Twenty Third Meeting of the
Informal South Pacific ATS Co-ordinating Group (ISPACG/23)

Santiago, Chile, 26-27 March 2009

Agenda Item 4: Review Open Action Items

VISION 2015

(Presented by Airways New Zealand)

SUMMARY

Aviation plays a crucial role in New Zealand's economic wellbeing. Projected long-term growth of the aviation sector globally means it is essential to maintain the vitality of aviation through safe, efficient, cost effective and environmentally sustainable air navigation services. To ensure this, future Air Traffic Management (ATM) systems must provide for optimum use of enhanced technology capabilities; both airborne and ground based.

1. INTRODUCTION

Existing and developing technologies are providing options to support both tactical and strategic management of air traffic. However, technology by itself does not provide the complete solution to enable optimum airspace and airframe efficiencies. Operating and service delivery practices must form and integral part of the outcome.

1.1 Investment decisions must provide for commercially sustainable outcomes

To achieve these future Air Traffic Management (ATM) goals enabling systems will be performance based, taking a Whole of System approach and compatible with global practice as defined by ICAO. Looking forward to 2015 and beyond, we anticipate an operating environment where an aircraft's profile will be managed from departure gate to arrival gate.

This will require a progressive shift in the role of the current ATM system, from one of tactical control, to strategic control and exception management. This is the philosophy of Air Traffic Enabling, ATE, which will allow members of the ATM community, especially airspace users to participate in decisions that affect them and is a fundamental requirement to establish future directives and work practices.

1.2 Background

Vision 2015 outlines the expectations, deliverables and benefits of adopting a whole of system approach to meet the future ATM requirements in New Zealand. Vision 2015 supports the New Zealand State Air Navigation Plan to be published in 2009 in line with ICAO mandates.

This Vision is built on the work of an industry-driven project team involving the New Zealand's Air Navigation Services Provider (Airways New Zealand), the New Zealand Civil Aviation Authority (CAA) and various aviation group representatives including the airlines, the military and general aviation interest groups. It was first published in 2006 and is currently being revised and re-issued as edition 2.

The intent of Vision 2015 is to define New Zealand's future ATM in broad terms including aspects that will become the foundations or 'fundamentals' of the future. It will highlight key requirements and milestones to deliver this Vision, as well as signaling to Industry the key decision points for the various stakeholders. Vision 2015 will address the ICAO Global Air Navigation Plan (Doc 9750) Initiatives (GPI) in addition to alignment with IATAs user expectations for operational improvements and the ICAO Global ATM Operational Concept (Doc 9854). The vision is also consistent with the near to medium term objectives of the SESAR and NextGen programs.

It is imperative that a whole of system approach is taken to enabling Vision 2015, as not only are there complex inter-program relationships in the ATM system, but the ground infrastructure, aircraft equipage, and importantly the rules framework and equipment mandates need to go hand in hand.

A key deliverable of Vision 2015 is the ability to provide the tools to manage varied fleet capability while delivering system wide enhanced outcomes in safety, capacity, efficiency and the environment. Sophisticated flow management tools (arrival sequence displays), datalink communications, RNAV/RNP route structures and enhanced surveillance tools, such as ADS-B, will be the key technology enablers to bring about these outcomes.

1.3 Operational Concept

Operations within New Zealand will be conducted to the same standards and in the same manner as those overseas to meet the drive for an interoperable global air traffic management system, for all users during all phases of flight, which provides agreed levels of safety, optimum economic operations, 4DT trajectories and is environmentally sustainable.

Taking the example of three different flights:

International departure (NZAA-YSSY) – the reference business trajectory (RBT) for the flight is modeled prior to departure, any constraints anticipated and a departure time issued to meet the RBT. The RBT will provide for the most efficient route, gate to gate and can be dynamically altered in real time as the flight progresses.

Domestic Main Trunk (NZCH-NZAA) – in domestic main trunk operations, there is much less flexibility in the RBT, apart from speed or requested flight levels. Again this is modeled prior to departure and an appropriate departure time issued. There are minimal if any constraints in the departure and arrival phase, and any reconfiguring of the RBT to meet arrival constraints is done during the cruise phase.

