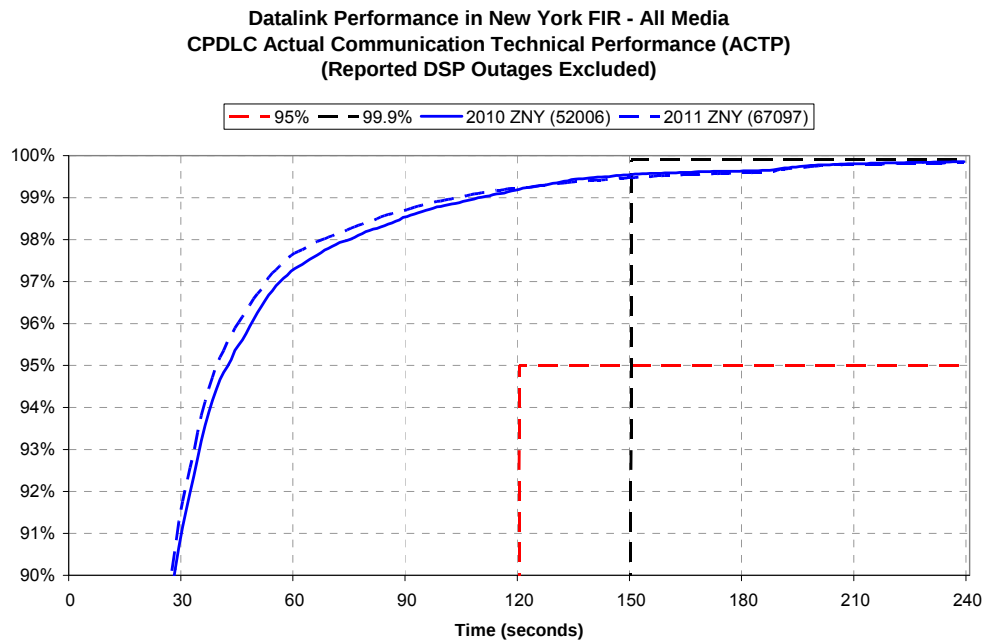


Figure 17. ACTP for New York oceanic FIR – 2010 and 2011

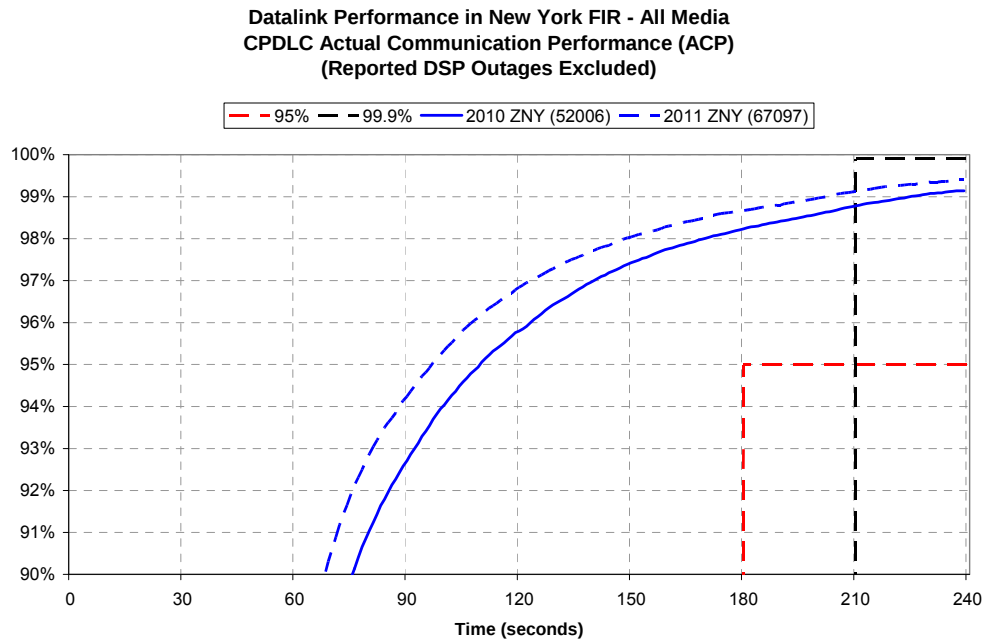


Figure 18. ACP for New York oceanic FIR – 2010 and 2011

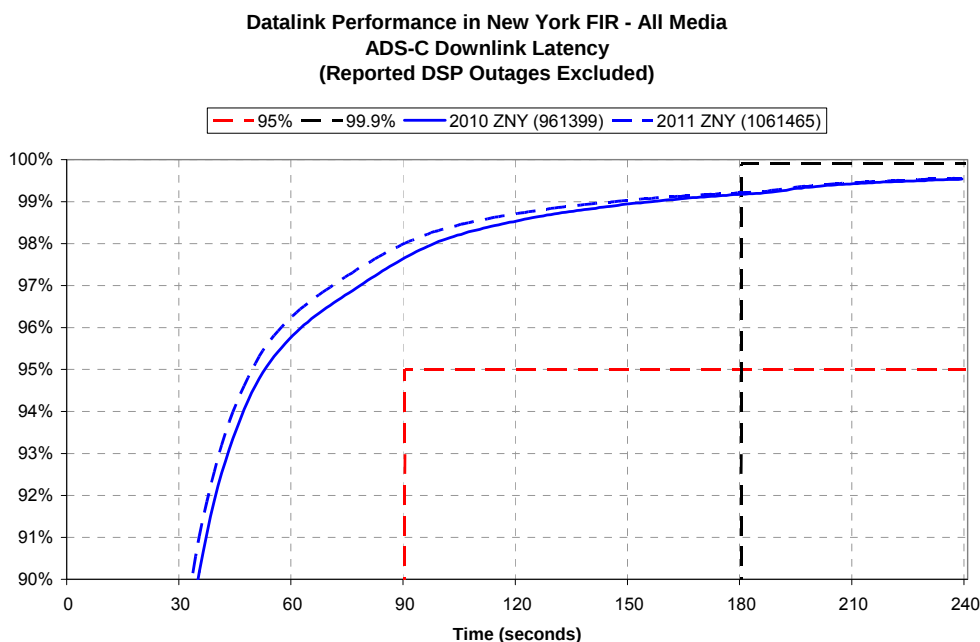


Figure 19. ADS-C downlink latency for New York oceanic FIR – 2010 and 2011

6.4. The 95% criteria were met for the RCP240 ACTP and ACP and the RSP180 ADS-C Downlink Latency in New York FIR during both 2010 and 2011. Conversely, the 99.9% criteria were not met for any of the included performance measures during the same periods.

6.5. A notable improvement in performance from 2010 to 2011 is observed in New York FIR for all three performance measures. Additionally, an approximate increase of ten percent in ADS-C downlink messages and an approximate increase of thirty percent in RCP CPDLC transactions can be observed from 2010 to 2011.

6.6. Table 7 shows the data link aggregate performance by media type for January to December 2011 as well as the percent contribution of each media type to each respective data set. The VHF performance is superior to the satellite and HF performance in the New York FIR and contributes approximately twenty-one percent of the ADS-C messages and eight percent of the RCP CPDLC transactions. The RCP transactions via pure HF make a negligible contribution to the aggregate performance. Approximately 1.2 percent of the RCP transactions are attributed to mixed media transactions in which the uplink was sent through a different medium than the responding downlink.

6.7. Appendix F provides the ACTP, ACP and ADS-C downlink latency charts by media type, corresponding to Table 7.

Table 7. Summary of performance by media type for January to December 2011

Media Type	Count of ADS-C Downlink Messages	ADS-C 95%	ADS-C 99.9%	Count of CPDLC Transactions	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
SAT	830,454 (78.2%)	97.8%	99.2%	61,125 (91.1%)	99.3%	99.5%	98.8%	99.2%	94.7%
VHF	226,555 (21.3%)	99.0%	99.6%	5,140 (7.7%)	99.9%	99.9%	99.2%	99.5%	94.9%
HF	4,456 (0.4%)	90.6%	93.6%	21 (0.03%)	--	--	--	--	--
Total	1,061,465	98.0%	99.2%	67,097	99.2%	99.5%	98.7%	99.1%	94.5%

6.8. Table 8 provides a complete listing of the station/gateway identifiers and the associated locations and service providers that have been observed in the combined data from the Ocean21 systems at Oakland, Anchorage and New York centers. Figure 20 shows the ADS-C data link performance by station/gateway identifier for all satellite operations observed during the aggregate period from July to December 2011 in the New York FIR. Table 9 details the observed performance by station identifier pictured in Figure 20 at the 95% and 99.9% RSP180 ADS-C downlink performance levels.

6.9. It is useful to observe the data link performance in this way because of the various “paths” being used for satellite communications. The station identifiers help to distinguish what “path” was used to deliver the message between the aircraft generating it and the ATC Center receiving it. The “paths” vary between the four constellations of satellites listed in Table 6 as well as between the two data link service providers.

6.10. The number of ADS-C downlink messages associated with each station identifier is shown in the legend of Figure 20. The majority of the ADS-C downlink messages travel via the Inmarsat-3 series of satellites using the ground station located in Aussaguel, France with data link service provided by SITA (AOW2). The observed performance for these messages meets the 95% criteria and nearly meets the 99.9% criteria for RSP180 ADS-C downlink latency.

6.11. The ADS-C downlink messages using both the Iridium satellites and gateway (IGW1) and the Inmarsat-3 series of satellites using the ground station located in Eik, Norway with data link service provided by SITA (AOW3) do not meet the 95% criteria for RSP180 ADS-C downlink latency.

Table 8. Station/gateway identifiers

Satellite	Ground Station Location(s)	SITA	ARINC
Inmarsat I-3	Aussaguel, France:	AOW2 AOE2	--
	Eik, Norway:	AOW3 AOE3 IOR5	XXE

	Perth, Australia:	POR1 IOR2	--
	Santa Paula, California, US	POR4	XXC
Inmarsat I-4	Fucino, Italy	EUA1	XXF
	Paumalu, HI, US	APK1 AME1	XXH
MTSAT	Kobe and Hitachiota, Japan	MTS1	--
Iridium	Phoenix, Arizona, US	IGW1	IG1

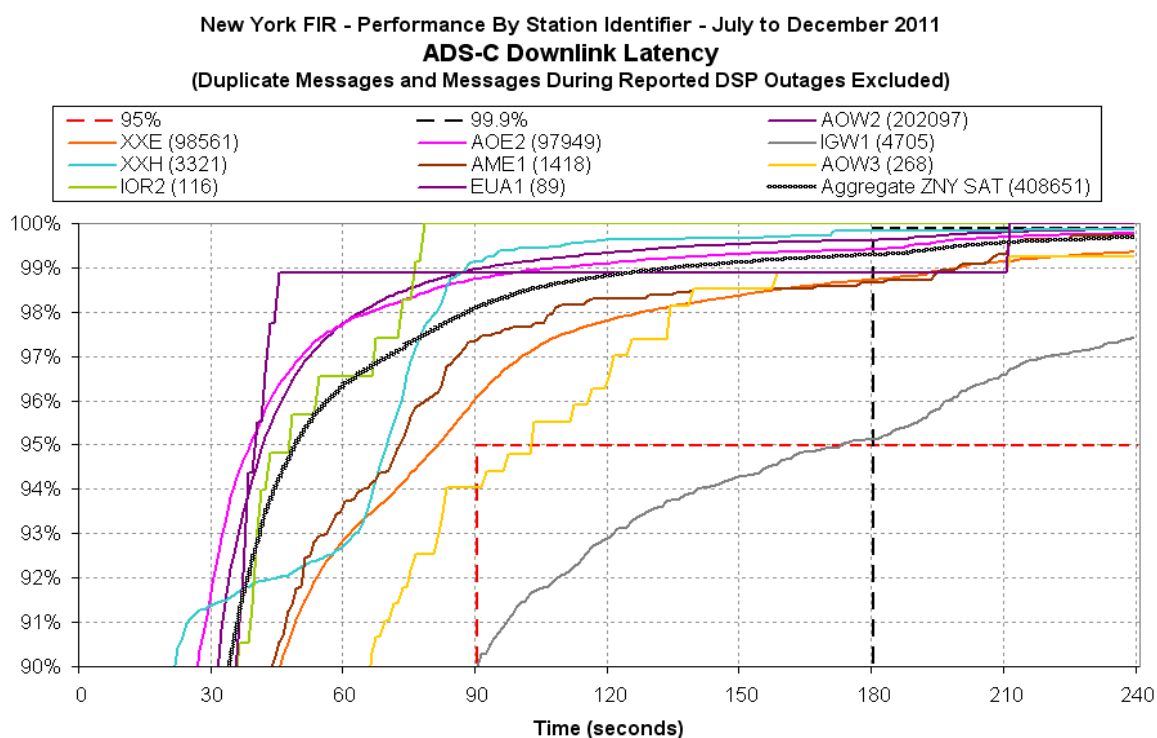


Figure 20. ADS-C downlink latency performance by station/gateway identifier

Table 9. Summary of ADS-C downlink latency performance by station/gateway identifier

