The background features a large, faint watermark of the NATCA logo. It consists of two concentric circles. Inside the inner circle is a stylized aircraft cockpit. The word "NATCA" is written across the center in a large, bold, red font. A registered trademark symbol (®) is located to the right of the word "NATCA".

Preparation for Air-to Ground

Data Link

Why CPDLC?

An ANSP Perspective

Background

- The world's aviation system is rapidly evolving to address volume and complexity issues that are growing at an exponential level.
- As we collectively seek to modernize our systems of managing traffic, we are all looking for solutions designed to increase capacity, increase efficiency and meet or exceed existing safety standards.
- One of these solutions is Controller Pilot Data Link Communications. (CPDLC)
- **VIDEO CFS 2015**

Examining the Application of CPDLC

- CPDLC is a form of communication that enables many more options for managing aircraft volumes and complexities.
- It provides a text based solution to many applications that were previously required to be addressed using voice communications.
- CPDLC improves the accuracy, utilizes standardized message formats, and improves overall system safety.

Examining the Application of CPDLC

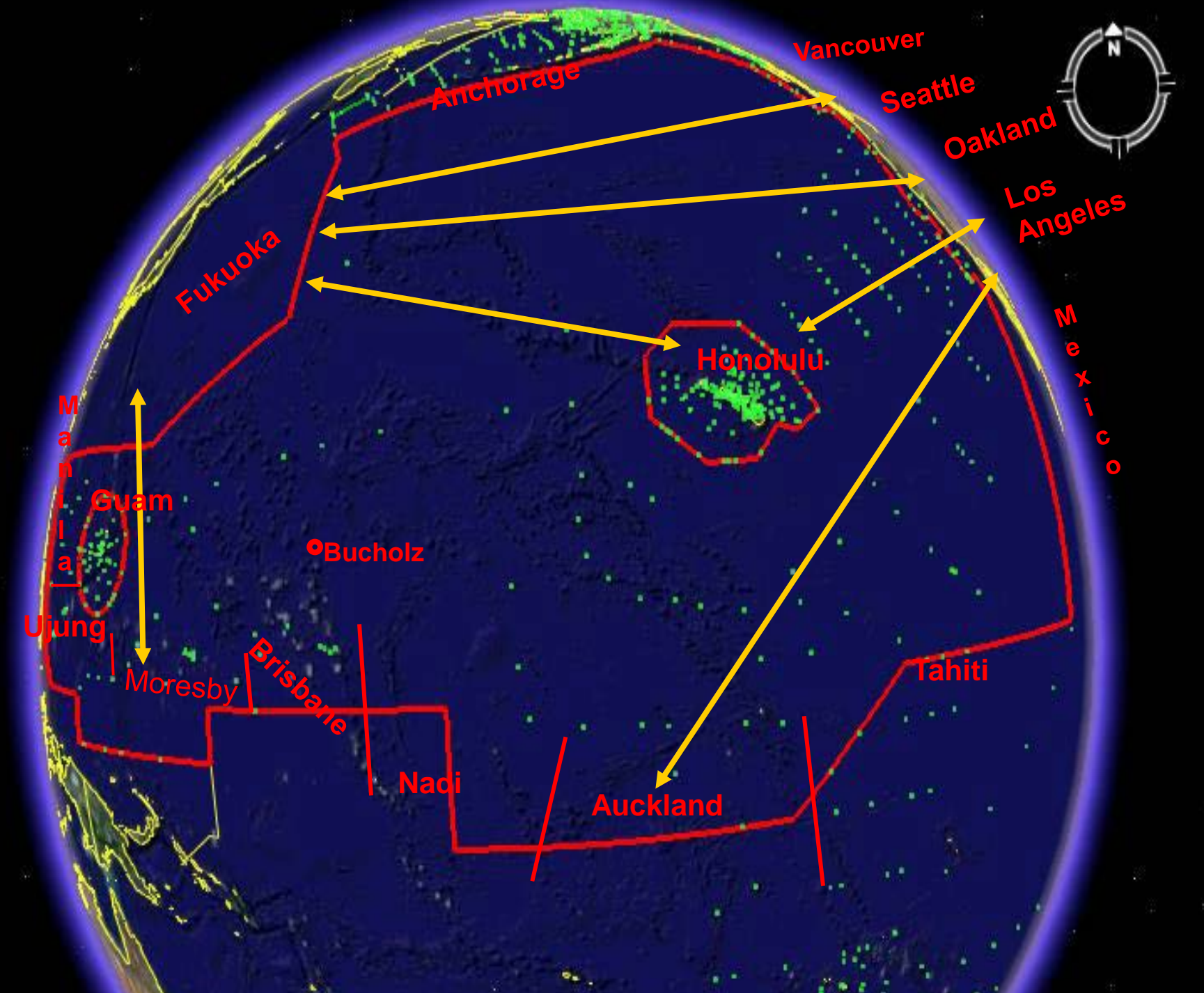
- In the United States, the domestic application of CPDLC is still in its infancy stage of deployment, and is targeted for system deployment across the next several years.
- Data communications as a whole are all gauged to address the same set of problems that we have previously discussed.
- Domestic Data Communications are already in use across much of Europe and are expanding.
- **VIDEO DataComm2015**

