DEVELOPING OPTIONS FOR UPPER AIR SPACE MANAGEMENT TOWARDS A REGIONAL AIR TRAFFIC MANAGEMENT FACILITY FOR PACIFIC ISLAND COUNTRIES

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Preface

Three studies have previously evaluated ATM service delivery in the Pacific upper airspace, each concluding that significant operational and financial benefits could arise if this upper airspace could be unified.[1] The outcomes from these studies highlighted:

- Problems with the delivery of ATM services in the upper airspace in the region have been known since mid 1990s. Opportunities to address these problems and realize benefits from new airspace arrangements have not taken place;
- Non-provider States want an equitable share of revenue from ATM services delivered to aircraft in the upper airspace above their sovereign territory. States in the Nadi FIR are most disadvantaged. The CAPA (2013) report highlighted the prospect of States within the Nadi FIR changing their ATM service delivery arrangements. Fragmentation of airspace and ATM service delivery presents the likelihood that operational costs to airline users will increase;
- The area in question encompasses the airspace above 16 sovereign countries. Five States provide ATM services in the upper airspace. It is likely to be difficult to gain consensus among the various States about the imperative to adopt new upper airspace arrangements and the content of the solution. Depending on the proposed solution AFL and Airways are likely to resist change, while Airservices are currently ambivalent[2].

All three studies found considerable operational and financial benefits would arise from creating a unified upper airspace across the South Pacific region. These benefits from the adoption of new ATM arrangements include operational cost reductions to airline users and a larger, more equitable distribution of upper airspace revenue to States. Improved financial arrangements provide the framework to deliver improved aviation infrastructure and related activities.

Lowering operational costs to airline users while increasing the returns to participating States is achieved through increasing the geographical area of the upper airspace. The larger the geographical size of the airspace, the greater the financial returns, due to lower marginal costs.

Despite the overwhelming benefits that are possible from unifying a greater geographical area of airspace and establishing a single ATM service delivery mechanism the recommendations contained in the 1999 and 2001 report were shelved. Parochial political interests apparently prevented the implementation of recommendations. At their core these political issues relate to air navigation service providers (ANSPs) responsible for air traffic services (ATS) in the upper airspace having a vested interest in maintaining the existing airspace arrangements. There also appears to

[1] These reports were titled: Pacific Forum Airspace Concept Study (1999)-also termed the PUAM report; Cooperative Airspace Management in the Pacific Region (2001); and Analysis of Flight Information Region (2013).

[2] Airservices have narrowed their commercial focus to being directed on their domestic operations and international neighborhood. The international neighborhood is adjoining countries (e.g., Indonesia) or where they have historical involvement (e.g., Solomon Islands, Nauru).

be considerable unease among the States about agreeing to initiatives that would increase the dominance of Fiji within the region.

The World Bank is sponsoring the Pacific Aviation Improvement Program (PAIP). PAIP is a Pacific regional aviation project with the development objective to provide safe and secure air transport operations and environmentally sustainable and efficient airports. PAIP initiatives were initially directed at Samoa, Tuvalu and Kiribati but will expand to include other Pacific Island countries.

Aviation in the Pacific needs to be established on a sound financial footing for the long-term aspirations of the PAIP to be realized. Revenue from upper airspace operations is an important element to funding aviation initiatives in manner countries.

Recommendations contained in earlier reports, detailing ATM arrangements in the Pacific upper airspace, concerns about current revenue allocation practices and the benefits that could be realized, have been revisited by the PAIP. To re-open the dialogue on these matters with States, the World Bank held a workshop in Vanuatu during October 2013 to discuss the current arrangement of Air Traffic Management (ATM) provision in the Pacific. The workshop reviewed the findings from the three preliminary studies conducted into the management of the upper airspace across the Pacific and discussed potential avenues for the optimization of ATM in the region. A major outcome from the workshop was agreement to explore the option of a unified upper airspace across the Pacific in more detail. This study termed "Developing Options for Upper Airspace Management Towards a Regional Air Traffic Management Facility for the Pacific Islands" was commissioned as an outcome of the Vanuatu Workshop.

The scope of this report encompasses the following airspace:

- Airspace above the eastern Polynesian States of Samoa, Tonga, Cook Islands and Niue. This area is currently within the Auckland FIR under the direction of Airways New Zealand;
- The full extent of the Nadi FIR. This includes the remaining area above the sovereign territory of Kiribati plus the areas above Tuvalu, Vanuatu and New Caledonia;
- Upper airspace of the Honiara and Nauru FIRs. This airspace is presently under the direction of Airservices Australia.

This report recommends a change to existing FIR boundaries in order for the unified Pacific upper airspace to incorporate the full extent of the sovereign territory of Kiribati. An expanded area would encompass the Kiribati sovereign territory that currently lies within the Oakland and Tahiti FIRs.

The lower limit of the unified Pacific upper airspace is FL245. It does not include ATM services in the airspace below this altitude.

Financial projections are based on flights that generate an air navigation service charge in this airspace. Data maintained by Airways indicates that scheduled commercial flights comprise 85% of flights[3]. The remaining 15% are from non-scheduled aircraft operations.

The main body of this study is structured into five sections. These sections are:

- Section 1: Pacific ATM Sector Background including descriptions about the nature of aircraft operations across the Pacific, current allocation of South Pacific Flight Information Regions, and current upper airspace ATM arrangements and revenue allocation models;
- Section 2: Design Considerations for Private Sector Participation;
- Section 3: Introduction of Three Proposed Options i.e., Shared ATM Service Provision, Regional ATS Contractor and Pacific Owned Provider;
- Section 4: Description of Preferred Option;
- Section 5: Implementation Aspects.

[3] Source: Airways Upper Airspace Annual Report (2012)-prepared for eastern Polynesian nations.

Overview (Executive Summary)

"Developing Options for Upper Airspace Management Towards a Regional Air Traffic Management Facility for the Pacific Islands" has been commissioned by the Pacific Aviation Investment Program (PAIP) to explore long-term options for the delivery of air traffic management (ATM) services in the upper airspace over the Pacific. Changes are needed for the continued efficiency of aircraft operations, provide operational and financial benefits to airline users, achieve greater equity in the method of upper airspace revenue distribution to all participating States and overcome the threat of fragmentation in airspace arrangements due to dissatisfaction arising from this revenue disparity. Resolution of these issues will help provide the foundation for a safe and sustainable aviation sector in the Pacific region.

The report applies to operations in the unified Pacific upper airspace. This airspace includes: airspace above the eastern Polynesian states of Tonga, Samoa, Cook Islands and Niue; the existing Nadi FIR; and the upper airspace above the Nauru and Honiara FIRs. It is recommended that this airspace be expanded to incorporate the area above the Kiribati sovereign territory including the parts that lie within the Tahiti and Oakland FIRs. The lower limit of the unified Pacific upper airspace is FL245 (which equates to 24,500ft AGL). ATM services to serve aircraft operations below this level are not included in this report.

Eleven States would provide airspace to the unified Pacific upper airspace. These nations are: Tonga; Samoa; Cook Islands; Niue; Fiji; Kiribati; Tuvalu; New Caledonia; Vanuatu; Nauru; and Solomon Islands.

Aircraft operations in the Pacific upper airspace can be characterized by long haul sophisticated jet operations which seek to achieve significant operational cost savings by flying on fuel efficient routes. These routes vary depending on the wind conditions and can change on a daily basis. Air navigation service providers (ANSPs) who provide upper airspace services within Pacific FIRs need to be able to accommodate these flexible aircraft routes. This means that ANSPs must provide ATM systems that can: communicate and receive aircraft position via satellite; assist controllers identify and resolve conflicts between aircraft flying on random routes; and enable the exchange of data with adjoining FIRs without the need for verbal coordination. It requires these ANSPs to have the capability to invest in sophisticated ATM technologies to meet evolving aircraft operational requirements. A high degree of route flexibility, combined with the greater sophistication of airlines and ANSPs, promotes the consolidation of air traffic service delivery and thereby FIR areas of responsibility.

ATM service delivery in the upper airspace of the South Pacific is dominated by three organizations i.e., Airservices Australia, Airways New Zealand and Airports Fiji Limited (AFL). Airservices provide ATM services in the upper airspace of the Honiara FIR. Airways provide services in the upper airspace above eastern Polynesia. AFL is responsible for ATM service delivery in the Nadi FIR.

Airservices is the largest of the three regional ANSPs. It is a very sophisticated organization and invests significantly in ATM technologies. Airservices has limited commercial aspirations to expand its ATM services. Over the past 10 years it has cut-back its international commercial aspirations to concentrate on domestic operations and a small number of neighboring countries such as Nauru and Solomon Islands.

Airways is the most commercial active ANSP in the region. It is aggressively seeking to grow its ATM revenues by undertaking a range of services outside its core business activities. Airways is actively seeking to expand the scope of its ATM services in the Pacific.

AFL is the smallest of the three ANSPs. Unlike Airways and Airservices, AFL is responsible for operating 15 airports in Fiji. The need to maintain these domestic airports, with associated low passenger and aircraft movement numbers, causes a financial drain on other areas of AFL's business.

Analysis of the revenue collected by AFL from en-route air navigation charges in the Nadi FIR over the past three years shows a slow decline. By way of comparison, Airways' air navigation revenue from eastern Polynesia increased by 7% for the financial year 2013, with a further 21% predicted for the financial year 2014. It highlights the difficulty of AFL in increasing its air navigation charges and generating greater revenue to meet its operating costs and commission new ATM infrastructure.

Airservices, Airways and AFL each employ different allocation methodologies to provide States with a share of upper airspace revenue. **Table** summarizes, for comparative purposes, the revenue sharing allocation models that AFL, Airservices and Airways have in place with Pacific nations.

Table: Comparison of Revenue Allocation Models

	AFL	Airservices Australia	Airways New Zealand
Nations within FIR	Kiribati, Tuvalu, Vanuatu, New Caledonia	Solomon Islands, Nauru	Samoa, Cook Islands, Niue, Tonga
Contract for provision of upper airspace services	No	Yes	Yes
Revenue Allocation Methodology	Revenue allocated based on share of costs to provide en-route services	Airservices collect charges from airlines for upper airspace services in Honiara and Nauru FIRs. They deduct a month service fee and pay the amount remaining to the two countries. Monthly service fee is a flat rate and varies from 23% to 40% of gross revenue	Airways collect charges from aircraft using the upper airspace over FIR sectors of Samoa, Cook Islands, Tonga and Niue. Airways retain 50% of revenue as service fee. The remaining revenue is shared by the nations based on their volume of airspace. These ratios are: Samoa 31%, Tonga 33%, Niue 10%, Cook Islands 27%.
Revenue Earned	For calendar year 2011: Vanuatu (253k), Kiribati (152k), Tuvalu (61k), New Caledonia (163k). All amounts in FJD and are subject to 15% deduction for Withholding Tax	Anticipated income for year to June 2013: Solomon Islands (961k), Nauru (392k). All amounts in AUD and net of Airservices service fee	Anticipated income for the year to June 2013: Samoa (536k), Tonga (571k), Niue (173k), Cook Islands (467k). All amounts in NZD and net of Airways service fee
Services Provided	En-route ATM in Nadi FIR	En-route services above FL245 in Honiara and Nauru FIRs	En-route services above FL245 over the sovereign territories and FIRs of the four nations.
		AFTN	AFTN
			AIS (AIP, NOTAMs, Procedure design)
Other Benefits	Nil	Provision for each nation to attend two regional safety meetings per year	Provision to attend two meetings per year-one operational the other to review the implementation of the contract
		Technical and operational support from Airservices internal resources as needed	Very active relationship management by Airways
		Assistance with capability development e.g., rescue fire	Operational familiarisation in New Zealand for technicians and air traffic controllers
		Strength of Australian dollar	Funding for ATC training often via NZ aid
Issues	No contract for the provison of ATM in upper airspace	Provision for up to 10% annual increase in service fee. Rarely exercised	68% Profit Before Tax from Service Fee
	Unfair methodology used for revenue allocation		
	Revenue allocation substantially less than received by other nations in other FIRs		
	Little, if any, engagement with nations in FIR		
	Nations within FIR have very little exposure to international aviation community		
	AFL has limited ATM support capability compared to Airservices and Airways e,g., training, technical advice		
	Deduction of 15% for Fiji Withholding Tax		

Note: Revenue earned is expressed in 000s (k)
Source: AFL, Airservices Australia and Airways New Zealand

The key points arising from the comparison of the three revenue allocation models are:

- In comparison with States in the Nadi FIR, those served by Airservices and Airways receive the benefit of significantly higher air navigation charges and more favorable currency exchange rates;
- The States within the Nadi FIR feel significantly disadvantaged financially compared to States that have upper airspace services provided by Airservices and Airways;

- Taking into consideration the revenue generated by AFL from upper airspace services, it almost certainly does not have the financial capacity to provide income distribution comparable to that undertaken by Airways and Airservices.

