



AURORA ATM SYSTEM

**New technology in ACC Automation system
Implementation in Fiji Islands and French Guyana**

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Who Is Adacel?

- Founded in 1987
- Offices in **Montréal, Canada**, Orlando, USA and Melbourne, Australia
- **ATM**: Providing Leading-Edge Aerospace Software with the Aurora ATM system that is widely used and provides advanced flight data processing capabilities
- **ATC Simulation**: Tower Simulation with MaxSim (360', VR), Radar
- **Advanced programs**: Training Solutions with voice recognition (ICE)

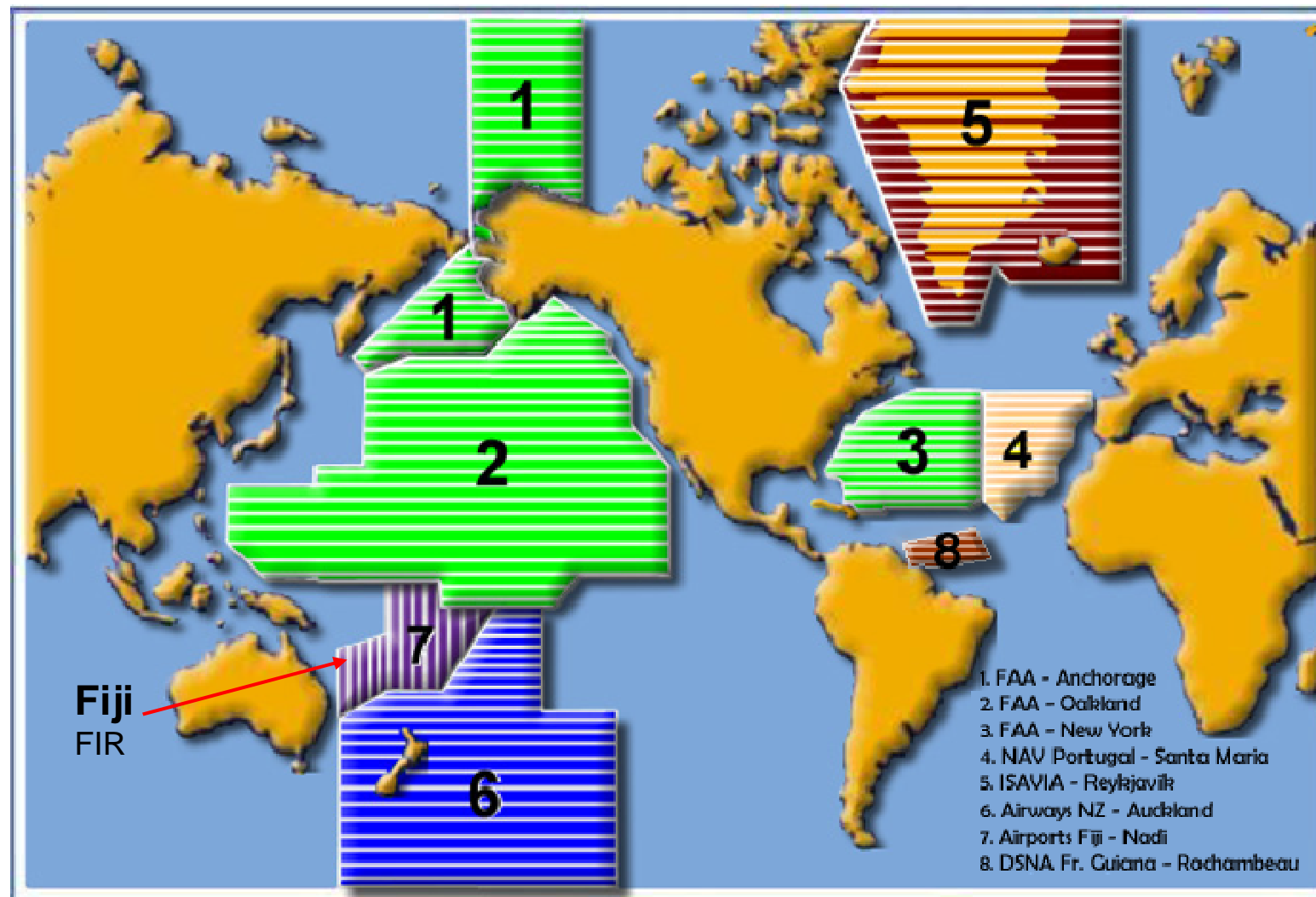
History

- Airports Fiji Limited (AFL) provides Air Traffic Management (ATM) services in the Nadi Flight Information Region (FIR).
- This includes the airspaces of Fiji, Tuvalu, New Caledonia, Kiribati and Vanuatu, covering a 6.0 million square kilometer area.
- AFL owns and manages Nadi International Airport, and manages Nausori and 13 other domestic outer island airports.

History

- Before the implementation of Aurora ATM the Fijian ATCO's had to rely on paper strip feed by the printer interfaced with AFTN and use the support of HFRO to communicate with the Oceanic traffic.
- The adjacent FIRs of Oakland California and Auckland New Zealand have been using Adacel's software with the integrated ADS-C/CPDLC, for many years.

Aurora: Advanced Air Traffic Management System



Implementation

This is the story of how Adacel ATM implemented the Aurora system for the OCS, TMA and 2 Towers at the Fiji FIR:

- ✓ Visit of Operational and Technical teams to Nadi and Nausori
- ✓ Thorough review of the requirements
- ✓ Teamed up with ERA for the ADS-B/MLAT (Wise decision by AFL to acquire ADS-B/MLAT)
- ✓ Airways New Zealand, responsible to Adacel for controller training and responsible to ERA for airspace design, safety case and supply of the billing system

Fiji- Operational and Technical requirements

- Oceanic, Enroute Approach and 2 Control towers
- Surveillance (ADS-B and MLAT)
- Datalink (CPDLC and ADS-C)
- HFRO positions
- Training Operational and Technical
- Maintenance
- Field Service Representative
- Billing & AMHS

AURORA tailored made for Mixed Airspaces

Flight Data and Surveillance Processing integrating all available surveillance sources (ADS-B/MLAT, ADS-C, CPDLC, *Radar*), in a procedural environment