Examining the Application of CPDLC

- I will seek to demonstrate the application of CPDLC at one facility within U.S. Oceanic Airspace.
- CPDLC will provide the medium to address growing aircraft volumes in complex manual environments.
- Oakland ARTCC will be used as the example facility utilizing CPDLC, and the platform applications that it influences.

OAKLAND ARTCC OCEANIC AIRSPACE

- Largest Oceanic Airspace in the world controlled by one facility. This airspace spans 9.56% of the earth's surface.
- OAKLAND ARTCC Oceanic (ZOA Oceanic) is comprised of eight Oceanic Sectors and four costal radar sectors.
- ZOA interfaces with 19 different international and domestic facilities.



Oceanic Air Traffic Control

- **Manual control**
- **Visual display through computer generated tracking system**



- CPDLC provides a communication medium required to implement a more modern Oceanic control system.
- When applied in conjunction with advanced navigation applications, the resulting opportunity to improve system fidelity and service applications can be realized.
- In the United States this operational platform is the Oceans 21/ATOP system
- This system has renovated the Oceanic ATC environment, and the separation standards that can be applied.

ATOP Oceans 21

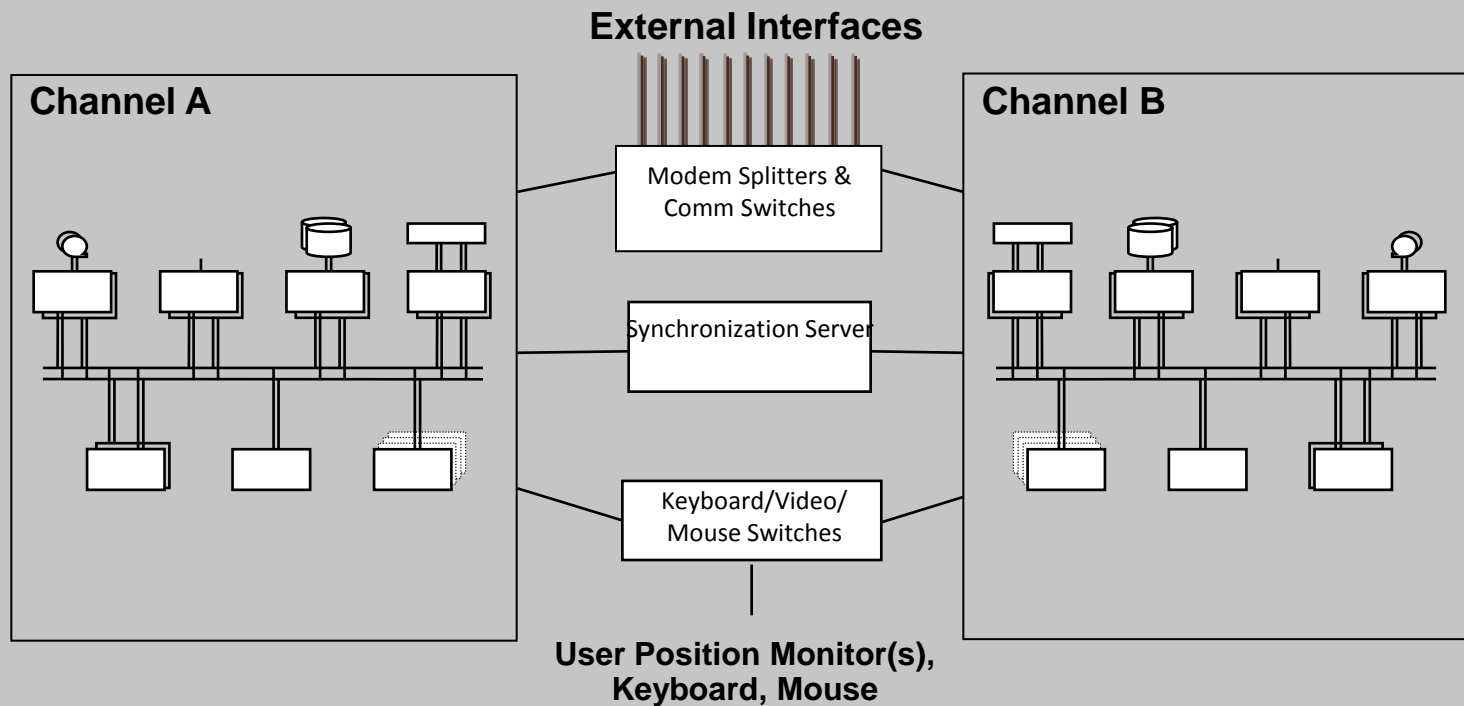
ATOP is an ICAO compliant Flight Data Processing System (FDP). This system utilizes/provides the following integrated tools:

- System maintained electronic flight Data
- Controller Pilot Data link Communications CPDLC
- Air Traffic Services Inter-facility Data Communications AIDC
- Automatic Dependent Surveillance (ADS)
- Automated Conflict Detection
- RADAR Data Processor (RDP)
- 24/7 Operations (dual channel architecture)



ATOP Equipment Capabilities: Two Channel Concept

Allows for 24/7 Operations

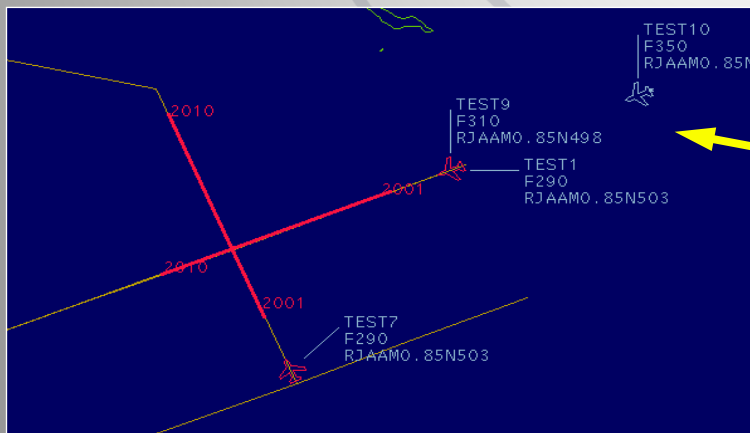


CONFLICT Probe

- The system detects conflicts and the Controller resolves them.
- Aircraft-to-Aircraft and Aircraft-to-Airspace.
- The Probe runs automatically on all trajectory updates.
- Applies appropriate Separation Standard.
- System enforces Pre-Delivery trial probe for all clearances.
- Employs additional Controller tools.

CONFLICT SUMMARY						
<u>Override</u>					<u>Help</u>	
Intruder	Att	Active	Att	Ovrd	Type	StartTime EndTime
TEST8	-	TEST1	-	X		1901 1910

Conflict Report					
crossing		REQUIRED 15 minutes (50 nm) 1000 ft			
89 degrees	LOS	19:01	ACTUAL	3 min 12 sec (49 nm) 0 ft	
PASSING POINT			CONFLICT SEGM		
B744	F290			5843N	5948N
TEST8	M085			17356W	17453W
				1901	1910
B744	F290			5922N	5854N
TEST1	M085			17245W	17454W
				1901	1910



Ocean21 ATC Clearances

- Controller Clearance Window
 - Utilizes CPDLC Messages
 - Applies Conflict Probe

The screenshot displays the 'CLEARANCE' window in Ocean21. At the top, a header bar contains the word 'CLEARANCE'. Below this, a status bar shows the identifier 'ANZ3C' and a long alphanumeric string: '5126N17258E 0833/ 4637N17425E 0908/ 4030N17536E 0952/ 3401N17626E 1039/ 2719N17519E 112'. The main area is a table with columns for various clearance parameters. Below the table, there are three lines of text representing clearance instructions: '(169) (freetext) PACIFIC ONE TA', '(83) AT COSTS CLEARED ROUTE', and '(19) MAINTAIN F330'. To the right of this text are 'INS' and 'DEL' buttons. At the bottom, a row of buttons includes: PRB, CAN, TPRB, SND, UNBL, VHF, SAVE, EALT, OVRD, COORD, RCPT, REJ, HLP, and CLS.