Three ATM service delivery options are evaluated for the unified Pacific upper airspace. These three options are:

- Regional ATS Contractor; and
- Pacific Owned Provider; and
- Shared ATM Service Provision;

Regional ATS Contractor

This option involves the States establishing an operating company that, in turn, creates a commercial contest for the delivery of ATS in the unified Pacific upper airspace.[4] A regional ANSP contractor then delivers these ATM services.

The objective of the operating company will be to balance income received from the ATM service delivery contract with the expenses of the operating company plus delivering an agreed distribution of upper airspace revenue to the States. The air navigation charges that are established by the regional ATS contractor will need to take account both the expenses of the operating company and income distribution to the States. This is in addition to the cost of service delivery and profit for the regional contractor.

The Regional ATS Contractor establishes a commercial contest between sophisticated ATM service providers in the region. This commercial contest provides the prospect of lowering the level of air navigation service charges and provides the opportunity for AFL to remain a contender for the provision of services.

Compared to the Shared ATM Service Provision model, the Regional ATS Contractor has higher implementation and on-going costs. The Shared ATM Service Provision model assumes an incremental increase in service costs by Airways and Airservices. Due to the larger airspace controlled, the Regional ATS Contractor would need to establish an entire sector to deliver ATM services for the unified Pacific upper airspace. This increases the service delivery cost.

Pacific-Owned Provider

The Pacific Owned Provider option involves the creation of an organization, located in one of the Pacific Island States, to provide ATM services in the unified Pacific upper airspace.

Through a multilateral agreement the States will agree to establish a company, or corporation incorporated by the States, to provide ATM services in the unified upper airspace. The Pacific Owned Provider would be established in one of the participating States.

Each of the participating nations would have the opportunity to provide staff to the upper airspace organization. The upper airspace organization would take responsibility to train ATCs and technical staff. After a period of time performing roles in the upper airspace organization, it is expected that these staff would return to their nation to take senior roles in civil aviation. This cycling of staff from Pacific Island nations through an upper airspace organization should improve aviation capability development within the participating nations.

[4] This was the recommended option presented in the Pacific Forum Airspace Management Concept Study (1999).

The Pacific Owned Provider option requires the greatest capital investment requirement. It also has the highest establishment costs and annual operating expenses. It takes the longest period to enter operation.

Shared ATM Service Provision-Preferred Option

The findings of this report suggest the most feasible option for ATM service delivery for a unified Pacific airspace would be a Shared ATM Service Provision. This option is in essence a modification of current arrangements that currently exist for ATM service delivery in the upper Pacific airspace.

The shared services would be provided by Airways New Zealand for the eastern half of the Pacific nations as an extension of the Auckland oceanic sector; with the western half of nations provided services by Airservices Australia as an extension to the Brisbane oceanic sector. This airspace incorporates the areas of eastern Polynesia, Nadi FIR, plus the Honiara and Nauru FIRs. This report recommends expanding this area to incorporate those parts of the Kiribati sovereign territory that currently lies beneath the Tahiti and Oakland FIRs. It would apply to FL245 and above. An eventual phase-out of current AFL services would need to be agreed and negotiated as a part of this arrangement.[5]

Participating States would enter into an administrative agreement to delegate ATM service provision within designated areas to the governments of New Zealand and Australia. Each government would delegate ATM service delivery to Airways or Airservices, as appropriate. The governments of New Zealand and Australia would assume ICAO delegations for their respective portions of the unified Pacific upper airspace.

States will enter into an arrangement with Airways and Airservices to provide ATM services within this unified Pacific upper airspace. States will individually contract with Airways and Airservices for these upper airspace ATM services by way of a common administrative agreement. The term of the agreement should be for five years. Airways and Airservices provide the ATM services, lead ATM policy for the area, impose their ATM charges and collect upper airspace revenue. A service fee will be negotiated with Airways and Airservices. The target level for this service fee is 20-25% of gross airspace revenue. Air navigation services revenue of USD24.8m is expected from this airspace. States receive a share of upper airspace revenue based on the proportion of airspace provided to the agreement and traffic volume.

The eleven states in the South Pacific will agree to collectively govern their sovereign interests over the upper airspace in this region[6] through a treaty. An amendment to the PICASST treaty would provide the framework for the agreement of the participating States. The Regional Transport Ministers Forum will provide governance of the upper airspace treaty and ATM service delivery arrangements.

PASO would provide management oversight, on behalf of the participating States, of the arrangements with Airways and Airservices. This involves reviewing financial and operational performance. PASO would receive a fee for these management services. A deduction could be made from the upper airspace revenue payable to each State (net of the Airways and Airservices

[5] A negotiated settlement will need to be made with AFL to offset their redundant investment in staff and infrastructure that is no longer required for the delivery of oceanic ATM services. The value of the negotiated settlement could be approximately USD1.7m.

[6] The 11 states comprise: Tonga, Samoa, Cook Islands, Niue, Fiji, Kiribati, Tuvalu, New Caledonia, Vanuatu, Solomon Islands, and Nauru.

service fee) to meet the States' annual financial obligations to PASO. It is estimated that USD420k would need to be collected from the eleven participating states for PASO to provide this management oversight.

States could make an application to ICAO to incorporate the full extent of the sovereign territory of Kiribati into the unified Pacific upper airspace. However, it is not necessary to achieve these FIR boundary changes for the Shared ATM Service Provision model to operate.

Benefits

Several benefits can be gained by implementing a Shared ATM Services model.

Financial: Based on the report's analysis, a Shared ATM Service Provision provides the opportunity for the greatest financial benefit to participating States. Even if the full potential revenue of USD24.8m does not materialize – because of the cost savings expected through this arrangement – States will continue to receive at least their current share of upper airspace income, and States in the Nadi FIR will receive a substantially greater amount.

Efficiency Gains: Airservices and Airways are both well-known and well-respected entities by the participating States. Similarly they are well-regarded by users of the airspace. Both organizations have the human resource and technical capabilities to provide a modern ATM service environment in a unified Pacific upper airspace for the long term. Airways and Airservices are able to generate service delivery efficiencies through achieving marginal cost benefits. Increases in air navigation service charges within the Nadi FIR portion of the unified Pacific upper airspace can be offset by lower charges over the entire Australian and New Zealand oceanic areas because air navigation charges over eastern Polynesia, Honiara FIR, and Nauru FIR will likely decrease.

Overcoming Political Barriers: Implementation of changes to the Pacific nations' upper airspace arrangements is highly political and has been curtailed on a number of previous occasions. Adoption of the Shared ATM Service Provision model provides the opportunity to negotiate an agreement that overcomes the political resistance to change. It provides the framework to achieve a resolution with AFL and other States during the engagement process around this report. This option also provides AFL the opportunity to improve its financial position by generating increased revenue and reducing its costs without providing an oceanic service in the Nadi FIR.

Separation of Governance and Delivery: Arrangements for the governance of the unified Pacific upper airspace and the ATM service delivery are separated. This helps to ensure that the same entity responsible for delivering services is also not responsible for governing itself. Establishing a treaty among States for the collective governance of this airspace will provide for a high level of stability in these agreements and arrangements. There is also low establishment and on-going contract management costs associated with this option. **FIR Boundaries:** The service delivery model can be implemented without any changes to existing FIR boundaries. While it is recommended that changes to FIR boundaries over the sovereign area of Kiribati are undertaken, these boundary changes can take place independent of the implementation of the new service delivery arrangements. However, making these changes concurrently to implementing a new arrangement would be a feasible approach.

PASO Funding: PASO operating costs would now be directly funded from upper airspace revenue. This direct funding means that States will not have to make payments to PASO from their general government funds, and PASO no longer has to be concerned over collecting funds from individual

States. Airways and Airservices can directly channel the States' financial obligations to PASO before distributing income to States. This would mean States would receive payments from Airways and Airservices net of their financial obligation to PASO.

Risks and Disadvantages

AFL Resistance: The most significant risk associated with implementing a Shared ATM Services model would be AFL's resistance to a new arrangement. The implementation of this model means the eventual phase-out of AFL providing oceanic ATM services in the Nadi FIR. AFL has provided these services for many years and it is a source of national prestige. Although the financial advantages through adopting the Shared ATM Service model are strong, no monetary compensation may overcome the loss of national prestige. Should AFL be unwilling to accept the Shared ATM Service Provision model, States within the Nadi FIR will need to assertively push for change in service delivery arrangements.

Increase in Nadi FIR Charges: Although airspace users will see a reduction in total airspace costs from the implementation of the new ATM service delivery arrangements, users operating within the Nadi FIR will see a sharp increase in costs with the implementation of Airways and Airservices air navigation charges. The increased charges within the Nadi FIR will need to be offset by lower overall charges within other oceanic areas.

The share of upper airspace income that each State receives is based on the proportion of revenue that each State could be expected to contribute to the potential total income of the new airspace. It considers the volume of airspace and traffic levels that each State contributes.

Table presents the revenue allocation that would be earned by each State, which reflects upper airspace revenue of USD24.7 million. From this gross upper airspace revenue a 20% service fee for upper airspace services conducted by the two ANSPs is deducted.

Table: Possible Distribution of Upper Airspace Revenue from Shared ATM Service Provision Model

State	Proportionate Share (Percent)	Gross Amount (USD)	Upper Airspace Revenue Allocation (USD)-20% Service Fee Deducted
Tonga	6.18%	1,530,662	1,224,530
Samoa	5.84%	1,446,451	1,157,161
Cook Islands	5.15%	1,275,552	1,020,441
Niue	2.40%	594,432	475,546
Fiji	44.00%	10,897,918	8,718,335
Kiribati	12.75%	3,157,919	2,526,336
Tuvalu	1.75%	433,440	346,752
New Caledonia	6.46%	1,600,013	1,280,010
Vanuatu	6.46%	1,600,013	1,280,010
Nauru	2.40%	594,432	475,546
Solomon Islands	6.61%	1,637,165	1,309,732
Total (USD)	**100.00%**	**24,767,996**	**19,814,397**

The table illustrates that all States will be financially advantaged strongly by the adoption of this methodology.

Five-stage Implementation Plan

A five-stage implementation plan is needed to implement the proposed recommendation. These stages involve:

1.) Engage AFL/Government of Fiji about Findings from this Report;
2.) Engage Other Pacific Island States and Stakeholders about Findings from this Report;
3.) Establish a Governance Treaty;
4.) Negotiate Agreements with Airways New Zealand and Airservices Australia;
5.) Make Changes to the FIR Boundary over Kiribati.

Steps 1 and 2: Engage AFL/Government of Fiji and Other Pacific Island States and Stakeholders about Findings from this Report

The Shared ATM Service Provision model involves the phase-out of AFL's responsibility for providing oceanic air services in the Nadi FIR. The findings of this report, along with other studies, would have to garner Fiji's buy-in by providing the appropriate rationale for change through a financial and operational assessment that illustrates the benefits of the Shared ATM Service Provision model over the existing arrangement.

Due to the eventual phase-out of AFL services, it will result in a significantly drop in air navigation revenue received by AFL. States will have to negotiate a financial settlement for the staff and infrastructure that would be no longer required by AFL. As a result, States also need to be continuously engaged in the process to ensure a fair and well-negotiated settlement is reached with AFL. Other large States in the region, including Vanuatu, Tuvalu, and Kiribati may need to assertively push for change and help lead the process to demonstrate there is enough political will and support for a newer and improved model of ATM in the region.

ICAO and the World Bank can continue providing resources and being used as mediators to facilitate the eventual outcome and find resolutions to ensure the smooth implementation of the proposed recommendation and delivery arrangements.

Step 3: Establish a Governance Treaty

States should sign a treaty to express their agreement to collectively govern the unified Pacific upper airspace. This will help provide for the long-term stability of upper airspace arrangements in the region. The PICASST treaty is in need of modification to encompass the scope of activities now being undertaken by PASO. An amendment to PICASST could incorporate an agreement that States collectively govern the unified Pacific upper airspace.

Step 4: Negotiate Agreements with Airways New Zealand and Airservices Australia

Airways New Zealand has previously indicated its eagerness to assume greater responsibility for providing ATM services over the Pacific. Airservices Australia has expressed some ambivalence about increasing the volume of airspace in the Pacific for which it provides ATM services, but it is expected that Airservices will agree to the proposed recommendation.[7]

An administrative agreement that details the scope of services to be provided by each ATM service delivery organization will need to be prepared.[8]

A service fee needs to be negotiated on behalf of the States with Airways and Airservices. Assuming the potential income of the unified Pacific upper airspace is USD24.8m[9], a service fee of 20-25% should be the negotiating target.

Current service delivery agreements between Airways and States in eastern Polynesia extend until 2017. Airservices have an agreement with Solomon Islands until 2018 and with Nauru until 2023. Part of negotiations around the service fee will likely involve an early end to these agreements and a transition to the new Shared ATM Service Provision arrangements.

