

Advanced Safe Separation Technologies and Algorithms (ASSTAR) Project

Aeronautics Days 2006, Vienna

19th-21st June 2006

ASSTAR is a Specific Targeted REsearch Project (STREP) sponsored by The European Commission – Directorate General RTD - within the 6th Framework Programme (contract number AST4-CT-2005-516140).

The programme started in January 2005 and has a duration of 30 months.

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Project Overview

Project Overview



- **Throughout the world, and particularly in Europe, Air Transport is experiencing major capacity, efficiency and environmental pressures. Flights are frequently delayed, with aircraft flying on non-optimal routes.**
- **As a consequence, fuel is wasted and the long-term economic survival of European Airlines and their support services is at risk.**
- **Maintaining safety levels in the face of the increasing demand for capacity, estimated as a factor of three by 2020, is a critical challenge.**
- **ASSTAR brings together a powerful team of European ATM researchers, industry and, in particular, airlines and ATS providers, to evaluate a subset of potential airborne separation assistance applications.**

Consortium Partners



BAE SYSTEMS



THALES



Consortium Partners	
BAE Systems (UK) (Project Co-ordinator)	National Aerospace Laboratory – NLR (NL)
Sistemi Innovativi per il Controllo del Traffico Aereo - Sicta (IT)	Direction des Services de la Navigation Aérienne - DSNA (FR)
Euro Telematik (GE)	University of Glasgow (UK)
Thales Avionics (FR)	EUROCONTROL Experimental Centre (FR)
National Air Traffic Services - NATS (UK)	Technological Educational Institute of Piraeus (GR)
HELLAS JET (GR)	University of Zilina (SL)



