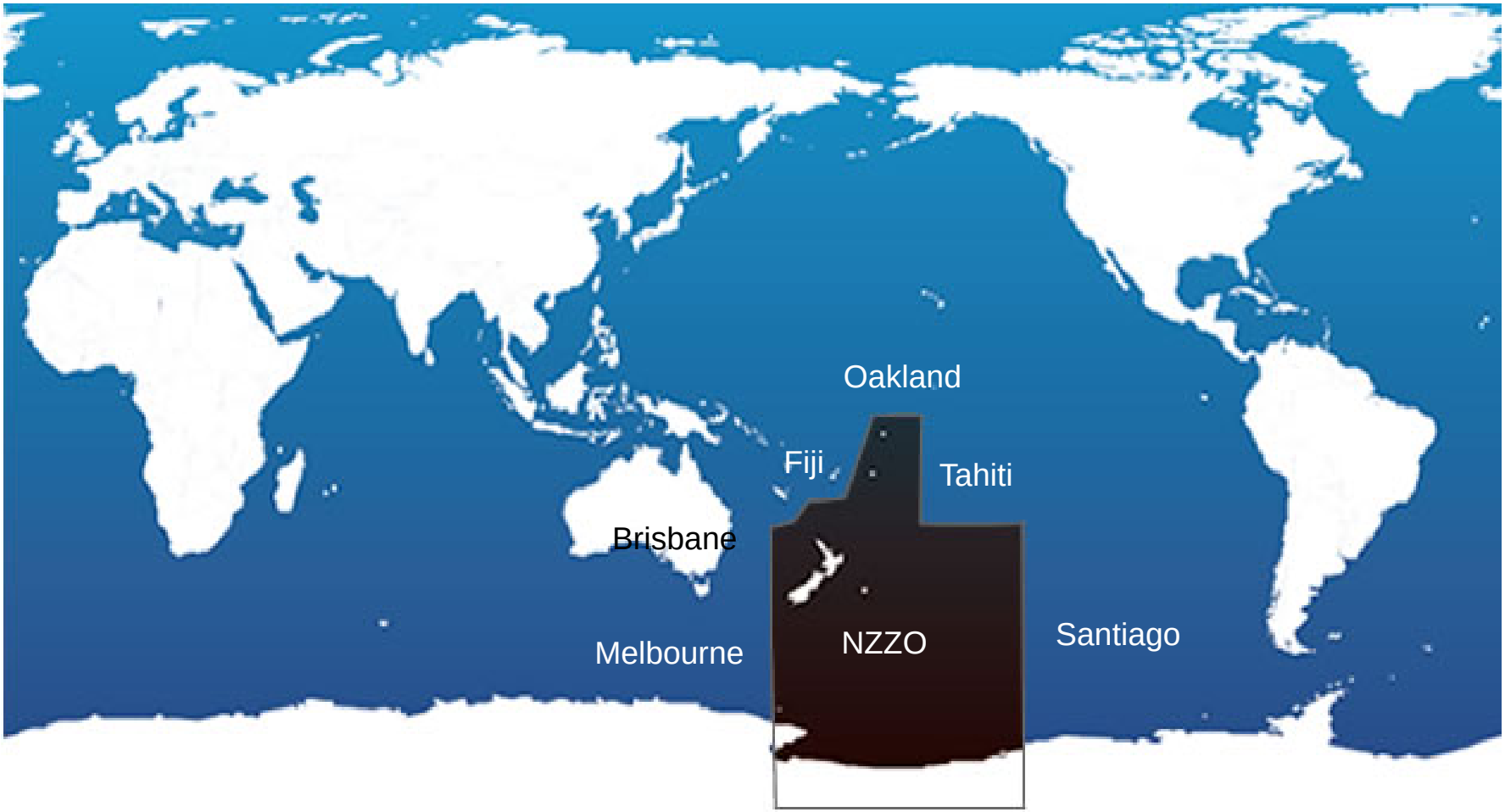
AIDC in the South Pacific - the NZZO perspective

(ICAO Seminar/workshop on the implementation of Ground Ground and Ground Air data link in the SAM Region)