Station Identifier	Count of ADS-C Messages	ADS-C 95%	ADS-C 99.9%
AOW2	202,097	99.0%	99.6%
XXE	98,561	96.0%	98.7%
AOE2	97,949	98.7%	99.4%
IGW1	4,705	89.9%	95.1%
XXH	3,321	99.1%	99.8%
AME1	1,418	97.3%	98.7%
AOW3	268	94.0%	98.9%
IOR2	116	100.0%	100.0%
EUA1	89	98.9%	98.9%

<i>Aggregate ZNY SAT</i>	408,651	98.1%	99.3%
--------------------------	---------	-------	-------

6.12. Table 10 contains a summary of the observed data link performance in New York oceanic airspace for the twenty-one operators contributing the top ninety percent of the operations. The operator names are encoded to ensure anonymity. The operators are listed in descending contribution of operations.

6.13. The cells shaded in gray highlight where the 95% performance criteria listed in Table 10 are not met. Of the 21 operators contributing ninety percent of the data link operations, only one operator, Operator M, is not meeting the 95% criteria for RSP180 ADS-C downlink latency. The same operator is the only one not meeting the 95% criteria for RCP240 ACP. All twenty-one operators are meeting the 95% criteria for RCP240 ACTP and eight of the twenty-one operators are not meeting the 95% criteria specified for PORT.

6.14. Conversely, the cells shown in bold highlight where the 99.9% performance criteria are met. Of the 21 operators contributing ninety percent of the data link operations, four of the operators are meeting the 99.9% criteria for RSP180 ADS-C downlink latency and five of the operators are meeting the 99.9% criteria for RCP240 ACTP.

6.15. Further analysis was conducted for Operator M, breaking down performance by media type as well as aircraft type. It was determined that the VHF transactions easily meet the 95% criteria for both RCP240 ACP and RSP180 ADS-C downlink latency. However, the satellite, HF and mixed media (for RCP240 only) bring down the aggregate performance.

Table 10. Summary of data link performance by operator

OP Code	Count of ADS-C	% of Total ADS-C	ADS-C 95%	ADS-C 99.9%	Count of CPDLC	% of Total CPDLC	ACTP 95%	ACTP 99.9%	ACP 95%	ACP 99.9%	PORT 95%
BB	63,168	12.10%	99.29%	99.49%	4,040	11.19%	99.03%	99.13%	99.01%	99.36%	95.99%
AA	61,842	11.85%	99.27%	99.73%	6,452	17.87%	99.75%	99.84%	99.36%	99.66%	96.84%
L	42,893	8.22%	97.00%	99.27%	3,389	9.39%	98.76%	99.29%	97.79%	98.41%	92.09%
FF	38,619	7.40%	97.57%	99.16%	2,955	8.18%	99.05%	99.26%	98.98%	99.32%	96.07%
DD	34,017	6.52%	97.01%	99.32%	2,674	7.41%	98.95%	99.59%	97.83%	98.43%	91.29%
GG	25,263	4.84%	99.47%	99.83%	1,545	4.28%	99.74%	99.81%	99.29%	99.29%	95.92%
EE	24,055	4.61%	98.97%	99.38%	1,835	5.08%	99.46%	99.62%	98.86%	99.24%	93.24%
HH	20,532	3.93%	99.64%	99.72%	1,026	2.84%	99.61%	99.71%	99.03%	99.42%	96.00%
R	19,717	3.78%	97.13%	99.58%	936	2.59%	98.72%	99.47%	99.04%	99.68%	95.94%
JJ	18,052	3.46%	99.58%	99.92%	666	1.84%	100.0%	100.0%	98.65%	98.95%	93.69%
A	15,255	2.92%	95.91%	98.70%	583	1.61%	98.28%	98.63%	98.46%	98.97%	95.03%
M	14,559	2.79%	93.34%	96.58%	728	2.02%	95.74%	96.43%	94.37%	95.88%	91.07%
CC	14,503	2.78%	97.38%	98.71%	1,175	3.25%	99.15%	99.23%	98.81%	99.32%	94.30%
PP	11,553	2.21%	98.71%	99.79%	719	1.99%	99.44%	100.0%	99.44%	99.72%	95.69%
LL	11,429	2.19%	99.08%	99.55%	1,343	3.72%	99.48%	99.55%	98.81%	99.26%	97.24%
MM	11,293	2.16%	99.75%	99.93%	555	1.54%	99.64%	100.0%	99.28%	99.46%	96.04%
KKKK	11,031	2.11%	99.82%	99.87%	1,204	3.33%	99.92%	99.92%	99.17%	99.50%	95.51%
SS	10,862	2.08%	98.29%	99.51%	504	1.40%	99.60%	99.60%	98.41%	99.01%	92.06%
ZZZZ	9,620	1.84%	94.94%	96.30%	414	1.15%	98.31%	98.79%	96.38%	96.62%	88.65%
WW	6,858	1.31%	96.44%	98.38%	256	0.71%	98.05%	98.44%	97.66%	98.05%	96.88%
DDDD	6,831	1.31%	99.93%	99.96%	581	1.61%	100.0%	100.0%	99.14%	99.83%	95.52%

6.16. Operator M operates a fleet of five aircraft types in the New York oceanic airspace. Figures 21 and 22 show the ACP and ADS-C downlink latency performance, respectively, for Operator M broken down for these five aircraft types.

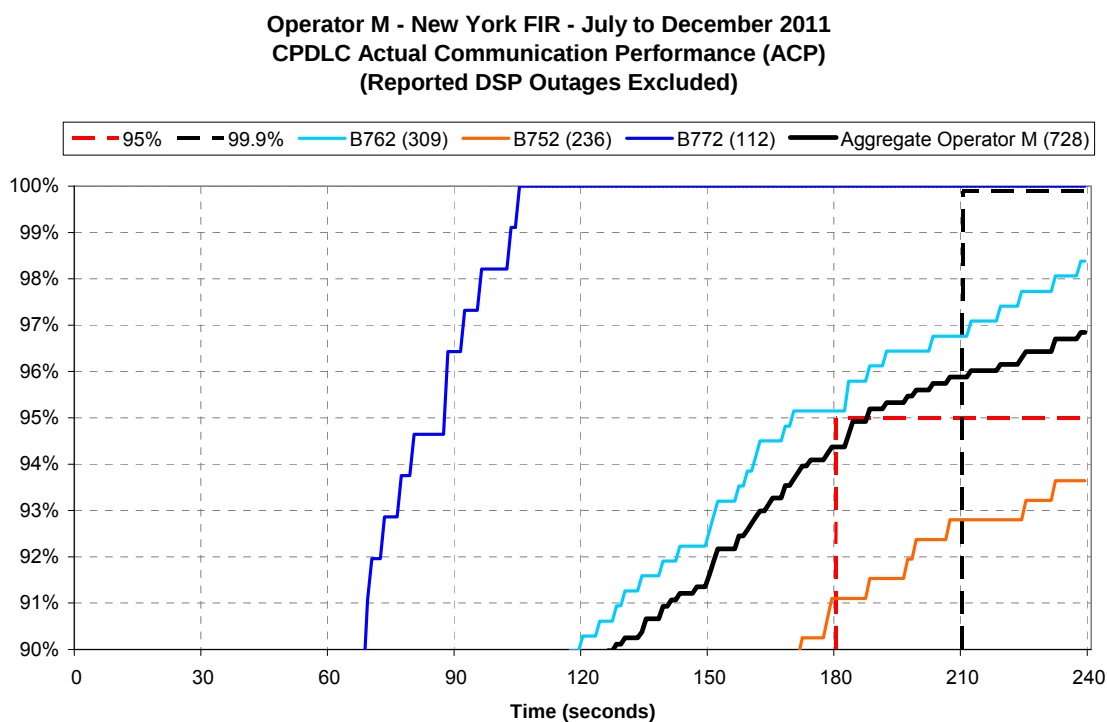


Figure 21. ACTP for Operator M – July to December 2011

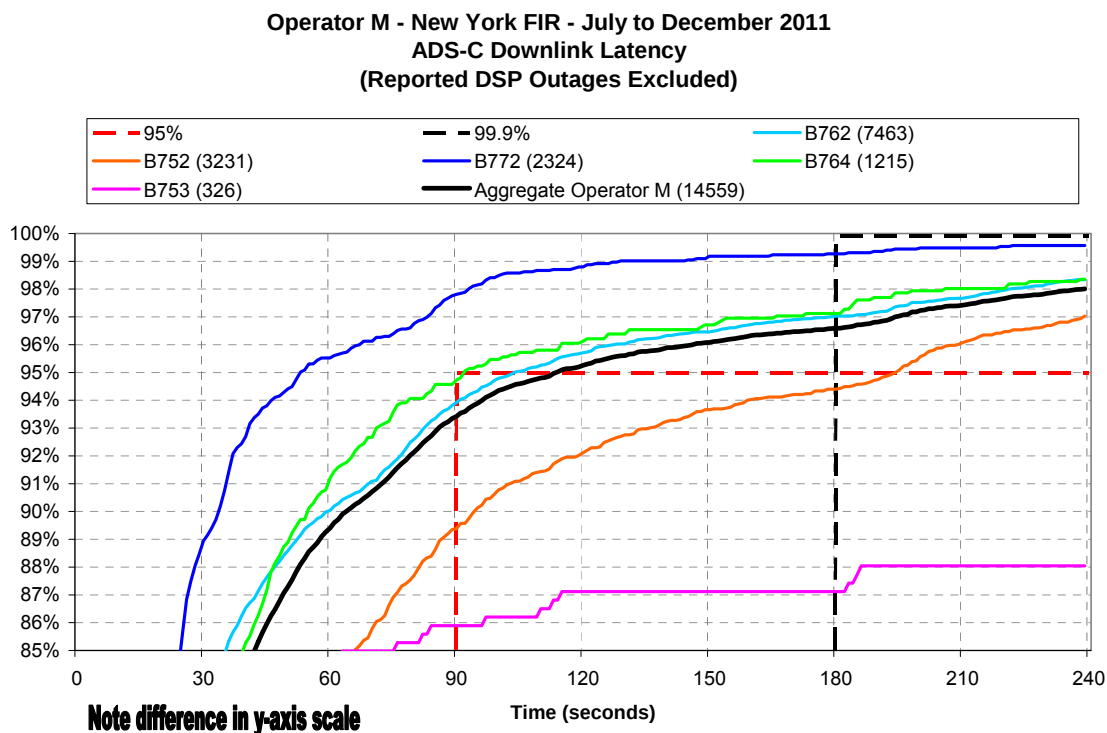


Figure 22. ADS-C downlink latency for Operator M – July to December 2011

6.17. It should be noted that there were not enough RCP CPDLC transactions for the B753 or the B764 to include those aircraft types on the ACP chart in Figure 21. It should also be noted that the y-axis scale was changed in order to show the performance of the B753 on the ADS-C downlink latency chart in Figure 22.

