

# Air Traffic Services Interfacility Data Communications (AIDC): U.S. Implementation Overview

Presented to:

ICAO MID AIDC/OLDI Workshop

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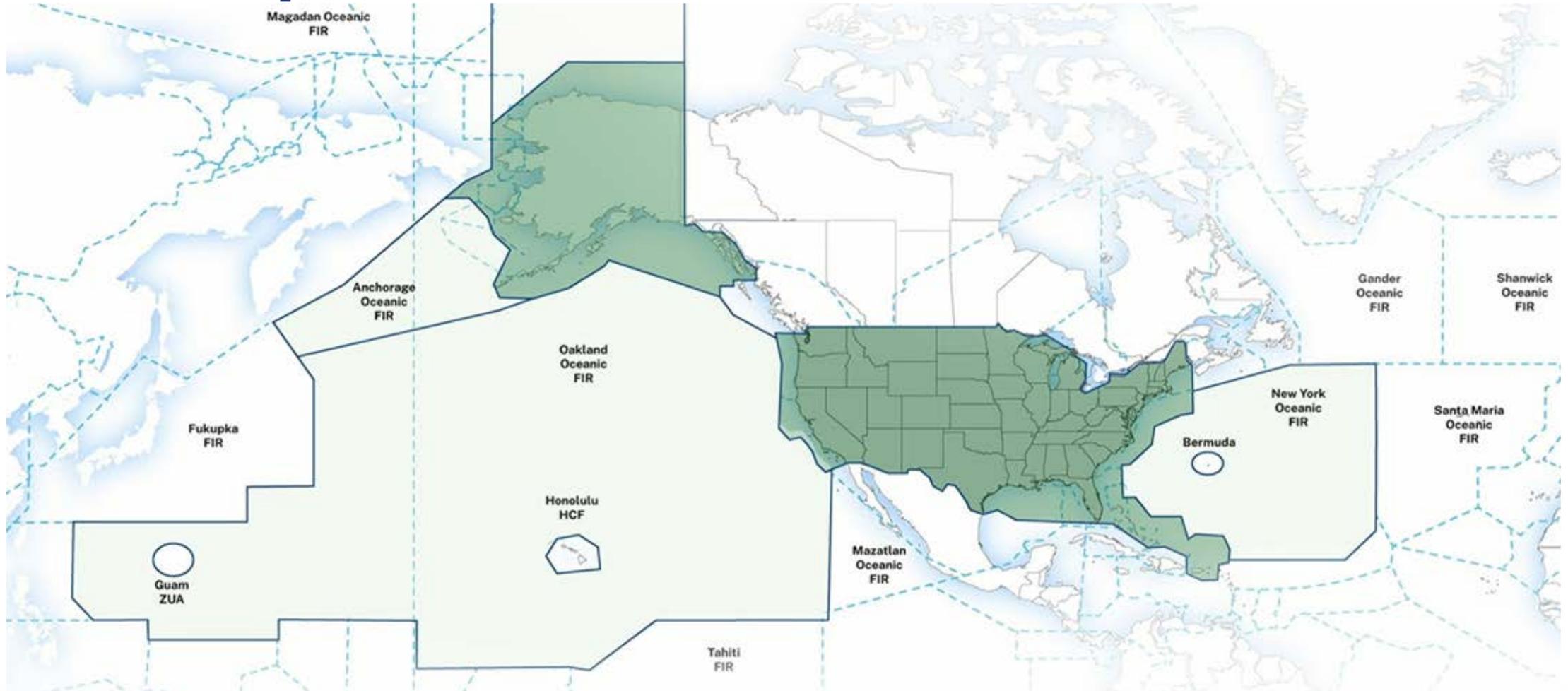
Federal Aviation  
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# Outline

- U.S. Airspace Overview
- AIDC Benefits
- FAA Implementation
- Message Categories
- Example Use Cases
- Summary



# U.S. Airspace Overview





# Automating Interfacility Communications

- Air Traffic Services Interfacility Data Communications (AIDC) recognized by ICAO under its Global Air Navigation Plan (GANP) and Aviation System Block Upgrades (ASBU) framework
- Increases efficiency by replacing manual flight data exchange
- Enhances safety by:
  - Enabling controllers to spend less time coordinating on the phone
  - Mitigates potential for manual entry errors
  - Mitigates potential for communication barriers