Lima, Peru 10 -12 September 2012

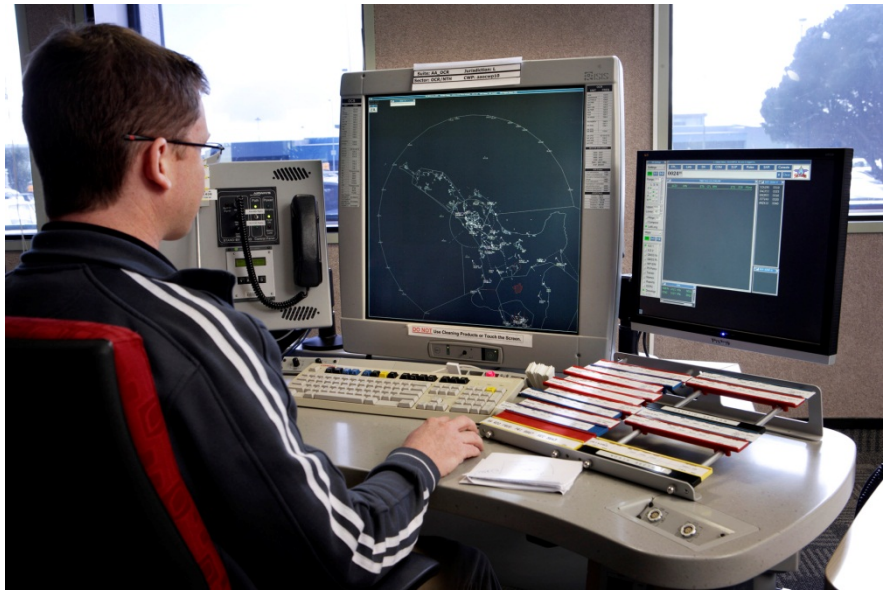
AIRWAYS NEW ZEALAND

NZZO (Auckland OCA)



Domestic ATM - NZZC

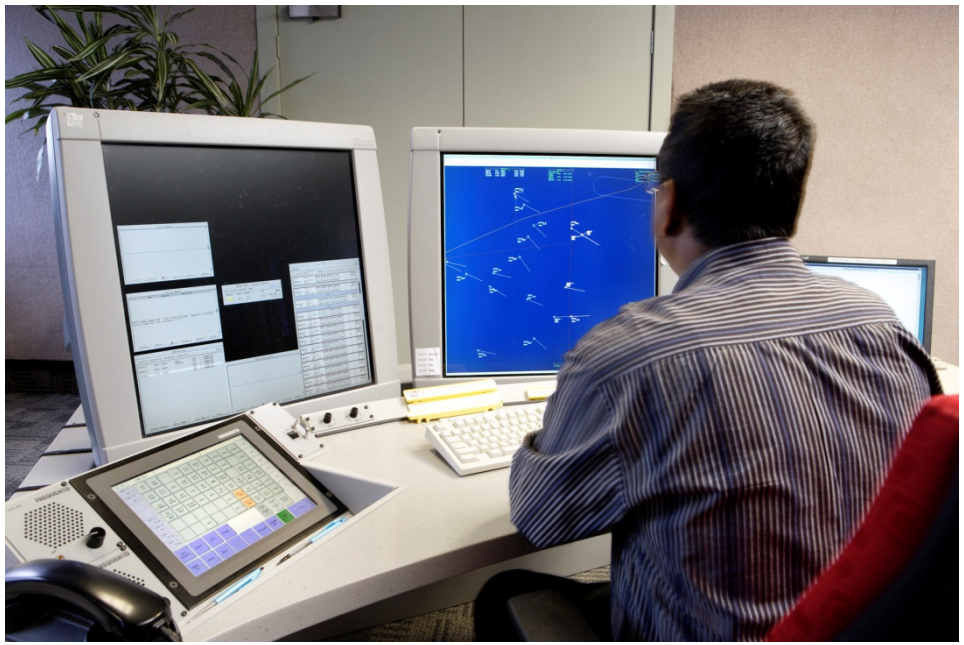
- Two Domestic ATC Centres – Christchurch (3 Terminal sectors 6 Area Sectors + Auckland (1 Area Sector)



- Skyline ATM System (Lockheed Martin)
- Installed 2002
- Surveillance
  - PSR
  - SSR
  - Multilateration
  - ADS-B
- AIDC interface with NZZO Auckland Oceanic