6.18. Operator M's B772 aircraft easily meet the 95% criteria for RCP240 ACP, even meeting the 99.9% criteria as well, but the B762 struggles to meet the 95% criteria and the B752 does not meet it. Similarly, Operator M's B772 aircraft easily meet the 95% criteria for RSP180 ADS-C downlink latency, but the other four aircraft types do not meet it at all.

6.19. Further analysis of the aircraft types by airframe revealed that the B752 airframe most used by Operator M in the New York FIR was performing significantly less well than the rest of the B752 fleet. Operator M was informed of the results from this analysis.

References

1. “Application of 30 NM Longitudinal, 30 NM Lateral and 50 NM Longitudinal Separation Minima in the New York Oceanic Flight Information Region,” IP/07, Thirty-eighth meeting of the North Atlantic Air Traffic Management Group (NAT ATMG/38), Paris, France, 12 to 16 September 2011.
2. *Global Operational Data Link Document (GOLD)*, First Edition, ICAO, 14 June 2010.

Attachment A to Appendix D**Airspace Coordinates for New York FIR**

The New York oceanic airspace boundary coordinates are listed below.

Latitude	Longitude
18° 00' 00" N	61° 30' 00" W
20° 00' 00" N	61° 53' 60" W
22° 00' 00" N	64° 00' 00" W
22° 08' 60" N	66° 12' 00" W
22° 00' 00" N	66° 45' 00" W
22° 15' 00" N	67° 40' 12" W
25° 00' 00" N	68° 30' 00" W
25° 00' 00" N	73° 12' 00" W
27° 49' 48" N	74° 49' 48" W
27° 49' 48" N	76° 49' 48" W
30° 00' 00" N	77° 00' 00" W
32° 15' 00" N	77° 00' 00" W
32° 12' 00" N	76° 47' 60" W
35° 08' 60" N	72° 40' 12" W
37° 15' 00" N	72° 40' 12" W
37° 30' 00" N	71° 40' 12" W
38° 19' 48" N	70° 00' 00" W
39° 00' 00" N	67° 00' 00" W
41° 36' 00" N	67° 00' 00" W
42° 30' 00" N	60° 00' 00" W
44° 30' 00" N	50° 00' 00" W
44° 30' 00" N	40° 00' 00" W
22° 19' 48" N	40° 00' 00" W
18° 00' 00" N	45° 00' 00" W
18° 00' 00" N	61° 30' 00" W

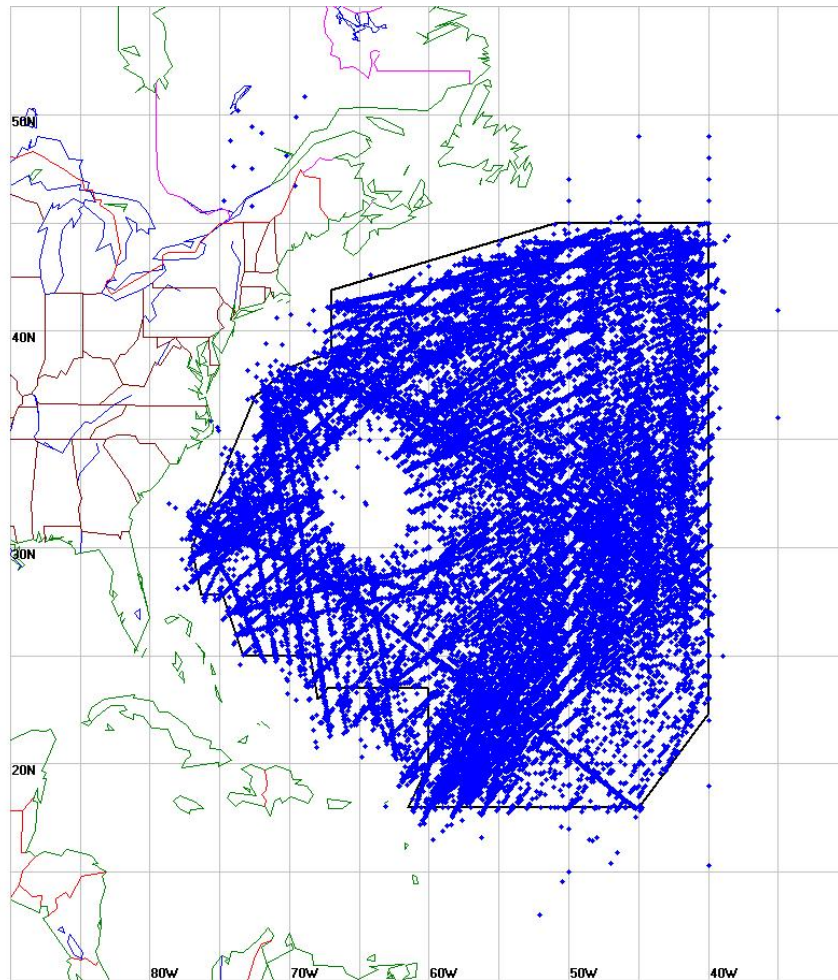


Figure A1. New York FIR coordinates and Ocean21 coverage

Attachment B to Appendix D**Operators Observed in the New York Oceanic Airspace**

ICAO Designator	Agency Name	Count	ICAO Designator	Agency Name	Count
JBU	JETBLUE AIRWAYS	22380	SAA	SOUTH AFRICAN AIRWAYS (SAA)	1311
AAL	AMERICAN AIRLINES, INC.	17787	CJA	CANJET AIRLINES	1242
DAL	DELTA AIR LINES, INC.	12912	SWR	SWISSAIR (SOCIETE	1202
AWE	AMERICA WEST AIRLINES (TEMPE, AZ)	11327	BPA	BLUE PANORAMA AIRLINES SPA	1142
COA	CONTINENTAL AIR LINES,	10887	TFL	TRONDERFLY AIR SERVICE	1045
IBE	IBERIA - LINEAS AEREAS DE ESPANA, S.A.	9262	AMX	AEROVIAS DE MEXICO, S.A. DE C.V.	1019
AFR	AIR FRANCE	7628	TAP	TRANSPORTES AEREOS	1008
BAW	BRITISH AIRWAYS	6740	XLF	XL AIRWAYS FRANCE	981
ACA	AIR CANADA	4729	FDX	FEDERAL EXPRESS CORP.	808
VIR	VIRGIN ATLANTIC	4199	IWD	IBERWORLD	806
BWA	CARIBBEAN AIRLINES,	4121	RAM	ROYAL AIR MAROC -	806
UAL	UNITED AIR LINES, INC.	4084	TSO	TRANSAERO AIRLINES	726
KLM	KLM ROYAL DUTCH	3511	RZO	SATA INTERNACIONAL	713
AEA	AIR EUROPA	3454	LNE	AEROLANE - LINEAS	711
DLH	DEUTSCHE LUFTHANSA,	3256	TRS	AIRTRAN AIRLINES	697
TOM	THOMSONFLY, LTD.	2878	GWY	USA 3000 AIRLINES	692
WJA	WESTJET AIRLINES, LTD.	2460	BBR	SANTA BARBARA	635
CFG	CONDOR FLUGDIENST	2372	JZA	AIR CANADA REGIONAL,	608
AZA	ALITALIA -LINEE AEREE ITALIANE S.P.A.	2284	GTI	ATLAS AIR, INC. (JAMAICA, NY)	570
FWI	AIR CARAIBES	2113	JAF	JETAIRFLY	569
TSC	AIR TRANSAT	1974	EIN	AER LINGUS TEORANTA	550
AVA	AVIANCA, AEROVIAS NACIONALES DE	1948	CUB	CUBANA DE AVIACION S.A.	534
MPH	MARTINAIR HOLLAND	1895	LPE	LAN PERU, S.A.	519
TAM	TAM - LINHAS AEREAS S.A.	1823	UPS	UNITED PARCEL SERVICE	487
BER	AIR BERLIN, INC.	1621	CJT	CARGOJET AIRWAYS, LTD.	487
SWG	SUNWING AIRLINES, INC.	1547	ELY	EL AL - ISRAEL AIRLINES,	392
CRL	CORSE AIR	1433	GEC	LUFTHANSA CARGO AG,	363
TCX	THOMAS COOK AIRLINES UK LTD.	1393	SLM	SURINAAMSE LUCHTVAART	320

Attachment B (Continued)

ICAO DESIGNATOR	AGENCY NAME	COUNT	ICAO DESIGNATOR	AGENCY NAME	COUNT
WHT	WHITE	308	ETH	ETHIOPIAN AIRLINES CORP.	70
ARA	ARIK AIR, LTD.	303	WOA	WORLD AIRWAYS, INC.	69
CLX	CARGOLUX AIRLINES	286	RJA	ROYAL JORDANIAN	68
UAE	EMIRATES	284	FIN	FINNAIR O/Y	67
NOS	NEOS S.P.A.	281	SIA	SINGAPORE AIRLINES,	66
CMB	US TRANSPORTATION COMMAND	245	JAV	JORDANIAN ENTERPRISE FOR AIR NAVIGATION	65
EDW	EDELWEISS AIR AG	225	LVG	LIVINGSTON S.P.A.	53
PLM	PULLMANTUR AIR	225	CTM	COMMANDEMENT DU	52
AEY	AIR ITALY S.P.A.	218	NAO	NORTH AMERICAN	52
OBS	ORBEST	199	DHK	DHL AIR, LTD.	46
THY	TURK HAVA YOLLARI	190	OAE	OMNI AIR EXPRESS, INC.	45
ABX	AIRBORNE EXPRESS, INC. (WILMINGTON,	189	LCO	LAN CARGO S.A.	44
AFL	AEROFLOT - RUSSIAN	188	XLS	EXCELAIRE	43
TVS	TRAVEL SERVIS	187	CWC	CHALLENGE AIR CARGO,	40
VCV	CONVIASA	184	SQC	SINGAPORE AIRLINES	39
MSR	EGYPT AIR	177	VDA	VOLGA-DNEPR	37
QTR	QATAR AIRWAYS CO.	176	NVR	NOVA AIRLINES AB	37
MON	MONARCH AIRLINES,	160	SOO	SOUTHERN AIR, INC.	32
CKS	AMERICAN	140	KAC	KUWAIT AIRWAYS CORP.	32
ATN	AIR TRANSPORT	139	AAY	ALLEGiant AIR, LLC	29
BSK	MIAMI AIR	113	VKG	PREMIAIR	28
AUA	AUSTRIAN AIRLINES	113	BOX	AEROLOGIC GMBH,	27
LAE	LINEAS AEREAS	102	ISS	MERIDIANA FLY S.P.A.	26
BOS	OPENSIES	101	AJM	AIR JAMAICA	26
ETD	ETIHAD AIRWAYS	100	MEM	MEDITERRANEAN AIR	25
SVA	SAUDI ARABIAN	81	AEW	AEROSWEET AIRLINES	25
CNV	U.S. NAVY RESERVE LOGISTIC AIR FORCES	71	MOV	VIM AIRLINES	23
JAI	JET AIRWAYS, M/S	71	ABP	ABA AIR	22

Attachment B (Continued)