# FAA Order JO 7110.65 - Air Traffic Control

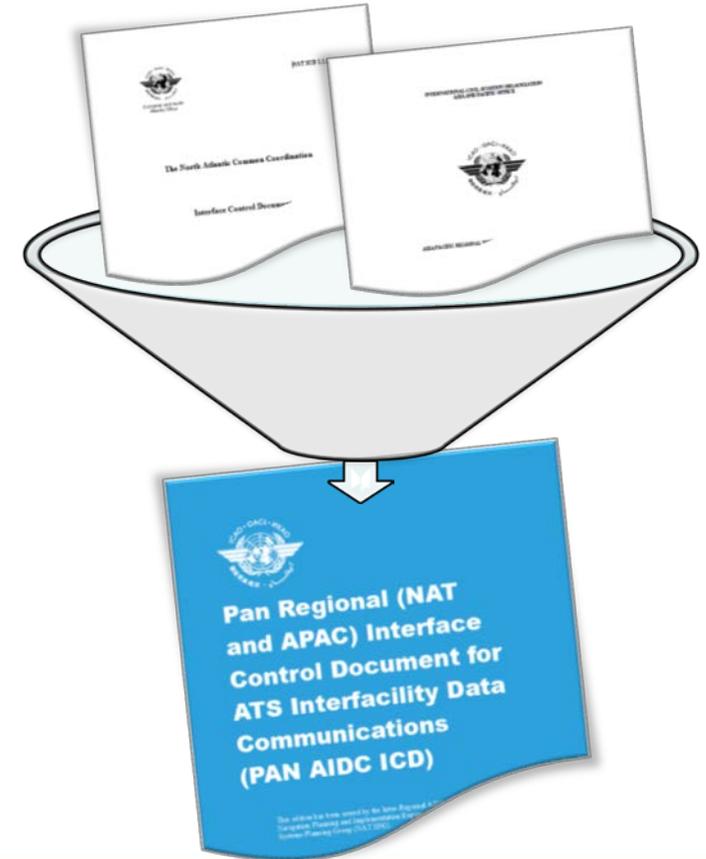
- Prescribes ATC procedures and phraseology for Air Traffic Controllers
- 8-2-3: AIR TRAFFIC SERVICES INTERFACILITY DATA COMMUNICATIONS (AIDC)
  - *“Where interfacility data communications capability has been implemented, its use for ATC coordination should be accomplished in accordance with regional Interface Control Documents, and supported by letters of agreement between the facilities concerned.”*





# Pan Regional (NAT and APAC) Interface Control Document (PAN AIDC)

- Progressive evolution of the Asia/Pacific Regional ICD for AIDC, issued by the ICAO Asia/Pacific Regional Office and the North Atlantic Common Coordination ICD
- Addresses the need to provide globally harmonized guidance for AIDC
- First Edition, merging the APAC and NAT guidance material adopted in 2014



# North American Common Coordination Interface Control Document (NAM ICD)

- Developed to support adjacent international domestic airspace
- Based on:
  - Procedures for Air Navigation Services (PANS) - Air Traffic Management (Doc 4444)
  - North Atlantic Common Coordination ICD
  - Pacific Common Coordination ICD
- Outlines current and long-term guidelines for harmonized development of automation systems
- Designed as a living document that will be updated to reflect the needs of the member states



# Message Classes (PAN and NAM ICDs)

| Message Class   | Purpose   |
|---|---|
| Notification  | Notifies the receiving ANSP of incoming flight  |
| Coordination (PAN)  | Coordination of boundary crossing information   |
| Coordination of Pre-Departure (near border) Flights (NAM) | Coordination of boundary crossing information for flights departing near the border and at the flight time to the boundary is less than the normal advance time for sending CPL |
| Coordination of Active Flights (NAM)                      | Coordination of boundary crossing information   |
| Transfer of Control                                       | Transfer and acceptance of executive control of the flight  |
| General Information                                       | Exchange of information   |
| Application Management                                    | Exchange of application (e.g., data link) information   |
| Surveillance Data Transfer                                | Exchange of ADS-C data  |
| Interface Management Messages                             | Initialization of interface   |
| Acknowledgements  | Notification of reception of message and whether the message is free of syntactic and semantic errors   |
| Radar Handoff   | Transfer of radar identification for a flight   |
| Point Out Messages  | Exchange of position information for a flight   |