Urgent	Rpt	Negot	Rspn	Misc	Vert	Route	Speed	X-ing	Conn							
RP	RR	Climb	@Time	@Fix	bTime	bFix	DSCND	@Time	@Fix	bTime	bFix	CROSS	AOA	AOB	NDA	HOLD

(169) (freetext) PACIFIC ONE TA
(83) AT COSTS CLEARED ROUTE
(19) MAINTAIN F330

PRB CAN TPRB SND UNBL VHF SAVE EALT OVRD COORD RCPT REJ HLP CLS

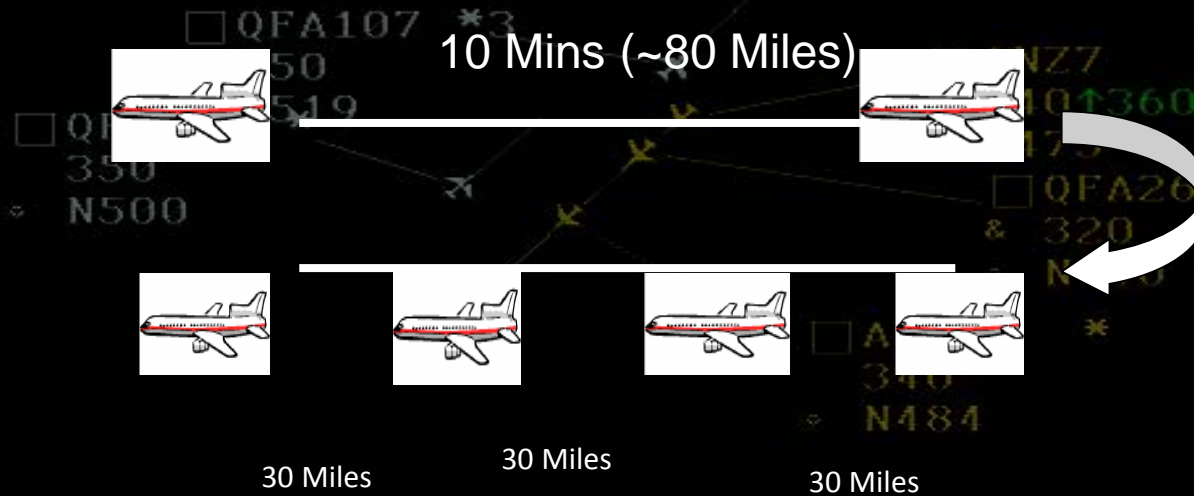
ATS Interfacility Data Communication (AIDC)

- Automated Flight Data Transfer.
- Eliminates/Reduces Verbal Coordination.
 - Reduces Coordination Errors
- In use with Japan, Anchorage, Tahiti, Nadi, New Zealand, Mexico and Australia. ®
- NAM Interface with Canada
- NAS Interface with Domestic FAA Facilities.



- The ATOP system has been the foundation at Oakland ARTCC for initiation of new procedures which are improving the efficiency and safety of Oceanic Operations

The ATOP System has enabled changes to manual separation standards. The previous standards that required as much as 10/15 minutes or 100 miles of separation have been reduced to as little as 30 miles lateral or longitudinal separation.



The ATOP System has Enabled Improved
Airspace Efficiency and Capacity via Reduced
Separation Standards

Tailored Arrivals

- A Tailored Arrival is an arrival clearance that is uplinked to an aircraft.
- The clearance contains a route with vertical crossing restrictions and/or speeds along the points of the route of flight,
- The aircrew can use their FMS to fly the most efficient descent path possible.

Other Enhancements

- There are a host of ongoing and additional system enhancements that have been added and are continuing to be built as we move forward with next generation deployments.
- Most of these enhancements are directly tied to the use of CPDLC.
- Above all, system safety continues to be the primary driver as we move forward in the global aviation system development.