UNIVERSITY of GLASGOW



EUROCONTROL

T.E.I. ΠΕΙΡΑΙΑ

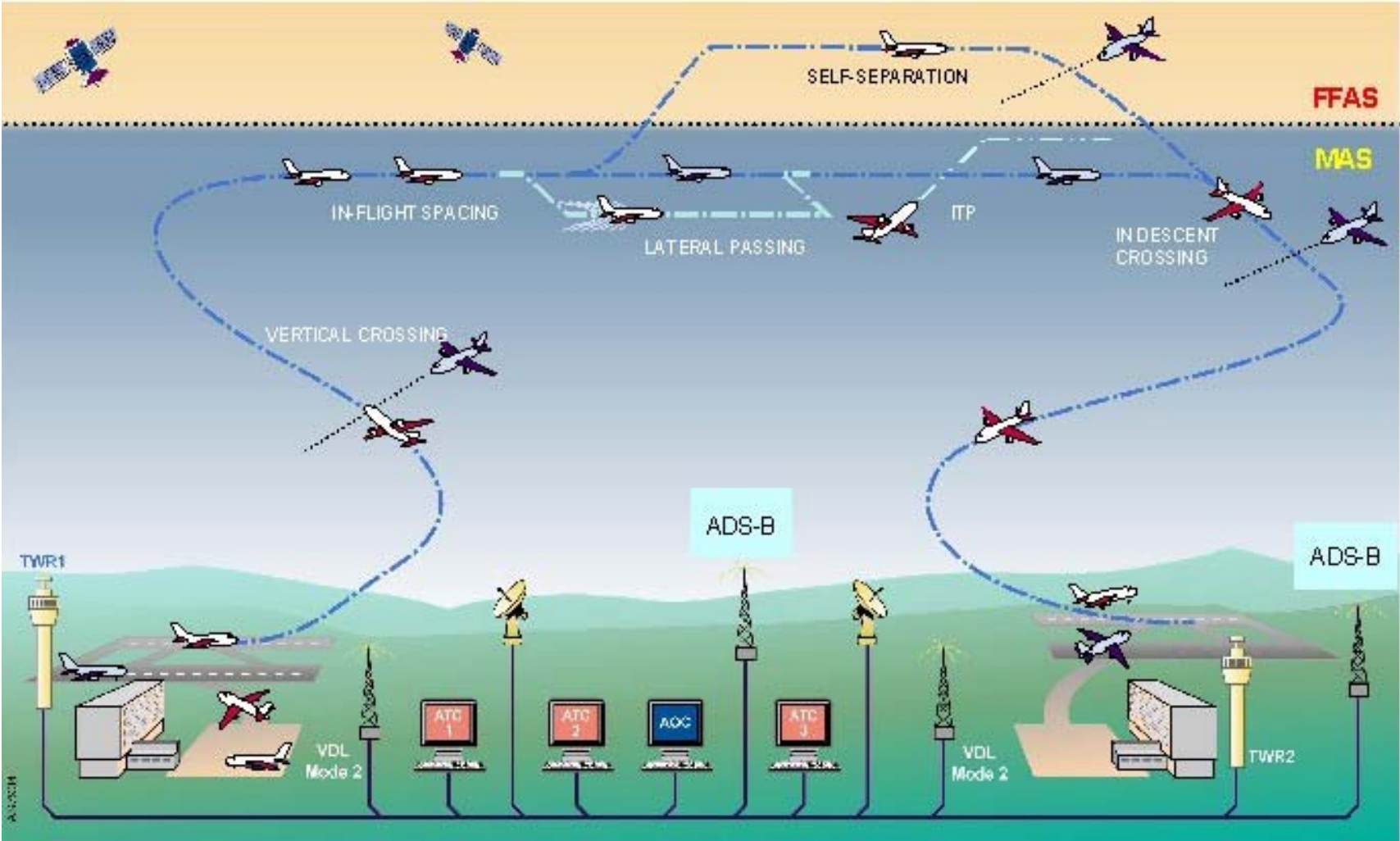


Project Objectives



- **ASSTAR is a EC Framework 6 STREP researching:**
 - Crossing and Passing Applications
 - Delegation of separation responsibility
 - Radar and Oceanic Environments
- **Research objectives support introduction in 2010+ time frame**
 - ASAS manoeuvre design and algorithm definition
 - Definition of supporting procedures
 - Air & Ground installation & implementation issues
 - Benefits
 - Safety assessment
 - Impact on Regulations