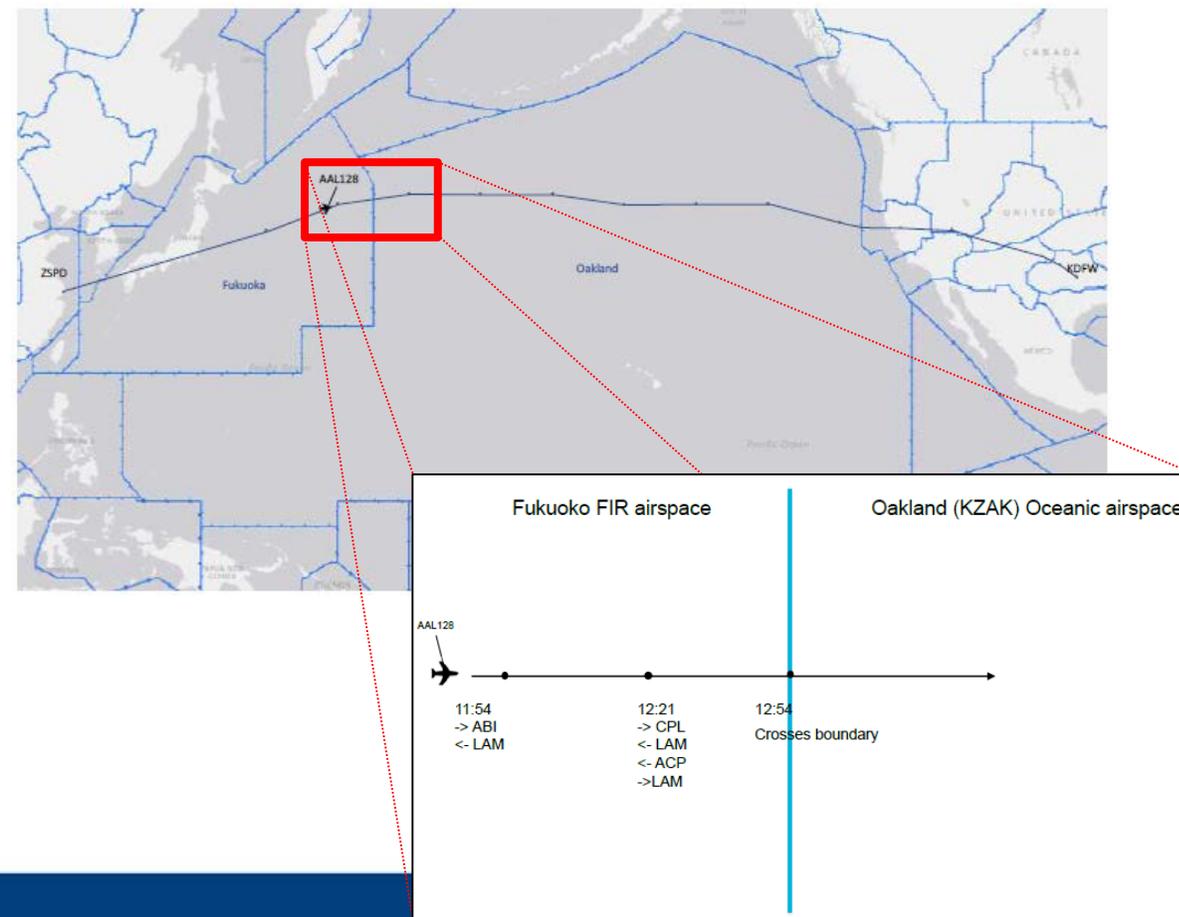
# Primary Automation Systems and Supporting Infrastructure

- En Route Automation Modernization (ERAM)
  - Used at FAA Air Route Traffic Control Centers (ARTCCs) for domestic operations
- Advanced Technologies & Oceanic Procedures (ATOP)
  - Oceanic air traffic control system, located at Oakland (ZOA), New York (ZNY), and Anchorage (ZAN) ARTCCs
- Air Traffic Services Message Handling Services (AMHS) and Aeronautical Fixed Telecommunications Network (AFTN)
  - Ongoing transition from Time-division multiplexing (TDM) to Internet Protocol (IP) Circuits



# Example 1: Notification and Coordination with No Changes (PAN ICD)

- AAL128 enroute from ZSPD to KDFW
- 1 hr prior to crossing, Advance Boundary Information (ABI) notification to inform of the incoming flight
- 30 min prior to crossing, Fukuoka sends Current Flight Plan (CPL) with crossing point, altitude, and time
  - Oakland responds with Logical Acknowledgement Message (LAM) to indicate receipt
  - Oakland also sends Acceptance (ACP) to indicate conditions are acceptable
  - Fukuoka responds with Logical Acknowledgement Message (LAM) to indicate receipt
- At boundary crossing, control transferred from Fukuoka to Oakland (No messages exchanged)



