



International ATM

AIRCON 2100

**ATS Interfacility Data Communication (AIDC) and
On-Line Data Interchange (OLDI) Seminar**

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El Cairo / 03-05 March 2014



indra

AGENDA

Agenda Item 1: Introduction

- General benefits of using AIDC/OLDI
- Operational advantages of using AIDC/AIDC over voice communication

Agenda Item 2: Global progress and requirements for AIDC implementation

- Global development
- Requirements between adjacent Regions
- Update from States
- Clarification on the messages set
- Introduce AIDC plan

Agenda Item 3: Technical and operational training requirements

- ATM System supporting AIDC/ OLDI
- Operational training
- Technical personnel training
- Testing requirements

Agenda Item 4: Template for bilateral letter of agreement on AIDC

- Technical and operational requirements between States using AIDC
- Operational complexities of using AIDC

Agenda Item 5: Discussions on the development MID AIDC implementation Plan

- Develop MID Region AIDC Implementation Plan
- Issues related to AIDC implementation
- MID IP Network address plan

Agenda Item 6: Closing

INTRODUCTION

WHAT IS INDRA ATM? - SYSTEM MISSION

To enhance the safety of the flights by providing the controllers with information of air movements from Surveillance Sensors such as Radars, ADS B, Multilateration Systems and Weather Data, Planning information such as Flight Plans, Route Availability and Flow Management and communicate control via Voice and Data Link

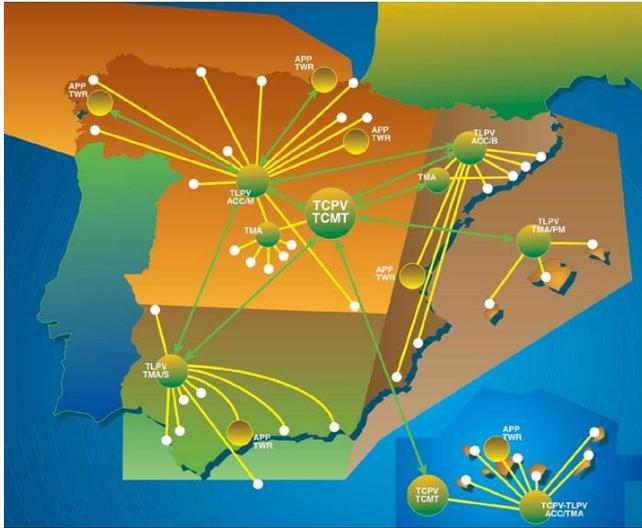


Airccon 2100 is one of the most advanced, safe and reliable automated air traffic control system and in a continuous evolution path.

Operating in more than 100 countries worldwide, integrating the latest & most advanced ATC functionalities.

INTRODUCTION

SACTA SISTEMA AUTOMATIZADO PARA EL CONTROL DE TRÁFICO AÉREO



- Integrated network of automation systems for all centers and control towers in Spanish Airspace
- Implements “Spanish Single Sky”
- Continuous technological evolution
 - SACTA I: 1984-1991
 - SACTA II: 1992-1996
 - SACTA III: 1997-2006
 - SACTA IV: 2007-2013

SDP
Surveillance Data
Processing

FDP
Flight Data Processing

MET/AIS
Meteorological and
Aeronautical Information



INTRODUCTION

ITEC INTEROPERABILITY THROUGH EUROPEAN COLLABORATION

- Common system for Flight Data Plan Management for AENA (Spain), DFS (Germany) and NATS (United Kingdom)
- Maastricht : first iTEC-like system in operation December 2008
- VAFORIT: first system in operation at Germany in 2009
- SACTA/iTEC operational in all Spanish control centres
- NATS/iTEC shall be the central flight data plan system at United Kingdom.
- iTEC, together with Indra Maastricht Flight Data Plan System, shall be an essential component of future European Single Sky.

..... Indra has been selected by the most advanced European ANSP to develop the future ATM systems following the Single Sky Concept.