- 4 D profile
- Conflict detection
- All Safety Nets
- EFS (Electronic Flight Strips)
- Automatic or manual coordination

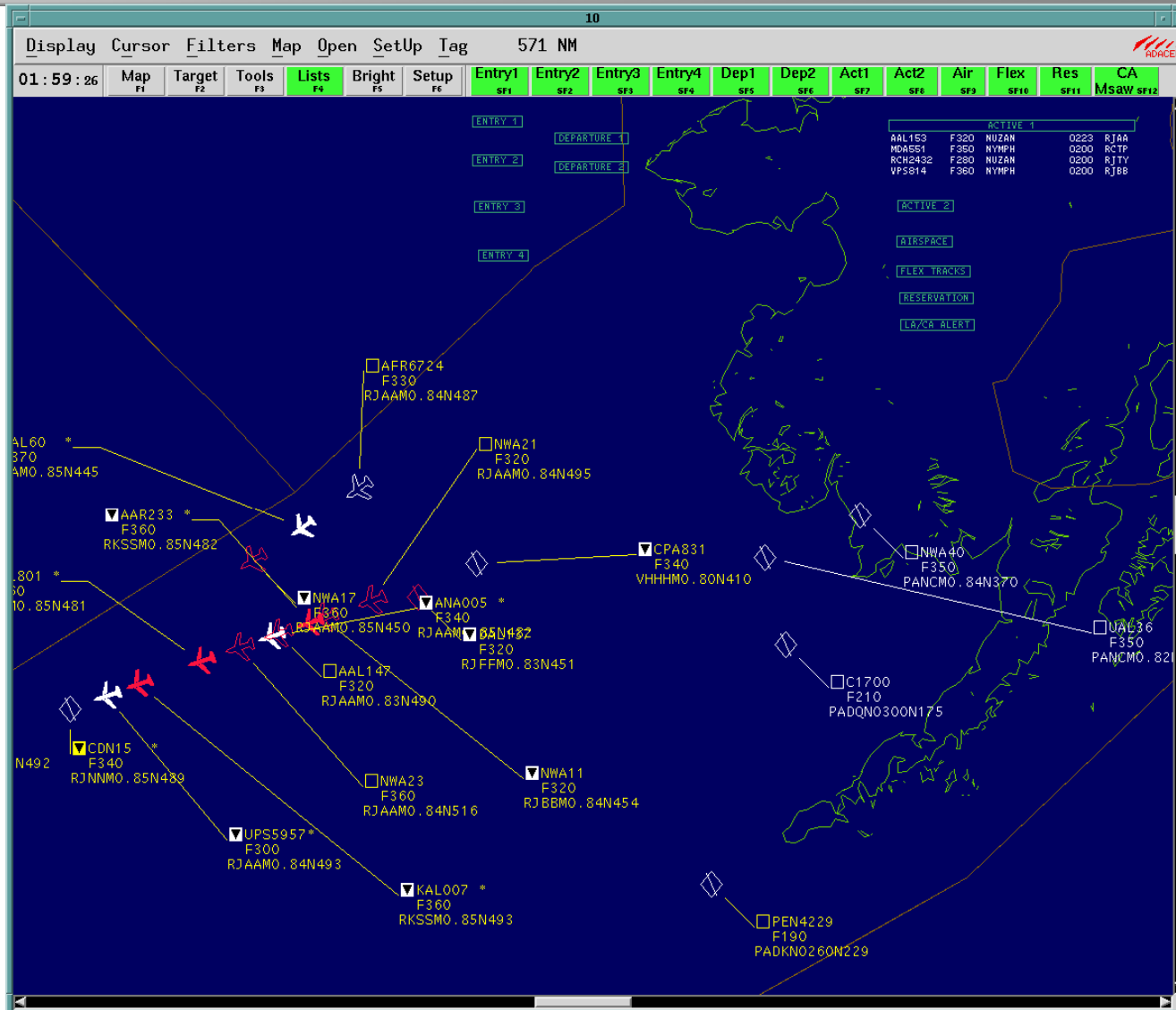
Oceanic (OCS), Enroute (ENR) and Approach (APP)

- CNS/ATM technologies
- Surveillance sources
- 4-D profiles
- Automatic Conflict Detection
- Automatic or Manual Coordination
- Air Situation Display Tools

Aurora's typical Controller and HFRO CWP



Aircraft Situation Display (ASD)



OCS, ENR, APP Electronic Flight Strips

01											
options											Help
Out of View		Search		DeadWood		Auto Insert		2			
4064	A330		PHNL	ZURIC	ZAAL	ZOLTR	ZIBUD	ZEFER	45N	PHNL	SE
CMM702	MRD	330	1107	1142	1236	1319	1359	1439	130W	CYVR	
HL	M082								1513	R	
4021	B742		4407N	46N	47N	48N	48N	48N	48N	RCTP	VR
JAL18	MRD	350	165E	170E	180W	170W	160W	150W	140W	CYVR	
01	M085		1139	1208	1300	1350	1439	1529	1618	R	
			49N	PRETY							
			13230W								
			1655	1656							
4016	B742		4531N	47N	48N	48N	46N	46N	46N	RKSO	SE
TOW378	MRD	350	16304E	170E	180W	170W	160W	150W	140W	KTCM	
01	N0502		1132	1208	1258	1346	1437	1527	1617	R	
			BEGUN	SEDAR	HQM						
			1652	1724	1741						
			1520								
320											
4047	MD11		40N	4107N	42N	43N	42N	40N	39N	RJAA	TO
VRG837	MRD	320	160E	165E	170E	180W	170W	160W	150W	KLAX	OA
TO	N0477		1154	1224	1253	1349	1446	1545	1644	R	35

Conflict Prediction & Reporting

CONFLICT SUMMARY							
<u>Override</u>							<u>Help</u>
Intruder	Att	Active	Att	Ovrd	Type	StartTime	EndTime
QFA103	-	ANZ54	-	>>X		0028	0148
ANZ103	-	QFA120	-	>>		0036	0152
QFA100	-	ANZ201	-	X		0048	0107