# Example 1 Messages

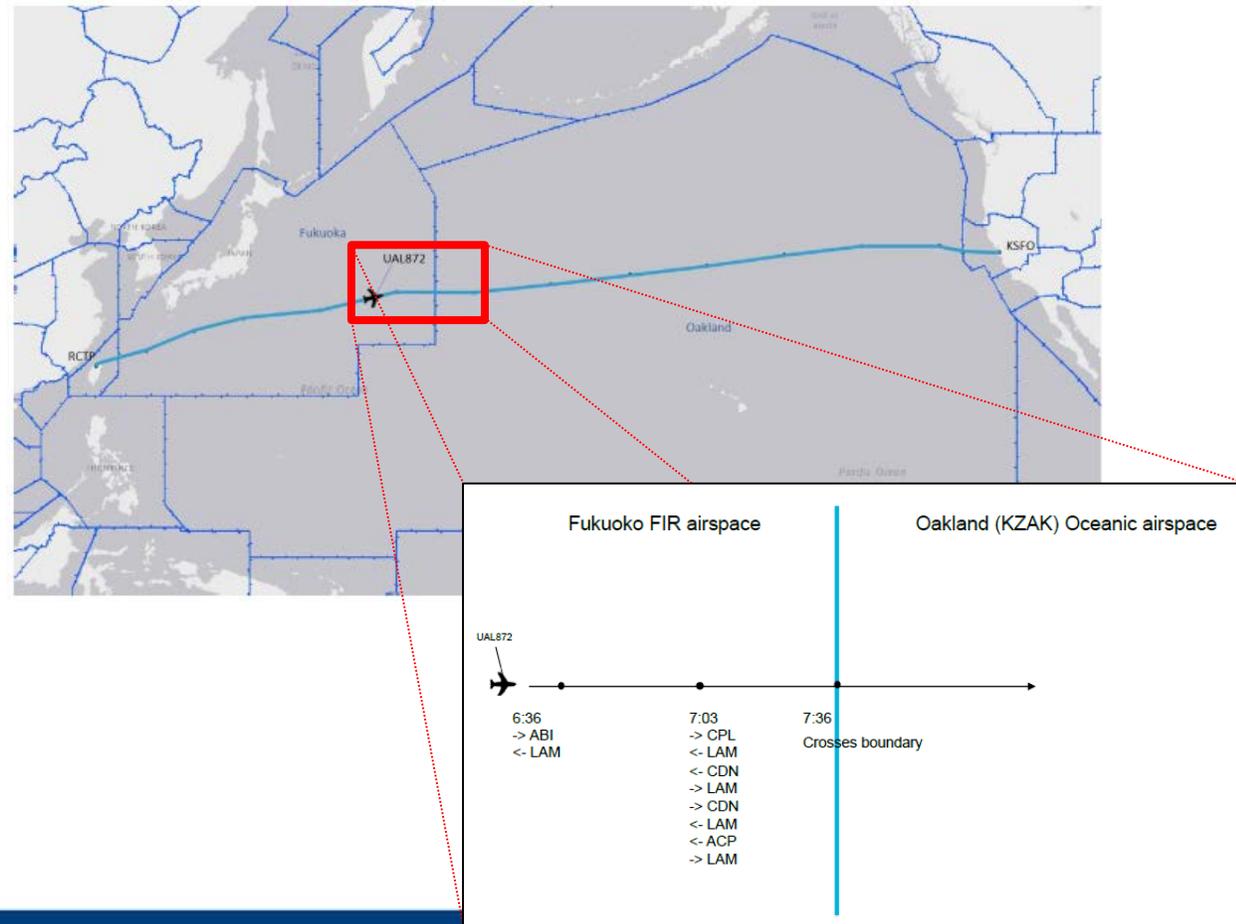
| Time  | Origin                      | Destination                | Message  |
|-------|-----------------------------|----------------------------|--|
| 11:54 | RJJZOZA<br>(Fukuoka System) | KZCEZQZX<br>(Oakland ATOP) | ABI-AAL128-ZSPD-4137N165E/1254F350/EM086-KDFW-8/IS-9/B788/H-10/SDE1E3GHIJ1J4J5M1RWXYZ/B1D1L-15/M086F350 41N160E 42N170E/N0474F350 42N180E/N0482F390 42N170W41N160W 41N150W 41N140W 39N130W DCT DACEM DCT SAC DCT ILC DCT BCEDCT RSK DCT PNH DCT MDANO VKTRY2-18/PBN/A1B1C1D1L1O1S1T1 NAV/RNVD1E2A1 RNP4 ACAS SUR/260B DOF/160801REG/N815AA EET/RKRR0027 RJJJ0037 ONION0233 ADNAP0241 EMRON0306160E0407 KZCE0434 170E0501 180E0556 170W0651 160W0745 150W0839140W0933 130W1030 DACEM1047 SEL/DRBM CODE/AB0D15 |
| 11:54 | KZCEZQZX                    | RJJZOZA                    | LAM  |