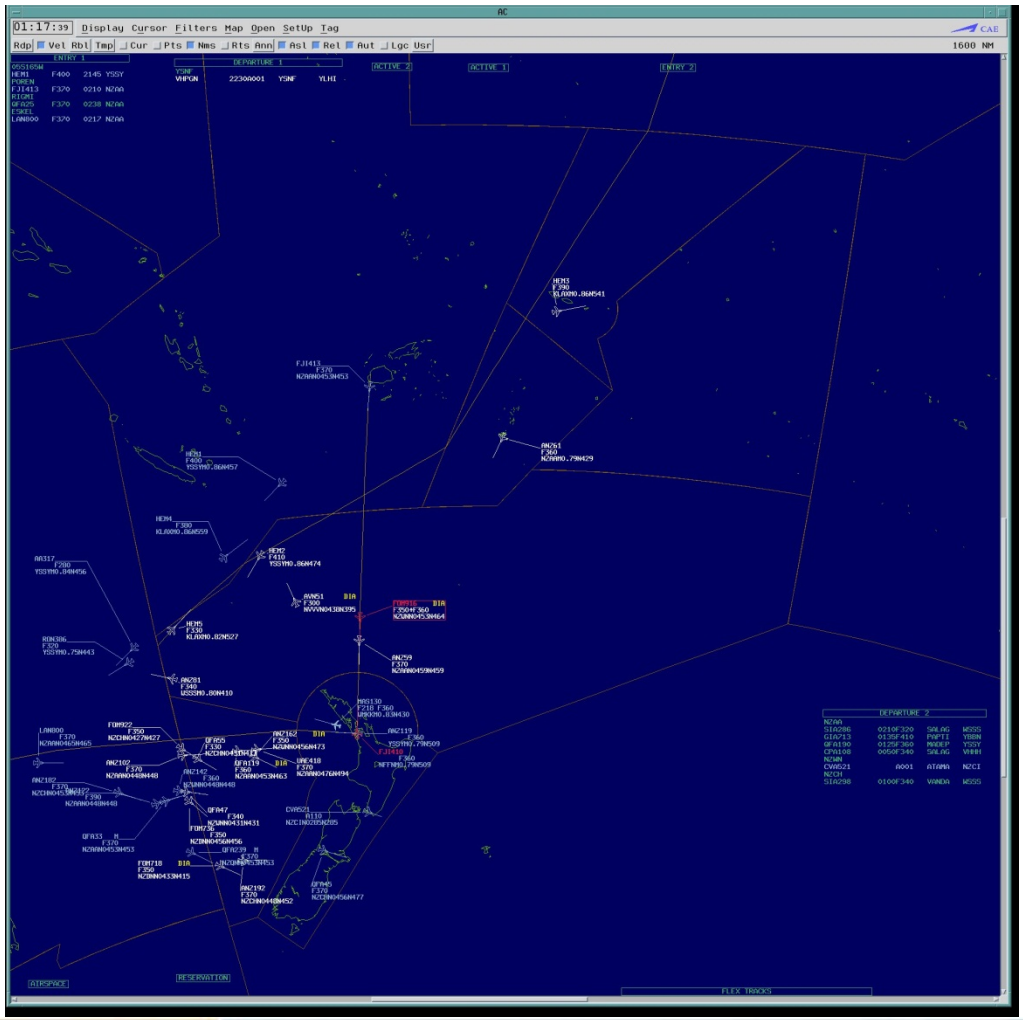
Oceanic ATM - NZZO

- Auckland Oceanic Centre
- ATM – Oceanic Control System (OCS)



- Installed 2000
  - Procedural System
  - FANS1/A integrated FDP
  - Conflict Probe
  - Electronic Strips
  - RNP10 50/50 separation
  - RNP4 30/30 separation
- Similar to FAA Oceanic Systems, Santa Maria, Nadi, and Iceland.
- AFTN AIDC interface with NZZC, YBBB, YMMM, NFFF, NTTT, KZAK per ASIA/PAC ICD.

Oceanic ATM - NZZO



- 2 Screens (Air Situation Display + Display Interface)
- 2K Barco – replacing with 30 inch LCD October 2012
- Airways manages own software and hardware upgrades
- 2nd Hardware refresh to be installed October 2012
- Airways schedules 4 software upgrades per year
- ICAO 2012 FPL software implemented July 2012

NZZO Oceanic ATM – AIDC Benefits

- The ICAO Global Plan notes that AIDC brings significant advantages over voice communication in terms of both workload and safety.

- The plan notes that the automation of coordination tasks using AIDC between adjacent sectors improves the quality of information on traffic transiting between sectors and makes it more predictable, thereby allowing reduced separation minima, decreased workload, increased capacity, more efficient flight operations, and enhanced safety.

- This has certainly been the NZZO experience.

NZZO Oceanic ATM – AIDC Benefits

- In NZZO AIDC was implemented with the OCS ATM system in 2000.
- At that time we were struggling to maintain a procedural paper strip based system using a single oceanic sector operation with an average of around 130 flights per day.
- With OCS and AIDC we are now handling an average of 220 flights per day and still maintaining a single sector operation.
- There has been a significant reduction in controller loop errors and a significant reduction in controller workload by automating the coordination tasks using AIDC.