Operational Environment



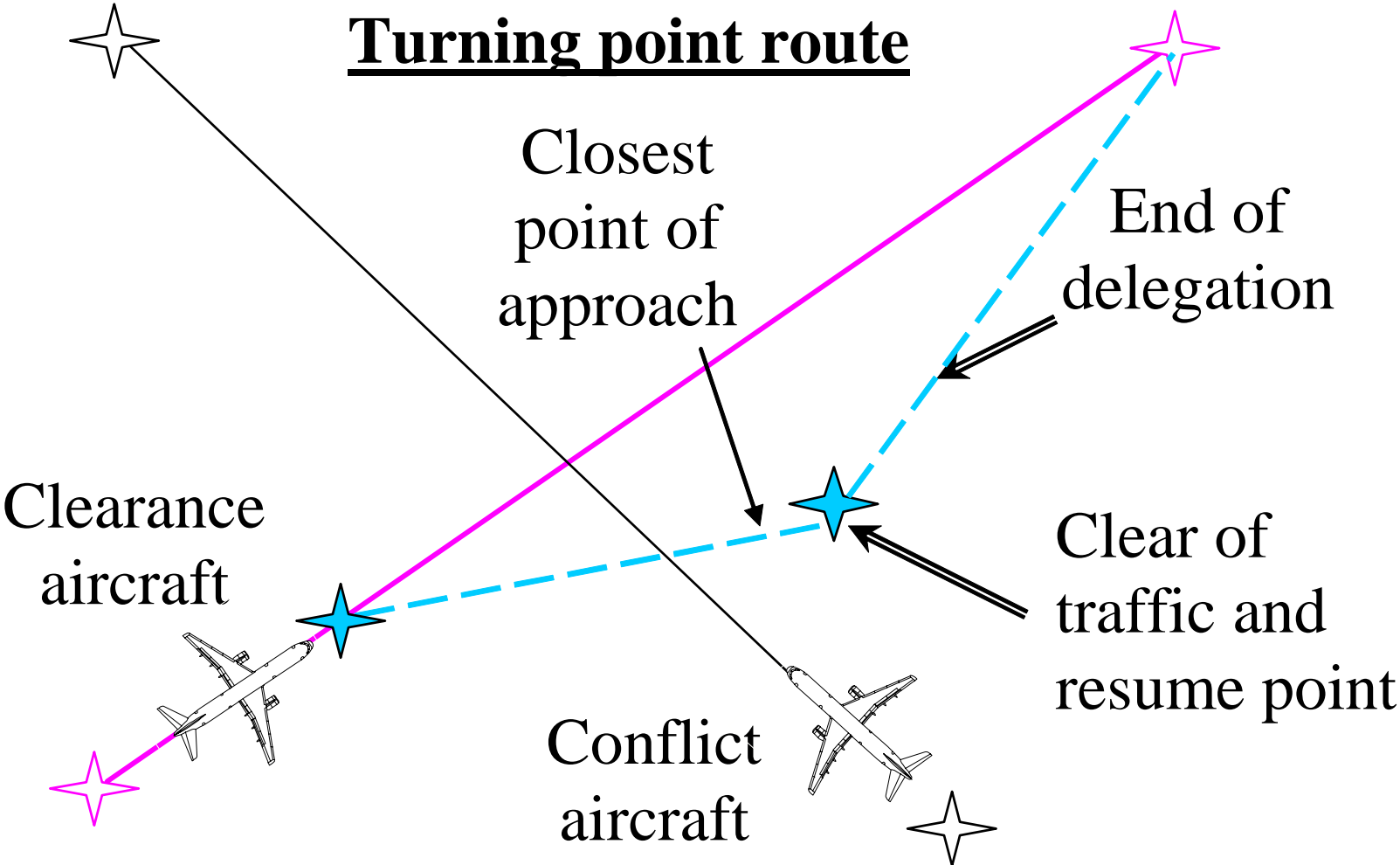
Separation Applications

Radar Controlled Airspace

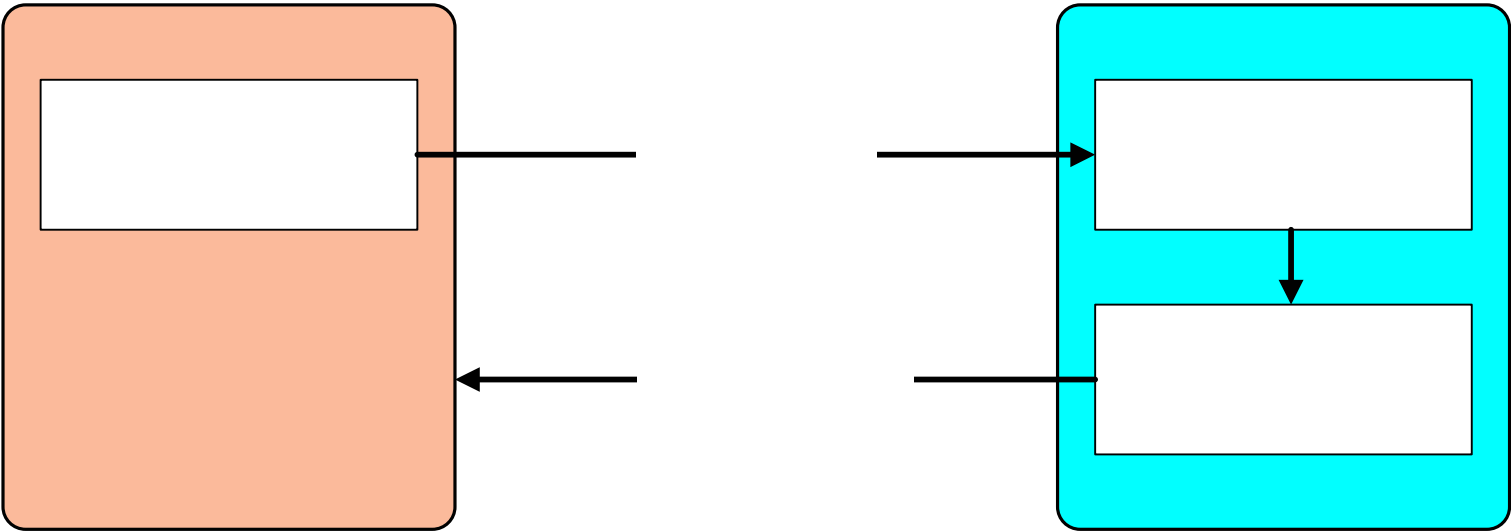
Crossing & Passing (ASEP-LC&P)