| Time  | Origin   | Destination | Message   |
|-------|----------|-------------|---|
| 12:21 | RJJZOZA  | KZCEZQZX    | CPL-AAL128-IS-B788/H-SDE1E3GHIJ1J4J5M1RWXYZ/B1D1L-ZSPD-4137N165E/1254F350/EM086-M086F350 41N160E 42N170E/N0474F350 42N180E/N0482F390 42N170W41N160W 41N150W 41N140W 39N130W DCT DACEM DCT SAC DCT ILC DCT BCEDCT RSK DCT PNH DCT MDANO VKTRY2-KDFW-PBN/A1B1C1D1L1O1S1T1 NAV/RNVD1E2A1 RNP4 ACAS SUR/260B DOF/160801REG/N815AA EET/RKRR0027 RJJJ0037 ONION0233 ADNAP0241 EMRON0306160E0407 KZCE0434 170E0501 180E0556 170W0651 160W0745 150W0839140W0933 130W1030 DACEM1047 SEL/DRBM CODE/AB0D15 |
| 12:21 | KZCEZQZX | RJJZOZA     | LAM   |
| 12:21 | KZCEZQZX | RJJZOZA     | ACP-AAL128-ZSPD-KDFW  |



# Example 2: Notification and Coordination with Coordination Changes (PAN ICD)

- UAL872 enroute from RCTP to KSFO
- 1 hr prior to crossing, Advance Boundary Information (ABI) notification to inform of the incoming flight
- 30 min prior to crossing, Fukuoka sends Current Flight Plan (CPL) with crossing point, altitude, and time (FL330)
  - Oakland responds with Logical Acknowledgement Message (LAM) to indicate receipt
  - Oakland also sends Coordination Negotiation (CDN) to indicate change to crossing altitude (FL340)
  - Fukuoka responds with Logical Acknowledgement Message (LAM) to indicate receipt
  - Fukuoka also sends Coordination Negotiation (CDN) to indicate a different crossing altitude (FL320)
  - Oakland also sends Acceptance (ACP) to indicate conditions are acceptable
  - Fukuoka responds with Logical Acknowledgement Message (LAM) to indicate receipt
- At boundary crossing, control transferred from Fukuoka to Oakland (No messages exchanged)