Once an agreement is reached on the adoption of the Shared ATM Service Provision model, the administration of the ATM service contracts will be undertaken by PASO. A scope of services and management fee will also need to be agreed.

Step 5: Make Changes to the FIR Boundary over Kiribati

Changes to the FIR boundaries above the sovereign territory of Kiribati do not need to be undertaken for the Shared ATM Service Provision model to be implemented. However, in order for the participating States to exercise governance over the sovereign territories of all nations, the FIR boundaries over the sovereign territory of Kiribati need to be amended. It requires a change to the boundaries of Oakland and Tahiti FIRs.

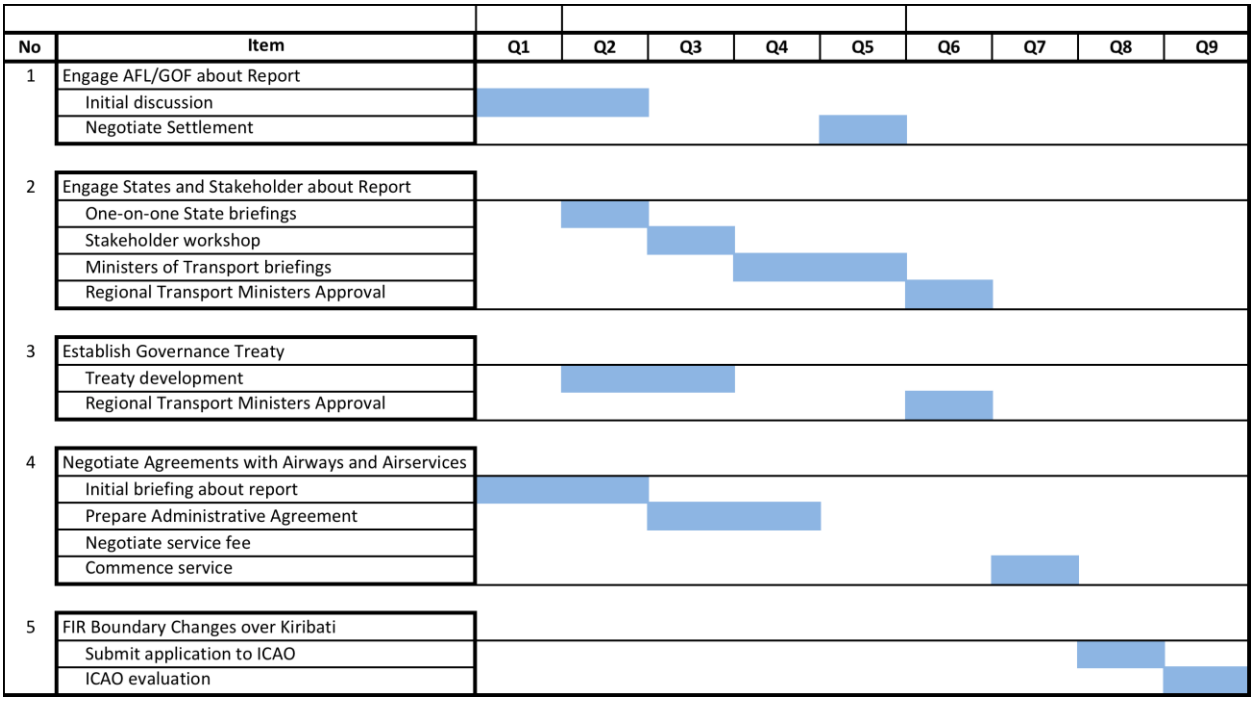
Obtaining the air navigation revenue from the entire sovereign area of Kiribati enables the income from this service delivery model to be maximized. In particular the revenue generated over this area has a material impact on the financial return for Kiribati.

Implementation Timeline

Below **Diagram** presents a high level graphical representation of the indicative timeline for the activities that will need to be carried out before the proposed recommendation can be implemented. The proposed timeline spans nine quarters i.e., two years three months.

Diagram: Indicative Implementation Timeline

[8] International airspace delegations require that each State has to enter into a separate agreement with Airways and Airservices.
[9] As highlighted in the calculations in Chapter 4


No
Item
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
1
Engage AFL/GOF about Report
Initial discussion
Negotiate Settlement
2
Engage States and Stakeholder about Report
One-on-one State briefings
Stakeholder workshop
Ministers of Transport briefings
Regional Transport Ministers Approval
3
Establish Governance Treaty
Treaty development
Regional Transport Ministers Approval
4
Negotiate Agreements with Airways and Airservices
Initial briefing about report
Prepare Administrative Agreement
Negotiate service fee
Commence service
5
FIR Boundary Changes over Kiribati
Submit application to ICAO
ICAO evaluation

Section 1
Sector Background

Nature of Aircraft Operations across the Pacific Islands

Flights across the Pacific Ocean historically have involved aircraft flying on fixed routes with restricted aircraft navigation performance. From an air traffic control perspective, apart from areas close to these countries, radar surveillance coverage was not available on these oceanic air routes. These areas also required pilot-controller communication to be undertaken using High Frequency (HF) radio. Information, requests and clearances exchanged between the controllers and pilots were relayed by specialist HF air-ground radio operators. Controllers passed and received voice or type written communications with the air-ground HF radio operator that detailed the exchanges with the aircraft. HF is notoriously impacted by atmospheric conditions, particularly thunderstorm activity, which is prevalent in areas of the Pacific.

Without surveillance coverage, procedural control is applied by air traffic controllers. Taking account of the possible navigation errors by aircraft, which determine their position without the availability of ground based navigation aids, as well as communication difficulties through the use of HF, meant that large procedural separations standards had to be applied. These oceanic airspace procedural separation standards required up to 20 minutes spacing between aircraft of similar performance on the same track at the same flight level. As on-board navigation systems improved, these procedural distances reduced to 10 minutes separation on the same track. For modern jet aircraft this spacing, still often amounting to 80 miles or more, consumes large blocks of air space and limits the capability of Air Navigation Service Providers (ANSPs) to accommodate aircraft at their optimum cruising level to achieve performance efficiencies.

The sophistication of aircraft flying across the Pacific has significantly increased in the past twenty years. A trial held in the South Pacific during the early 1990's was instrumental in development of Future Air Navigation Systems (FANS). This trial assessed the use of satellites by aircraft to determine their position and undertake communication by Controller Pilot Data Link Communication (CPDLC). Avionics utilizing satellites to enable aircraft to determine and report their position as well as communicate through the use of data link is termed FANS-1/A.

The very long route length across the Pacific Ocean is an ideal setting to implement initiatives to substantively reduce the operating costs of airlines. Initially flex tracks provided an alternative to fixed routes. Flex track routes are generally planned a day in advance of the flight and take into account the forecast weather conditions, in particular the upper winds, expected on the route. They are offered by the ANSP, with the route availability and details published via a Notice to Airman (NOTAM). Flex tracks provide an optimized route between two way points, taking into account the forecast winds, and can change daily with variations in upper wind conditions.

Flex tracks have always been seen as a somewhat intermediate step in the route availability for long haul aircraft. User Preferred Routes (UPRs) enable an aircraft to select their desired route, altitude and speed as well as take place at their choice of time. The relatively high level of sophistication of aircraft flying across the Pacific has promoted the use of UPRs. These UPRs can extend from a gateway clear of the domestic traffic on the west coast of the United States to a gateway on the east coast of Australia.

A number of different operational criteria can be used by an airline in determining a UPR. For example, an airline might want to select a route that provides the lowest operating cost. On another occasion, the airline may need to choose a route with the shortest flight time to overcome crew time limitation or reduce downstream service delays.

UPRs require sophisticated enabling technology by both airlines and the ANSPs providing these services. With aircraft no longer flying on fixed routes, new technology is needed for both the aircraft and ANSP to determine position, identify when aircraft are on conflicting flight paths, and effect separation.

Aircraft require FANS 1/A as their avionics foundation in order to operate UPRs. This involves the use of Automatic Dependent Surveillance-Contract (ADS-C) for position reporting. ADS-C involves a one-to-one relationship between the aircraft, ANSP and satellite communication provider i.e., a contract. The aircraft determines its position from the Global Navigation Satellite System (GNSS) constellation and transmits this information, again using satellite, via the on-board Aircraft Communication Address and Reporting System (ACARS) data link, to the ANSP.

Under ADS-C, aircraft send position information to the ANSP typically every 14 minutes. Communication between the ANSP and aircraft in these oceanic areas utilizes CPDLC, in the place of voice over HF radio.

Modern oceanic Air Traffic Management (ATM) systems now incorporate FANS-1/A capability into their processing and display functions. The ADS-C position of an aircraft is depicted on the controller display. Data link communication takes place directly between the controller and aircraft, without an HF air-ground operator being an intermediary.

Greater accuracy in determining the aircraft position and improved communication has enabled the separation distance between aircraft, both equipped with FANS-1A, to be reduced. Instead of 10 minutes spacing, often equating to 80 nautical miles (nm) or more, this distance can be reduced to 30 nm same track and 30 nm between tracks.

Some 70% of aircrafts flying across the Pacific are now equipped with FANS-1/A and able to undertake UPRs. This proportion is expected to increase as older B747-400 aircraft are replaced by new generation airframes.

The use of UPRs require ATM systems to dynamically update aircraft route information, and help controllers determine when aircraft are in conflict and be integrated with the ATM systems of adjoining flight information regions (FIRs).

Air traffic control centres located in Oakland, Nadi, Auckland, and Brisbane manage the oceanic airspace across the Pacific. Each system has the capability to accommodate aircraft flying on UPRs. Data is exchanged about aircraft through standardised system interfaces, significantly reducing the need for verbal coordination between controllers.

UPRs present considerable complexity for air traffic controllers in determining whether aircraft are or will be in conflict. Software upgrades to enable conflict detection are being incorporated into ATM systems to support manual calculations of separation standards by air traffic controllers. At present, this conflict detection is based on flight plan track calculations, enhanced by ADS-C position information. This functionality is adequate for relatively low density operations.

Implementation of Automated Dependent Surveillance-Broadcast (ADS-B) (Out) involves an aircraft emitting a transponder signal that is used as a surveillance source by air traffic controllers, and is well advanced in the domestic airspace of a number of countries. However, this technology is likely to be used widely in oceanic upper airspace. Once a large percentage of aircraft are equipped with ADS-B (Out), the possibilities offered by ADS-B (In) become a vital enabler to increase traffic capacity, provide more efficient flight profiles, and reduce ATM related costs. ADS-B (In) involves an aircraft receiving ADS-B information from other aircraft and processing this data to support various on board "applications" to assist with air traffic management and overall situational awareness for the flight crew.

Within oceanic airspace the use of ADS-B (In) is being trialed for an In Trail Procedures (ITP) application. ITP can be applied when there are ADS-B (Out) equipped aircraft on the same track and one aircraft is seeking to climb or descend through the level of other aircraft.

Instead of air traffic control needing to apply large procedural separations between the aircraft, the ADS-B (In) ITP application tells the pilots the distances and rates of closure with respect to other aircraft. If they fall within specified limits (which are smaller than the procedural separation which would otherwise apply) then ATC can approve the change in flight level.

Rather than being reliant on ground stations to receive ADS-B (Out) transponder messages from aircraft, a satellite constellation will be operational in 2017 that relay these signals from the aircraft to ground ATM locations. This satellite based ADS-B system will provide coverage of the entire Earth's surface. It is particularly suited to low-medium density airspace, including the oceanic upper airspace areas of the Pacific Ocean.

In summary the oceanic upper airspace across the Pacific Ocean can be characterized by the following:

- Air services provided by increasingly technologically sophisticated long haul aircraft which seek to achieve significant operational cost savings by flying on fuel efficient routes. These routes vary depending on the wind conditions and can change on a daily basis;
- The need for ANSPs who provide upper airspace services within Pacific FIRs to accommodate these UPRs. This means that ANSPs need to provide ATM systems that can: communicate and receive aircraft position via satellite; assist controllers identify and resolve conflicts between aircraft flying on random routes; and enable the exchange of data with adjoining FIRs without the need for verbal coordination;
- Satellite technology is planned to become available in 2017 which will enable the greater use of ADS-B in oceanic areas. This technology will provide complete surveillance coverage over the Pacific Ocean. The use of ADS-B (In) is likely to gain greater prominence through aircraft seeking to gain operational efficiencies by having greater access to optimal flight levels;

A high degree of route flexibility, combined with the greater sophistication of airlines and ANSPs, promotes the consolidation of air traffic service delivery and thereby FIR areas of responsibility.