NZZO Oceanic ATM – AIDC Benefits

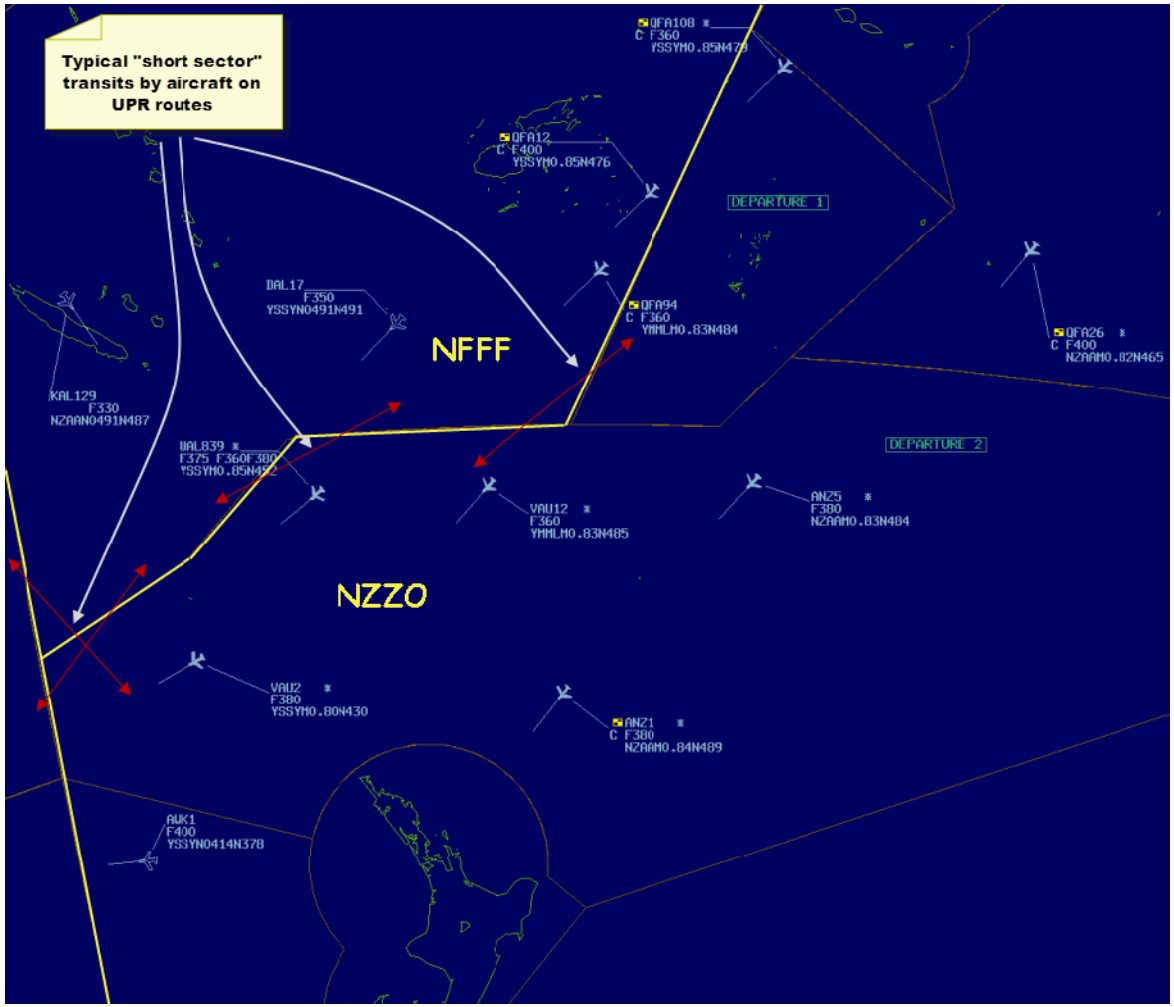
- DARP (Dynamic Airborne Reroute Procedure) has the aircraft making reroute requests directly to the ATC unit in control who then process and modify the request if necessary and forward the approved route to aircraft and the next downstream ATC unit.

- AIDC is a pre-requisite before implementing the DARP procedure.

- We have implemented DARP for aircraft in transit between Auckland, Nadi, Tahiti, and Oakland FIR.

- AIDC has provided Airways New Zealand and our customers the benefits envisaged in the Global Plan.