NATS

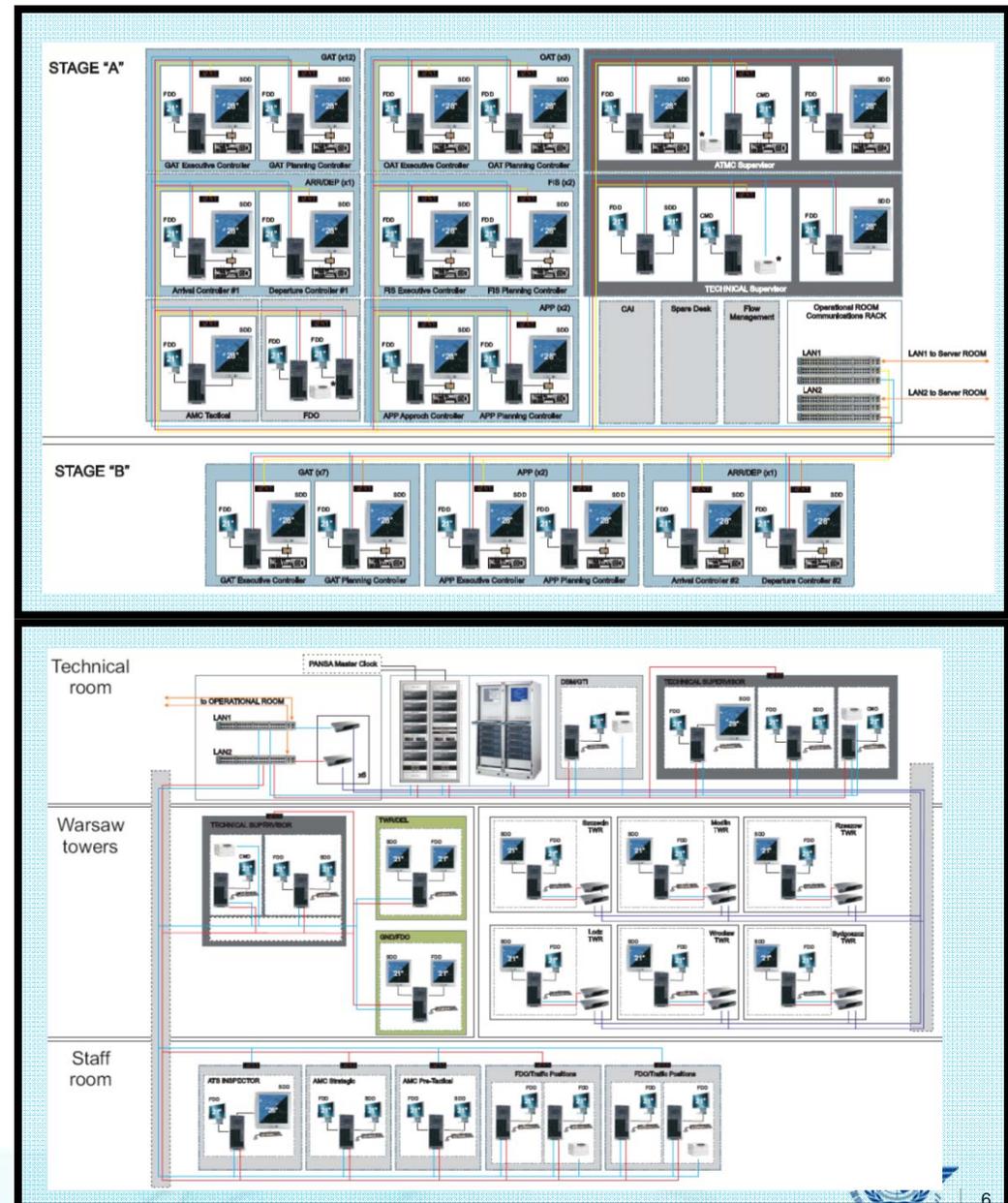


INTRODUCTION

INDRA ATM Systems – In constant evolution in Size and Scope...

- **PEGASUS 21 Project:** A large country system implementation using Indra Aircon System.

- **POLAND - Warsaw: ACC Center – Large Installation for Pegasus 21 project. 74 CWP.**
- **InterOperates with 3 TMAs also supplied by Indra**
- **Implements En Route, Approach and Tower Functionality**



TYPES OF COORDINATION

4 Types of coordination in Air Traffic Control

- **Manual** coordination: By Telephonic coordination
- ICAO: **AFTN** EST messages
- ICAO: **AIDC** (ATS INTERFACILITY DATA COMMUNICATIONS)
- EUROCONTROL: **OLDI** (On-Line Data Interchange)

BENEFITS OF COORDINATION

- Avoid Telephonic communication
- Coordinate with most precise times and levels based on trajectories calculations
- Dynamic Interaction with the Collateral
- Adjust the coordination rules based on LoAs
- Customize different kinds of coordinations for the different neighbours

SAFETY

- Coordination makes flying significantly safer for the aviation community by providing to the Control Centers the needed data to manage in advance the flights to avoid future Conflicts
- Real-Time interaction with the neighbours
- Executive or Planners controllers doesn't needs to loose time and attention to the telephone calls from/to collaterals
- Strip printing and Flight Plans adjusted based on the coordination data

EFFICIENCY

- Coordination helps to the controllers to reduce the task calling to the neighbours
- Better ATC traffic flow management
- Merging and spacing
- Enhanced operations in high altitude airspace
- Automatic correlation between FPLs and Radar Data based on received coordination messages
- Parameterized alerts on the Data blocks based on the received Levels, coordination messages,...

ICAO AIDC

The Asia/Pacific Regional Interface Control Document (ICD) for ATS Interfacility Data Communications (AIDC) defines the Aeronautical Fixed Telecommunications Network (AFTN) and the future Aeronautical Telecommunication Network (ATN) as communication interfaces between centers.

The main advantage is that the infrastructure is done between Control Centers

The AIDC application supports information exchanges between ATC application processes within automated ATS systems located at different ATSUs. This application supports the Notification, Coordination, and the Transfer of Communications and Control functions between these ATSUs.

- **AFTN**
- **ATN**

EUROCONTROL OLDI

Flights which are being provided with an ATC service are transferred from one ATC unit to the next in a manner designed to ensure complete safety.

The Main advantage is the capability to customize the messages to be used with each different collateral Control Center

Where it is carried out by telephone, the passing of data on individual flights as part of the coordination process is a major support task at ATC units, particularly at Area Control Centres (ACCs). The operational use of connections between Flight Data Processing Systems (FDPSs) at ACCs for the purpose of replacing such verbal "estimates", referred to as On-Line Data Interchange (OLDI), began within Europe in the early nineteen eighties.

- **X.25**
- **FMNTP:** IPv6 network connection

COMPARISON OLDI VS AIDC

	OLDI	AIDC
Interfaces	X.25 FMTP	AFTN IA-5 ATN
	Europe Africa	Asia/Pacific
Format to Exchange data	ICAO AFTN/ADEXP	ICAO AFTN
Version	4.2	3.0
Last Release	December 2010	September 2007

HARDWARE & SW REQUIREMENTS OLDI VS AIDC

	OLDI	AIDC
Hardware	X.25 or Ethernet	Serial cards Ethernet
Lines	X.25 or IPv6	Serial lines or IPv4 IPv6
Software	FDP OLDI capabilities	FDP with AFTN or AMHS and AIDC capabilities

MAIN DISADVANTAGES

OLDI

- Communications dedicated to the protocol
- Too much operational messages interchange on the maximum level of coordination