Conflict Reporting

Conflict Report

Conflict Type: same direction intersecting
8 degrees LOS 13:08 ACTUAL 3 min 27 sec (49 nm) 0 ft
REQUIRED 10 minutes (50 nm) 1000 ft

Loss of separation time

PASSING POINT					CONFLICT SEGM	
B742	JAL18	F350			4714N 17817W 1308	4806N 16637W 1407
M085						
B742	TOW378	F350			4805N 17744W 1308	4717N 16547W 1407
M0502						

Active

Intruder

Draw

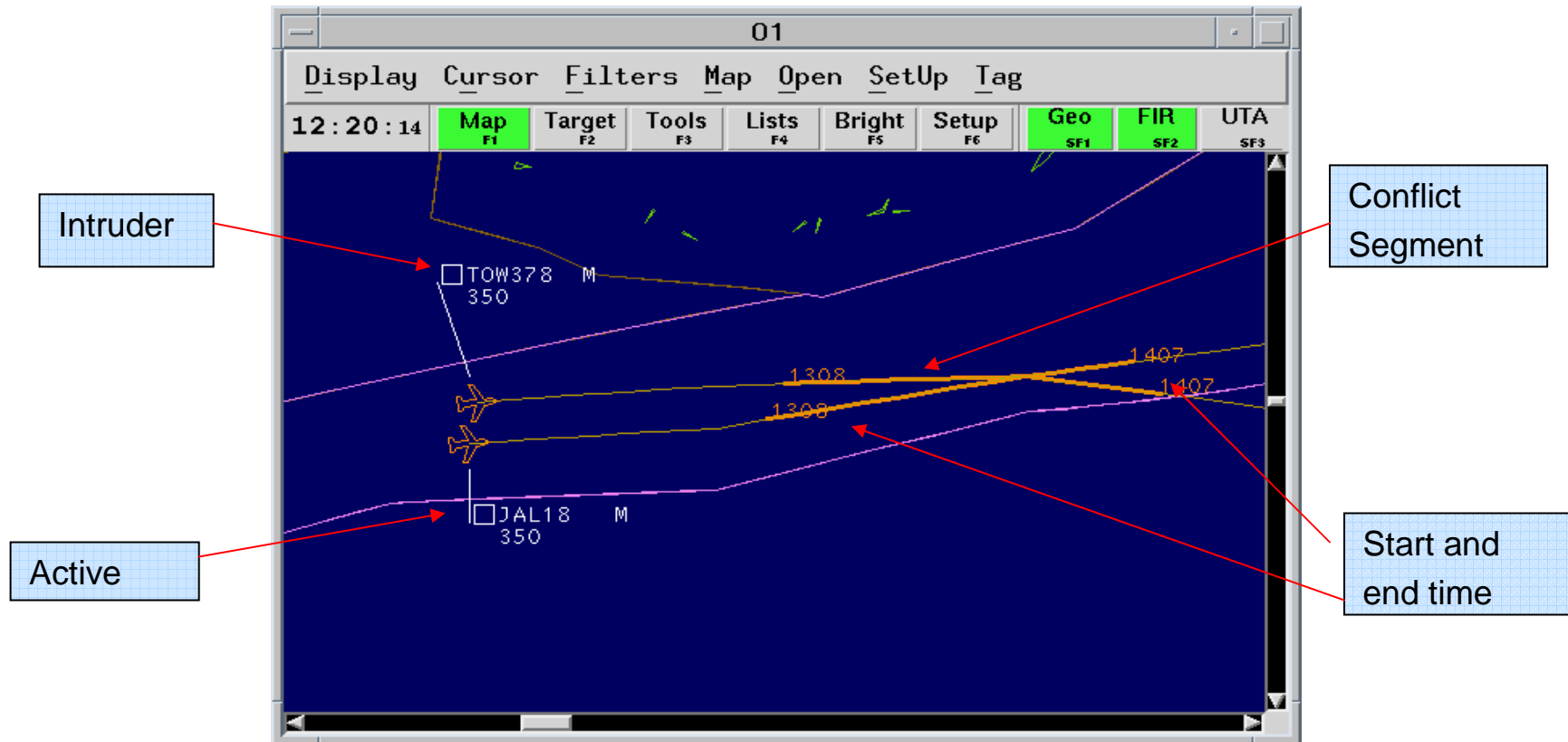
Conflict Segment

Actual Separation

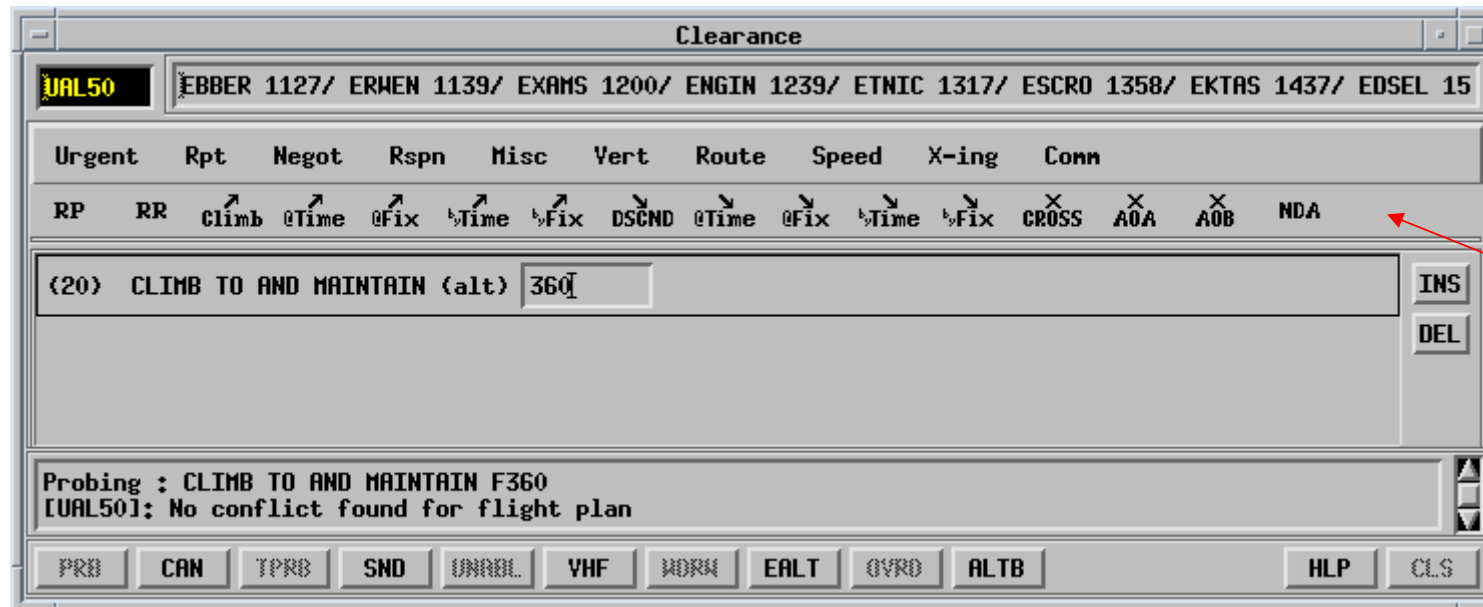
Required Separation

Close

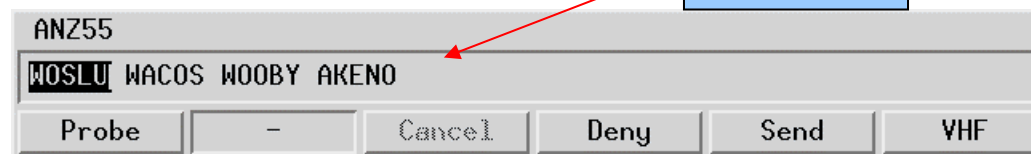
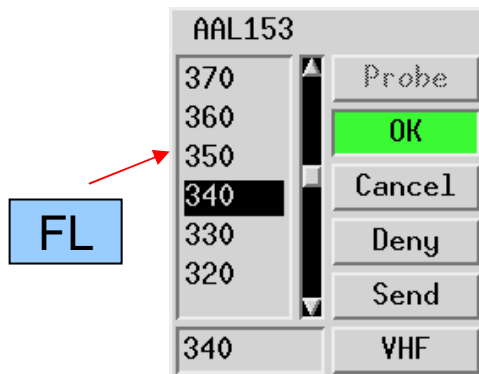
Conflict Reporting



Clearance widows