# Example 2 Messages

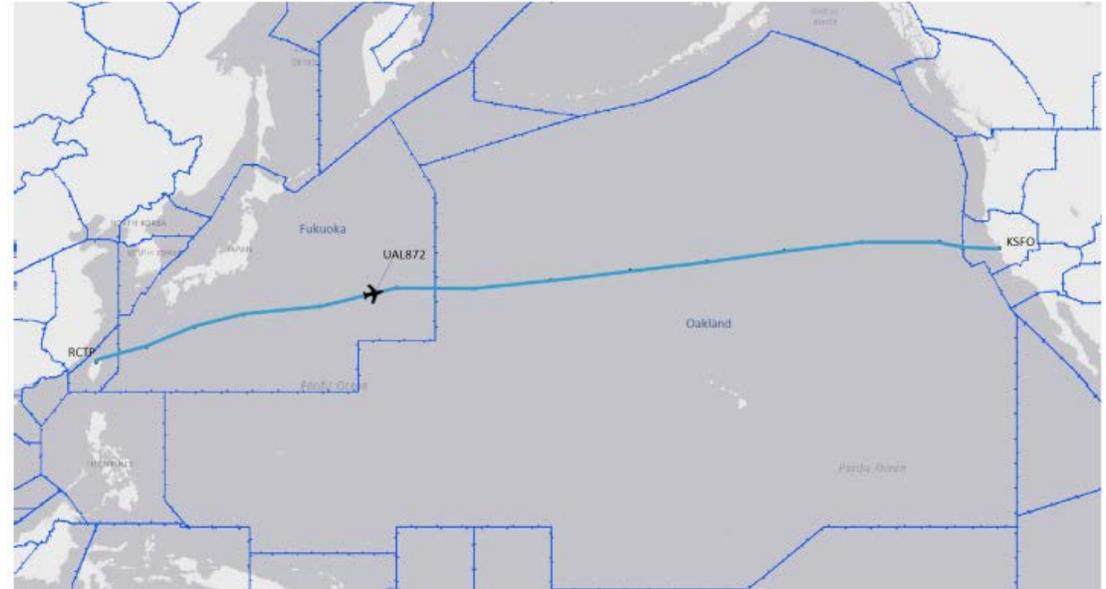
| Time | Origin   | Destination | Message   |
|------|----------|-------------|---|
| 6:36 | RJJZOZA  | KZCEZQZX    | ABI-UAL872-RCTP-3306N165E/0736F330-KSFO-8/IS-9/B77W/H-10/SDE3FGHIJ1J4J5M1RWXYZ/LB1D1-15/N0484F330 33N160E 33N170E DCT 34N180E DCT 35N170W/M083F350 DCT36N160W DCT 37N150W/M082F310 DCT 38N140W DCT 38N130W DCTALLBE/N0481F310 DCT PIRAT DCT OSI DCT-18/PBN/A1L1B1C1D1O1S2T1 NAV/RNP2 DAT/1FANSP2PDC SUR/260B DOF/180101 REG/N2639U EET/RJJJ0023 KZAK0359 KZOA0957 SEL/DHBK CODE/A28DC8 RVR/75 OPR/UAL PER/D RALT/RJTT PMDY PHNL KSFO RMK/TCAS |
| 6:36 | KZCEZQZX | RJJZOZA     | LAM   |
| 7:03 | RJJZOZA  | KZCEZQZX    | CPL-UAL872-IS-B77W/H-SDE3FGHIJ1J4J5M1RWXYZ/LB1D1-RCTP-3306N165E/0736F330-N0484F330 33N160E 33N170E DCT 34N180E DCT 35N170W/M083F350 DCT36N160W DCT 37N150W/M082F310 DCT 38N140W DCT 38N130W DCTALLBE/N0481F310 DCT PIRAT DCT OSI DCT-KSFO-PBN/A1L1B1C1D1O1S2T1 NAV/RNP2 DAT/1FANSP2PDC SUR/260B DOF/180101REG/N2639U EET/RJJJ0023 KZAK0359 KZOA0957 SEL/DHBK CODE/A28DC8 RVR/75 OPR/UAL PER/D RALT/RJTT PMDY PHNL KSFO RMK/TCAS               |

| Time | Origin   | Destination | Message   |
|------|----------|-------------|---|
| 7:03 | KZCEZQZX | RJJZOZA     | LAM   |
| 7:05 | KZCEZQZX | RJJZOZA     | CDN-UAL872-RCTP-KSFO-14/3306N16500E/0736F340-15/N0484F340 33N160E 33N170E DCT 34N180E DCT 35N170W DCT 36N160W DCT 37N150W DCT 38N140W DCT 38N130W DCT ALLBE DCT PIRAT DCT OSI DCT |
| 7:05 | RJJZOZA  | KZCEZQZX    | LAM   |
| 7:08 | RJJZOZA  | KZCEZQZX    | CDN-UAL872-RCTP-KSFO-14/3306N16500E/0736F320  |
| 7:08 | KZCEZQZX | RJJZOZA     | LAM   |
| 7:08 | KZCEZQZX | RJJZOZA     | ACP-UAL872-RCTP-KSFO  |
| 7:08 | RJJZOZA  | KZCEZQZX    | LAM   |



# Example 3: Transfer of Control

- Transfer of Control (TOC) and Acceptance of Control (AOC) used for transfer and acceptance of executive control of flight between ANSPs
- Notional exchange of message at crossing
  - At boundary crossing, Fukuoka sends Transfer of Control (TOC) message
  - Oakland responds with Logical Acknowledgement Message (LAM) to indicate receipt
  - Oakland also sends Acceptance of Control (AOC)
  - Fukuoka responds with Logical Acknowledgement Message (LAM) to indicate receipt



| Time | Origin   | Destination | Message              |
|------|----------|-------------|----------------------|
| 7:36 | RJJZOZA  | KZCEZQZX    | TOC-UAL872-RCTP-KSFO |
| 7:36 | KZCEZQZX | RJJZOZA     | LAM                  |
| 7:37 | KZCEZQZX | RJJZOZA     | AOC-UAL872-RCTP-KSFO |
| 7:37 | RJJZOZA  | KZCEZQZX    | LAM                  |

# Example 4: Near-Border Departure (NAM ICD)

- DAL122 departing KFAR to CYOW
- Filed Flight Plan (FPL) used between ANSPs for near-border departures when flight time to boundary is less than normal advance time for Current Flight Plan (CPL) messages
- Coordination Estimate (EST) sent to provide estimated crossing information
- Message sent from Minneapolis Center to Winnipeg Center with expected crossing point and altitude (Humboldt at FL350)