ICAO DESIGNATOR	AGENCY NAME	COUNT	ICAO DESIGNATOR	AGENCY NAME	COUNT
CAJ	AIR CARAIBES ATLANTIQUE	22	SBE	SABRE AIRWAYS, LTD.	6
SCX	SUN COUNTRY	21	TFF	TALON AIR, INC.	6
CRV	ACROPOLIS AVIATION,	18	ACE	AIR CHARTER EXPRESS,	6
BRS	BRAZILIAN AIR FORCE	18	ACX	ACG AIR CARGO	6
TCV	TRANSPORTES AEREOS	17	AME	AERONAVE MILITAR	6
MLM	MILLENNIUM AIR CORP. (MAC)	16	MMZ	EUROATLANTIC AIRWAYS, S.A.	6
CFC	CANADIAN ARMED	16	HFY	HI FLY	6
JAL	JAPAN AIR LINES CO.,	16	ROJ	ROYAL JET	6
EIA	EVERGREEN	15	THT	AIR TAHITI NUI	5
GAF	GERMAN AIR FORCE	15	ADB	ANTONOV DESIGN	5
QAF	QATAR AMIRI FLIGHT	14	DNC	AERODYNAMICS	5
LOT	LOT - POLSKIE LINIE LOTNICZE	13	LAN	LINEA AEREA NACIONAL DE CHILE (LAN)	5
BLX	BRITTANNIA AB	12	SUM	STATE UNITARY AIR	5
UJT	UNIVERSAL JET	11	RAB	RAYYAN AIR PVT., LTD.	4
RYN	RYAN AVIATION CORP.	11	AIC	AIR INDIA	4
SWQ	INTERSTATE	10	UAF	UNITED ARAB EMIRATES	4
GMA	GAMA AVIATION, LTD.	9	CIU	CIELOS DEL PERU, S.A.	4
SMJ	AVIENT AVIATION	9	FAV	FAIR AVIATION PTY, LTD.	4
PAC	POLAR AIR CARGO,	9	FAC	FIRST AIR COURIER, INC.	4
AAR	ASIANA AIRLINES	8	IMP	HELLENIC IMPERIAL	4
NCR	NATIONAL AIR CARGO	8	NGR	NIGERIAN AIR FORCE	4
CRG	CARGOITALIA SPA	8	TAY	TNT AIRWAYS S.A.	4
AZW	AIR ZIMBABWE	8	SXI	SOUTHERN CROSS	4
POT	POLET	8	KFR	KINGFISHER AIRLINES,	3
PIA	PAKISTAN	8	AUH	AMIRI FLIGHT	3
GES	GESTAIR EXECUTIVE	7	PAN	-	3
AJK	ALLIED AIR, LTD.	7	VIZ	AEROVIS AIRLINES, LTD.	3
PVJ	PRIVAJET, LTD.	7	KYE	SKYLEASE CARGO	3

Attachment B (Continued)

ICAO DESIGNATOR	AGENCY NAME	COUNT	ICAO DESIGNATOR	AGENCY NAME	COUNT
AZS	AVIACON ZITOTRANS	3	TXC	TRANSAVIAEXPORT	1
CCA	AIR CHINA	2	PTI	PRIVATAIR SA	1
VTF	VETERAN-AVIA LLC	2	DCS	DAIMLER CHRYSLER	1
MAD	M.A.S.H. SERVICE	2	VAL	VOYAGEUR AIRWAYS,	1
CLU	AVANTI AVIATION	2	MJE	EMPIRE AVIATION	1
TRA	TRANSAVIA HOLLAND B.V.	2	STX	STARS AWAY AVIATION	1
AWC	TITAN AIRWAYS, LTD.	2	BLE	BLUE LINE	1
ICL	CAVEI AVIR	2	BRK	BRIANSK STATE AIR	1
RSB	RUBYSTAR	2	DHL	DHL AIRWAYS, INC.	1
DTA	TAAG, LINHAS AEREAS	2	ABD	AIR ATLANTA ICELANDIC	1
CAN	3GRCOMM, LTD. (T/A	2	SEN	SEVENAIR	1
AEU	ASTRAEUS, LTD.	2	PHA	PHOENIX AIR GROUP, INC. (CARTERSVILLE, GA)	1
SGB	SKY KING, INC.	2	AFP	PORTUGUESE AIR FORCE	1
ABW	ARBERIA AIRWAYS	1	WTJ	WHITEJETS	1
ARE	AIRES, AEROVIAS DE	1	FAB	FIRST AIR (BRADLEY	1
RPN	US IMMIGRATION AND	1	TWN	AVIALEASING AVIATION	1
CEV	CENTRE D'ESSAIS EN VOL	1	IAF	ISRAELI AIR-FORCE	1
KAL	KOREAN AIR LINES CO.,	1			
EXS	JET2.COM, LTD.	1			
RSD	SPECIAL DETACHMENT	1			
DUB	DUBAI AIRWING	1			
TCS	ATS, PRIVATE	1			
CAZ	CAT AVIATION AG	1			
MCG	SOS HELIKOPTERN	1			
BFO	BOMBARDIER, INC.	1			
NAX	NORWEGIAN AIR	1			
ICE	ICELANDAIR	1			

AOV	AERO VISION	1
-----	-------------	---

Attachment C to Appendix D
Aircraft Observed in the New York Oceanic Airspace

Aircraft Type	Count of Operations	Aircraft Type	Count of Operations	Aircraft Type	Count of Operations	Aircraft Type	Count of Operations
B763	27,028	E190	709	C560	49	B734	8
A320	25,627	CL30	690	HA4T	47	B703	8
B738	16,020	GLEX	587	B773	45	E3TF	8
A332	15,659	B722	501	DC87	38	B721	7
B752	15,463	C130	498	B743	37	01B7	7
B772	11,714	LJ35	495	FA20	35	H25A	6
B744	10,681	IL96	440	A318	34	FA10	6
A343	9,445	K35R	434	LJ40	34	WW24	6
A333	6,566	GALX	419	DC93	32	B733	5
A346	6,126	B742	408	AN12	31	MU2	5
A319	5,393	A345	389	A124	31	3ZZZ	5
B737	4,807	LJ60	377	IL76	29	2	4
B762	4,199	E135	298	MD83	28	SW3	4
B77W	3,974	FA50	247	1H	19	A330	4
MD11	3,495	A342	238	BE20	18	KC10	4
A310	2,543	A388	230	C25C	18	SW3	4
B753	1,918	FA7X	227	CRJ2	17	F60	4
B764	1,787	C550	215	C208	17	6	4
GLF4	1,750	GL5T	209	A306	17	G200	4
GLF5	1,520	GLF3	164	C30J	17	B767	3
B739	1,460	C56X	163	BE40	15	SR22	3
H25B	1,260	ASTR	137	1	15	LJ31	3
B77L	1,116	A321	107	BE30	14	B732	3
CL60	921	LJ55	106	C525	14	AT72	3
C750	844	C25B	97	ZZZZ	14	E145	3
BLNK	839	G150	89	B74S	13	L101	3
F2TH	798	LJ45	73	B777	12	B741	3
DC10	773	DC86	71	B350	12	A340	3
C17	765	GLF2	60	C160	11	2H	3
F900	752	P3	70	AT8T	10	B757	3
C680	731	C650	53	GTWN	9	C2	3
C5	719	H25C	51	VC10	9	BA46	2

Attachment C (continued)

Aircraft Type	Count of Operations	Aircraft Type	Count of Operations	Aircraft Type	Count of Operations
AC95	2	C182	1	B747	1
R722	2	7	1	4K13	1
5ZZZ	2	B190	1	A334	1
LJ25	2	CJ50	1	DA50	1
AN32	2	6F15	1	J100	1
BE36	2	PAY3	1	01F9	1
E6	2	B727	1	G250	1
HS25	2	SJ30	1	C27J	1
3H	2	B36T	1	C295	1
J328	2	WB57	1		
5	2	C172	1		
DH8D	2	2GTW	1		
AT5T	2	5GTW	1		
1B77	2	1C13	1		
C5	2	E170	1		
MD87	2	M20P	1		
01A3	2	T154	1		
CN35	2	3	1		
01LJ	2	C25A	1		
BE9L	1	MD88	1		
F400	1	B852	1		
P46T	1	N752	1		
DC9	1	K35T	1		
G4	1	CL2P	1		
E55P	1	B701	1		
C206	1	PA34	1		
DC92	1	KODI	1		
GBIZ	1	PC12	1		
01DC	1	DH8C	1		
E120	1	SBR1	1		
5A10	1	LF35	1		
LR35	1	AT6T	1		

Attachment D to Appendix D
ADS-C Mach Speed Distribution by Aircraft Type

For all of the charts in Appendix D the number of observations included in the distribution for each aircraft type is shown in parentheses in the chart title.