NZZO Oceanic ATM – AIDC Benefits



- Typical early morning traffic pattern in NZZO at 0400AM.
- All FANS1/A data-link aircraft (solid APS symbol) are flying UPR routes between NAM and Australia/New Zealand.
- Two of the southbound aircraft have carried out DARP procedure in Oakland airspace with the revised route passed by AIDC.
- Note traffic flow aligned with NFFF/NZZO boundary, we see numerous “Short Sector” transits with increased coordination requirements assisted by AIDC

AIDC – In SOPAC via AFTN

- Airways upgraded to a Comsoft AFTN/AMHS switch in March 2012.
- International AFTN circuits are still via X25.
- Intention is to upgrade international circuits to TCP/IP.
- All AIDC currently via AFTN but intention is to move to AMHS.
- Representative AIDC messages received per month and latency

	ABI	CPL	CDN	EST	ACP	TOC/AOC
Average	3.5"	2.5"	2"	2"	2"	1.5"
Min	2"	1"	1"	1"	1"	1"
Total #	4216	3420	5003	2095	5988	10123

- 66726 AIDC messages were received in month illustrated with 99.9% received within 20 seconds.
- Of 35717 messages with LAM response 1 LAM exceeded accountability timer of 180 seconds

AIDC Interface Differences NZZO and .....

- OCS allows the specification of individual message sets per FIR and the parameters to be used with each set in adaptation.
- The adaptation data for each FIR includes:
  - the type of messages to be used e.g. CPL or EST;
  - the fields to be used in each message;
  - the timing of messages;
  - Route detail to be sent in Field Type15. Some FIR require the Field type 15 route to start at the waypoint preceding the coordination point while others expect the full FPL route to be included;
  - The different Field type 14 optional subfields used by each FIR (block level, speed, weather deviation/offset).

AIDC Interface Differences NZZO and .....

	YBBB	YMMM	NFFF	NTTT	KZOA	NZZC	SCIZ**
Notify	ABI	ABI	ABI	ABI	ABI	ABI	ABI
Coordinate Initial	EST	Voice	CPL	CPL	CPL	CPL	EST
Coordinate Negotiate	CDN	Voice	CDN	CDN	CDN	CDN	Voice
Item 14 - Block Level	YES	YES	YES	YES	YES	YES	YES
Item 14 – Weather Deviation/Offset	NO	NO	YES	YES	YES	YES	YES
Item 14 - Speed	NO	NO	YES	YES	YES	NO	NO
Notify Time	40’	40’	40’	60’	70’	120’	90’
Coordinate Initial Time	30’	30’	30’	30’	30’	30’	30’
Field 15 Route type	ALL	ALL	ALL	ALL	PRE-COP	PRE-COP	PRE-COP

NZZO – OCS Coordination HMI (1)