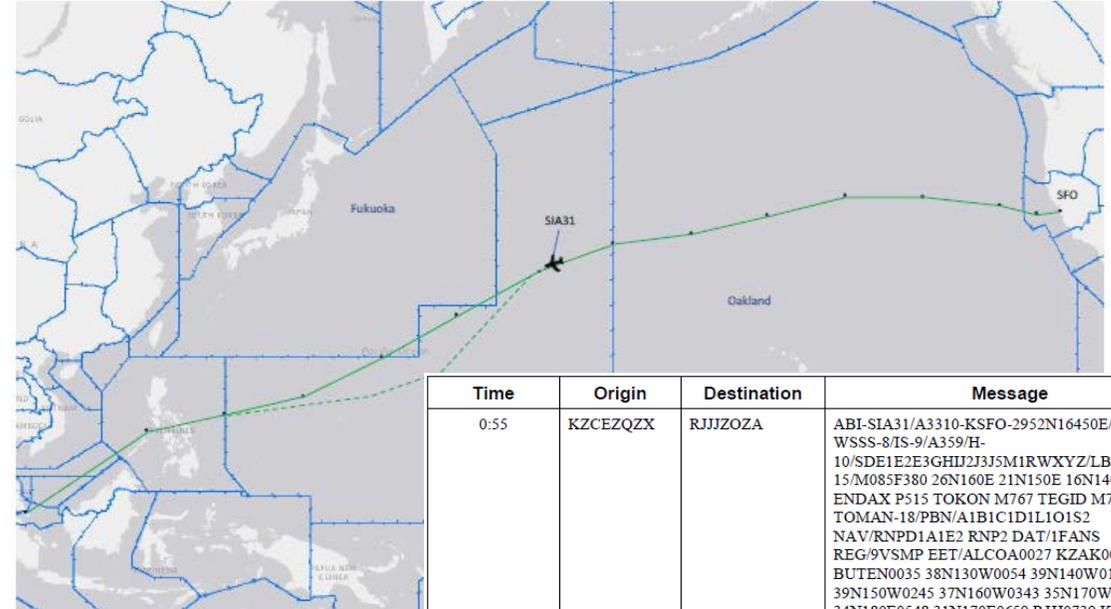
(ESTKZMP/CZWG992KZMP/CZWG991 -DAL122/A4322 -KFAR-HML/2042F350 -CYOW)



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# Example 5: Cancellation of Coordination (PAN ICD)

- SIA31 enroute from KSFO to WSSS
- 1hr prior to crossing boundary, coordination completed between Oakland and Fukuoka Centers similar to Example 1
- 15 minutes later, Oakland Center reroutes SIA31 which keeps the aircraft in Oakland airspace and bypasses Fukuoka
- Oakland sends Fukuoka Cancellation of Notification and/or Coordination (MAC) message which informs Fukuoka the flight is no longer relevant to them
  - MAC message cancels the coordination, but does not cancel the flight
- Fukuoka responds with Logical Acknowledgement Message (LAM) to indicate receipt