Regional (NZTG-NZWN) – the process is similar to the main trunk operation with RBTs being modeled. However there is less flexibility in the 'procedural environment' and the departure process is to get the flight on track as soon as possible after departure.

In all of the examples the role of the controller has changed from tactical decision making to strategic decisions that take into account the effect actions taken have on the whole system. The role of the human in such an automated system will need careful consideration.

2. DISCUSSION

To move forward in delivering the expectations of the aviation community both in the air and on the ground; performance based operations, collaborative information sharing and decision making, plus support systems and tools are required.

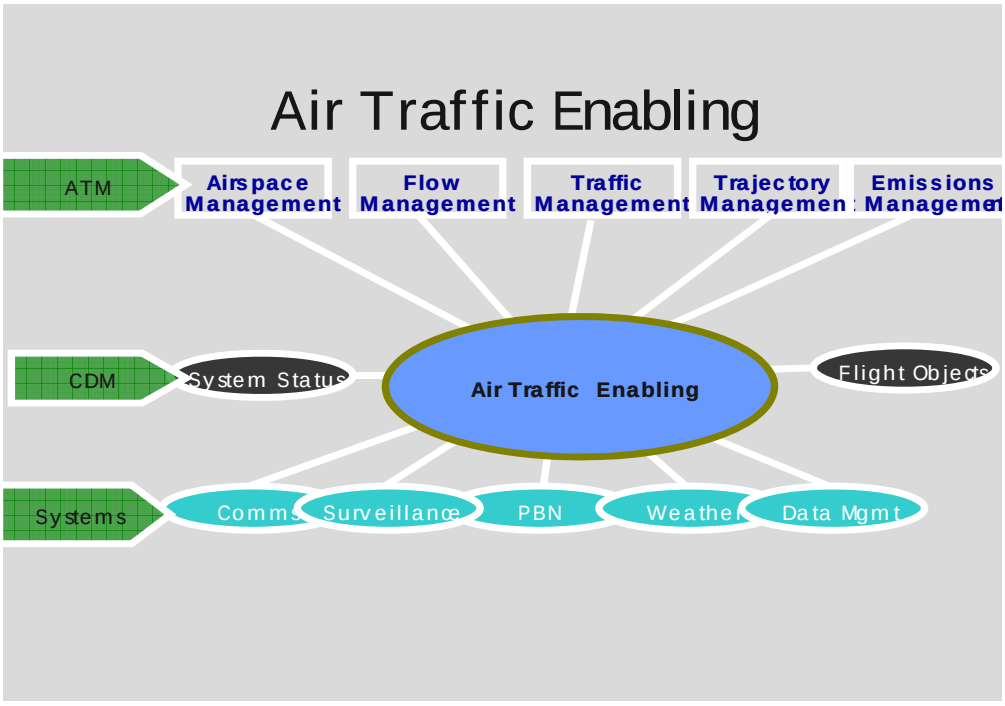
Together these components form the whole of system approach of Vision 2015.

This approach requires the engagement of the ANSP, airline operators and airspace users, regulator, airport companies, aircraft manufacturers and avionics suppliers. The ANSP is best positioned in this group to facilitate the way to a performance based environment.

From the perspective of the air traffic services provider this continues the evolution from air traffic 'control' through air traffic 'management' to air traffic 'enabling' (ATE).

ATE aims to maximize performance based outcomes and capability, share this information to stakeholders who can make best use of it and allow decisions to be made by the various participants. Tools need to be provided and processes and procedures developed to balance the varying requirements of the aviation community; and support the people (controllers and pilots) who are the end users and essential to the success of ATE.

2.1 Key Elements of ATE



An Example of one of these Key elements follows:

VISION 2015
Systems
Navigation - Performance Based Navigation (PBN)
Stakeholder Expectation: Access and Equity, Cost-effectiveness, Environment, Participation *Flight paths that allow for reasonable GA activity and access to airspace.* *Cost effective air navigation services, through prudent investment and efficient procedures.* *Minimise environmental impact of noise and emissions.* *Customer driven solutions.* *Accommodation of diverse equipage standards.* *Provide appropriate levels of contingency for core services.*

Operational Concept:

A route structure where a balance is achieved between the absolute shortest distance between take-off and landing, and one where routes are separated from each other, and fast and slow same-direction routes are used (i.e. separate Jet and Turbo prop routes used in some high density airspace). Navigation in the PBN environment will be enabled by GNSS, with DME-DME updating and a network of VOR/DMEs providing contingency.