Complexe



Quick access, Altitude and Speed clearance window

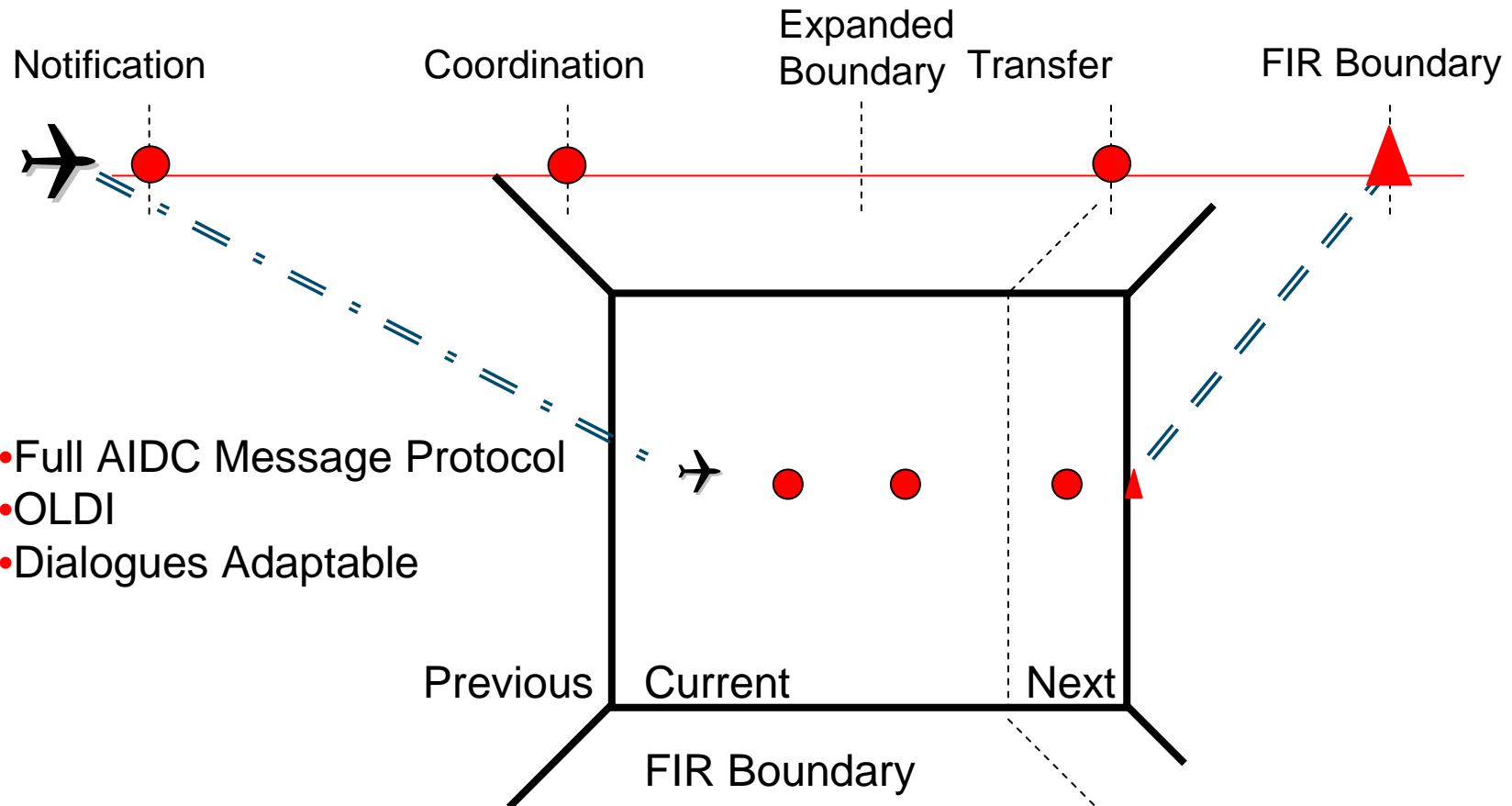


■ ▲	■ ▲
180	300
100	250
050	180
040	150
030	120
▼	▼

■ ▲	□ ▲
180	290
100	280
050	270
040	260
030	250
▼	▼

□ ▲	□ ▲
050	530
040	520
030	510
020	500
010	490
▼	▼

Automatic Coordination



Coordination window

The screenshot shows the 'xwud' window with the following sections and labels:

- Requested Coordination:** A text box at the top containing the message: "FPCT-I-FREE_FORMAT_INF : FPCT-I-COOR_INIT_REQ : [ACA030]: Initial Coordination is required with [UHMA] : [CPL-ACA030/C5164-IS".
- Planned:** A table with columns 'FIX' and 'TIME ROUTE'.