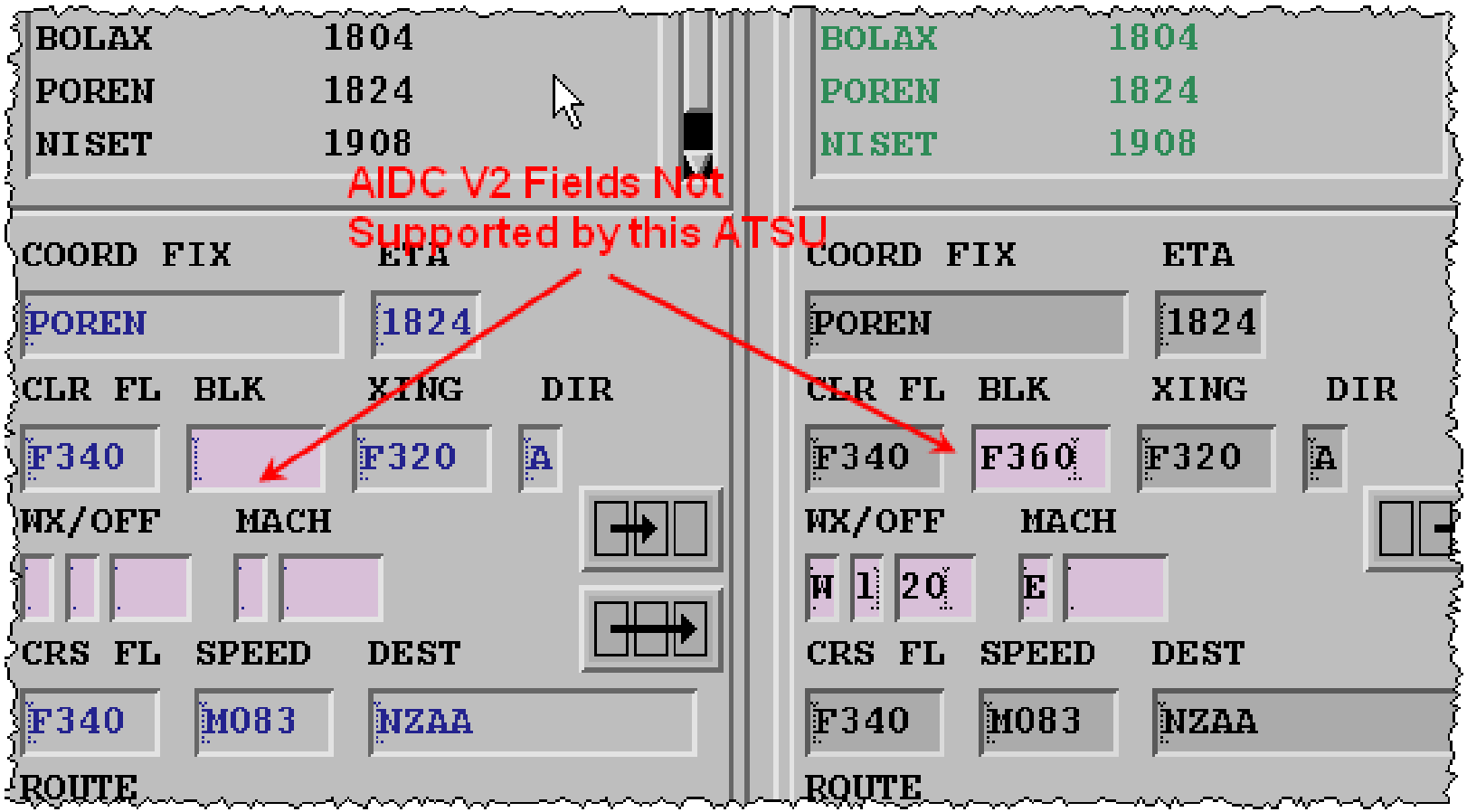
Coordinated Block F340F360

Coordinated Fix PEBLU/0006

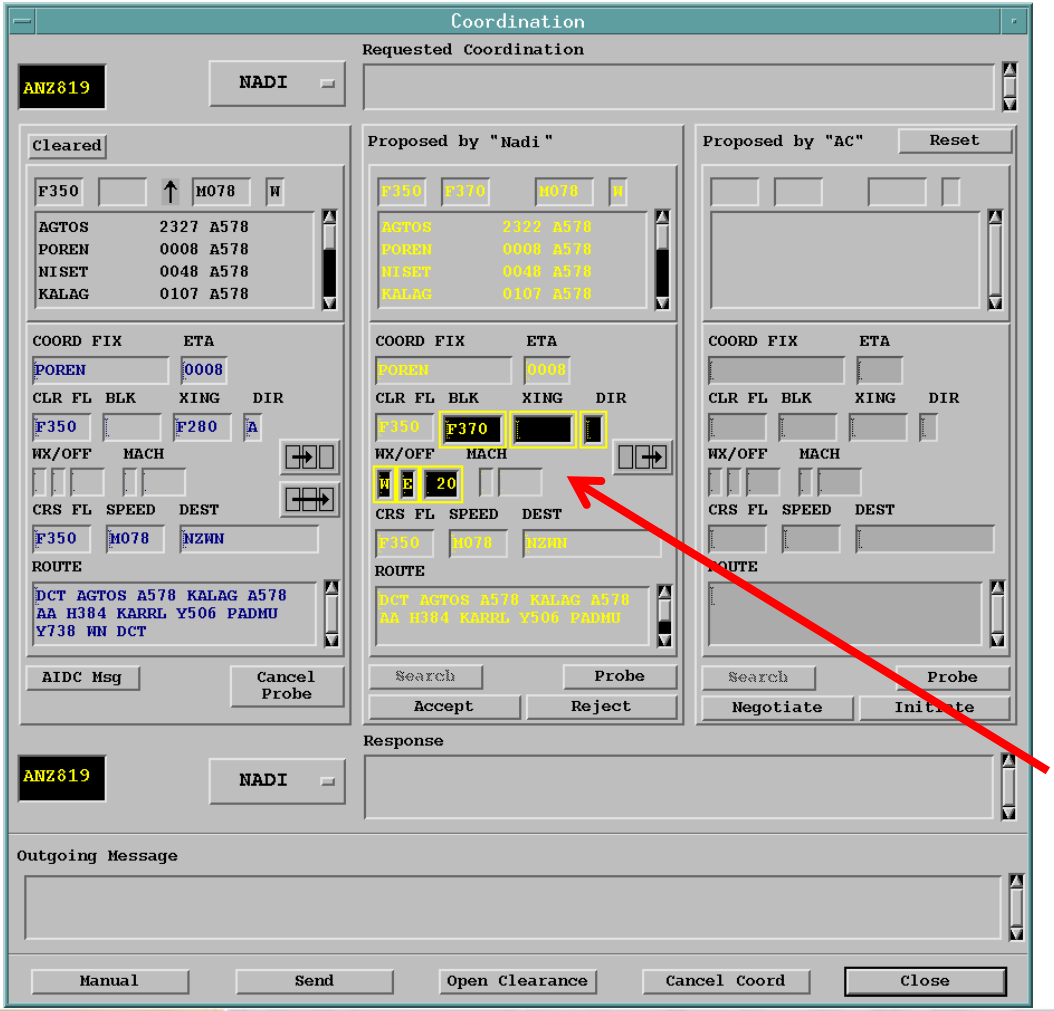
Pink background indicates Mach Speed coordination is not available with this sector