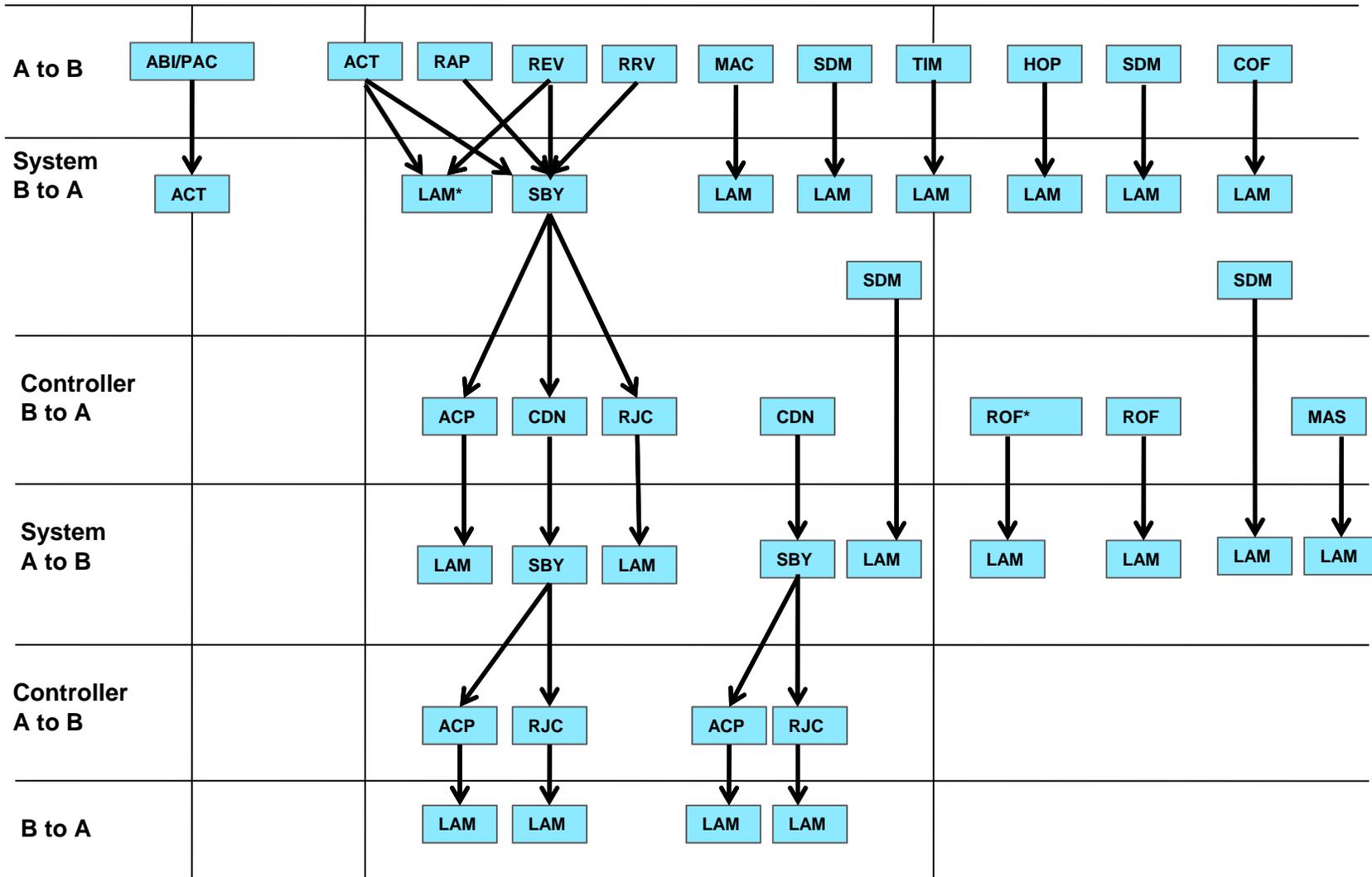
AIDC

- Low adaptation level: Its not possible to adaptate the kind of messages taking into account the level of development of the collateral control center