FIX	TIME ROUTE
VALDA	0835 G212
YUREE	0842
OME	0854 J111
MONAB	0859 J111
UNK	0911 J111
- Proposed by "UHMA":** A table with columns 'FIX' and 'TIME ROUTE'.

FIX	TIME ROUTE
VALDA	0835 G212
YUREE	0842
OME	0854 J111
MONAB	0859 J111
UNK	0911 J111
- Proposed by "10":** A table with columns 'FIX' and 'TIME ROUTE' (currently empty).
- COORD FIX, ETA, OFF/DEV, MACH:** Three identical sections for 'VALDA', 'YUREE', and 'OME' with input fields for these parameters.
- CLR FL, BLK, XING, DIR:** Three identical sections for 'VALDA', 'YUREE', and 'OME' with checkboxes and directional buttons.
- CRS FL, SPEED, DEST:** Three identical sections for 'VALDA', 'YUREE', and 'OME' with input fields.
- ROUTE:** Three text areas containing route information for 'VALDA', 'YUREE', and 'OME'.
- MESSAGES:** A button labeled 'MESSAGES'.
- Response Area:** A large text area for receiving responses.
- Annotations Restrictions:** A text box containing the identifier 'ACA030'.
- Coord. Message Buttons:** A row of buttons: 'Accept', 'Reject', 'Negotiate', 'Initiate', 'Cancel'.
- Outgoing Message:** A text area for composing outgoing messages.
- Manual, Send, Other Buttons:** A row of buttons: 'Manual', 'Send', 'Open Clearance', 'Reset', 'Close'.

Inbound Message

Inbound coord. profile

Response Area

Annotations Restrictions

Outbound Coord. profile

Next Sector Button

Coord. Message Buttons

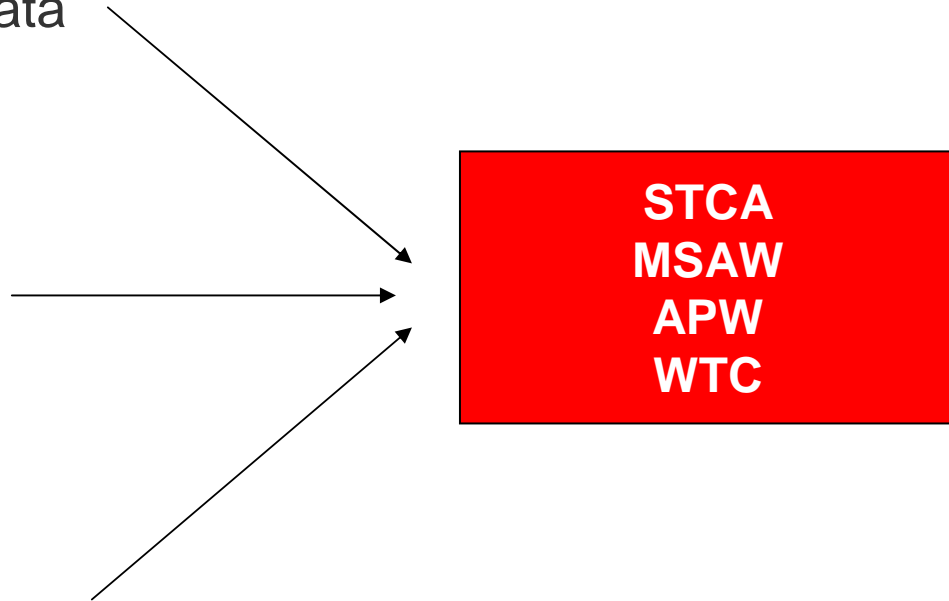
Manual, Send, Other Buttons



Safety Nets

Aurora processes:

- the Surveillance Data
 - Radar
 - ADS-B
 - MLAT
- the Flight Data
 - RVSM status
 - CFL
 - WTC
- the Environment Data
 - Reserved Airspace