- **Separation application based upon Package 1 application ASPA-C&P**
 - ASSTAR separates vertical and horizontal separation applications
 - ASEP-LC&P (Lateral Crossing & Passing)
 - ASEP-VC&P (Vertical Crossing & Passing)
 - Only LC&P is considered within ASSTAR
- **Differences from ASPA-C&P**
 - Delegation of responsibility for separation
- **Similarities to ASPA-C&P**
 - Manoeuvre types
 - Application phases



Separation responsibilities



Impact on Roles and Procedures

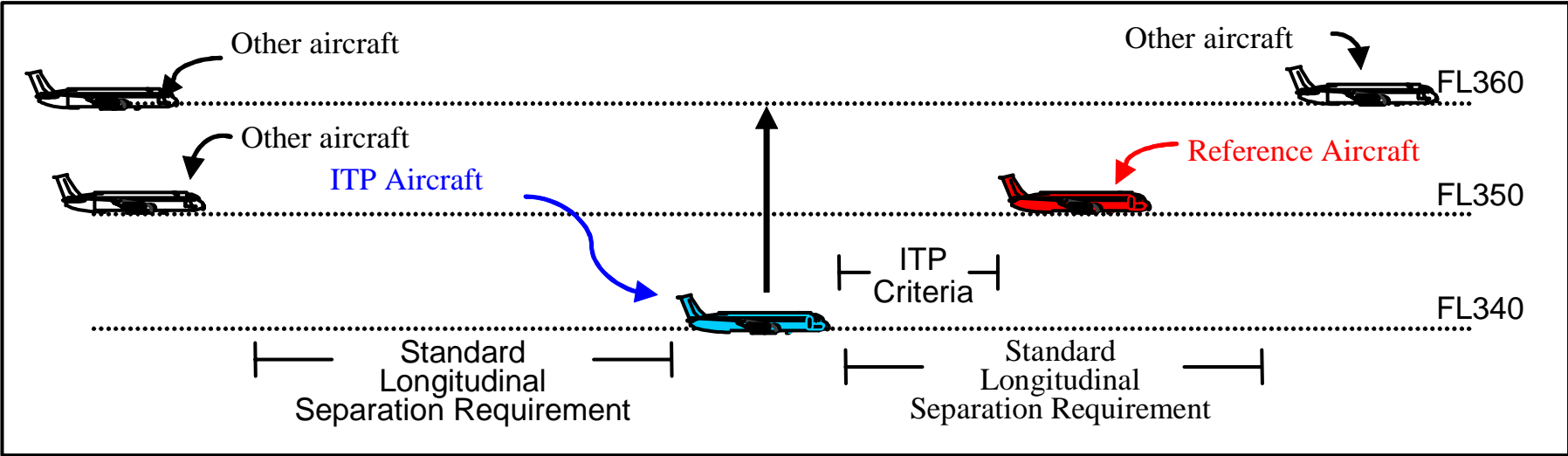


- **Controller is responsible for:**
 - Conflict detection
 - Initiation of the application
 - Separation of other traffic from involved aircraft
- **Air crew is responsible for:**
 - Selection of conflict resolution strategy
 - Execution of conflict resolution strategy
 - Informing controller when conflict has been resolved
- **New procedures will be required**
 - Additional training for both controllers and flight crews

Separation Applications

Oceanic and Remote (Non-Radar) Airspace

In Trail Procedure



In Trail Procedure (ASEP-ITP)