Coordinated Weather Deviation (W)
Up to 30NM Right (R 30)

NZZO – OCS Coordination HMI (2)



NZZO – OCS Coordination HMI – CDN receipt

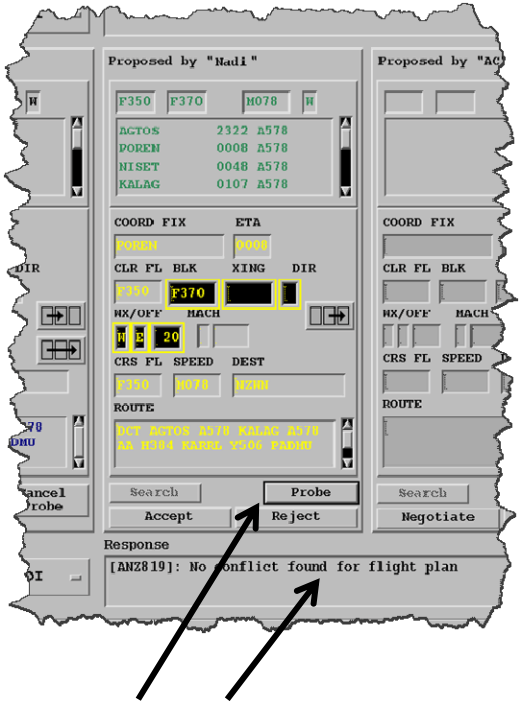


CDN Message – proposing a change in coordination is received from Nadi (NFFF) and processed from controllers queue.

The Coordination window opens with proposed data prefilled and changes from current coordination highlighted.

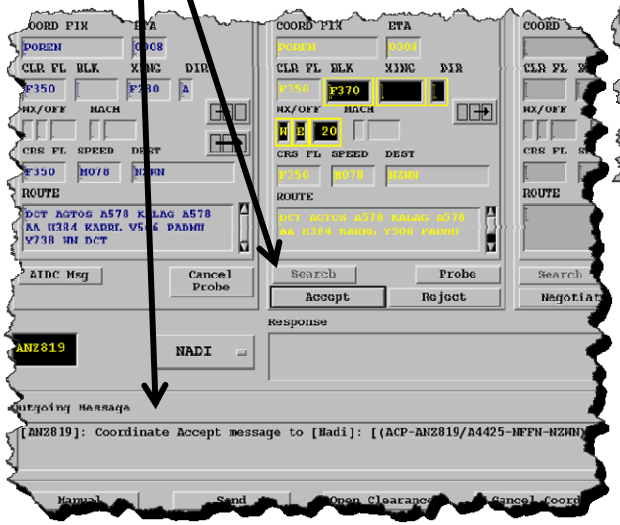
(CDN-ANZ819/A4425-NFFN -NZWN -14/POREN/0008F350F370/W20E -15/M078F350 DCT AGTOS A578 KALAG A578 AA H384 KARRL Y506 PADMU Y738 WN DCT)