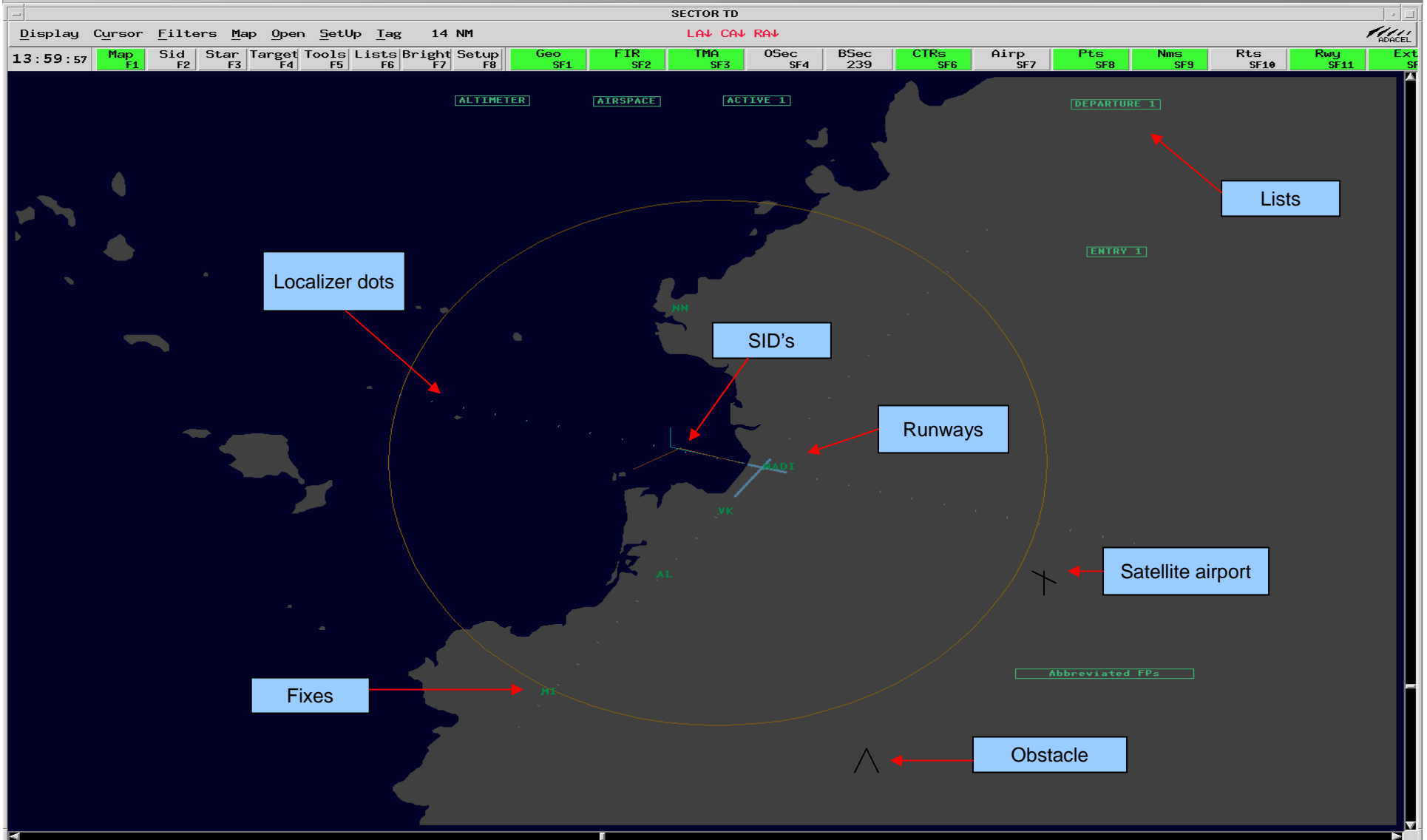


OCS, ENR and APP Summary

- Provides surveillance
- Improves communications and coordination
- Provides conflict free trajectories
- Provides all Safety Nets
- Reduces aircraft separation
- Reduces controller workload

- Air Situation Display (ASD)
- Electronic Flight Strip (EFS)

NADI TOWER ASD



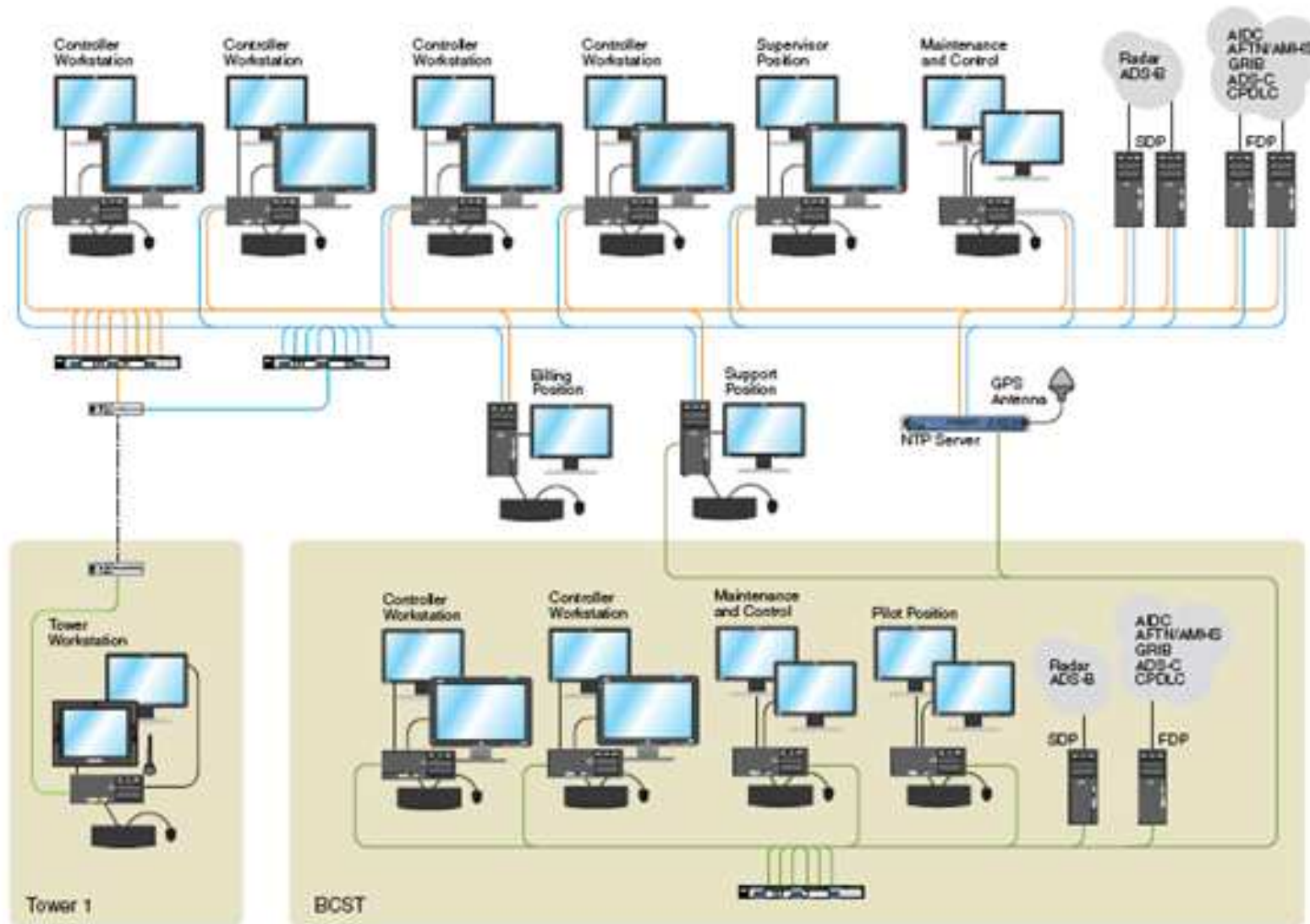
NADI Tower EFS (Electronic Flight Strip)