External Coordination

DIALOGUE PROCEDURE

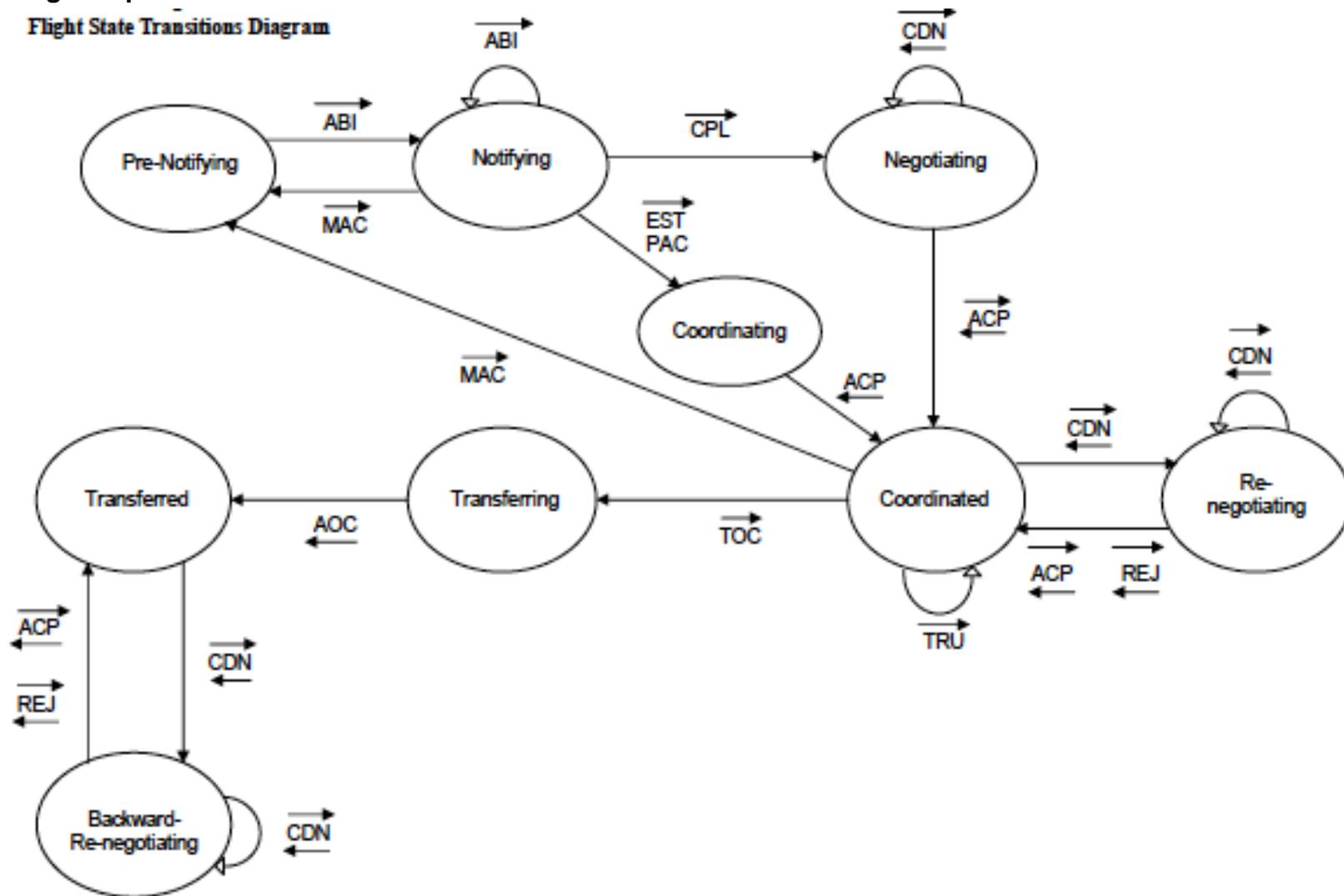
Message Sequence



DIALOGUE PROCEDURE - AIDC

Message Sequence

Flight State Transitions Diagram



TACTICAL COMMANDS. Profile Modeling

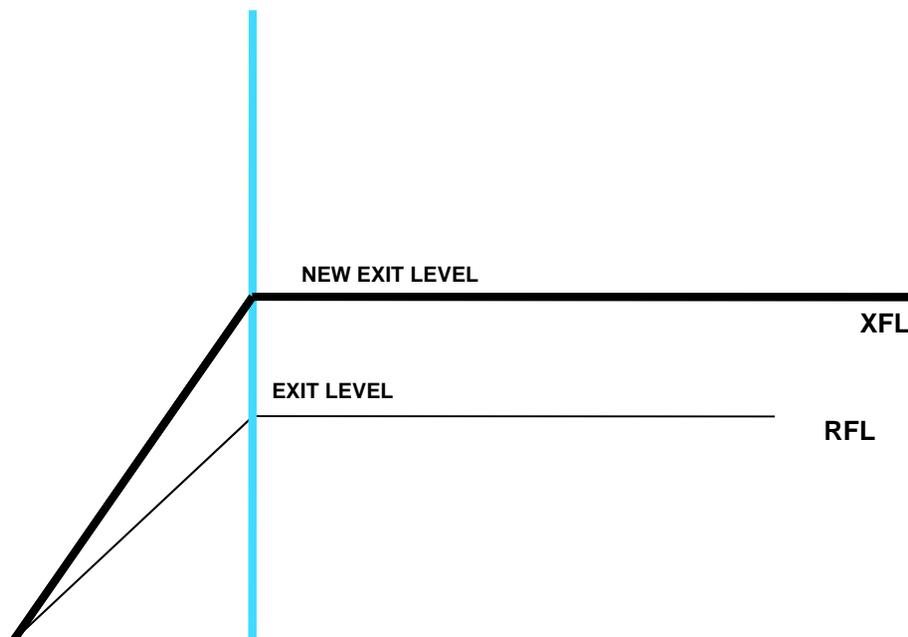
XFL.- Exit Flight level

When does the XFL value apply to the profile calculation?

1 – XFL value > RFL value

Owner sector

Next Sector

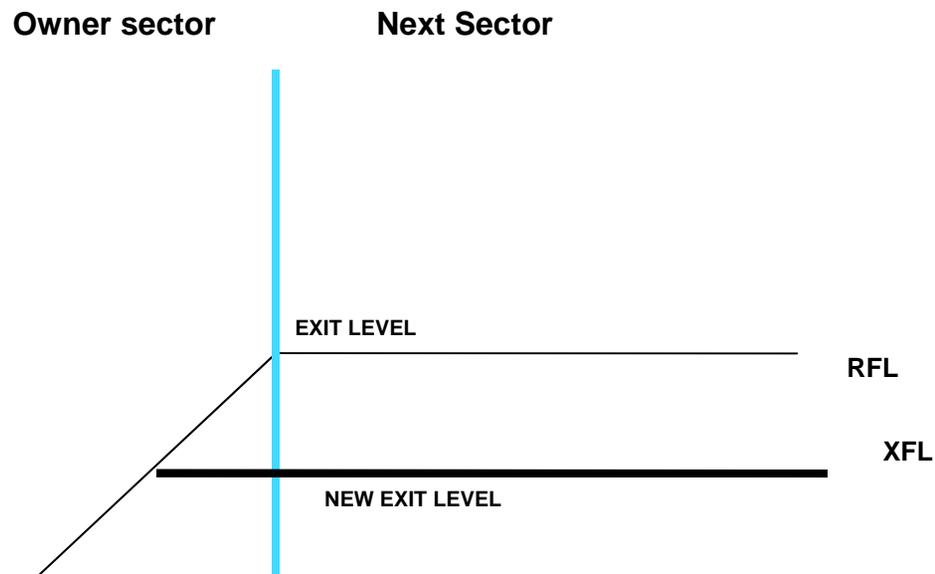


TACTICAL COMMANDS. Profile Modeling

XFL.- Exit Flight level

When does the XFL value apply to the profile calculation?