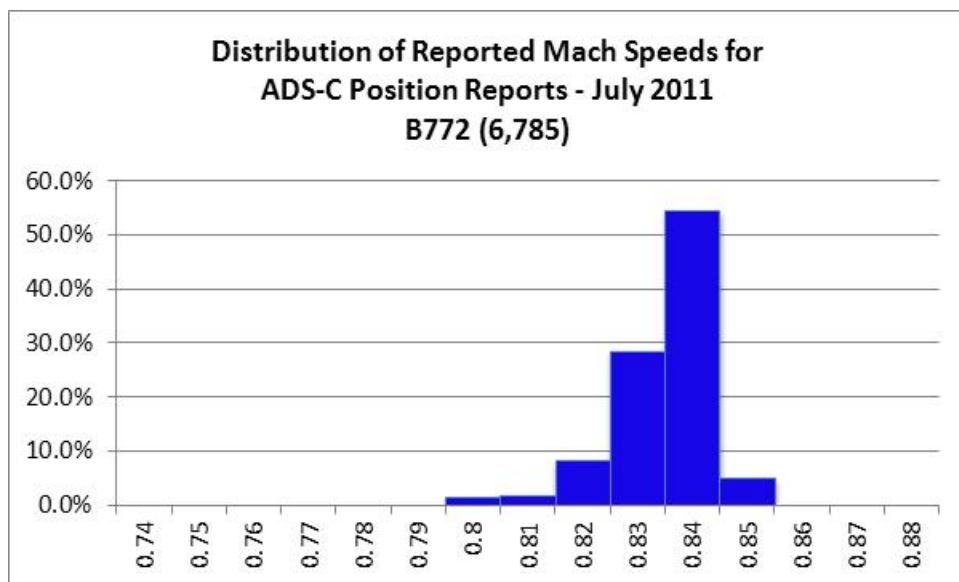


Figure B1. ADS-C mach speed distribution for B772

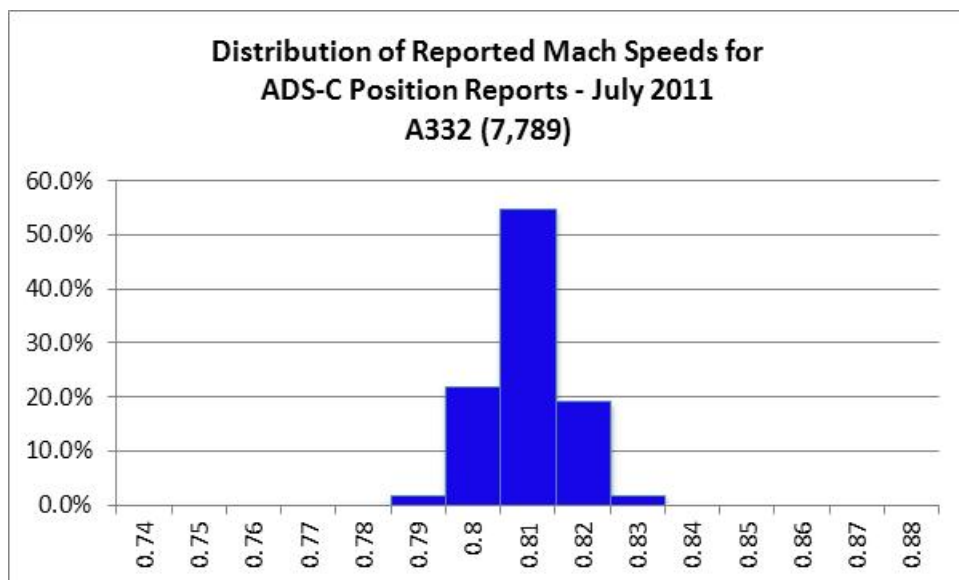


Figure B2. ADS-C mach speed distribution for A332

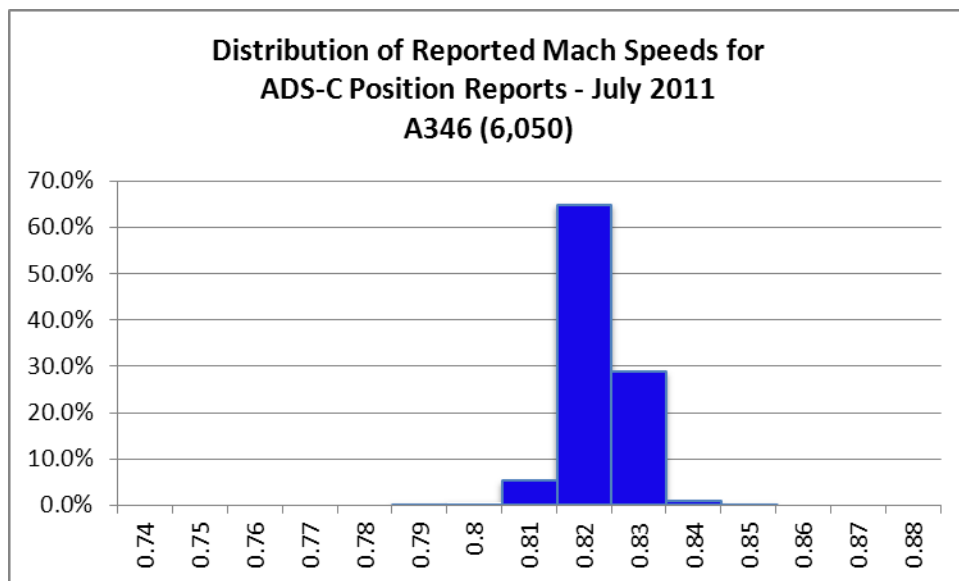


Figure B3. ADS-C mach speed distribution for A346

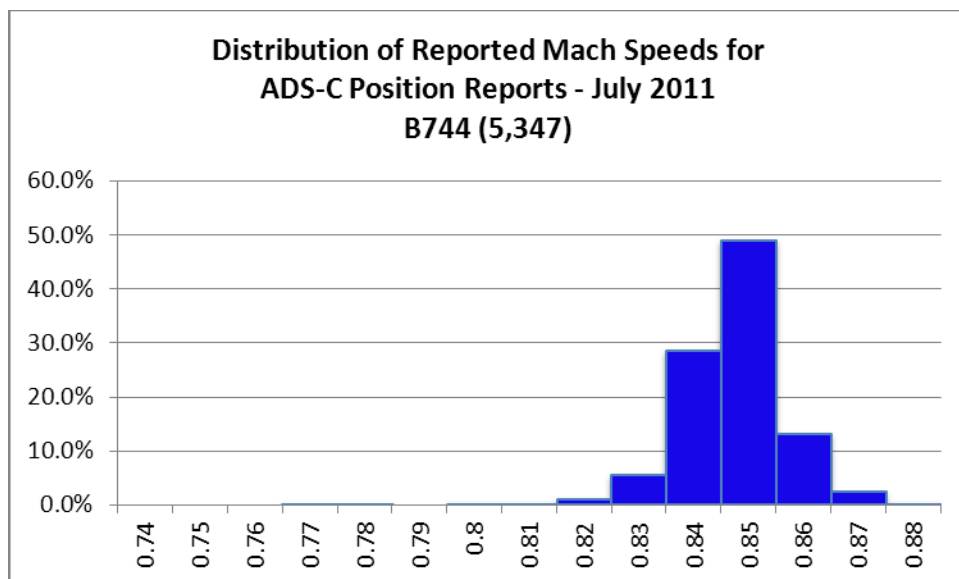


Figure B4. ADS-C mach speed distribution for B744

— D43 —

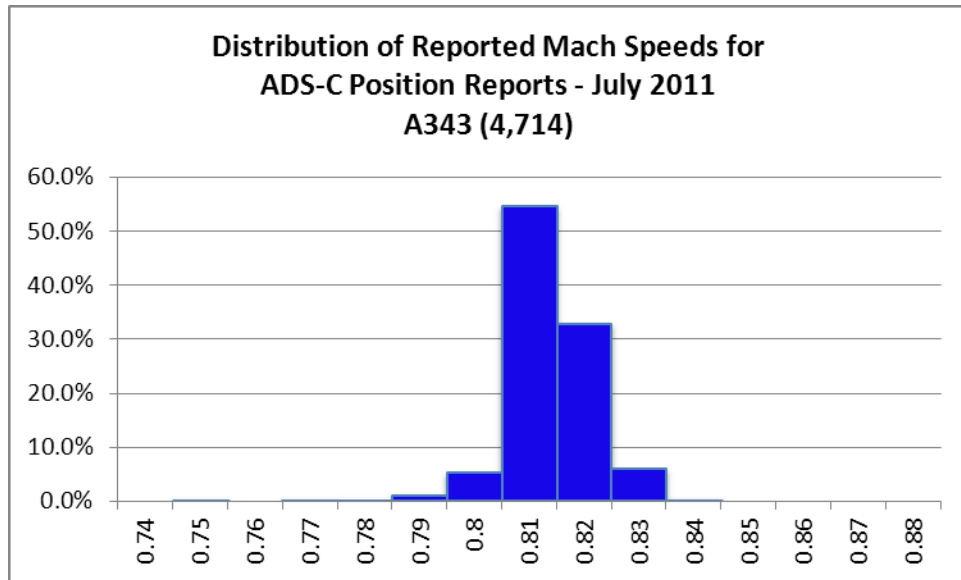


Figure B5. ADS-C mach speed distribution for A343

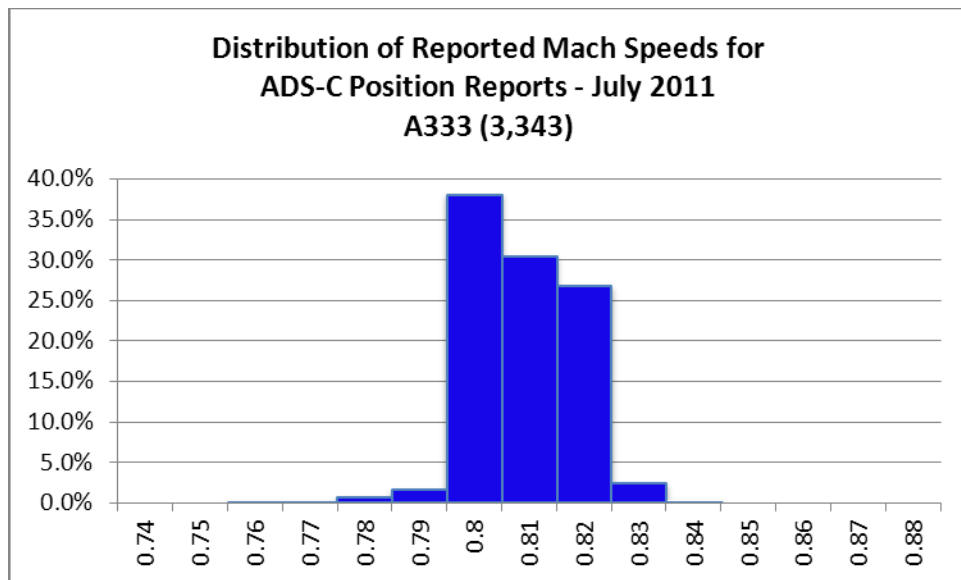


Figure B6. ADS-C mach speed distribution for A333

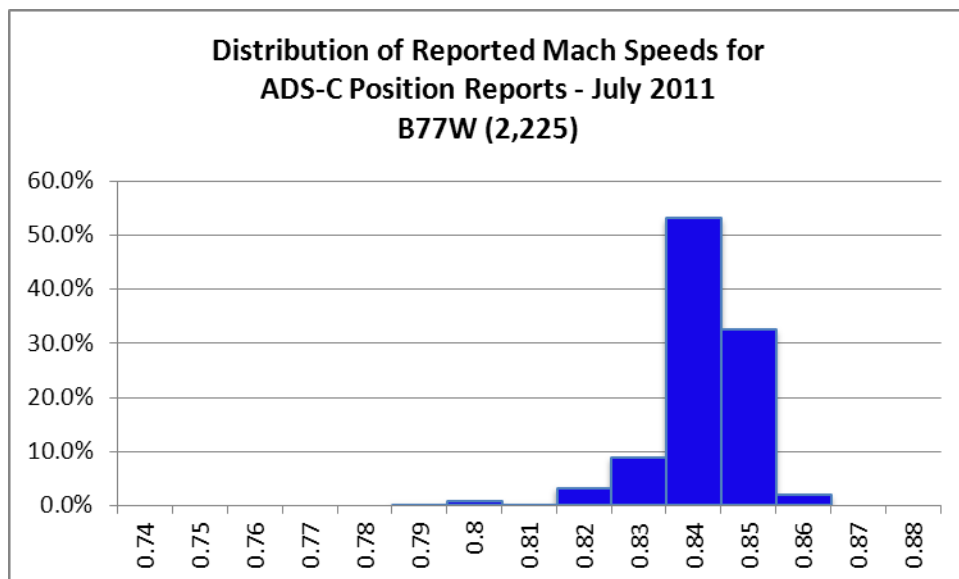


Figure B7. ADS-C mach speed distribution for B77W

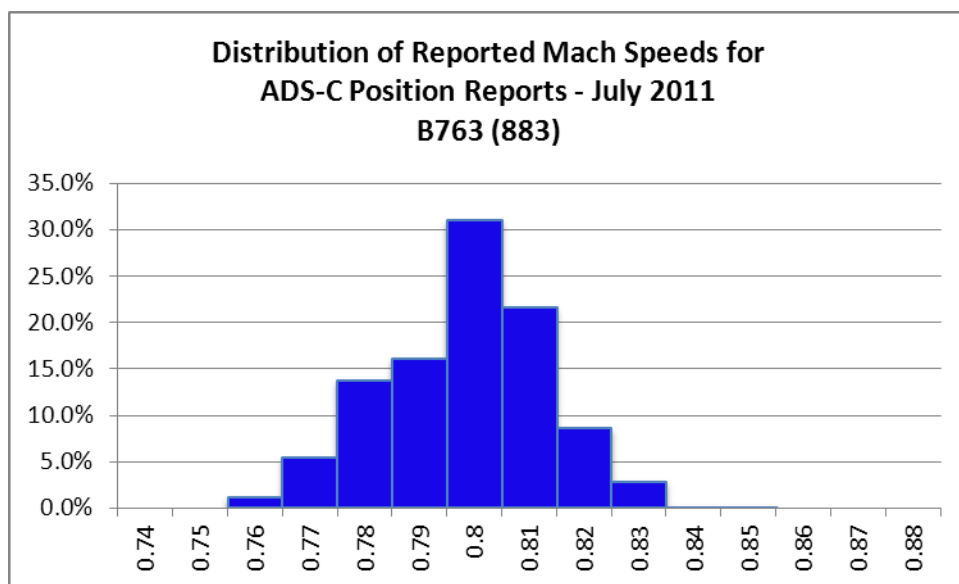


Figure B8. ADS-C mach speed distribution for B763

— D45 —

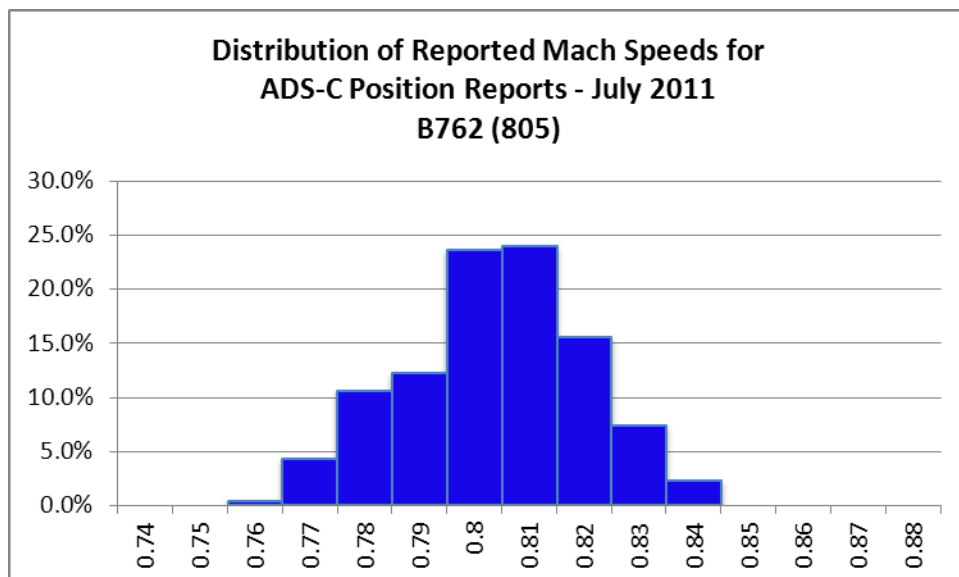


Figure B9. ADS-C mach speed distribution for B762

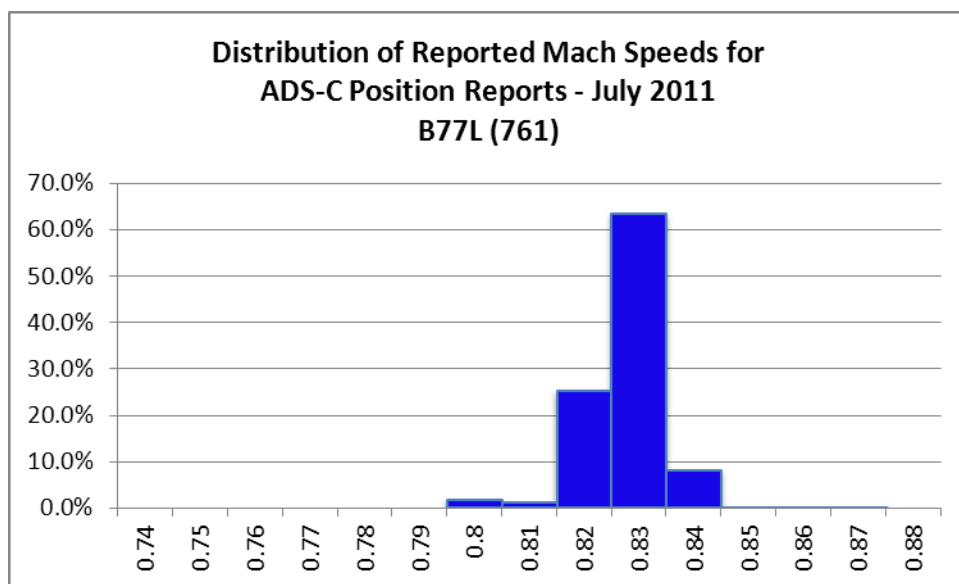


Figure B10. ADS-C mach speed distribution for B77L

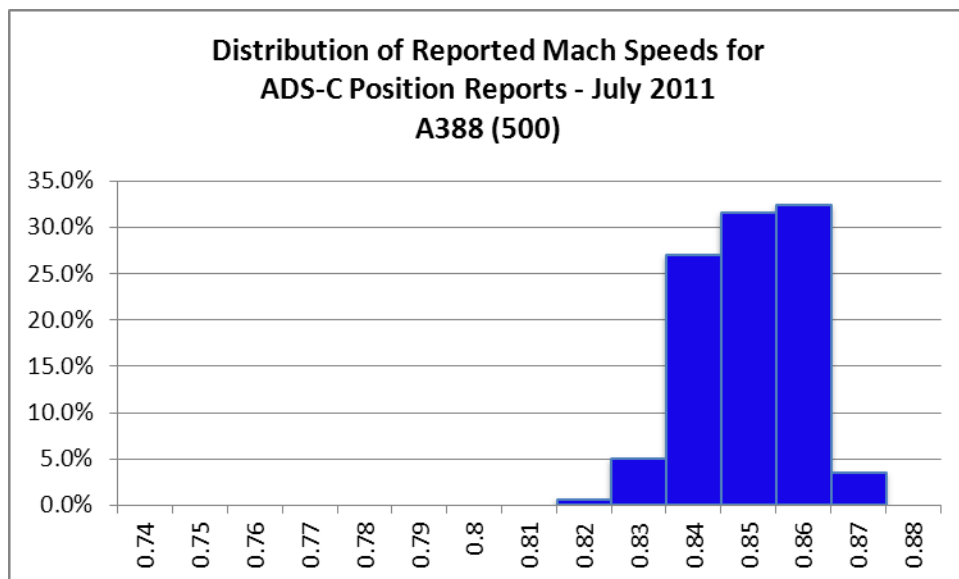


Figure B11. ADS-C mach speed distribution for A388

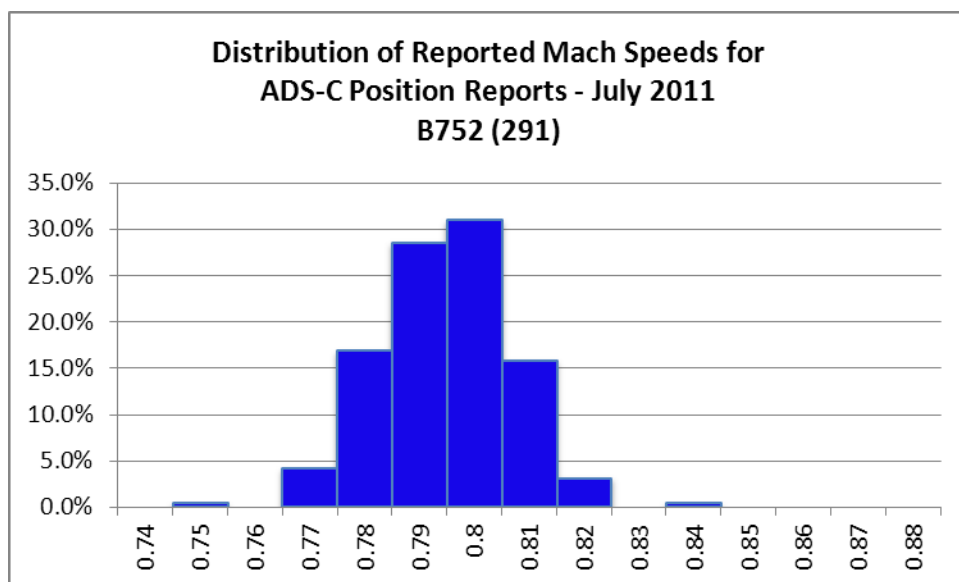


Figure B12. ADS-C mach speed distribution for B752

Attachment E to Appendix D
Origin Destination Pairs Observed in the New York Oceanic Airspace

The top 80 percent of Origin/Destination Pairs are detailed in this table.

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations	Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
TJSJ	KJFK	3303	3323	6626	TJSJ	KEWR	545	602	1147
MDST	KJFK	2308	2320	4628	KMIA	LFPG	651	490	1141
KJFK	MDSD	2211	2195	4406	KBOS	TXKF	577	545	1122
KJFK	SBGR	1408	1382	2790	CYYZ	TXKF	557	548	1105
TFFR	LFPO	1323	1438	2761	KJFK	TNCM	545	546	1091
TFFF	LFPO	1301	1305	2606	LEMD	SEGU	346	691	1037
KJFK	TPPP	1205	1206	2411	KJFK	SBGL	473	465	938
TJSJ	KPHL	1324	1082	2406	KEWR	MDPC	484	443	927