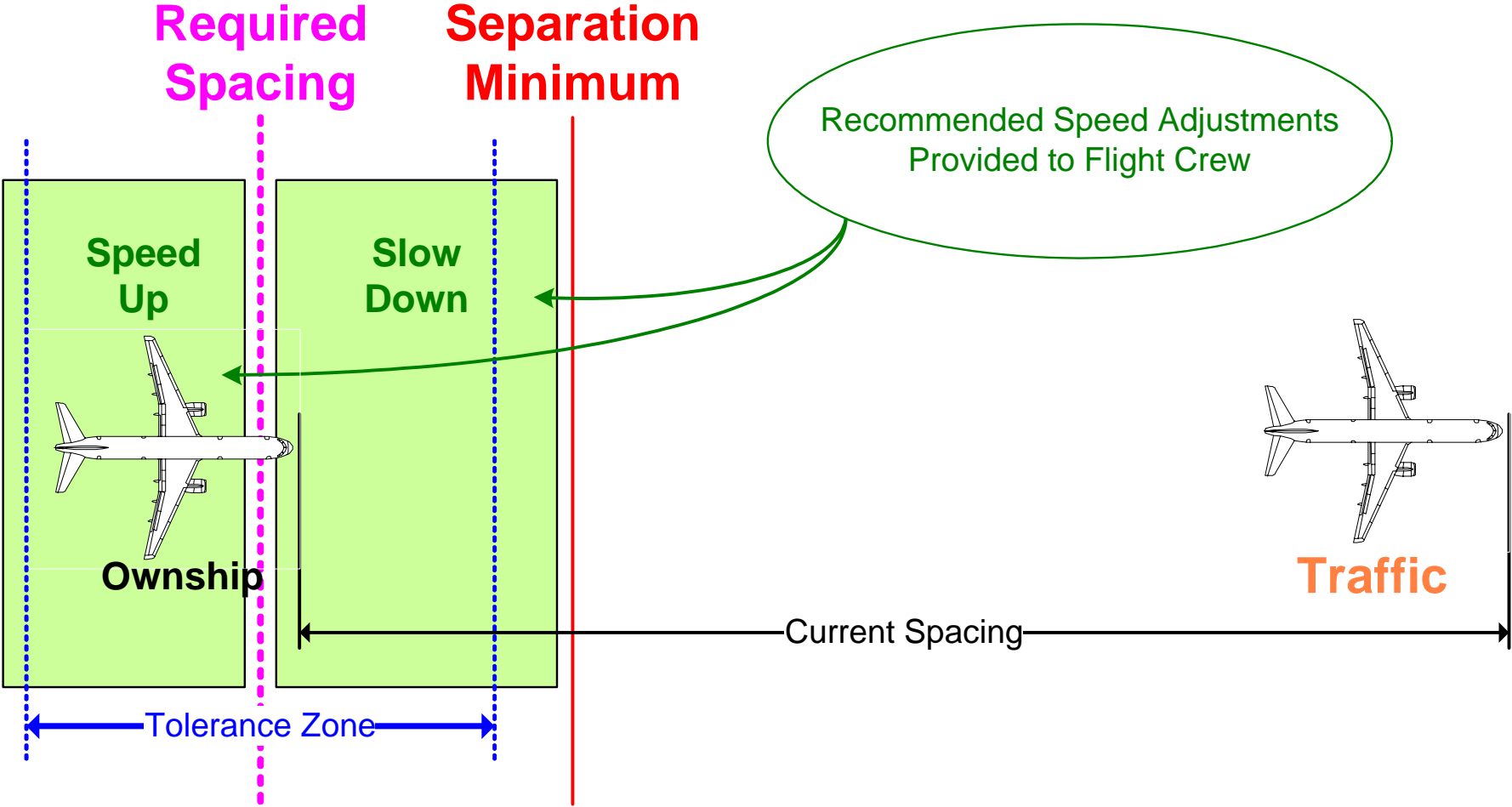
- **Separation application based upon Package 1 application ATSA-ITP**
- **Differences**
 - Active monitoring phase during flight level change
 - Aircraft are responsible for separation
- **Similarities**
 - Applicability conditions unchanged (Could be extended though)

In Trail Follow (ASEP-ITF)