2 – XFL value < RFL value, but the RFL is reached in the owner sector.



STRATEGIC CONSTRAINS. Route conditions.

The system establish an exit level (crossing level) at defined fixpoints to flights that fulfils the defined conditions: Max, Min RFL/ECL, Origin/destination airport, Coordination type or fixpoints sequence condition, sequentially before and after the COP .

ROUTEConditionsEdit AMTEK1
DataBase : war_sat_t_01_jul2010_sim

EXIT Esc Save F1

Route Condition Name : AMTEK1

Minimum ECL : 250

Maximum ECL : 660

Crossing Level : 250

Create Modify Copy Delete Create Modify Copy Delete

AIRPORTS ORIGIN AIRPORTS DESTINATION

AIRPORT AIRPORT EDITION AIRPORT AIRPORT EDITION

EPWR OK Forget OK Forget

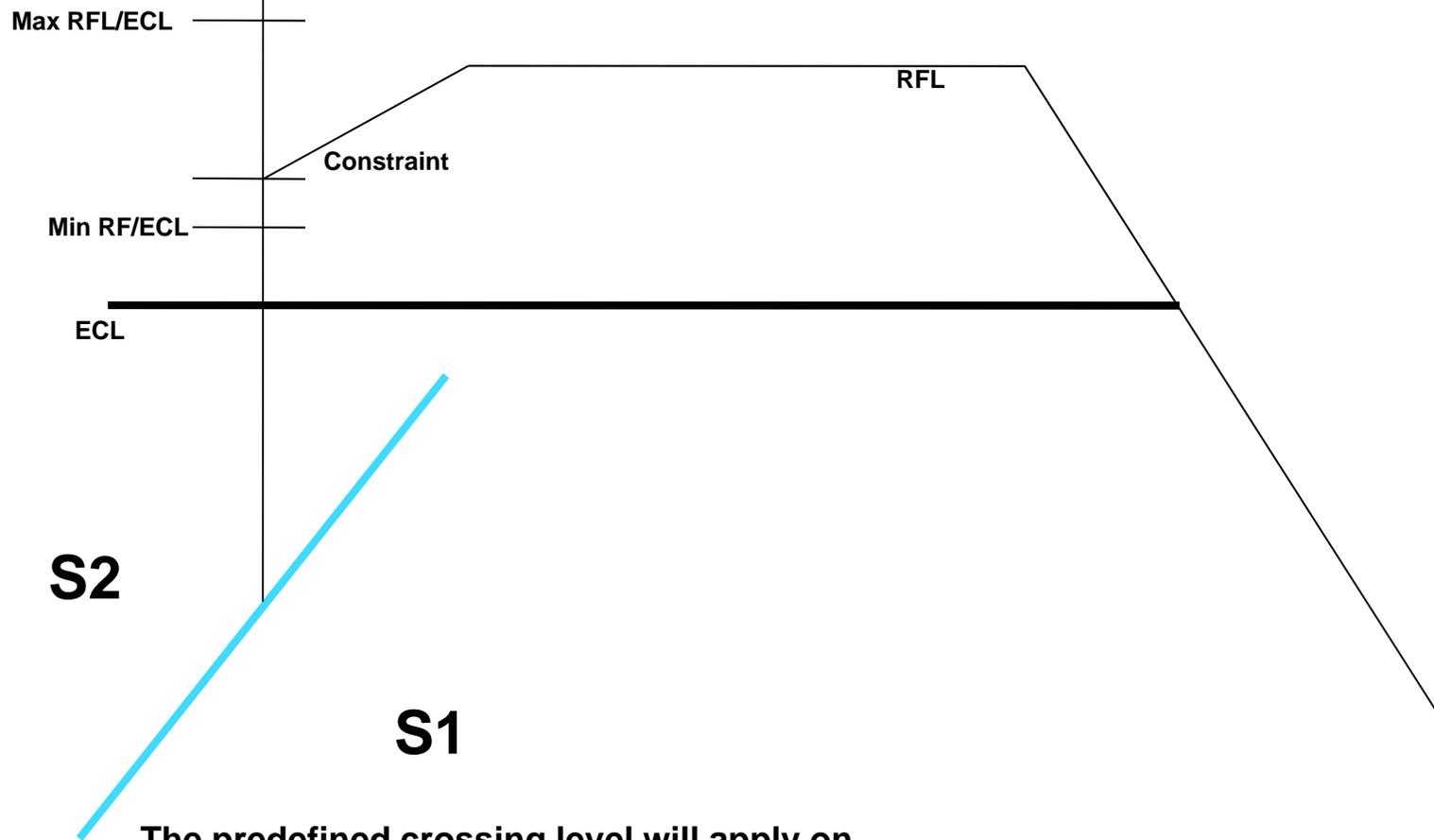
COORDINATION

Coordination Type : External Internal Control Sector:

Offset -5 Offset -4 Offset -3 Offset -2 Offset -1 COP Offset 1 Offset 2 Offset 3 Offset 4 Offset 5

AMTEK

STRATEGIC CONSTRAINS. Route conditions



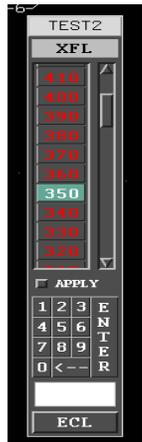
The predefined crossing level will apply on trajectory when the RFL/ECL value is the range defined in DBM

Internal Coordination

Level negotiation.

For Incoming Track

PEL menu, proposing level



Owned track



Inbound track



the owner can re-negotiate through XFL menu:

Accept /Reject or counter-proposal

Internal Coordination

Level negotiation.