KMIA	EGLL	1311	991	2302	KATL	TXKF	466	453	919
TJSJ	KBOS	1107	1117	2224	KEWR	TNCA	450	435	885
TBPB	EGKK	1054	1027	2081	MMUN	LEMD	438	430	868
KMIA	LEMD	1032	975	2007	KJFK	MDPP	427	425	852
MDPC	CYYZ	923	971	1894	TAPA	EGKK	423	423	846
SKBO	LEMD	908	919	1827	KEWR	MDSD	447	399	846
SVMJ	LEMD	905	892	1797	TNCC	EHAM	502	334	836
KJFK	LEMD	906	837	1743	KJFK	MBPV	443	384	827
MMMXX	LEMD	862	759	1621	KBOS	TNCA	410	414	824
TNCA	KJFK	768	770	1538	TNCA	EHAM	77	746	823
LEMD	MUHA	713	775	1488	KCLT	TJSJ	420	400	820
TXKF	KJFK	715	723	1438	KPHL	MDPC	411	404	815
TBPB	KJFK	724	709	1433	TLPL	EGKK	408	403	811
KJFK	MDPC	717	716	1433	MDPC	LFPG	317	485	802
MDPC	CYUL	679	742	1421	EHAM	SMJP	426	376	802
SPIM	LEMD	760	640	1400	KEWR	LPPT	393	407	800
KJFK	TJBQ	694	695	1389	KMIA	EHAM	506	291	797
MDSD	LEMD	692	692	1384	KJFK	EGLL	461	308	769
TBPB	CYYZ	646	670	1316	TXKF	KMIA	359	398	757
CYYZ	TPPP	661	653	1314	KPHL	TXKF	382	368	750
KMCO	EGKK	766	538	1304	TJSJ	KORD	424	307	731
KEWR	TXKF	600	614	1214	KJFK	LEBL	412	318	730

KIAD	TJSJ	573	579	1152
------	------	-----	-----	------

EDDF	SVMI	358	372	730
------	------	-----	-----	-----

Attachment E (Continued)

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
SVMI	LFPG	359	359	718
KATL	FAJS	356	356	712
SPIM	EHAM	360	349	709
SKBO	LFPG	355	353	708
KIAD	GOOY	361	346	707
MROC	LEMD	357	350	707
KJFK	TJPS	353	350	703
TJSJ	KBDL	353	349	702
SBGR	CYYZ	348	354	702
SBGR	KEWR	348	346	694
KEWR	TNCM	377	316	693
SVMI	LIRF	346	335	681
KJFK	LIRF	364	301	665
KCLT	TNCM	331	332	663
KCLT	SBGL	335	325	660
KIAD	SBGR	355	301	656
KJFK	MTPP	414	233	647
LEMD	KPHL	447	194	641
MDPC	LEMD	319	322	641
TXKF	EGKK	320	315	635
KEWR	TJBQ	315	317	632
MDPP	CYYZ	296	336	632
EGKK	MKJS	306	326	632
DNMM	KATL	313	315	628
KJFK	GMMN	302	323	625
KJFK	TIST	307	305	612
KCLT	TIST	311	301	612
SKCL	LEMD	299	300	599
TNCM	LFPG	290	305	595
MUHA	LFPG	327	268	595