Flights within the unified Pacific upper airspace can be characterized as being predominantly high-level scheduled jet operations travelling between North America and Australia or New Zealand. There are also high level scheduled operations into and out of international airports in the region. These airports include Nadi, Nausori, Port Vila, Tontouta, Faleolo, Nauru, Honiara, Fua'amotu,

Rarotonga, Niue, Funafuti and Bonriki. It estimated that scheduled services account for 85% of total movements.[10]

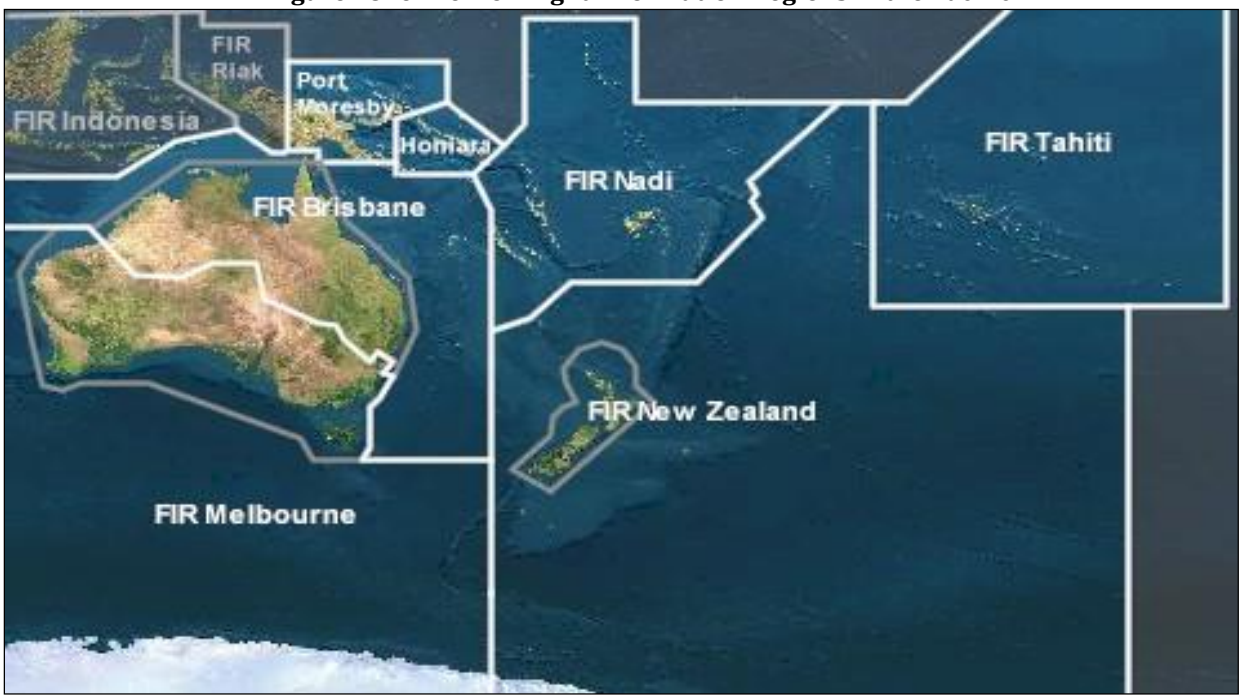
The Boeing Corporation has provided an estimate for the growth in aircraft movements in the oceania region for the period 2013-2035[11]. Aircraft movements in this region are forecast to increase by 4.4% annually.

Current Allocation of South Pacific Flight Information Regions (FIRs)

The airspace above the Pacific Ocean is divided up into a number of defined areas, called Flight Information Regions (FIRs). Within these areas a State has been delegated authority by the International Civil Aviation Organization (ICAO) to provide air traffic services and search and rescue services. Across the Pacific, these FIRs include sovereign territory and high seas airspace.

Figure depicts the current FIR arrangements in the region.

Figure : Overview of Flight Information Regions in the Pacific



Most of the FIRs across the Pacific are a reflection of the political and colonial influences that existed in the 1940's and 1950's. They are also a reflection of the aircraft performance, navigation systems, and air-routes of the time. These historic FIR boundaries are becoming less relevant as the sophistication of aircraft increases, enabling the use of random routes which take account of wind conditions that often change on a daily basis.

[10] Airways (2012)

[11] Boeing Corporation (2013) Traffic Growth Forecast for Oceania 2013-2032

FIRs are determined by the Council of ICAO, and incorporated into regional air navigation agreements. In essence, decisions by the Council concerning the allocation of FIRs occurs following regional consultation with the affected State, the States of airlines using the airspace, and other international aviation organizations.

Outcomes from these consultations are reviewed at regional meetings, with a preferred action presented to the Council for final ratification. FIRs, including the services provided there-in, are detailed in the ICAO Regional Air Navigation Plan. The FIRs are named after the area control center that is responsible for providing services.

Four FIRs are relevant to this study: Nadi (Fiji), Oakland (USA), Tahiti, Auckland (New Zealand), and Brisbane (Australia).

BOX :Allocation of FIRs

Appendix N of ICAO Assembly Resolution A32-14 (1998) outlines some key principles in the allocation of FIRs and the process for determining these airspace boundaries. It requires that airspace should be "established on technical and operational considerations with the aim of ensuring optimum efficiency and economy for both providers and users of the services." It also details that when an airspace extends over two or more states, an agreement should be prepared based on negotiations between the states concerned. Furthermore, it notes that "the providing State in implementing air traffic services within airspace over the territory of the delegating State shall do so in accordance with the requirements of the delegating State."

Under the Chicago Convention only a State can accept responsibility for providing ATS over the sovereign territory of another State and the high seas. However, the State can agree that a suitable agency can provide the services.

The South Pacific Island nations could collectively seek to unify the upper airspace over their sovereign territories. An arrangement would be required among the participating States. This arrangement could take the form of a treaty or formal agreement between the States. It would require that the participating States define the level of ATS that are required to be provided in the upper airspace. The agreement also specifies the State for which the provision of these services is to be delegated. This State with the delegated authority can choose to engage another agency to provide ATS. For example, Samoa, Tonga and Niue entered into a state-to-state agreement with the government of New Zealand for the provision of air traffic services. The delivery of these services was in-turn delegated by the Government of New Zealand to Airways New Zealand.

Table presents a summary of the FIR arrangements for Pacific Forum States. It describes the FIR where each state resides, the ATM service provider in the upper airspace above their sovereign territory and the status of an ATS agreement between the service provider and state.

Table: FIR ATM Service Provision by Sovereign State

Sovereign State	FIR	Service Provider	ATS Agreement
Australia	Brisbane	Airservices	Local legislation
Belau	Oakland	Federal Aviation Administration	Constitutional Arrangement
Cook Islands	Auckland	Airways	Commercial agreement until 2017
Federated States of Micronesia	Oakland	Federal Aviation Administration	Constitutional Arrangement
Fiji	Nadi	AFL	Local legislation
Kiribati	Nadi, Oakland, Tahiti	AFL, Federal Aviation Administration, Tahiti	Nil
Marshall Islands	Oakland	Federal Aviation Administration	Constitutional Arrangement
Nauru	Nauru	Airservices	Commercial agreement until 2023
New Caledonia	Nadi	AFL	Nil
New Zealand	Auckland	Airways	Local legislation
Niue	Auckland	Airways	Commercial agreement until 2017
Papua New Guinea	Port Moresby	Airservices Papua New Guinea	Local legislation
Samoa	Auckland	Airways	Commercial agreement until 2017
Solomon Islands	Honiara	Airservices	Commercial agreement until 2018
Tokelau Islands	Auckland	Airways	Nil
Tonga	Auckland	Airways	Commercial agreement until 2017
Tuvalu	Nadi	AFL	Nil
Vanuatu	Nadi	AFL	Nil
Wallis & Futuna	Nadi	AFL	Nil

The FIR boundaries over the South Pacific that were determined in the 1950s are no longer reflective of the sovereignty in the region nor do they any longer reflect the operational needs of modern jet operations across the Pacific Ocean. There is also concern that the present FIR arrangements do not provide air traffic services within upper airspace in the most cost effective manner to the airlines.

Current Upper Airspace ATM Arrangement and Revenue Allocation Model

This section describes the existing arrangements for ATM in the upper airspace across the South Pacific. ATM service delivery in the upper airspace of the South Pacific is dominated by three organizations:

1.) Airports Fiji Limited (AFL)

2.) Airways New Zealand
3.) Airservices Australia

Upper Airspace Services provided by Airports Fiji Limited (AFL)

AFL provides oceanic ATM services in the upper airspace of the Nadi FIR. The sovereign territories of Kiribati, Tuvalu, New Caledonia, and Vanuatu lie within the Nadi FIR. AFL is a Government of Fiji owned commercial company with 465 employees.

AFL was established in April 1999, following a move to separate the commercial and regulatory functions of the Civil Aviation Authority of Fiji (CAAFI). The Government of Fiji appoints a four member board of directors to provide governance of AFL. AFL has a dual reporting system, reporting to the Minister for Public Enterprise on its commercial performance and to the Minister of Civil Aviation on aviation policy matters. AFL has a financial obligation to deliver a 10% return on shareholder funds.

Unlike the commercially operated ANSPs in Australia and New Zealand, AFL is also responsible for the management of 15 airports in the Fiji Islands. The need to maintain these domestic airports, with associated low passenger and aircraft movement numbers, causes a financial drain on other areas of the business.[12]

AFL is responsible for providing en-route ATM services in the upper airspace, above FL245, of the Nadi FIR. New Caledonia and Port Vila have responsibility for airspace up to FL245 in the New Caledonia and Port Vila sectors. For airspace above the sovereign territories of Tuvalu and Kiribati, AFL provides a service to the lower limit of controlled airspace up to 9,500 feet.

AFL imposes air navigation service charges on airlines and aircraft operators when they fly within the upper airspace of the Nadi FIR. AFL pays out dividends to nations within the Nadi FIR as a share of this en-route income.[13] Vanuatu and New Caledonia separately charge airlines when they operate within the Port Vila and New Caledonia sectors below FL245.

Analysis of the revenue collected by AFL from en-route air navigation charges in the Nadi FIR over the past three years shows a slow decline.[14] A combination of high costs and comparatively low revenue prevents AFL distributing a share of upper airspace revenue to States within the Nadi FIR. This is due to the need to fund the operations of airports at outlying islands which have increased AFL's cost base.

Table presents the air navigation charges collected by AFL for the period 2010 to 2012.

Table: AFL Air Navigation Charges Revenue 2010-2012

	2010	2011	2012
Air Navigation Charges (FJD)	10,316,922	10,314,820	10,274,880

[12] For the year ending 31 December 2011, AFL reported that these airports incurred FJD1.7m in operational losses.

[13] For the calendar year 2011, en-route revenues accounted for FJD10.315m. AFL paid out FJD465,369 to nations within the Nadi FIR as a share of this en-route income, (AFL Annual Report, 2012)

[14] By way of comparison, Airways' New Zealand air navigation revenue from eastern Polynesia increased by 7% for the financial year 2013, with a further 21% predicted for the financial year 2014. It highlights the difficulty of AFL in increasing its air navigation charges and generating greater revenue to meet its operating costs and commission new ATM infrastructure.

Source: AFL

The sovereign territory of Kiribati lies beneath the FIR boundaries of Nadi, Oakland, and Tahiti. Each FIR is obtaining revenues from aircraft operations in this upper airspace. A calculation was made in the 2013 CAPA study *Analysis of Flight information Region* of the estimated revenue from air navigation charges for aircraft flying over the sovereign territory of Kiribati. It assessed the air navigation revenue for that portion of Kiribati within the Nadi FIR and also for its entire sovereign territory.

Table provides an estimate of the total upper airspace revenue over the entire sovereign territory of Kiribati.

Table: Estimate of Upper Airspace Revenue over the Kiribati Sovereign Territory

Scheduled Services	1,607,252
Unscheduled Services	283,633
Total (FJD)	**1,890,884**

Table provides an estimate of the upper airspace revenue from the sovereign territory of Kiribati that lies within the Nadi FIR.

Table: Estimate of Upper Airspace Revenue of Kiribati Sovereign Territory within Nadi FIR

Scheduled Services	392,534
Unscheduled Services	69,271
Total (FJD)	**461,805**

The two tables illustrate the difference in revenue depending on whether the entire sovereign territory is included or only the portion that lies within the Nadi FIR. Differences in revenue result from having fewer air routes crossing the portion of the sovereign territory of Kiribati that lies within the Nadi FIR and the shorter route length for when the area over the Phoenix and Line Islands is not included.

AFL Revenue Allocation Model

Following the decision by the ICAO Council in 2001 to amend the FIR airspace boundary between Nadi and Auckland, a study was undertaken in 2002 review the revenue sharing formula for upper airspace revenues in the Nadi FIR.

Methodology for the study was based upon two ICAO documents: i.) *Policies on Charges and Air Navigation Charges* (DOC 9082) and ii.) *Manual of Air Navigation Services Economics* (Doc 9161). A separate study on *Sharing Revenues from En-Route Charges in Nadi FIR* was published by ICAO in March 2003.