For Controlled Track

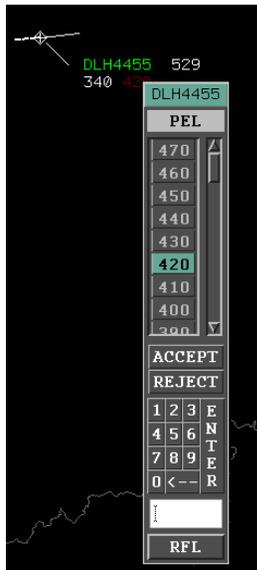
XFL menu, proposing level



Owned track



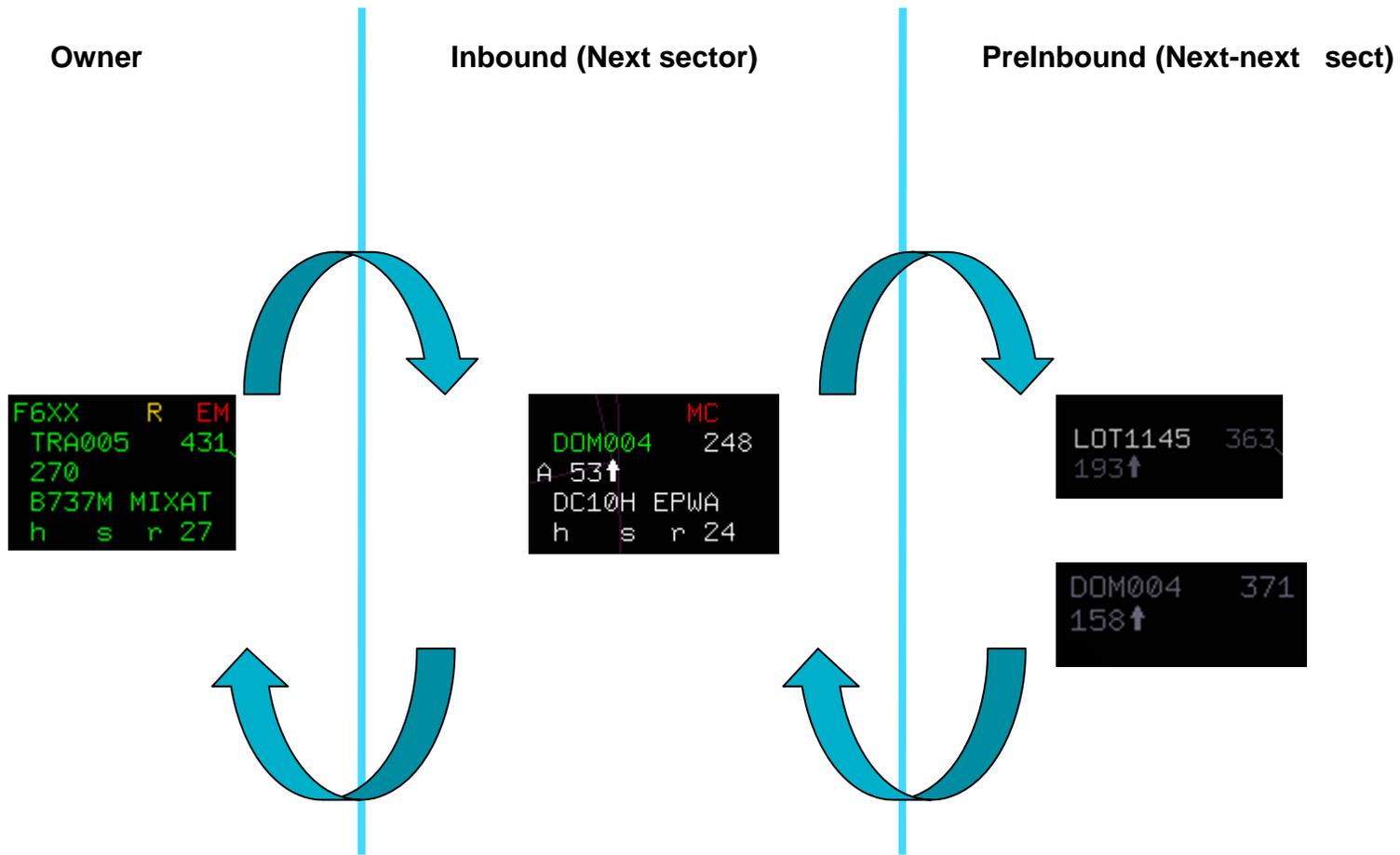
Inbound track



the inbound track can re-negotiate through PEL menu:

Accept/Reject or counter-proposal

Negotiation



External Coordination

Coordination Window

Allows Entry/ Exit Coordination.

By means of this window, a coordination message is manually send to external centers both entry and exit

COP	Coordination Fixpoint
ETO	Estimated Time Over Fixpoint
TFL	Transfer Flight Level
FREQ	Frequency
MAN	Manual coordination (Not available for AFTN)
HOF	Handover proposer (Not available for AFTN)
G .ABI	ABI Coordination Message (Not available for AFTN)
MAS	Manual Assumption (Not available for AFTN)
G .ACT	ACT Coordination Message (Not available for AFTN)
CDN	Coordination message
COF	Change of frequency (Not available for AFTN)
ACP	Acceptance message
ROF	Request of frequency
RJC	Rejection
EST	Estimation
COOR	Coordination dialogue establishment
ICON	DESCRIPTION
SEND	Coordination message sending
CANCEL	Cancel the coordination message process

External Coordination

COORD IN/ OUT LISTS

These lists includes the information related with flight plans that have pending coordination dialogue, and includes, in COM field, the current coordination status

COORD IN										
C/S	ADEP	ADES	EOBT	COPN	ETO	PEL	COOR	COM	2	
C	DLH4455	EDDF	UKDD	0959	BOKSU	1138	340	RAP	OTO	
C	IBE7733	LEMD	ZBAA	0959	PENOR	0959	340	RAP	OTO	