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
MPTO	EHAM	294	296	590
KMIA	LSZH	315	269	584
MDPC	EDDF	299	280	579
TNCB	EHAM	301	277	578
KIAD	DGAA	285	281	566
KMIA	LIRF	294	268	562
TJSJ	KBWI	258	285	543
KBOS	MDSD	270	272	542
KEWR	MDPP	300	224	524
KMIA	EDDF	311	212	523
KJFK	GOOY	156	365	521
KCLT	TNCA	320	200	520
CYYZ	TLPL	256	261	517
KJFK	LFPG	260	256	516
KJFK	SAEZ	300	212	512
LFPG	MMMX	248	256	504
KJFK	TLPL	250	248	498
TXKF	KTEB	76	414	490
EGKK	MMUN	246	237	483
LERT	KDOV	226	248	474
MYNN	EGLL	248	224	472
EGCC	KMCO	192	276	468
KJFK	SYCJ	233	234	467
KATL	LEMD	250	214	464
EDDL	KMIA	176	285	461
KIAD	LEMD	248	207	455
TAPA	KEWR	215	224	439
LIMC	MDLR	373	61	434
KHPN	TXKF	340	89	429
EDDF	KMCO	158	267	425

Attachment E (Continued)

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
MKJP	EGKK	213	210	423
KCLT	MDPC	238	185	423
KEWR	TIST	225	197	422
KJFK	DGAA	212	205	417
EDDF	SKBO	211	206	417
UDDF	MDPC	208	202	410
KJFK	LSZH	262	144	406
KORD	SBGR	244	155	399
SKBO	LEBL	198	200	398
KPHL	TIST	203	195	398
KIND	TJBQ	209	186	395
KJFK	FAJS	349	40	389
LEMD	MPTO	183	205	388
TNCM	KTEB	120	267	387
KTPA	EGKK	209	164	373
KJFK	LIMC	214	152	366
KATL	LEBL	194	170	364
KEWR	LEMD	171	189	360
LIMC	MUHA	328	32	360
KJFK	LLBG	216	142	358
TJBQ	KGSO	163	188	351
LEMD	SEQU	349	1	350
TXKF	KBWI	169	181	350
KPHL	TNCA	173	172	345
TNCM	CYYZ	161	183	344
EGCC	TBPB	172	171	343
LFPO	TNCM	329	0	329
MDPC	CYOW	152	172	324
EDDF	MDSD	160	160	320
MDPC	EHAM	79	240	319
DGAA	KATL	154	158	312

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
LEMD	TJSJ	148	160	308
KSDF	TJSJ	162	145	307
KJFK	TGPY	155	151	306
KJFK	DNMM	153	151	304
KIAH	FNLU	153	146	299
LEBL	MMMX	142	151	293
KEWR	LLBG	203	87	290
SOCA	LFPO	131	157	288
KDFW	LEMD	147	140	287
KNGU	LERT	145	141	286
CYYZ	SVMJ	141	142	283
KPHL	TNCM	145	137	282
CYUL	MDPP	126	155	281
KATL	LFPG	137	138	275
KEWR	LEBL	147	126	273
LPPT	KPHL	158	115	273
KJFK	TAPA	136	136	272
EHAM	TNCM	270	1	271
KORD	LEMD	166	98	264
EDDL	MDPC	130	133	263
LPPD	KBOS	142	120	262
KMIA	LIMC	133	118	251
EGCC	MDPC	127	123	250
EGCC	MMUN	139	110	249
CYQB	MDPC	120	128	248
CYYZ	TAPA	128	119	247
MUHA	EHAM	90	154	244
EDDF	MMUN	105	137	242
TXKF	KCLT	115	126	241
KPHL	MDSD	116	121	237
CYYZ	MBPV	179	57	236

Attachment E (Continued)

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
EGKK	MUHA	85	151	236
KJFK	HECA	160	75	235
MMUN	EHAM	156	79	235
KIAD	EGLL	65	170	235
EDDF	MUVR	101	133	234
KIAD	TIST	213	19	232
MBPV	KEWR	83	149	232
KORD	MDPC	113	117	230
CYYZ	MDCY	124	106	230
KJFK	EDDF	101	126	227
KEWR	TTPP	113	111	224
UUEE	MDPC	113	111	224
KATL	LIRF	120	104	224
CYHZ	MDPC	116	102	218
KPHL	LFBG	94	120	214
KBOS	MDPC	107	104	211
EBBR	MDPC	120	90	210
EDDM	KMIA	77	132	209
KEWR	EGLL	62	145	207
KBOS	TIST	104	103	207
KPHL	LEBL	77	130	207
KATL	EDDF	139	67	206
MMUN	LFBG	115	89	204
EDDF	MDPP	100	104	204
TQPF	KTEB	67	135	202
TXKF	KBED	75	126	201
SKRG	LEMD	96	104	200
EHAM	TJBQ	58	142	200
KJFK	LFMN	124	74	198
LEMD	MGGT	198	0	198
EGKK	MUHG	116	79	195

Origin	Destination	Count of Operations	Count of Reciprocal Operations	Total Operations
CYUL	MTPP	95	100	195
SVMI	KJFK	93	97	190
KJFK	EBBR	118	72	190
CYYZ	TNCA	102	88	190
KHPN	TNCM	134	55	189
LPPT	SVMI	99	90	189
LPPT	MDPC	94	94	188
EGKK	MDPC	95	93	188
LEMG	KJFK	91	97	188
CYUL	TFFR	104	83	187
KBOS	LEMD	80	106	186
EGCC	MKJS	85	100	185
KEWR	LIRF	82	101	183
MSLP	LEMD	181	0	181
GMMN	CYUL	127	53	180
EDDF	MMMXX	45	130	175

Attachment F to Appendix D

Data Link Performance by Media Type

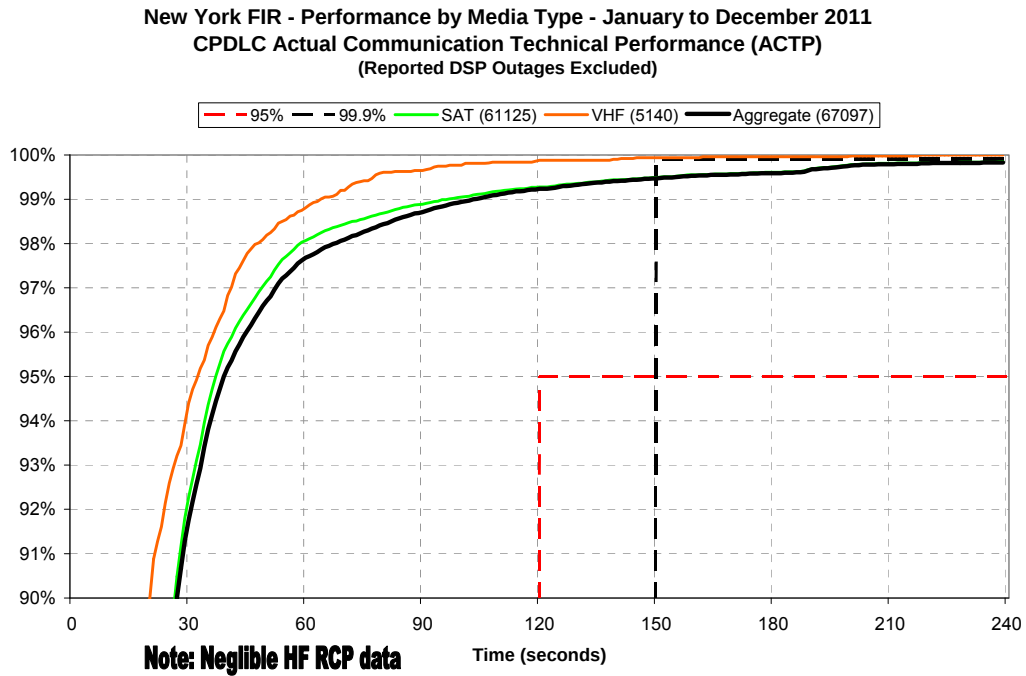


Figure E1. ACTP for New York FIR – January to December 2011

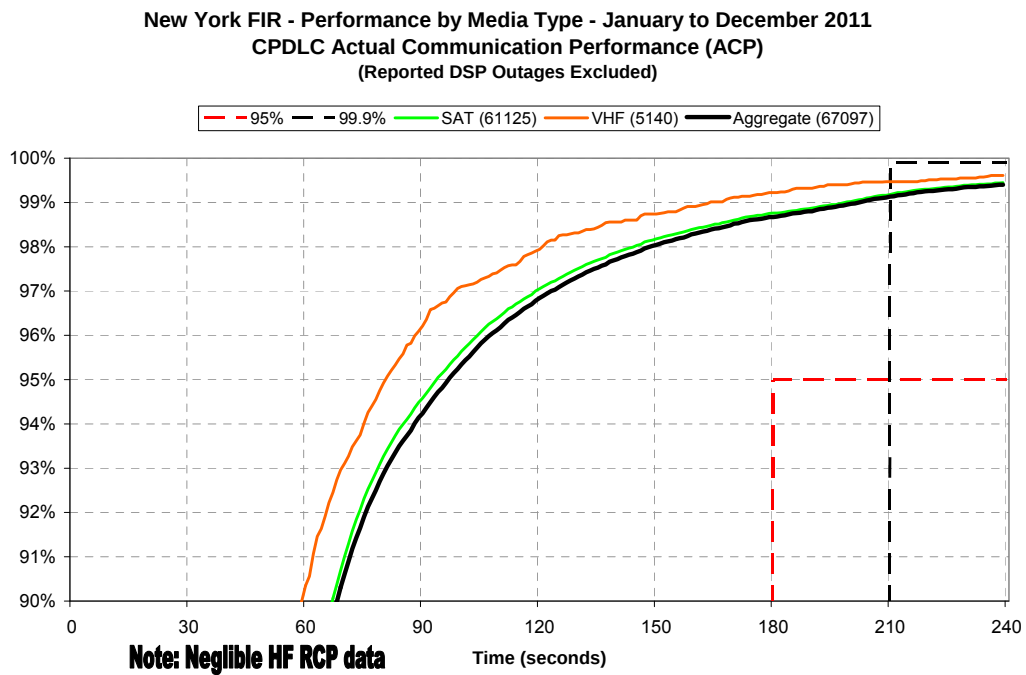


Figure E2. ACP for New York FIR – January to December 2011

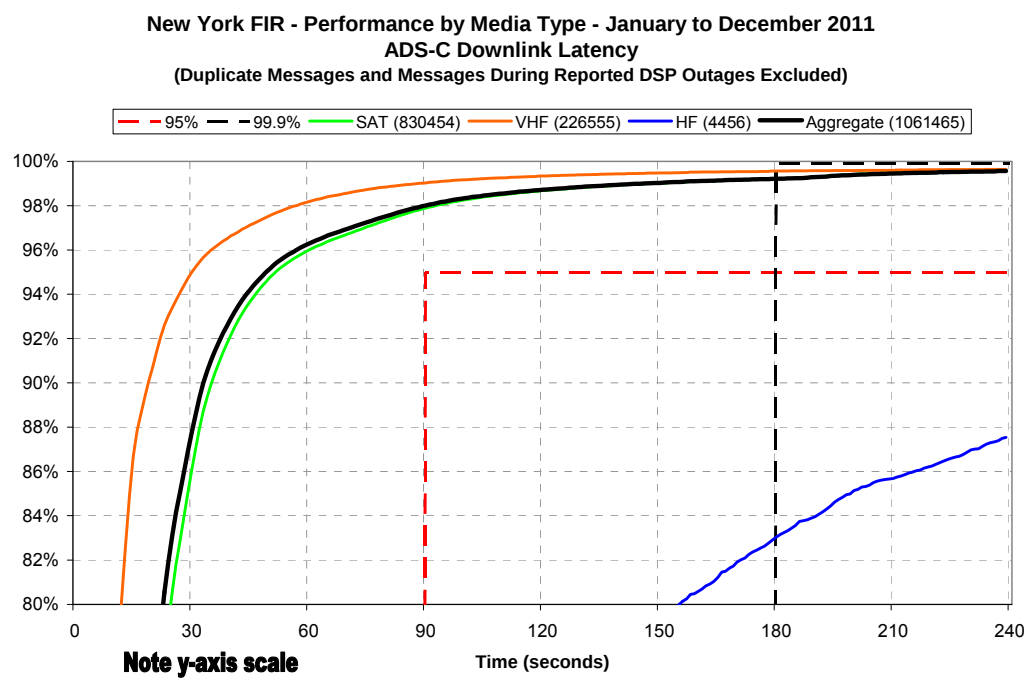


Figure E3. ADS-C downlink latency for New York FIR – January to December 2011

APPENDIX E

ZNY 50Long & 30/30 Task List (Updated 09 May 2012, Rev 1c)