The report recommended that the share of en-route revenue received by each nation in the Nadi FIR should be based upon their proportion of the total costs required to deliver the service. Only the costs associated with facilities listed in the Asia Pacific Regional Air Navigation Plan could be included. Notably the report expressly excluded revenue allocation based upon the size of a nation's airspace or aircraft volumes.

Table below presents the revenue allocation as a percentage received by each nation for 2011.

Table: En-route Revenue Allocation in the Nadi FIR (2011)[15]

Nation	Share of Revenue from Nadi FIR-post 2003 Report (%)	Share of 2011 En-route Revenue (FJD)
Fiji	93.91	9,686,647
Vanuatu	2.45	252,713
Kiribati	1.47	151,628
Tuvalu	0.59	60,857
New Caledonia	1.58	162,974
Total	**100**	**10,314,820**

Source: AFL-CAPA (2103) Study.

The ICAO 2003 report sought to provide the framework for establishing a joint venture partnership arrangement between all the nations within the Nadi FIR. However, the methodology applied, implementation and on-going management of the contract by AFL has resulted in considerable dissatisfaction with arrangements from the nations that remain in the Nadi FIR.

Revenue share based only on the capital and operating costs of member nations in the Nadi FIR presents a number of issues. This approach strongly favors AFL, as upper airspace service provider in the Nadi FIR, at the disadvantage of the nations that lie within the FIR. It promotes capital and operational expenditure by AFL, not investment in efficiency.

This ICAO cost-based model disregards two parameters used in determining air navigation service charges and ANSP revenue: (1) route length; and (2) numbers of aircraft using a particular airspace. These parameters are used by AFL in the calculation of their air navigation charges. The ICAO model also does not reflect the value that individual nations contribute to the financial viability of the Nadi FIR.

The ICAO study team recommended the establishment of agreements and quarterly payments of revenue share by AFL to each of the nations. Following finalization of the ICAO report in 2003, no formal agreements have been negotiated or signed, and no annual review of cost inputs has occurred.

[15] It should be noted that these revenue allocation figures are subject to an additional reduction of 15% due to Fiji Withholding Tax.

AFL calculates the proportion of revenue that each nation receives following publication of their annual report. A nation's share of the preceding year's en-route revenue is then deposited into a nominated bank account in August. There appears to be no record of these financial transactions sent by AFL to each of the nations.

Following the release of the CAPA study *Analysis of Flight Information Region* in 2013, dissatisfaction with the AFL revenue allocation model has intensified among Tuvalu, Kiribati and Vanuatu. In response to this dissatisfaction AFL has commissioned a further study into the revenue allocation model adopted within the Nadi FIR. ICAO will again undertake this study.

Upper Airspace Services Provided by Airservices Australia

Airservices is a Commonwealth Statutory Authority, established by the Australian government *Air Services Act 1995*. Airservices' primary role is to provide air navigation and aviation rescue and firefighting services, which are regulated by the Civil Aviation Safety Authority and independently investigated by the Australian Transport Safety Bureau. Governance is provided through a government appointed board of directors, comprising eight members and a 10 ten-person executive management committee.

With a total staff of 3,900, including 1,000 air traffic controllers, Airservices is the largest and most sophisticated ANSP in the region. It provides en-route ATM services across continental Australia as well as the oceanic areas extending into the Indian, Pacific, and Southern Oceans as well as the Tasman Sea.

In 2013 Airservices spent AUD185m on capital infrastructure projects. This figure could likely increase as project expenditure on the new OneSky ATM system commences. A government directive to focus on activities within its FIR has seen Airservices curtail many of the international aspirations it held in the early-mid 2000's.

Airservices Revenue Allocation Model

Airservices has entered into individual contracts with the Solomon Islands and Nauru to provide ATM services above FL245 in the Honiara and Nauru FIRs. The Solomon Islands have agreed a contract extension for these upper airspace services until 30 June 2018. Nauru has agreed a 10 year contract extension through 30 June 2023.

The agreements involve Airservices providing ATM services and charging the airspace users. Airservices also provides an AFTN to each country. In return, Airservices deducts a flat service fee each month. This service fee is subject to negotiation and amounts to between 23% and 40% of gross charging revenue. Monies net of the service fee are paid by Airservices to each nation monthly.[16]

Upper Airspace Services Provided by Airways New Zealand

Airways is a New Zealand government State Owned Enterprise. At its inception in 1987 it was the first air navigation service provider (ANSP) run on commercial lines. Governance is provided by an 8-member Board of Directors, who are responsible to two shareholding ministers: the Minister of Finance and the Minister for State Owned Enterprises. Day-to-day operations of the business are

[16] There seems to be no obvious reason for the difference in service fee charged to the Solomon Islands or Nauru. In view of the large variation in the service fee charged to both nations, it would seem that their ability to pay is part of this determination.

led by an executive management team comprising of a chief executive and five general managers. Airways has a total staff of 750 people.

Airways provides ATM services within New Zealand domestic and international airspace. Since 2002 it has also provided en-route ATM services in the upper airspace over the eastern Polynesian States of Tonga, Samoa, Cook Islands, and Niue. These nations joined the Cook Islands, which was already served by Airways. Airways also provides the Aeronautical Information Package (AIP) for seven Pacific nations and flight calibration services for 10 nations.

Soon after its inception Airways has adopted a relatively aggressive approach to expanding its revenue base beyond its core ATM activities within New Zealand domestic airspace. Since 1990 it has had a separate division focusing on winning and delivering international projects.

In 2012 Airways restructured its organization into two main business areas. The System Operator provides ATM services within New Zealand as well as some commercial activities in the Pacific. Airways refer to these services in the Pacific as being 'System Operator-Ancillary Services'. The other operating division is Global Services. This division provides international training, simulation, consulting, and air traffic management tools.

Airways New Zealand Revenue Allocation Model

Airways has entered into a contract for the provision of ATM above FL245 in the airspace above Samoa, Tonga, Niue, and Cook Islands. A collective arrangement is in place whereby Airways provides services and collects air navigation charges for the entire area. In 2012 these eastern Polynesian States agreed a contract extension with Airways for five years until 30 June 2017.

Airways retains 50% of the upper airspace revenue as a service fee, while the remaining 50% is shared among the nations proportionate to the volume of airspace and traffic they each contribute.[17] From discussions with the parties, it seems that a subjective allocation of airspace revenue along with airspace volume was made. Payments are made quarterly to each nation. As part of the agreement with the nations, Airways prepares an annual report detailing the past year's financial income, operational performance, and predictions about the next year's income.

Table describes the proportion of costs that comprise the service fee that Airways charged eastern Polynesian nations in the financial year to June 30 2012 *(Upper Airspace Management Agreement Annual Report 2012)*.

[17] The following revenue share occurs: Samoa 31%; Tonga 33%; Niue 10%; and Cook Islands 27%.

Table: Proportion of Airways Costs to Service Fee (2012)

Item	Amount (NZD)	Proportion of Service Fee
Labour: One additional air traffic controller plus small amount of managerial overhead required to operate the combined Auckland FIR and Pacific Upper Airspace	186,687	11%
Equipment Costs: AFTN and PASNET costs; plus line rental costs and band width costs	241,973	14%
Transportation Costs: Travel and accommodation associated with annual conference	46,014	3%
Corporate Overhead: Insurance, Safety and Finance	52,519	3%
Information Costs: International fax and aeronautical publishing	2,230	0.1%
Interchanges (Indirect Costs): Pacific NOTAM, ATC Training, Procedure Development and Publishing	23,579	1.3%
Depreciation:	7,699	0.5%
Airways Profit Before Tax	1,169,299	68%
Total	**1,730,000**	

Source: Upper Airspace Management Report 2012, Airways New Zealand

Table presents the proportion of costs that comprise the Airways service fee charged to eastern Polynesian States published in the Upper Airspace Management Agreement Annual Report 2013.

Table: Proportion of Airways Costs to Service Fees (2013)[18]

Item	2011/12		2012/13		2013/14	
	Amount (NZD)	Proportion of Service Fee	Amount (NZD)	Proportion of Service Fee	Amount (NZD)	Proportion of Service Fee
Labour: Calculated as a proportion of the Oceanic sector roster. Revenue has been used to approximate the workload relating to the Upper Airspace.	728,000	43%	795,000	43%	903,000	40%
Equipment: Fixed line and AFTN costs between New Zealand and each of the Pacific Island States and the cost of the PASNET system. The cost includes maintenance, line rental costs and band width costs.	237,000	14%	237,000	13%	242,000	11%
Transportation: Costs associated with the annual conference and SPOAG meeting. This includes all travel, venue hire, meals and accommodation.	28,000	2%	31,000	2%	47,000	2%
Information: International fax and the cost of aeronautical publishing.	22,000	1%	14,000	1%	15,000	1%
Other: Professional services and other minor operating costs.	5,000	0%	5,000	0%	12,000	1%
NOTAM, Navigation Development: Provision of Pacific NOTAM information and the cost of the procedure development.	22,000	1%	24,000	1%	24,000	1%
Depreciation: Share of the assets used to provide the upper airspace service i.e., ATM system and HF radios.	82,000	5%	101,000	5%	122,000	5%
Airways Net Profit Before Tax	567,000	34%	641,000	35%	872,000	39%
Total	**1,691,000**		**1,848,000**		**2,237,000**	

Source: Upper Airspace Management Report 2013, Airways New Zealand

[18] The total figure is the share of upper airspace revenue retained by Airways. Revenue for the entire eastern Polynesian area is double the figure listed in the total.

Comparison of Revenue Allocation Models

Table summarizes, for comparative purposes, the revenue sharing allocation models that AFL, Airservices and Airways have in place with Pacific nations in their FIRs.

Table: Comparison of Revenue Allocation Models

	AFL	Airservices Australia	Airways New Zealand
Nations within FIR	Kiribati, Tuvalu, Vanuatu, New Caledonia	Solomon Islands, Nauru	Samoa, Cook Islands, Niue, Tonga
Contract for provision of upper airspace services	No	Yes	Yes
Revenue Allocation Methodology	Revenue allocated based on share of costs to provide en-route services	Airservices collect charges from airlines for upper airspace services in Honiara and Nauru FIRs. They deduct a month service fee and pay the amount remaining to the two countries. Monthly service fee is a flat rate and varies from 23% to 40% of gross revenue	Airways collect charges from aircraft using the upper airspace over FIR sectors of Samoa, Cook Islands, Tonga and Niue. Airways retain 50% of revenue as service fee. The remaining revenue is shared by the nations based on their volume of airspace. These ratios are: Samoa 31%, Tonga 33%, Niue 10%, Cook Islands 27%.
Revenue Earned	For calendar year 2011: Vanuatu (253k), Kiribati (152k), Tuvalu (61k), New Caledonia (163k). All amounts in FJD and are subject to 15% deduction for Withholding Tax	Anticipated income for year to June 2013: Solomon Islands (961k), Nauru (392k). All amounts in AUD and net of Airservices service fee	Anticipated income for the year to June 2013: Samoa (536k), Tonga (571k), Niue (173k), Cook Islands (467k). All amounts in NZD and net of Airways service fee
Services Provided	En-route ATM in Nadi FIR	En-route services above FL245 in Honiara and Nauru FIRs	En-route services above FL245 over the sovereign territories and FIRs of the four nations.
		AFTN	AFTN
			AIS (AIP, NOTAMs, Procedure design)
Other Benefits	Nil	Provision for each nation to attend two regional safety meetings per year	Provision to attend two meetings per year-one operational the other to review the implementation of the contract
		Technical and operational support from Airservices internal resources as needed	Very active relationship management by Airways
		Assistance with capability development e.g., rescue fire	Operational familiarisation in New Zealand for technicians and air traffic controllers
		Strength of Australian dollar	Funding for ATC training often via NZ aid
Issues	No contract for the provison of ATM in upper airspace	Provision for up to 10% annual increase in service fee. Rarely exercised	68% Profit Before Tax from Service Fee
	Unfair methodology used for revenue allocation		
	Revenue allocation substantially less than received by other nations in other FIRs		
	Little, if any, engagement with nations in FIR		
	Nations within FIR have very little exposure to international aviation community		
	AFL has limited ATM support capability compared to Airservices and Airways e,g., training, technical advice		
	Deduction of 15% for Fiji Withholding Tax		

Note: Revenue earned is expressed in 000s (k)
Source: AFL, Airservices Australia and Airways New Zealand

The key points arising from the comparison of the three revenue allocation models are:

- In comparison with States in the Nadi FIR, those served by Airservices and Airways receive the benefit of significantly higher air navigation charges and more favorable currency exchange rates;
- The States within the Nadi FIR feel significantly disadvantaged financially compared to States that have upper airspace services provided by Airservices and Airways;
- Taking into consideration the revenue generated by AFL from upper airspace services, it almost certainly does not have the financial capacity to provide income distribution comparable to that undertaken by Airways and Airservices.