TRANSFERRED ARRIVALS							
Glider Ops							
GLID01	B ?				CALT		1546
ACTIVE BAY							
NN							
2222	B737	2222	FPL	NFFN	CALT		ATL
IFR003	B M			1501			09
			GATE				LAND
1110	B744	2222	FPL	NFFN	CALT		ATL
ARR2	H			1531			02
			GATE				LAND
1102	B744	2222	FPL	NFFN	CALT		ATL
ARR1	H			1531			09
			GATE				LAND
RUNWAY TRAFFIC							
1101	B737	2222	FPL	NFFN	CALT		ATL
IFR001	B M			1457			09
			GATE				LAND
Run released for inspection							
SUP1							
1111	B744	NFFN	FPL	PHNL	CALT		ATD
DEP1	H	1555		1608	SID		27
			GATE	F350	CLRD		T/O
START							
N123A	B ?				CALT		1530
	B744	NFFN	FPL	PHNL	CALT		ATD
DEP7	H	1854		1907	SID		27
			GATE	F350	CLRD		T/O
NN AS79 CARRP							
	B744	NFFN	FPL	PHNL	CALT		ATD
DEP6	H	1854		1907	SID		27
			GATE	F350	CLRD		T/O
1105	GTUR	NFFN	FPL	NFFN	CALT		ATD
IFRDPO4	B M	1521		1537	SID		27
			GATE	F250	CLRD		T/O
TAXI							
Dobro na taxi dravin							
FIRE1							
<input type="radio"/> VFR Arr <input checked="" type="radio"/> VFR Dep CFABC DEP2 1553							
<input type="radio"/> IFR Arr <input type="radio"/> IFR Dep IFR002 1459 DEPS 1854							
16:33:35 a111 27 09		0 Special strips		RES Field		FPEA IFF	

TOWER Summary

- Same ASD functionalities as in the ACC
- Advanced EFS using touch screen technology

System architecture



Training

- In-depth Factory Training
 - ATCO's and ATSEP's

- Adacel's Training Personnel
 - theoretical knowledge
 - practical experience

Maintenance

- Online customer support
- Post warranty support

FSR

- Field Service Representative
 - Maintenance
 - Training

AMHS and Billing

- **AMHS** (ATS Message Handling System) or AFTN
 - a COTS product designed to provide ATS Messaging capabilities to the world's Air Navigation Service Providers (ANSP's).
- **Billing**
 - a COTS product designed to improve billing operations and processes for the (ANSP's) and airports.
- **Aurora supports any third party system**

- Supports all ATC domains: OCS, ENR, APP, TWR
- Flight Data and Radar Processing incorporating all available surveillance sources (Radar, ADS-B/MLAT ADS-C, CPDLC)
- 4 D profile
- Conflict detection (Procedural) and Safety Nets (Surveillance)
- EFS
- Automatic or manual coordination
- Low cost workstations
- Factory training
- Field Support Representative
- Maintenance
- Billing and AFTN/AMHS integration

French Guyana CPDLC and ADS-C

- **Requirements for Datalink on a stand-alone position**
- **Solutions with ADS-C and CPDLC**
 - ADS-C to receive automatic position reports
 - CPDLC to transmit the ATC clearances
- **How its done**
 - AFTN feeds our FDPS
 - Built a 4D trajectory
 - Display on an ASD and EFS
 - on Linux

Process- French Guyana

- June 2010
 - Contract signed with DSNA??
- July
 - Software integration
- September
 - FAT plus Operational and Technical training
- October
 - System's installation in F-G
- November
 - Final Operational and Technical training
- December
 - SAT after the SITA link integration



ICAO New Flight Plan Adacel Converter

Adacel Inc.

Introduction

- During late 2003, the Air Navigation Commission authorized the establishment of the ICAO Flight Plan Study Group (FPLSG) to assist the Secretariat.
- The primary work of the FPLSG was to develop a proposal for amendment of the flight plan provisions, including the ICAO model flight plan form and associated operating practices, so that they would meet future needs of aircraft with advanced capabilities and the requirements of automated air traffic management (ATM) systems, while taking into account compatibility with existing systems, human factors, training, cost and transition aspects.
 - The changes were announced by ICAO in State letter AN 13/2.1-08/50 dated 25 June 2008 and will become applicable on **15 November 2012, with a transition starting in 2011.**

Rationale for ICAO New Flight Plan (INFPL)

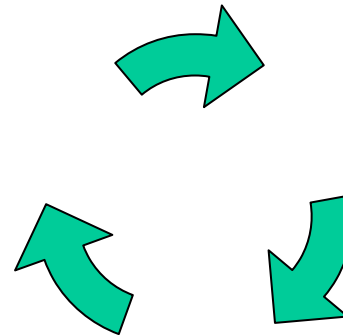


Flight Plan Study Group (FPLSG) mandate was to update the ICAO model flight plan form to:

- Show aircraft advanced CNS capabilities in more detail
- Meet evolving requirements of automated ATM systems

Solutions

- Upgrade your current FDPS to the new format
- Replace your current FDPS
- Interface the Adacel's INFPL Converter in your system