Target Implementation Date: 12 Dec 2013

	<u>SUBJECT</u>	<u>START</u>	<u>COMPLETE NO LATER THAN</u>	<u>LEAD</u>	<u>KEY ZNY 30/30/D50 IMPLEMENTATION TASKS - REDUCED SEPARATION BETWEEN ELIGIBLE PAIRS</u>
1	Lead Organizations	1/15/2011	N/A	N/A	AJE-32: Air Traffic Oceanic and Offshore Operations; AFS-470: Flight Standards Performance Based Flight Systems; ANG-E61: Separation Standards Analysis Team
2	Establish Target Implementation Timeframe	1/15/2011		ALL	Completed. AJE-32, AFS-470 and ANG-E61 agreed to 4 th Qtr 2013 at Jan 2012 OSRWG
3	Review ICAO SARPS and Guidance for Existing Global Requirements	2/5/2011	2/5/2012	AJE-32, AFS-470	Completed. Review of related ICAO SARPS and guidance documents: Chapter 5 of ICAO Doc 4444; Annexes 2 and 6; ICAO PBN Manual; Global Operational Data Link Document (GOLD). Requirements for 50Long and 30Long are contained in Doc 4444 Para 5.4.2.6.4 and Requirements for 30Lat are in Doc 4444 Para 5.4.1.2.1.6
4	Concept of Operations	4/1/2011	6/1/2012	AJE-32, AFS-470	Draft developed. Submitted to NAT Sub-groups for review and comment (2011 meetings and Spring 2012 meetings).
5	Doc 4444 Chapter 5 provisions needing verification	6/1/2011	8/31/2012	AJE-32, AFS-470	Open. Identify Doc 4444 Chapter 5 provisions that need verification of compliance for ZNY application of: (1) 30 NM lateral, (2) 30 NM longitudinal and, (3) 50 NM longitudinal separation. To be verified during Safety Analysis.
6	ZNY Ocean21 System Modification.	2/5/2011	6/12/2012	ZNY, AJE-32	Open. Establish schedule for ZNY Ocean21 system local adaptation. (50Long and 30/30/ already incorporated into conflict probe).
7	NAT & CAR Sub-group coordination: document review schedule	8/19/2011		AJE-32, AFS-470, ANG-E61	First draft table developed. See separate schedule table. Revise and update as necessary.

	<u>SUBJECT</u>	<u>START</u>	<u>COMPLETE NO LATER THAN</u>	<u>LEAD</u>	<u>KEY ZNY 30/30/D50 IMPLEMENTATION TASKS - REDUCED SEPARATION BETWEEN ELIGIBLE PAIRS</u>
8	Confirm/Verify Implementation Date and Time	2/15/2012	2/15/2012	ALL	Open. 12 Dec 2013 identified as target implementation date
9	Examination of Costs and Benefits	8/1/2011	N/A	AJE-32; AFS-470	Benefits (reduced separation applied to pairs of suitably equipped AC)
10	Operator/aircraft fleet readiness projection	7/11/2011	N/A	AJE-32, AFS-470, ANG-E61	Ongoing. Data obtained from Operator Data Collection on RNP and DL equipage and ADS-C usage from ZNY traffic data.
11	Role of RCP and RSP	8/19/2011	9/15/2012	AJE-32, AFS-470, ANG-E61	Open. Determine role of RCP and RSP. Measure communication performance against RCP240 and RSP180.
12	Develop Safety Assessment/Collision Risk Modeling Document	9/15/2011	8/31/2012	ANG-E61	Open. FAA Tech Center to develop Safety Assessment /Collision Risk Modeling to submit for NAT & CAR Sub-group review. Work underway. KYA Analysis presented to SARSIG/15. CRM parameter estimates being developed.
13	FAA submit Safety Risk Management Document to Air Traffic Oversight	4/15/2012	9/15/2012	AJE-32	Open. FAA submit SRMD to FAA Air Traffic Oversight organization and also to appropriate NAT Sub-groups for review.
14	Submit draft ICAO Regional Supplementary Procedures revision	12/1/2012	12/12/2012	AJE-32	Open. Draft Package to be completed and presented to ATMG/40 and SARSIG/16, then submitted to ICAO EUR/NAT and CAR/SAM Nov 2012.
15	Advance Notice	4/15/2012	9/15/2012	AJE-32	Open. Publish FAA Notice to announce intent to implement 50Lomg and 30/30 between eligible aircraft pairs.
16	Publish FAA Notice: Operational Policy & Procedures	8/15//2012	12/15/2012	AJE-32, AFS-470	1. Submit to FAA NOTAM Office for publication in NOTAM book. 2. Distribute FAA Notice containing applicable operational policy and procedures. 3. FAA consider follow-up in Aeronautical Information Manual (AIM).

- E3 -

	<u>SUBJECT</u>	<u>START</u>	<u>COMPLETE NO LATER THAN</u>	<u>LEAD</u>	<u>KEY ZNY 30/30/D50 IMPLEMENTATION TASKS - REDUCED SEPARATION BETWEEN ELIGIBLE PAIRS</u>
17	ICAO State Letter, if required.	8/15/2012	12/15/2012	AJE-32	Open. Determine if ICAO State Letter is necessary.
18	RNP 10 and RNP 4 Authorization Job Aids	2/15/2012	2/15/2013	AFS-470	Open. Update and post RNP 10 and RNP 4 Job Aids. Current update is posted on FAA website.
19	CPDLC/ADS-C Job Aids	2/15/2012	2/15/2013	AFS-40	Open. Current update is posted on FAA website.
20	ZNY 30/30/D50 Webpage	6/15/2012	6/15/2013	AJE-32, AFS-470	Open. Establish an FAA Webpage where appropriate documents can be posted.
21	Document Distribution List	6/15/2012	12/15/2012	AJE-32, AFS-470	Open. Develop document distribution list for timely distribution of significant documents to 50/30/30 stakeholders. Update list from WATRS+ 50Lat Implementation
22	FAA ATS Policy Documents	12/15/2012	6/15/2013	AJE-32	Open. Develop revisions to Air Traffic Services policy documents, as necessary (e.g., FAA Order 7110.65).
23	Establish measures to inform Flight Operations inspectors	12/15/2012	6/15/2013	AFS-470	Open. Establish Webpage and distribution to inform Flight Operations Inspectors in a timely manner of project objectives and requirements.
24	State Regulations and Guidance	12/15/2012	6/15/2013	STATES	Open. States revise guidance, as necessary and prepare responsible offices for operator authorization tasks.
25	Implementation Decision: Pre-implementation Safety Assessment & Implementation Decision	6/15/2013	8/15/2013	AJE-32, AFS-470, ANG-E61	Open.

	<u>SUBJECT</u>	<u>START</u>	<u>COMPLETE NO LATER THAN</u>	<u>LEAD</u>	<u>KEY ZNY 30/30/D50 IMPLEMENTATION TASKS - REDUCED SEPARATION BETWEEN ELIGIBLE PAIRS</u>
26	Notice of Decision to Implement	9/1/2013	9/1/2013	AJE-32, AFS-470, ANG-E61	Open. Issue NOTAM of intent to implement on 12/12/2013, 0000UTC. Provide notification to States and operators of decision to implement.
27	Controller Training	10/12/2013	11/12/2013	AJE-32	Open. Develop controller training requirements and programs.
28	Operators complete eligibility actions	1/15/2013	11/12/2013	Operators	Open. Recommend that operators wishing to participate complete actions to be eligible for 50Long and 30/30/D50 one month in advance of implementation. (Will need to follow up with operator groups).
29	Target Implementation Date and time		12/12/13 0000UTC	AJE-32, AFS-470, ANG-E61	Open. Confirm day and time of implementation every quarter throughout implementation process.
30	Post Implementation Monitoring: 30-day Review	12/12/13	1/12/2014	AJE-32, AFS-470, ANG-E61	Open. Conduct 30-day post implementation review. Convene specialists as necessary for monitoring.
31	90-day Review	12/12/13	3/12/2014	AJE-32, AFS-470, ANG-E61	Open. Conduct 90-day review.
32	12-month Review	12/12/13	12/12/2014	AJE-32, AFS-470, ANG-E61	Open. Conduct 12-month review.

END TASK LIST

Schedule For Document Review - New York Oceanic 50Long & 30Long/30Lat Implementation Project

EUR/NAT and CAR/SAM Regions

Sub-group	Dates	Documents To Submit	Remarks
NAT ATMG/38	12-16 Sept 2011	1. US WP 2. Concept of Operations 3. Task List 4. Draft 7030 amendment	Complete – resistance in the group – concern about multiple separations and adjoining airspace issues and lack of Regional Harmonization
NAT CNSG/5	26-30 Sept 2011	US WP stating intent of 30/30/D50 project	
NAT SARSIG/14	10-14 Oct 2011	1. US WP 2. Concept of Operations 3. Task List 4. Draft 7030 amendment	Complete – some resistance in group
NAT IMG/39	7-10 Nov 2011	US WP: Status of work	Complete – continued resistance in the group
NAT ATMG/39	5-9 March 2012	1. US WP 2. Updated CONOPS	Updated CONOPS presented, thorough explanation of Ocean 21 capability and how adjacent FIRs and multiple separation standards would be handled. Resistance seems to have dissipated.
NAT SARSIG/15	19-23 March 2012	1. US WP 2. Updated CONOPS	Updated CONOPS and Ocean 21 30/30 Demonstration at FAATC OIIF Lab Facility during meeting. Resistance seems to have dissipated.
NAT CNSG/06	26-30 March 2012	US Paper providing status	
NAT SG/3	16-20 April 2012	US Paper providing status	
NAT MWG/47	23-27 April 2012	US Paper providing status	
NAT IMG/40	7-10 May 2012	US WP/31	
NAT SOG/06	7-10 May 2012	US IP	
NAT SPG/48	12-15 June 2012	US WP	
E/CAR	June 2012	US WP	

Sub-group	Dates	Documents To Submit	Remarks
NAT ATMG/40	10-14 Sept 2012	1. US WP 2. Draft FAA Notice: Operational Policy & Procedures 3. Updated Task List 4. Final CONOPS 5. Draft 7030 PfA Package 6. Safety Assessment CRM 7. FAA Safety Risk Management Document (SRMD)	
NAT SARSIG/16	8-12 Oct 2012	1. US WP 2. Draft FAA Notice: Operational Policy & Procedures 3. Updated Task List 4. Final CONOPS 5. Draft 7030 PfA Package 6. Safety Assessment CRM 7. FAA Safety Risk Management Document (SRMD)	
NAT IMG/41	Fall 2012	US WP	IMG endorsement of Implementation
CAR WG Coordination	Summer/Fall 2012	US WP and IPs to appropriate groups	WG endorsement of Implementation
	Nov/Dec 2012	Submit Doc 7030 Package to ICAO EUR/NAT and CAR/SAM Offices for processing Nov 2012	