Pacific Aviation Safety Office (PASO)

Safety and security is one of the cornerstones of the aviation sector in the Pacific. The Pacific Aviation Safety Office (PASO) has been established to undertake this safety and security oversight. PASO is headquartered in Vanuatu.

PASO was established in 2004 to overcome the shortcomings in aviation policy and regulation experienced by many States in the Pacific. Many States do not have the specialist skills, capability, and funding to undertake these functions.

PASO was been created by way of the Pacific Islands Civil Aviation Safety and Security Treaty (PICASST), signed by all the developed nations within the Pacific Islands Forum. It seeks to maximize the efficiency and effectiveness of operations and create a least-cost operating environment for airlines. This requires the legislation and regulations of member countries to be harmonized in order to create a common inspection regime and common compliance protocols. PICASST has been ratified and is in force in 10 countries (except Fiji, the Federated States of Micronesia, and Marshall Islands).

The role of PASO is to help the members of PICASST achieve regulatory oversight of civil aviation in a regional and collaborative manner in the areas of: (i) airworthiness; (ii) flight operations; (iii) aerodromes; (iv) aviation security; and (v) personnel licensing for these disciplines.

PASO works with States to harmonize rules that regulate the aviation sector across the region. For many states PASO is the link to ICAO and therefore acts as a technical advisory body. PASO acts as the technical arm for all of the small States to provide ongoing advice and support and at times supplement capacity. It helps these States understand and meet the required international standards.

In recent years, these ICAO standards have been greatly expanded, particularly those related to security. However, most PASO members are unable to fully meet all of their oversight obligations. As a result, safety and security audits of many Pacific Island Countries (PICs) have reported that they do not meet the required levels in many areas.[19]

PASO is a non-profit organization, which generates revenue to cover operational costs. Members agreed to fund PASO activities through a combination of subscription fees to fund fixed costs and service fees to fund the costs associated with specific inspections and other activities.

[19] These audits included the ICAO-mandated Universal Safety Oversight Audit Program and Universal Security Oversight Audit Program

The *PASO Business Plan* (CAPA, 2012) provides a breakdown of the subscription fees that should be payable by each member country. **Table** presents the annual fees payable for each of the 11 States which would be members of the unified Pacific upper airspace.

Table: PASO Subscription Fees-11 Pacific Island States (2012)

State	Proportion of PASO Total Revenue	Fee Allocation (USD)
Cook Islands	0.59	38,840
Kiribati	0.59	38,840
Nauru	2.95	19,420
Niue	2.95	19,420
Samoa	7.29	47,979
Solomon Islands	8.85	67,378
Tonga	4.34	28,559
Tuvalu	2.95	19,420
Vanuatu	8.85	57,978
Fiji	12.5	82,250
Total (USD)		**420,086**

Source: PASO Business Plan (CAPA, 2012)

This indicates that the 11 States within the unified Pacific upper airspace need to contribute approximately USD420,000 per annum to PASO. It should be noted that Australia, Papua New Guinea, and New Zealand each contribute 12.5% of PASO revenue. They are not included in this table as these three nations will not be member States of the unified Pacific upper airspace.

The government financial systems of some participating States do not provide for aviation revenues being available to directly fund aviation expenditure or infrastructure. In these cases revenues from aviation are directed to general government consolidated funds. Separate application needs to be made for aviation expenditure. Under these government financial processes there is no assurance that improved funding of aviation activities will occur even though increased revenue may be generated from the upper airspace.

In order to directly fund PASO, without requiring additional government approvals for this expenditure, upper airspace income will be set aside to meet the contributions of the 11 participating States. A deduction of approximately USD420,000 will be made annually from upper airspace revenue prior to distribution to the participating States.

BOX :World Bank Study (2011) on PASO

The World Bank study *Review of the Pacific Aviation Safety Office (2011)* provided an analysis of the current state of PASO and recommendations for improvement. The study reported that assessments of the aviation sector in the South Pacific by ICAO have found that many countries lack proper policy, regulatory, and infrastructure frameworks to comply with ICAO standards and recommended practices. The study also found that PASO operating expenses have always exceeded its revenue. The most significant reason for this financial shortfall is that Sates who have annual work plans, which are budgeted and agreed, fail to honor their financial commitments. There are also a number of countries who are in arrears with their subscription fees due to concerns over PASO's services. The report concludes that under the present arrangement, PASO is not financially sustainable.

Section 2
Design Considerations for Private Sector Participation

Possible Options for Private Sector Engagement

Involvement of the private sector in ATM is not a novel concept, but has a different set of risks and benefits that need to be considered within the context of the regional environment. Considerations including: human resource capacity, technical capability, existing physical infrastructure, governance structures, regulatory environment, legal frameworks, risk/return profile of needed investments, would all need to be considered to determine whether ATM could be better managed through a public, private, or quasi-private entity[20] in the Pacific region. This report will review possible options for private sector engagement including: multilateral agreements with private entities, regional inter-government organizations, limited liability operating companies, public-private partnerships, and private corporations.

Multilateral Agreement

Through a multilateral agreement, a regional ATS private contractor could be established. States would agree to incorporate an operating company in a member State to operate on a for-profit or not-for-profit basis. This operating company would, at the end of a selection process, appoint an ATM service provider for the unified Pacific upper airspace.

No new regional government entity is required to be established as part of the multilateral agreement for the Regional ATS Contractor. The ATM service delivery contract will be awarded to an established ANSP that has existing state responsibilities and commercial provider technical capacity. In common with the Shared ATM Service Provision model, the domestic law of the ATM service provider governs operational and commercial activities of the Regional ATS Contractor. ICAO obligations are performed by the Provider State, who also assumes safety and regulatory responsibility.

This option is simple to implement. It enables government control and safety oversight to be linked to the commercial provision of air traffic services on a commercial basis. Not requiring the establishment of a new legal entity minimizes transaction costs. Administration of the agreement could be undertaken by a small secretariat.

The agreement is able to define the responsibilities of the States in meeting ICAO obligations, providing CNS infrastructure and delivering ATS for the unified Pacific upper airspace. It can define the revenue allocation methodology and other financial reporting obligations. The agreement between the Pacific Island States and state/provider can include a range of other items such as review conferences, additional aviation support, and supply of wider range of equipment e.g., AFTN. Reporting protocols can be detailed to ensure clear lines of accountability and auditing are available.

[20] Both Airways New Zealand and Airservices Australia operate in a quasi-private manner. Although they are public entities they operate based on private commercial principles.

BOX :Multilateral Agreement with Public Entities

An alternative option to creating a multilateral agreement with a private entity is creating an agreement with a public entity that operates like a commercial concern.

The Shared ATM Service Provision model recommended by this report would be structured in this way. This model involves the unified Pacific upper airspace being split with services provided by: i.) Airways New Zealand and ii.) Airservices Australia; both are public entities which operate under commercial principles. The provider states, New Zealand and Australia, would assume responsibility for meeting obligations for ICAO Air Navigation Agreements and Plans on behalf of the contracted States.

Pacific Island States would agree with the governments of New Zealand and Australia the arrangements for ATS service provision in the unified Pacific upper airspace. In effect the Pacific Island States would be ensuring that their obligations under Annex 11 (Air Traffic Services) and Article 28 of the Chicago Convention are undertaken, providing appropriate services in the prescribed airspace. The civil aviation regulator of the provider State(s) would be responsible for safety oversight.

Arrangements would be expressed in an administrative agreement. The governments of Australia and New Zealand would delegate responsibility for ATS provision to Airservices and Airways respectively. The domestic law of Australia and New Zealand would govern the delivery of services and commercial arrangements. Within this legal framework Airways and Airservices would assume all legal liability.

Regional inter government organization

A regional inter-government organization would be established by international agreement among the participating countries. This international agreement could be a treaty or administrative agreement. The international agreement would establish the regional inter-government organization as a legal entity.

A constitution would also be included in the treaty or administrative agreement. The constitution would define the roles and functions of the organization; in this case the delivery of ATS with a regional focus. A Pacific Owned Provider model fits within this scenario.

The agreement would need to combine the state control of the organization with the commercial provision of ATS in the upper airspace. Governance would be provided by a Council of Ministers, where all participating states would have representation. The Council of Ministers would administer this governance through a board of directors.

The regional organization would have international legal representation among its participating states. It would be given the legal status in the domestic law of participating states as necessary for the effective performance of its functions. The organization would enter into an agreement with a host country giving it certain exemptions from local taxes and similar immunities.

ICAO obligations of the Pacific Island States would likely be assumed by the host country of the regional ATM organization. The regional inter-government organization would retain ICAO APANPIRG responsibilities for the upper airspace. It would likely enter into a memorandum of understanding with ICAO through which it would have observer status at ICAO conferences.

Currently, only Fiji has capability to provide safety oversight of ATM activities. If the regional organization is located in a different state, additional safety oversight would need to be provided. PASO would almost certainly be required to provide this additional capability. The creation of a regional organization through a treaty among participating countries is the strongest form of legal organization. A regional inter-government organization would have the character of an international government organization.

The PUAM (1999) study was concerned that this organizational form could end up having a government focus, rather than being perceived as commercial. It was concerned that airline users would have limited opportunity to be involved as a stakeholder or member. There was a fear that a large bureaucracy could be created and become a burden. Many of these concerns can be addressed through a well-defined treaty or administrative agreement and effective management. However, an organization created through treaty would require the legislative approval of participating states before the scope of the organization could be substantially changed or new states added to the group.

BOX :Example of Regional Inter-Government Organization

The Central American Air Navigation Services and Facilities Corporation (COCESNA) is the most relevant example of a regional inter-government organization. COCESNA has exclusive rights to provide air traffic services, aeronautical telecommunications and radio navigation aids in the territories of the participating states. In practice, it provides services in the upper airspace above FL200 and cooperates only partially with contracting states in the provision of ATS in the lower airspace. COCESNA provides ATS in the upper airspace and owns the assets to discharge these services. It levies fees and charges and is self-funding.

Limited Liability Operating Company

Within the context of a multilateral agreement the States could agree to establish a limited liability company or corporation as the regional organization to be located in one the participating nations. Shareholding could comprise the participating States or a combination of the participating States and airline users.

A limited liability company would give the organization a legal status independent of its shareholding governments. It would have clear business objectives. No one state would have a dominant influence. The company would be registered in one of the participating States and would be subject to the domestic laws and the political vicissitudes of the county in which it is established. Changes to the company or tax law of the host country could inhibit the regional organization carrying out its international duties. This means the strength of the legal structure and political stability will be important criteria in selecting the host state.

The company would operate on either a for-profit or not-for-profit basis. In this context not-for-profit means that the organization is being operated for commercial objectives and producing sufficient surplus revenues to pay all costs and expenses and to gather in sufficient reserves to meet all future investment requirements. In a not-for-profit organization the 'surplus' is not distributed to members or owners.

The size of the capital base needed for the organization will depend upon the service delivery mechanism. In the cases of the Regional ATS Contractor and Shared ATM Service Provision the

organization would not provide services or own facilities and infrastructure. Participating states would not be required to subscribe any money for initial capital. In view of the limited financial obligations, the company could be 100% debt financed.

In the case of the Pacific Owned Provider service delivery model a greater level of capital investment is required. In view of the financial limitations of most of the participating states this capital investment is likely to be funded by commercial borrowing or private sector financing.

A limited liability company structure is able to accommodate new and different classes of shares. It would enable airline users to be a part of the ownership structure. While supported by ICAO and IATA, the involvement of airline users in the ownership of commercial ATM providers in the South Pacific region has not taken place.

Most of the commercial ATM organizations are limited liability companies (e.g., Airways New Zealand, Airports Fiji Ltd, Tonga Airports Ltd and Samoa Airports Authority) or a statutory corporation (e.g., Airservices Australia). The company structure provides for clear commercial objectives. Users could participate as shareholders. It enables profits to be distributed to shareholders through dividends. The company could be established quickly and has flexibility in performing its administrative functions if incorporated under a modern company's statute.

The disadvantages of this organizational arrangement include the company being subject to the domestic commercial law of the host country. It may be difficult for the company to be recognized as an international organization by institutions like ICAO. Some States may require legislative approval for a Minister or authorized person to subscribe for shares, causing a delay in establishment.

Public-Private Partnership (PPP)

A PPP is a long term relationship between the public and private sector to finance, design, construct, and maintain service infrastructure. The arrangement can be expanded to incorporate the private sector taking responsibility for the delivery of services.

A Pacific Owned Provider option might be suitable for private sector funding or private ownership. In the cases of the Regional ATS Contractor and Shared ATM Service Provision capital requirements are small and can be debt financed. An established ATM provider will undertake the delivery of services in the upper airspace.

Two forms of PPP could be considered for the delivery of upper airspace services in the Pacific in support of the Pacific Owned Provider option. One could be characterized as a design-build-finance-transfer (DBFT). It would still involve a company owned by the participating states providing ATM services in the upper airspace. Private financing would be used to fund and maintain ATM infrastructure.