COORD OUT										
C/S	ADEP	ADES	EOBT	XCOP	XTO	XFL	COOR	COM	2	
F	ARG1332	UKDD	SAEZ	1100			ACT	OTO		
C	IBE4565	EPWA	LEMD	1203	KORUP	1212	300	REV	MAN	

Field	Description
Status Indicator (1 character)	H (Hold)
	F (Conflict)
	L (Lost)
ADEP	Departure Aerodrome.
ADES	Destination Aerodrome
EOBT	Estimated Off-Block Time. It may be filled with "C"; which indicates the reception of CTOT indication.
ADEP	Departure Aerodrome.
ADES	Destination Aerodrome
COPN/ XCOP	Coordination Point
ETO/ XTO	Estimate Time Over Fixpoint
PEL/ XFL	Planned Entry/ Exit Level With (*), Activation level With (F), the RFL from the FP
COOR	Coordination Dialogue Establishment
COM	Coordination Status
<number>	Total number of flights in "holding" status. It also provides a menu to sort the flights

COORDINATION DBM TABLES

CONTROL CENTERS COORDINATION FIXPOINTS

These tables includes the information related to parameters to establish the connections and conditions to perform the external coordination

CONTROL CENTERS

This table contains all the necessary information to define a control centre, its classification, its AFTN address, as well as its OLDI communications with adjacent centres, for coordination operations

The screenshot shows a software window titled "ControlCentersEdit EDUU" with a database name "DataBase : war_sat_t_01_jul2010_sim". It contains several configuration sections:

- NAME :** EDUU
- KIND :** Foreign (selected), Local
- FORMAT :** I (selected), ADEXP, ICAO
- AFTN ADDRESS :** EPWWTST
- COMMUNICATIONS** section with a "FIXP OPTIONS" button:
 - CLASS :** AFTN (selected), OLDI, NONE
- OLDI PARAMETERS** section:
 - BEHAVIOUR :** LISTENER(MASTER) (selected), CALLER(SLAVE)
 - PARTNERS MESSAGE FORMAT :** ORIGINAL (selected), INF
 - LOCAL ATS UNIT :** HA
 - LOCAL ATS PHONE NUMBER :** 1122131103
 - REMOTE ATS IDENTIFIER :** R
 - REMOTE ATS PHONE NUMBER :** 1015121118
 - LINE COMMUNICATION :** 1
- PAC :** ETOT (selected), ETO_AT_COP
- CONTROL CENTER OPS** button
- AUTHORITY AND FORMAT IDENTIFIER (AFI)** section:
 - ADJACENT CENTER VALUE :** 48
 - LOCAL CENTER VALUE :** ADJACENT CENTER IDENTIFIER : 10
 - LOCAL CENTER IDENTIFIER :** ADJACENT CENTER SELECTOR : 00
 - LOCAL CENTER SELECTOR :** TIME OUT EXPECTED HEARTBEAT : 70
 - TIME OUT SENDING HEARTBEAT :** 30

COORDINATION DBM TABLES

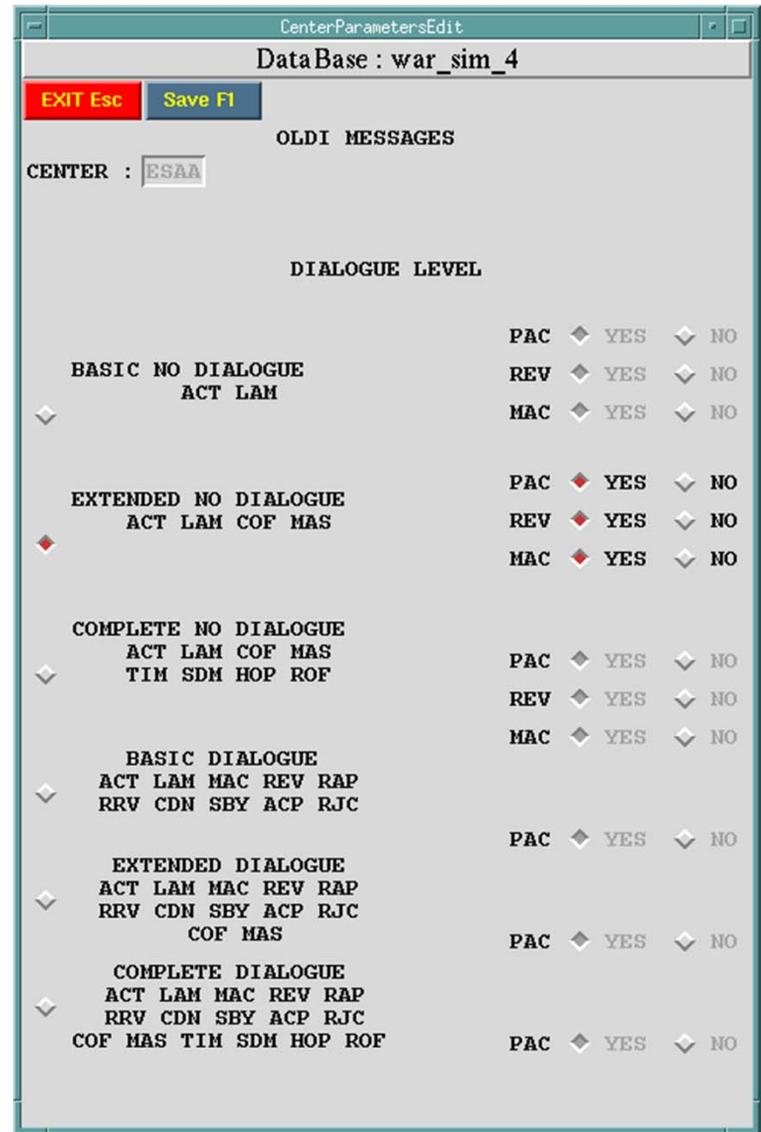
CONTROL CENTERS

Control Center Options

This window is acceded by clicking on “CONTROL CENTER OPS” in Control Centers Edit Window.