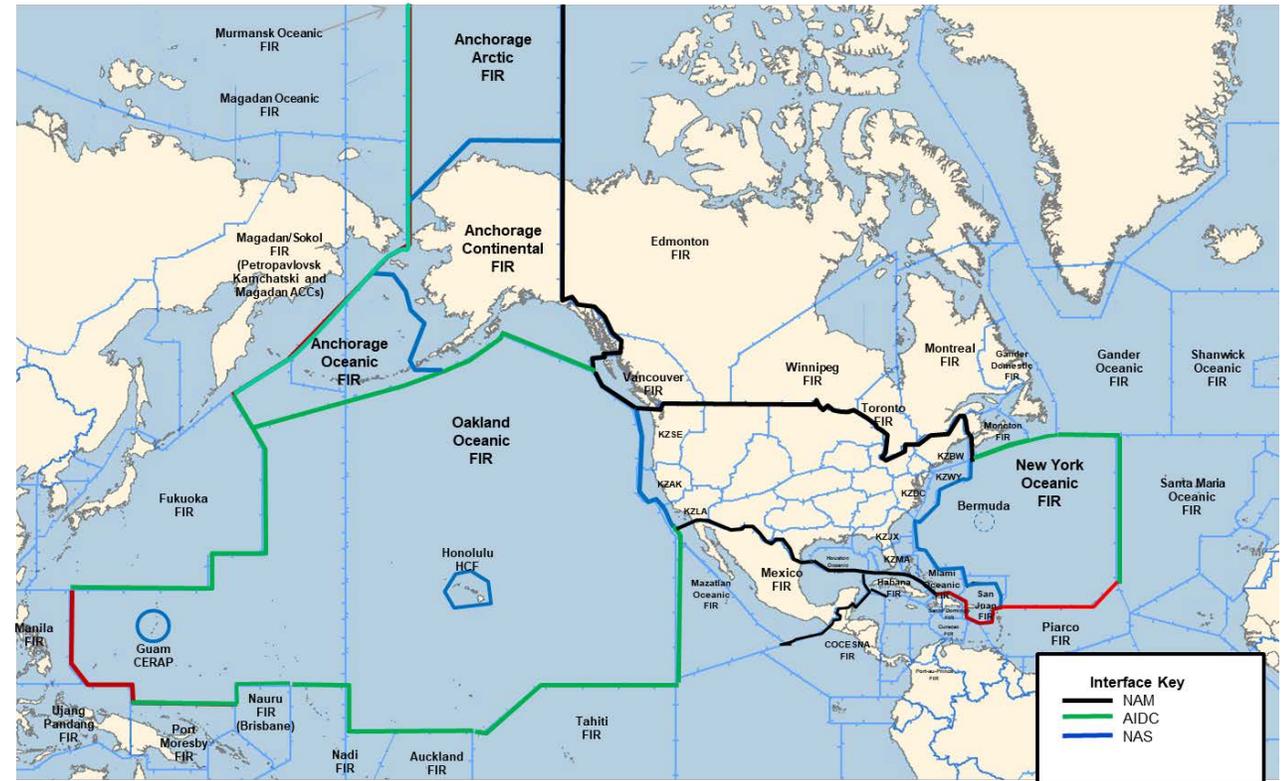


| Time | Origin   | Destination | Message  |
|------|----------|-------------|--|
| 0:55 | KZCEZQZX | RJJJZOZA    | ABI-SIA31/A3310-KSFO-2952N16450E/0333F380-WSSS-8/TS-9/A359/H-10/SDE1E2E3GHIJ2J3J5MIRWXYZ/LB1D1-15/M085F380 26N160E 21N150E 16N140E DCT ENDAX P515 TOKON M767 TEGID M767 TOMAN-18/PBN/A1B1C1D1L1O1S2 NAV/RNPD1A1E2 RNP2 DAT/1FANS REG/9VSMPEET/ALCOA0027 KZAK0033 BUTEN0035 38N130W0054 39N140W0150 39N150W0245 37N160W0343 35N170W0447 34N180E0548 31N170E0659 RJJJ0739 KZAK0804 26N160E0820 RJJJ0901 KZAK0943 16N140E1106 RPH1221 WSJC1414 SEL/GPDR CODE/76CDB0 OPR/SIA PER/C RALT/CYQQ PHNL PMDY PGUM RPLL RMK/ACASII EQUIPPED TCAS UPR FLIGHT |
| 0:55 | RJJJZOZA | KZCEZQZX    | LAM  |
| 1:10 | KZAK     | SIA31       | CLEAR 2440N158E 2015N151E ENDAX P515 TOKON M767 TEGID M767 TOMAN WSSS  |
| 1:11 | SIA31    | KZAK        | WILCO  |
| 1:11 | KZCEZQZX | RJJJZOZA    | MAC-SIA31/A3310-KSFO-WSSS  |
| 1:11 | RJJJZOZA | KZCEZQZX    | LAM  |



# Ongoing Expansion and Enhancements

- Pacific Ocean
  - Port Moresby connection established in 2022
  - Trial started with Manila end of 2022
  - In early talks with Ujung about starting trial
- North America/Caribbean
  - Ongoing coordination with Canada, Dominican Republic, The Bahamas, Cuba, and others to enhance interface
  - Progress towards voiceless radar handoffs and point outs



# Conclusion and Lessons Learned

- Safety and efficiency interests extend beyond our borders
- Operational efficiencies gained in the National Airspace System should be continuous to the extent possible into other regions and service providers
- Taking a harmonized approach with En Route and Oceanic systems extends collective capabilities
- Standardization of automated data exchange technologies and procedures is critical to cross-border, regional and multi-regional interoperability
  - Drives the seamless operation of regional and global systems
  - Both the NAM ICD and the PAN ICD extend the region's interface capabilities
- Harmonization supports safety objectives through standardization and promotes economic efficiencies
- A network of harmonized ATC systems cannot be built without developing partnerships with our international neighbors



# Thank you