Another form of PPP suitable is design-build-finance-operate (DBFO). It would involve a private company providing the finance for the necessary infrastructure plus take responsibility for the delivery of operational ATM services. The DBFO form of PPP would mean the private sector delivery of ATM services in the Pacific upper airspace.

BOX :Obtaining Financing for Private Sector Involvement

Providing finance for infrastructure for the delivery of upper airspace ATM services would likely be a favorable investment for the private sector. The investment decision would be based on an evaluation of past and future revenues. In the case of the upper airspace, revenues tend to be highly predictable and stable. The private financier will obtain commercial funds from sources like banks and superannuation funds.

The financier will make an assessment about the political stability of the host country where the operating organization is located. A premium on the base interest rate could be imposed by the private sector financier to reflect concerns they may have about political stability. Currently in Australia low risk airport infrastructure investments are receiving a weighted average cost of capital (WACC) of around 11%[1].

Design Build Finance Transfer: Under the DBFT approach a private firm would enter into a commercial agreement with the organization responsible for ATM service delivery in the upper airspace. The private firm would provide funding for the defined infrastructure used for the delivery of ATM services. This funding would encompass activities associated with the design, procurement, commissioning and on-going maintenance of the infrastructure. The term of the commercial arrangement would extend for the operational life of the ATM infrastructure. Typically this is 16 years following commissioning.

The arrangement between the private sector financier and the company would be managed through a project control group (PCG). Funds would be provided to a project trust account that is managed by the PCG. The PCG would provide reports about project activities and financial performance to the private financier and the client operational organization.

The PCG would be responsible for obtaining the functional requirements of the infrastructure to be procured as part of the PPP arrangement from the operating organization. The PCG will also take responsibility for preparing and issuing tender documentation and then selecting the preferred supplier. The scope would incorporate both the acquisition phase and maintenance over the life of the asset. This funding should also incorporate provision for software enhancements during the operational life of the ATM system.

By way of illustration, for ATM infrastructure the PPP arrangement would include the funding for level-three maintenance. This involves the repair of faulty hardware, such as computer boards. Performance of these level-three maintenance tasks would be contracted to another organization, probably the original equipment manufacturer (OEM). Level one and level two maintenance involving fault identification, system resetting, and minor hardware replacement, would be undertaken by the technical staff within the operating organization.

In essence, the private financier is agreeing to provide fully operational assets for an agreed term. Selection of preferred suppliers is typically conservative to mitigate risks associated with non-performance. Supplier selection will consider their financial viability as well as technical capability. This process significantly reduces the prospect of corruption in the selection of suppliers.

Contracts are signed by the PCG and suppliers. The private financier, through the PCG, is accountable should the asset not deliver the operational requirements specified by the operating organization.

Funding is provided for specific assets, this form of financing is not a loan for the operating organization to spend as it chooses. Security will be held over the assets for which funding is provided. Other security is not required. The annual repayment required to fund the asset will be agreed between the private financier and operating organization. At the conclusion of the term, the asset can revert to the operating company without additional cost.

The DBFT PPP option provides for the direct funding of ATM infrastructure that may be beyond the lending arrangements from state treasuries or bank lending. This method of financing shifts the responsibility for asset performance from the operational organization to the financer. There is a significant incentive for the financer to ensure that infrastructure is acquired from suppliers who have strong technical capability and financial stability. The process of asset acquisition and maintenance is highly transparent with defined accountabilities. It discourages inefficient, and potentially corrupt, procurement practices.

This form of commercial lending will be above the interest rates that could be available from government sources. A minimum amount, probably at least AUD30m, is likely to be needed before this form of financing would be made available by a commercial entity.

Design Building Finance Operate (DBFO): The DBFO form of PPP provides for the private sector financing of infrastructure plus the delivery of operational services. Adoption of this model would mean a private firm would undertake ATM service delivery for the Pacific upper airspace.

For the private sector delivery of ATM in the Pacific upper airspace a multilateral agreement would need to be signed by the participating States. This agreement would specify the intent of the States to tender for a private company to undertake the ATM service delivery for the Pacific upper airspace. Part of the arrangement would be for the private company to fund and supply all infrastructure required for the provision of these ATM services. The term of the agreement would need to extend for the operational life of the ATM infrastructure; typically a minimum of 16 years.

The governance of the unified Pacific upper airspace needs to be separated from the commercial delivery of ATM services. This governance enables States to meet their ICAO obligations. A nominated State will be assigned these ICAO delegations. This State will be the host country of the operating company that oversees the performance of the commercial ATM service provider.

A private company providing commercial ATM services may or may not be located in one of the Pacific Island countries. Care will need to be taken to ensure that the home country of commercial ATM organization has appropriate legal structures and safety oversight of service provision.

The private company would provide the ATM infrastructure and personnel to deliver services in the Pacific upper airspace. It would be responsible for establishing air navigation charges and contracting with users for the delivery of services. The private company would also undertake user billing and revenue collection. Having the private company undertake consultation with users around the establishment of air navigation charges ensures visibility and scrutiny over its operational costs and capital expenditure plans.

A large capital investment would not be required by a private organization to provide these upper airspace ATM services. The Pacific upper airspace has predictable and stable income streams. Therefore, an on-going financial return should be returned annually to the participating States. This financial return could be an agreed return or a proportion of gross upper airspace revenue. The type and extent of the return would be a matter between the organization representing the States and the private company.

The DBFO option enables the States to engage a private organization to undertake ATM provision independent of the established ANSPs in the area. However, this option is likely to involve significantly greater costs compared to the options involving a Regional ATS Contractor and Shared ATM Service Provision. Both these options would enable services to be undertaken using existing ATM infrastructure operated by established ANSPs. They are also likely to improve the utilization of operational staff, thereby providing marginal cost benefits. These same marginal cost benefits are unlikely to be as great for the private company only providing ATM for the Pacific upper airspace.

Unless the private company was to be hosted in Fiji, additional resources would likely need to be directed at safety oversight. In these circumstances, an expanded role by PASO would be required.

Private Corporation

Another option for the private sector delivery of services in the Pacific upper airspace would arise from the sale of the organization, owned by the States, which provides ATM services (a Pacific Owned Provider). In order for the value of this Pacific Owned Provider to be commercially realized, confidence in the operational and financial performance of the organization would need to be gained by potential purchasers. Therefore a number of years, probably at least five, would need to elapse before the organization is offered for sale.

A decision to sell the ATM service provider would need to be made by the ministers of transport from the participating States. This decision could involve the sale of all or a portion of the shares that are held by the States.

The sale of all or a majority of shares would transfer the control of the operating company from the States to a private concern. A sale of the majority of shares would provide the greatest lump sum to the participating States but would significantly reduce the governance that the States have over the delivery of ATM services. There would be no obligation for the private concern to meet public interest obligations that the participating States may have.

The sale of 49% of shares would still ensure that participating States retain final control, while potentially bringing improved commercial and/or operational expertise to the organization. It would enable the States to receive a lump sum payment for their shares purchased by the private concern. In addition to receiving a lump sum payment the participating States would receive an annual share of profits. However, private buyers could be wary of the influence that some State officials could seek to have over the activities of the operating company.

A board of directors would be formed to provide governance of the operating company. With a private shareholding of 49% or less the participating States would be able to appoint the majority of directors. A private shareholding of greater than 50% would enable the private concern to appoint the majority of directors and exert greater strategic leadership over the company.

It is important to emphasize that the sale would only be for the ATM operating company and the role it has been delegated in providing ATM in the Pacific upper airspace. A deed of sale would need to be explicit about the delegation for the provision of ATM that has been granted to the private concern. The sale would not change the governance of sovereignty of the unified Pacific upper airspace. This means that the States would still be responsible for meeting ICAO delegations and obligations. The private ATM organization could seek to have observer status at ICAO meetings. PASO or the host country of the private ATM provider would provide safety and regulatory oversight.

The sale of shares in an ATM operating company provides the opportunity for States to receive a lump sum payment. Involvement of the private sector enables additional finance and possibly improved commercial acumen to be brought to ATM service delivery organization. Control of the upper airspace sovereignty would remain unaffected by any sale.

Any loss of control by States will depend upon the proportion of shares sold to the private interest. The sale of a minority interest may allow the States to protect their social or political interest concerns while day to day activities are performed in an expert commercial manner. A minority share may raise concerns for private buyers about political interference and reduce the value of the ATM organization.

Comparative Summary

Table presents a comparative matrix of five organizational forms. These forms are: Regional Agency, Regional Inter-government organization, Limited Liability Company, PPP and Private Company. Each of the organizational forms are assessed against seven factors i.e., match of cost drivers to revenue driver, effective capital investment, need for economic regulation, organizational independence, lines of accountability, interoperability, social/political goals.