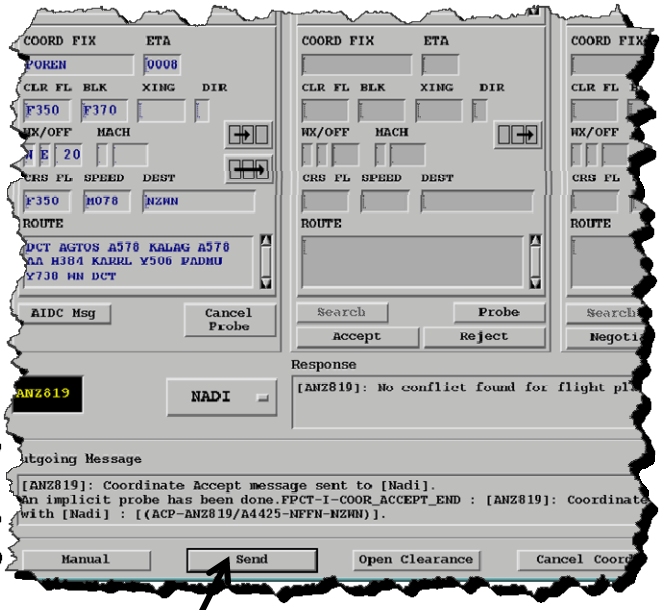
NZZO – Coordination HMI – Process CDN



1. **Probe** – for conflict
2. **Response** – no conflict found

3. Accept – construct ACP message





4. Send – send ACP message (ACP-ANZ819/A4425-NFFN-NZWN)

NZZO – Coordination – Typical Processing

- The CDN processing depicted in the previous two slides occurred on 4 September 2012. The timing of the AIDC exchange was as follows:
  - 2339:42 Nadi send AIDC CDN message
  - 2339:44 CDN message received in the controllers queue.
  - 2340:16 CDN message processed from queue.
  - 2340:20 Proposed coordination probed for conflict.
  - 2340:24 ACP message sent to Nadi.
  - 2340:26 ACP message received in Nadi
  - 2340:28 LAM response received from Nadi
    - 44 seconds for Nadi controller to complete co-ordination
    - 8 seconds for Auckland controller to process co-ordination

NZZO – AIDC Interface testing

- Airways has a number of OCS platforms separate from the Operational Main and Reserve platforms, that we use for training, software development, and contingency operations.
- We have the ability to setup one of these platforms with its own AFTN connection and distinct AFTN address to enable it to be used for full AIDC testing with other units.
- This AIDC test platform was successfully used for the pre-implementation testing of the new TIARE ATM system in Tahiti in 2008 and 2009, and for the pre-implementation testing of the new Aurora ATM system in Fiji in early 2010.
- More recently it has been used for ICAO 2012 FPL AIDC interoperability testing with the FAA and Tahiti. Interoperability scheduled with Australia late September.

NZZO – AIDC issues

- Incorrect route truncation. The Asia/Pacific ICD clearly states the rules required for truncating a route after the last known significant route point. If these rules are not followed there are significant risks associated with the transmission of incorrect route information to the downstream ATC unit. While the majority of instances investigated in New Zealand are the result of human error there have been occasions when the automation system was at fault. With the increasing use of DARP procedures and route modifications the accuracy of route handling and transmission between automated systems is of increasing importance. We have found that comprehensive training backed up by regular refresher training is required to minimize these errors.

NZZO – AIDC Issues

- Handling duplicate fix/airway information. A lot of the route processing errors we see are caused by duplicated fix or airway names. The OCS ATM system can handle duplicate fixes in most cases because it uses both the fix name and associated FIR key as the key ie. AA NZZC, AA NFFF, AA NTTT. However, because we do not operate a global data base we do strike problems where a duplicate fix name is used as the entry point to an airway. If the duplicate fix name is known in adaptation but the airway is not the route extraction will fail requiring manual intervention. In the days when most flights flew fixed routes this was not such an issue. However, with the increasing use of UPR routes we are finding we have to spend more time on database management to keep this type of error at a minimum.

NZZO – AIDC issues

- Conformance monitoring by the ATM automation. Mitigating route inaccuracy caused by failures in route truncation requires ground automation conformance monitoring of received position reports against the current flight plan.
- This conformance checking in the Airways OCS ground system will check the reported current, next, and next+1 positions against current flight plan.
- Conformance monitoring also provides mitigation for flight plan input errors in the aircraft FMS.

NZZO – AIDC issues

- ATM system software coding differences. Different ground systems often come up with different interpretations of the same AIDC specification.
- We have seen a number of different interpretations since implementing AIDC which we have had to work around.
- While the interoperability testing and software development associated with the introduction of the ICAO 2012 FPL changes have been able to eliminate most of the coding differences we expect to see some more examples introduced as we move into the full use of the ICAO 2012 Flight Plan.

Thank you

Paul Radford
Oceanic Systems Manager
Airways New Zealand
paul.radford@airways.co.nz

AIRWAYS NEW ZEALAND