This window sets the OLDI messages dialogue profile (from the predefined profiles included in the window, that also allows optional messages inclusion)

Selected profile will apply in the coordination dialogue between the system center and the external control center.



External Coordination

COORDINATION DBM TABLES

OLDI OPTIONAL FIELDS

This window sets the OLDI messages configuration

CENTER :

OLDI OPTIONAL FIELDS

MESSAGES CONFIGURATION

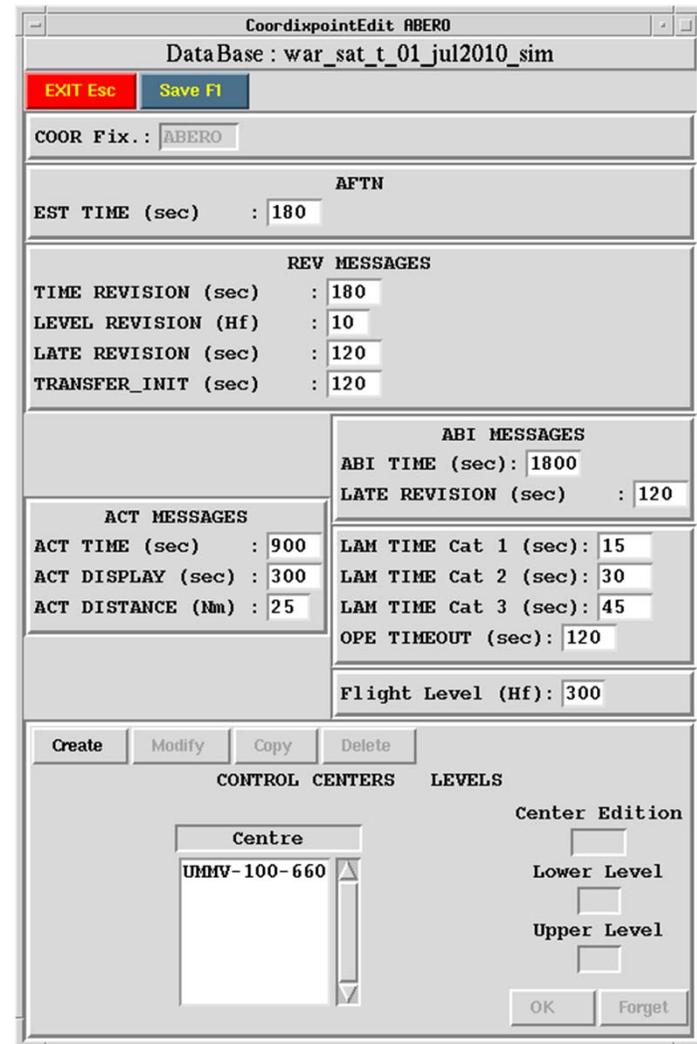
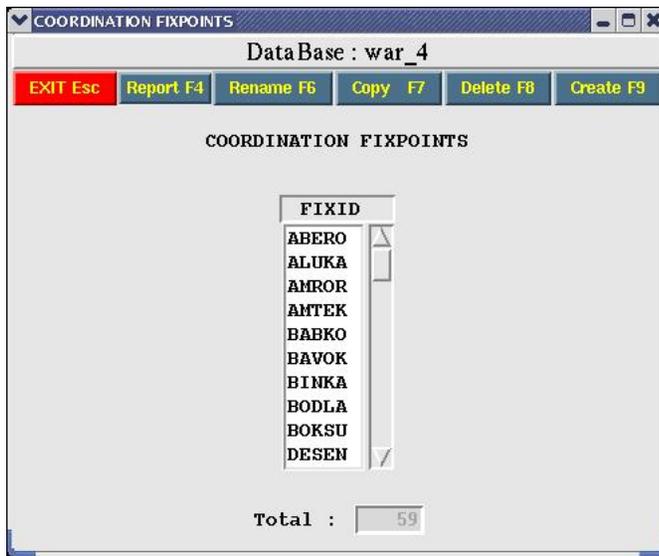
◆ ABI	Route	◆ YES	◇ NO
	ABI-Request	◇ YES	◆ NO
	Field 18	◇ YES	◆ NO
	B-RNAV & P-RNAV	◇ YES	◆ NO
	S-MODE	◇ YES	◆ NO
◇ PAC	Type of flight	◆ YES	◇ NO
	B-RNAV & P-RNAV	◆ YES	◇ NO
	S-MODE	◆ YES	◇ NO
	Route	◆ YES	◇ NO
	Message Reference	◆ YES	◇ NO
	Time Type	◆ ETOT	◇ ETO_AT_COP
	PAC-Request	◇ YES	◆ NO
	SID	◇ YES	◆ NO
	CFL	◇ YES	◆ NO
	RWY Dep	◇ YES	◆ NO
Field 18	◇ YES	◆ NO	
◇ ACT	Route	◆ YES	◇ NO
	Actual Take-off Time	◆ YES	◇ NO
	Field 18	◆ YES	◇ NO
	B-RNAV & P-RNAV	◆ YES	◇ NO
◇ REV	S-MODE	◆ YES	◇ NO
	Route	◆ YES	◇ NO
◇ MAC	Message Reference	◆ YES	◇ NO
	Message Reference	◆ YES	◇ NO
	Coordination status and reason	◆ YES	◇ NO

COORDINATION DBM TABLES

COORDINATION FIXPOINTS

This table contains all the necessary information to define the Coordination Fixpoints (Cops). The parameters defined here will associate a Fix to a Control Sector.

Also, in order to activate Advanced Boundary Information, ABI, or Activation (ACT) messages, a set of time and distance parameters are defined





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