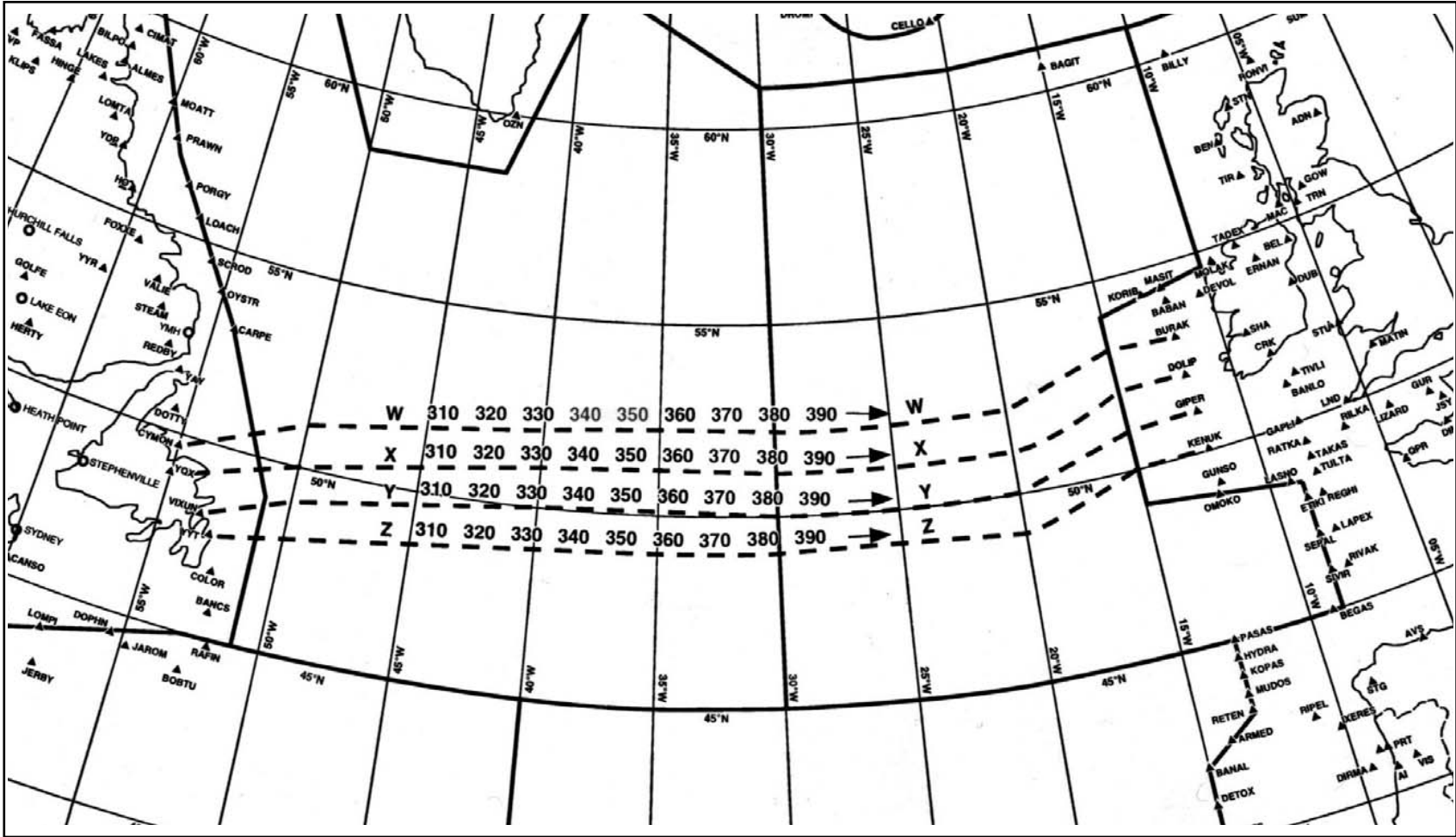
- **Separation application based upon Package 1 application ASPA-S&M**
- **Differences**
 - Aircraft are co-altitude
 - Aircraft are responsible for separation
 - Extended duration (several hours)
 - Spacing defined in minutes rather than seconds
- **Similarities**
 - Procedural termination condition - exit from track
 - Merge instructions can be used to initiate spacing at track entry

In Trail Follow (ASEP-ITF)