There will be a reduction in bi-directional routes.

In the Terminal environment (aircraft climbing and descending) crossovers will be reduced to a minimum.

There will be a low demand for controller and pilot intervention to take the aircraft away from its optimum profile.

Discussion:

Oceanic Airspace

ATM in Oceanic airspace is based around the best use of technology to deliver tangible benefits to the customer. This includes reduced separation minimums, Controller Pilot Datalink Communications (CPDLC), RNP, Conflict Probe, User Preferred Routes and Dynamic Airborne Re-routes (DARPS).

RNP 4 was introduced into the Auckland Oceanic Flight Information Region (FIR) in 2005, and 30/30 separation in 2006.

Conflict Probe functionality was implemented within the Auckland Oceanic FIR in 2000, where conflict detection is now fully automated. Airways New Zealand's customers are therefore able to take advantage of full 'free flight' – the ability to randomly re-route at any point of the flight to optimise wind patterns. Track re-routes, rather than level changes, have become the preferred method of conflict resolution, with resultant savings to airline users in terms of time and fuel burn.

Domestic Environment

The future opportunities lie in taking advantage of RNP in the en-route and terminal airspace. As a first step RNAV 1 and RNAV 2 procedures will be introduced in the terminal and enroute environments, this will require appropriate rule and advisory circular publication.

PBN -RNP approach procedures into Queenstown, New Zealand, have been designed for Qantas International B738 operations and Air New Zealand B733 and A320 operations.

These procedures will eventually allow the current minimums of 2630FT agl to be reduced to approx 250FT agl under RNP0.1 This provides a tangible benefit to the airlines involved and fully justifies the expenditure to enhance both safety and reliability of operations in what is accepted as a very challenging environment.

Experience indicates that when approximately 70% or more aircraft operating in any area have upgraded to a new generation of onboard navigation equipment, the ATM system itself should declare this as the primary method of operation.

It is assumed that by 2015 a minimum of 70% of all aircraft operators will be capable of lateral navigation to:

- *RNAV 1 or RNAV 2 for en-route phase of flight*
- *RNAV 1 or Basic RNP1 for use within a terminal when on a SID or STAR.*
- *RNP0.3 or better for approach.*

Any aircraft not capable of operating to the new standards would still be accommodated; however a finite time should be given to comply

Initiatives:	**Timeline**	**Responsibility**	**Status**
RNAV STARs and SIDS	*2008-2009*	*Airways*	*In progress*
RNAV En-route	*2009-2012*	*Airways*	*In progress*
RNAV Regional airports	*2009-2015*	*Airways*	*In progress*
RNP -AR Trial	*2009-2010*	*Airways/Air NZ*	*In progress*
PBN Navigation specifications to defined for New Zealand by CAA.	*2009-2010*	*NZCAA*	*Not started*
Eg RNAV 1 and RNAV 2 standards defined by advisory circular/rule.			
APV – based on Baro V-Nav	*2008-2016*	*Airways*	*In progress*
APV Baro-VNAV approaches have been introduced at Auckland, Wellington, Christchurch, Dunedin, Hamilton, Palmerston North airports.			
Retirement of 'end of life' navigation aids	*2008-2015*	*Airways*	*In progress*
Establishment of a contingency conventional navigation network	*2009-2015*	*Airways/Industry*	*In progress*
Primary means GNSS usage	*2009-2010*	*NZCAA*	*Not started*
Equipment mandates	*2010-2011*	*NZCAA*	*Not started*
RNAV to RNP conversion	*2015+*	*Airways*	*Not started*

Linkage to Global Plan Initiative:
GPI/5 RNAV and RNP (Performance-based navigation); GPI/10 Terminal area design and management; GPI/11 RNP and RNAV SIDs and STARs; GPI/21 Navigation Systems

3. ACTION BY THE MEETING

3.1 The meeting is invited to note and comment on New Zealand's ATM plans to 2015.