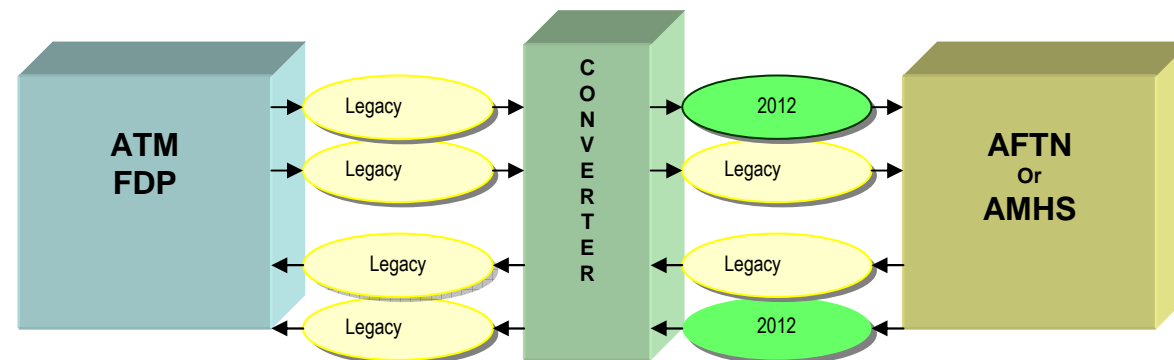
Converter Solution

- The Adacel Converter is the solution to ANSP's:
 - who wishes to maintain their present FDPS until it is completed its life cycle.
 - that do not require an ATM system supporting PBN,RVSM,ADS,etc
- To Flight planning/briefing offices that need to forward the new format via the AFTN/AMHS circuits.
- To the “Bureau de Piste” (BDP) that requires to forward the new format via the AFTN/AMHS circuits.

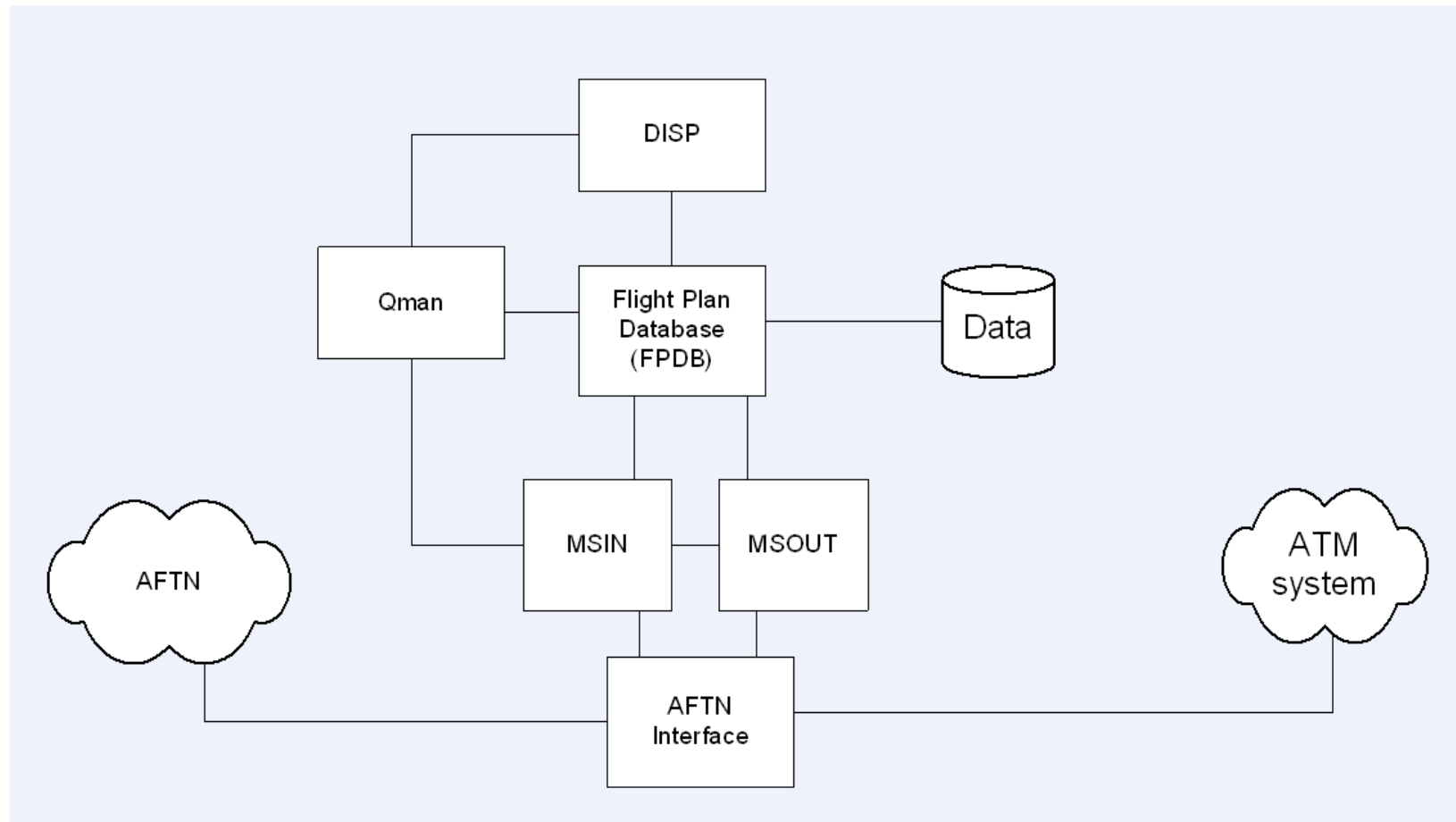


How does it work

- The Converter interfaces with the AFTN/AMHS circuit and your ATM/FDP system and provides a conversion from the new format to the legacy or old flight plan format and vice-versa



INFPL Architecture



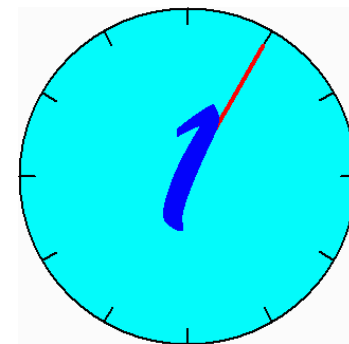
Information available on the Graphical User Interface (GUI)

- **All ICAO messages**
- FPL messages
- CHG messages
- SPL Message
- RPL listing form
- Aircraft Identification
- Flight Rules and Type of Flight
- Equipment
- Serviceable COM/NAV/approach aid
- Surveillance
- Departure aerodrome and time
- Route
- Destination Aerodrome and Total Estimated Elapsed Time, Alternate Aerodromes
- Other Information

Benefits

The Adacel's INFPL Converter provides your facility with:

- Full compliance with Amendment 1 to PANS ATM, DOC4444
- Interface with any ATM/FDP systems
- Interface with AFTN
- Interface with AMHS
- Takes you through the transition and beyond



Thank you

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