Self-Separation Applications

Organised Track System

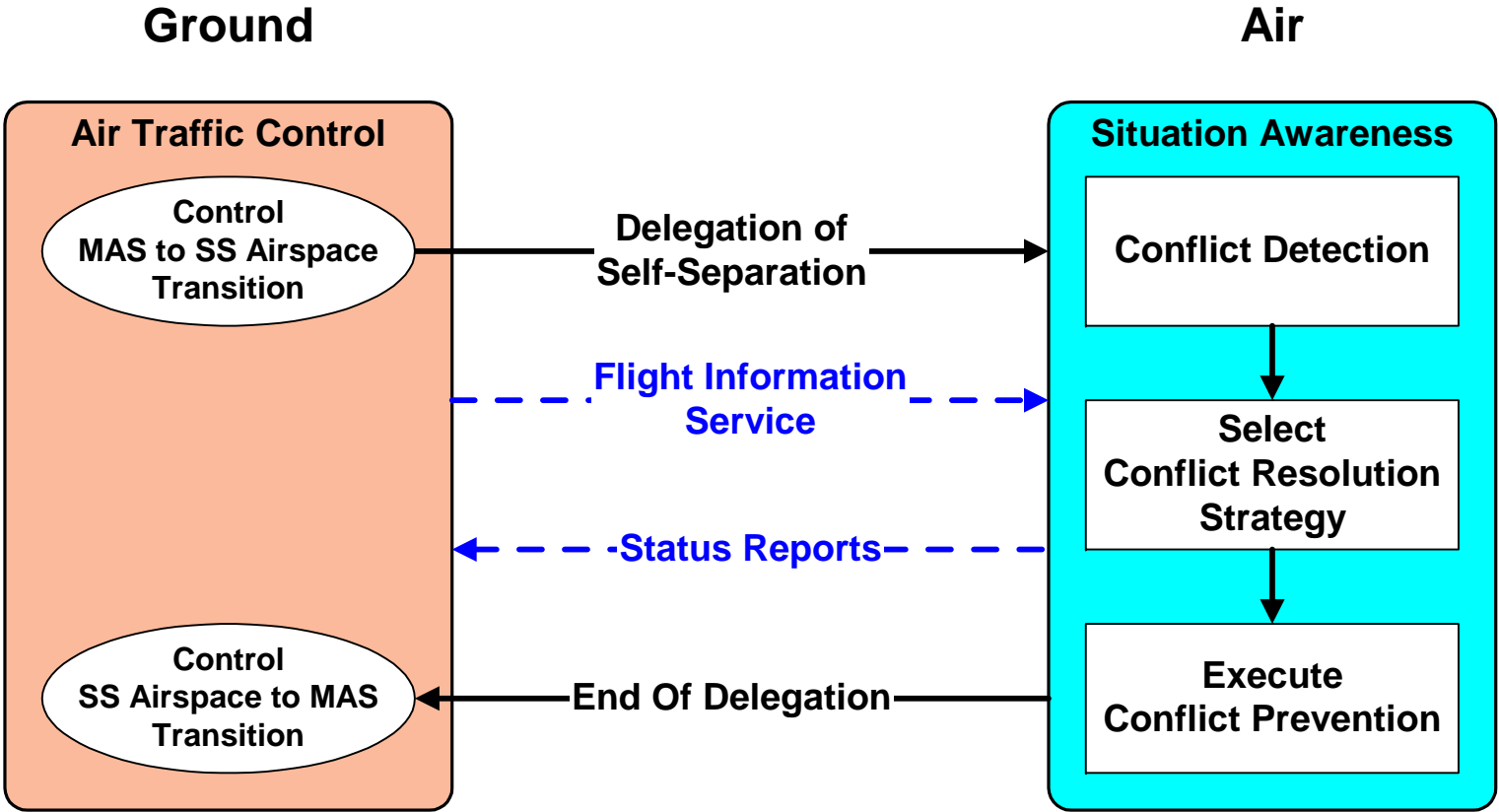


Self-separation on a Free-Flight Track (SSEP-FFT)

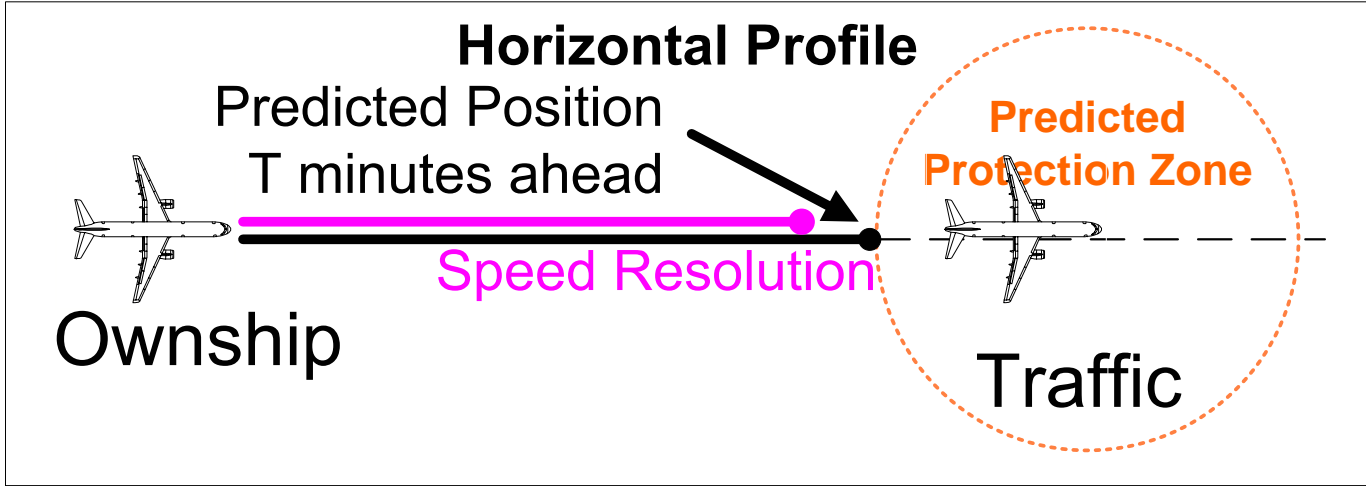
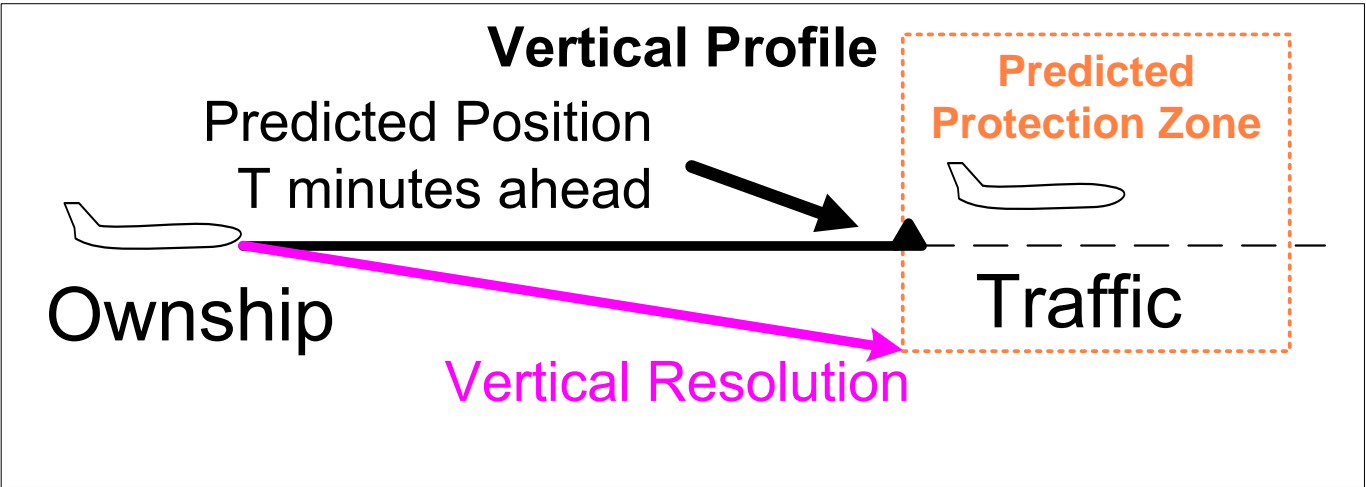


- **Self-separation application on a Free-Flight Track**
 - Aircraft are responsible for separation
 - Extended duration (several hours)
- **Benefits**
 - Optimised flight profile (altitude and speed)
 - Improved fuel economy
- **Issues**
 - Procedural termination condition - exit from track
 - Merge instructions can be used to initiate spacing at track entry

Self-Separation responsibilities



Conflict Resolution Strategies



Impact on Roles and Procedures



- **Controller is responsible for:**
 - Transition from managed to self-separation airspace
 - Transition from self-separation to managed airspace
 - Provision of flight information services
- **Airborne domain is responsible for:**
 - Conflict detection
 - Selection of conflict resolution strategy
 - Execution of conflict resolution strategy
 - Provision of flight status information
- **New procedures will be required**
 - Additional training for both controllers and flight crews

Benefits for Oceanic Applications

Benefits for Oceanic Applications



Improved flight efficiency leads to benefits in the form of

- Reduced fuel consumption
- Reduced gaseous emissions
- Potential for increased payload
- Reduced maintenance costs
- Reduced diversion risk (due to reduced fuel consumption)
- Earlier arrival time
- Reduced ATC provision (ASEP-ITF and SSEP-FFT)
- Reduced turbulence
- Possible safety improvements

THANK YOU

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