Table: Comparative Summary of Organizational Forms

	Regional Agency-No New Legal Entity	Regional Inter-government Organization	Limited Liability Company	PPP	Private Company
Brief Description	States sign a multilateral agreement for one or more nations to take responsibility for providing ATM services in the unified Pacific upper airspace. No new legal entity would be required since ATM service delivery would be undertaken by an existing organization. States would likely receive the air navigation revenue earned over the region less a service fee. Applies to Shared ATM Service Provision and Regional ATS Contractor service delivery models.	A regional inter-governmental organization would be established by international treaty or administrative among participating Pacific Island States. The organization would be located in a 'host' country within the participating States. Governance provided by Council of Ministers. Regional organization would be responsible for providing ATM services in the unified upper airspace. States would likely share a proportion of the upper airspace revenue received by the regional organization.	States would enter into a multilateral agreement to establish a limited liability company or statutory corporation to undertake ATM service delivery. The organization would be established under special legislation of a participating State. It could operate on either a for-profit or not-for-profit basis. The company would be subject to the domestic laws of the host country. Airline as well as participating states could be shareholders. The Pacific Owned Provider service delivery option falls within this organizational category.	Two forms of PPP are relevant. DBFT provides for all activities associated with the design, construction and maintenance of ATM infrastructure to be financed by the private sector. A private entity would provide funding for specific assets, for which repayments would be made over the life of the asset. A DBFO option adds the provision of services by the private sector to the financing of infrastructure. This would involve outsourcing ATM service delivery to a private entity for a specified term.	A private company could undertake the provision of ATM services in the Pacific upper airspace following the sale of shares in a 'Pacific Owned Provider'. Participating States still retain control over their sovereignty of the upper airspace along with ICAO delegations and obligations.
Match Cost Drivers to Revenue Drivers	ATM services would be undertaken by an existing commercial organization e.g., Airservices, Airways. Commercial ATM service delivery provides for the match between cost and revenue drivers.	Charter would need to be developed to define scope of activities plus operational and financial responsibilities. Financial obligations would need to include requirements for cost recovery and/or provide a return to participating from upper airspace revenue. However, within the commercial ATM organizations have flourished in the south Pacific. Regional inter-government organization form returns to public sector control of ATM service delivery. It restricts the ability to match revenue and costs, plus fund necessary infrastructure.	Establishment of a limited liability company for ATM service provision provides a direct relationship between costs and revenue drivers. The company would be required to establish air navigation charges through consultation with airspace users. This consultation process provides user scrutiny over predicted service costs and revenue.	The process of PPP provides for a high degree of matching between service revenues and costs. For DBFT a private entity will scrutinise revenue of the organization against the long term cost of financing the asset. A DBFO arrangement would involve a private entity scrutinising on-going revenues to ensure that they meet all capital and operating costs.	ATM service delivery by a private corporation provides for a process that matches costs to revenue drivers. The commercial organization would still be obliged to undertake consultation with users over capital expenditure plans and projected operating costs in the determination of air navigation charges.
Effective Capital Investment	Shared ATM Service Provision or Regional ATS Contractor models enable existing ATM infrastructure to be optimized further by providing services over a greater airspace area. Lower capital investment costs should flow through to users in lower air navigation charges.	The regional inter-government organization would own and operate the ATM infrastructure. Air navigation charges would reflect the capital investment program needed for ATM infrastructure.	The organization would be required to borrow funds for capital investment. Costs associated with the capital investment program are incorporated in air navigation charges recovered from airspace users.	PPP arrangements provide the opportunity for capital investment that may not be available to be financed from other government or commercial sources. A commercial premium will be added to interest rate to reflect risk and provide a return to the financier. It provides for full upfront investment in infrastructure. However, investment of at least USD50m is normally required for this form of PPP financing.	Involvement of the private sector provides for on-going capital investment. However, there is no particular requirement for the private company to continually invest in upgrading ATM systems. A requirement may be required in a deed of sale that stipulates a need to provide ATM infrastructure to meet ICAO regional planning obligations.
Need for Economic Regulation	No need for new economic regulation	Regional inter-government organization would need to enter into an agreement with the host country giving it immunities and exemptions from local taxes. The organization could be given legal status in the domestic law of participating States in order to perform its functions.	The company would be subject to the domestic laws of the host country and the country of its registration. Legislation may be required in the host country to protect the company's corporate, tax and international status. This legislation would need to protect the company from being sued.	Depending on the laws of the host country, there may be limitations on borrowing by government owned entities. These restrictions may need to be lifted.	States would require collective agreement of ministers to agree the sale of a regional ATM provider to the private sector. Some states may require legislation to approve the sale. The organization would be subject to the domestic laws of the host country and country of operation.
Organizational Independence	Organization model provides for independence between the participating Pacific Island States, the States whoe are delegated ICAO responsibility for the upper airspace and the ANSP that will provide the services. Need to have a governance structure in place with the States to monitor ATM service delivery performance.	The charter would be important in establishing the independence of the regional organization. This format could be a vehicle for performing a wider range of aviation activities in the region, such as safety and security. An organization combining service delivery as well as safety and security oversight is likely to have less independence than commercial ANSPs.	A limited liability company would have a strong level of independence to undertake the delivery of ATM services. This form of organization functions very well in the region. Airspace delegations between States, as well as from State to ATM service provider need to be put in place.	This method of financing assets and performing operational services provides for a high level of organisational independence. Assets and operations have a clear purpose and are scrutinised by private sector interests.	The sale of the an ATM service provider to the private sector enacts a high level of organisational independence. A 100% sale may allow an organization to operate with excessive autonomy, possibly outside the interests of the States in the region. Retaining a controlling interest would enable the States to ensure that the private company was acting in the region's best interests.
Lines of Accountability	Commercial organizational structures promote clear lines of accountability. International conventions require that agreements are formalised between States and ATM service delivery organizations. Requirements for annual financial/operational reporting can be agreed between the States and the ATM service delivery organization.	The combination of ATM service delivery as well as safety oversight has the potential to detract from a unified organisational purpose. Safety oversight is normally a government function while service delivery is provided under commercial models. There is less clarity in accountability and organisational purpose compared to an organization solely responsible for ATM service delivery or safety oversight. This model could lead to higher administrative costs.	The limited liability structure provides for clear lines of accountability. This accountability is supported by having responsibility only for ATM service delivery in the Pacific upper airspace, not ICAO state obligations.	In essence the private sector is assuming responsibility for the performance of selected assets or operations. They will seek to implement processes to minimize their exposure to risk. The process of requirements definition, tendering and supplier selection is highly scrutinised. Service delivery is undertaken in a commercial manner.	The lines and level of accountability will depend upon the share holding that is retained by the participating States. A fully private owned company would have limited accountability to the participating States beyond a safety and quality of service obligation. Greater lines of accountability and scrutiny would occur with the retention of shares in the company by the participating States.
Interoperability	The service delivery model is applicable to other situations. However, it involves the rationalization of the number of ANSPs providing upper airspace services across the Pacific. Politically this rationalization could present implementation hurdles.	This model functions effectively in Central America. However, separation of service delivery and safety oversight is well established in the south Pacific.	This is a highly successful organisational form for organizations undertaking ATM within the south Pacific region.	To date there has been very little use of PPP models in ATM service delivery.	To date there has been no use of privatized ATM service delivery in the region.
Social/Political Goals	ATM service delivery would probably be undertaken by an ANSP outside the region. A need to meet social goals of the region is not likely to be a priority. Social goals need to be made explicit in arrangements with commercial ANSPs. There may be a cost element to these social goals. Within the Pacific ATM environment AFL appears to be less responsive to the social goals of other States compared to Airways and Airservices. Funding limitations could partly explain this difference.	This organisational form could assist in addressing social and political aviation goals in the region. It would assist in the direct funding of aviation initiatives without requiring individual States to provide monies, which is problematic in the Pacific. The scope of social/political activities would be heavily scrutinised, and probably resisted, by users.	A limited liability company has a focus on the effective commercial delivery of ATM services. Social/political goals are not a priority and could detract from the primary purpose of the organization. When non-commercial goals are sought they need to be explicit. Funding of these social goals may be sourced from governmental aid.	PPP arrangements have a highly commercial focus. It is likely that any broader social or political goals would result in a cost being imposed by the private organization.	A fully private company would have little scope for addressing social and political goals. Retention of a controlling interest by participating States would provide some scope for social issues to be addressed. Social/political activities will likely result in a lower financial return by the company.

Limitations of Private Sector Participation in the Pacific ATM Sector

Corporatized ATM service delivery models are well established in the Pacific. An extension of these corporatized models appears possible with greater private sector participation involvement in ATM service delivery of the unified Pacific upper airspace. ATM service delivery also involves stable predictable income streams. Despite this potential, increased private sector participation is not considered feasible.

Private sector involvement adds value through improved management capability and access to capital funding for ATM infrastructure. Of the three ATM service delivery options being evaluated in this report only the Pacific Owned Provider involves the requirement to fund ATM infrastructure and substantial establish costs. It also requires the creation of a commercial management structure and practices. The Shared ATM Service Provision and Regional ATS Contractor models involve service provision being outsourced to established corporatized ATM organizations. As a prerequisite these organizations will already operate sophisticated ATM infrastructure.

Although the Pacific Owned Provider would require access to capital to fund ATM infrastructure and establishment costs, the size of the investment is unlikely to interest many private investors. The Pacific Owned Provider model is expected to require a capital investment of approximately USD15.8m. Guidelines for PPP projects in Australia establish a threshold of around USD45m as being the minimum size for this form of investment. The investment required for the Pacific Owned Provider model is significantly below the minimum threshold for PPP projects. An investment of USD15.8m would likely be funded by other sources, such as bank loans.

Section 3
Introduction of Three Proposed Options

This section will present three ATM service delivery options for the unified Pacific upper airspace. These three options are:

- Shared ATM Service Provision;
- Regional ATS Contractor; and
- Pacific Owned Provider.

For each option a description of the concept will be made and organizational arrangements will be defined. It will also present an estimate of the capital and operational costs for each service delivery option.

A description of the generic organizational forms that could be used for ATM service delivery is presented in Appendix.

Key Features of Each Option

Shared ATM Service Provision

This option is in essence a modification of current arrangements that currently exist for ATM service delivery in the upper Pacific airspace.

The unified Pacific upper airspace will be split into two parts. ATM service delivery for the eastern half would be undertaken by Airways New Zealand as an extension of the Auckland oceanic sector. The western half of the unified upper airspace would have ATM services provided by Airservices Australia as an extension to the Brisbane oceanic sector.

States will then negotiate with the two ANSPs over the scope of services and service fee. However, this option would slowly phase out the current provision of oceanic ATM services delivery by AFL, and each State will have to execute a separate administrative agreement with each of the organizations providing ATM services.

Participating States would enter into an administrative agreement to delegate ATM service provision within designated areas to the governments of New Zealand and Australia. Each government would delegate ATM service delivery to Airways or Airservices, as appropriate. The governments of New Zealand and Australia would assume ICAO delegations for their respective portions of the unified Pacific upper airspace.

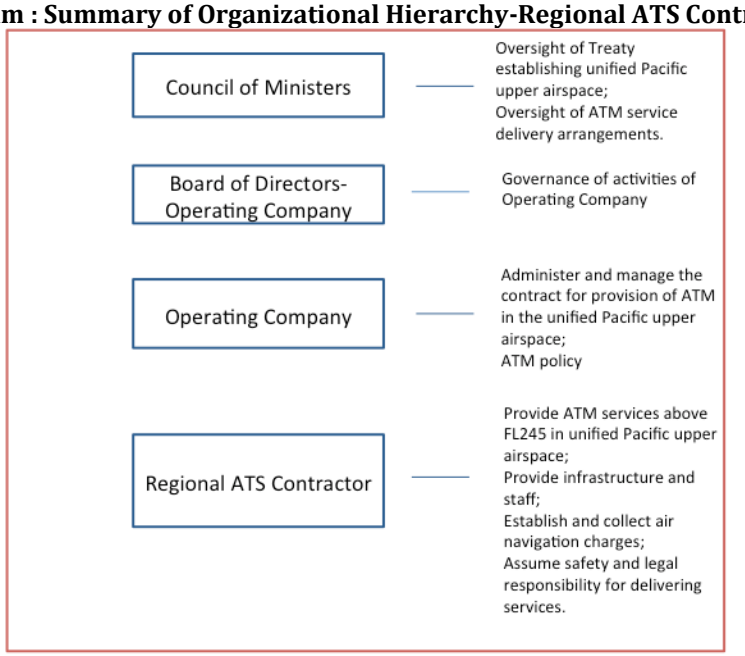
Regional ATS Contractor

This option involves the States establishing an operating company that, in turn, creates a commercial contest for the delivery of ATS in the unified Pacific upper airspace.[21] A regional ANSP contractor then delivers these ATM services. To implement the concept and to meet ICAO requirements each State will have to agree to execute a separate agreement with the operating company.

[21] This was the recommended option presented in the Pacific Forum Airspace Management Concept Study (1999).

The organizational hierarchy for the Regional ATS Contractor option is summarized in **Diagram** below. This diagram presents each level of the hierarchy along with a brief description of its responsibilities.

Diagram : Summary of Organizational Hierarchy-Regional ATS Contractor



As with the other options, participating States will enter into a treaty to collectively govern the unified airspace across the South Pacific. An administrative agreement will be developed by the States to establish an operating company to arrange for the provision of ATS in the unified Pacific upper airspace.

For the initial period at least, it is recommended that the operating company is incorporated in a host country.[22] A not-for-profit government owned corporation is the recommended entity.

The objective of the operating company will be to balance income received from the ATM service delivery contract with the expenses of the operating company plus delivering an agreed distribution of upper airspace revenue to the States. The air navigation charges that are established by the regional ATS contractor will need to take account both the expenses of the operating company and income distribution to the States. This is in addition to the cost of service delivery and profit for the regional contractor.

The regional ATS contractor will be required to investigate safety related incidents and report on investigations. These requirements will need to be specified in the contract with the regional ATS contractor. The regional ATS contractor will be subject to the domestic laws of its country of incorporation and the country of operation, if that is different. Under this service delivery option, if an incident occurs in the unified Pacific upper airspace it would be investigated by the State of the regional ATS contractor. As part of this agreement the role of PASO in auditing safety procedures and reviewing incidents in the unified Pacific upper airspace will be defined.

[22] See section on Pacific-Owned Provider for explanation on selection of host country.

The Regional ATS Contractor establishes a commercial contest between sophisticated ATM service providers in the region. This commercial contest provides the prospect of lowering the level of air navigation service charges and provides the opportunity for AFL to remain a contender for the provision of services.

Compared to the Shared ATM Service Provision model, the Regional ATS Contractor has higher implementation and on-going costs. The Shared ATM Service Provision model assumes an incremental increase in service costs by Airways and Airservices. Due to the larger airspace controlled, the Regional ATS Contractor would need to establish an entire sector to deliver ATM services for the unified Pacific upper airspace. This increases the service delivery cost.

Pacific-Owned Provider

The Pacific Owned Provider option involves the creation of an organization, located in one of the Pacific Island States, which would provide ATM services in the unified Pacific upper airspace.

Through a multilateral agreement the States will agree to establish a company, or corporation incorporated by the States, to provide ATM services in the unified upper airspace. No end date for the provision of services will be established. To implement the concept and to meet ICAO requirements each State will have to agree to execute a separate administrative agreement with the company-termed the Pacific Owned Provider.

The Pacific Owned Provider will be established in one of the participating States. A number of criteria need to be considered when determining a host country. These criteria include: (i) political stability; (ii) technological capability; (iii) ease of undertaking international business; (iv) proximity to other regional aviation activities; and (v) acceptability of other participating States.

Four states have been evaluated as potential locations to host the Pacific Owned Provider. The states evaluated are Fiji, Tonga, Samoa, and Vanuatu. **Table** presents a summary of the comparative evaluation of these states.

Table: Host Country Comparison of Regional States

Criteria	Fiji	Samoa	Tonga	Vanuatu
Political Stability	Moderate. Recent history of political unrest.	High	Moderate. Some political unrest.	Moderate. Some political unrest.
Technological Capability	High. Technology already accommodates modern ATM systems	Moderate-High. VSAT about to be commissioned; Submarine cable has been installed.	Moderate-High. VSAT about to be commissioned. Submarine cable has been installed.	Moderate. VSAT planned to be introduced. Submarine cable has been installed.
Ease of International Business	Low. International transactions incurr 15% withholding tax.	Low. International transactions incurr 15% withholding tax.	Low. International transactions incurr 155 withholding tax.	High. Established laws to promote hosting international business; No withholding tax for international transactions.
Proximity to other Regional Aviation Activities	High. Fiji has strong civil aviation authority; Prominent regional airline headquatered in Nadi (Fiji Airways); Nadi Airport most active regional international airport; Other States can easily reached from Nadi.	Low-Moderate. West Samoa Airports Ltd is a prominent ANSP in the region.	Moderate. Tonga Airports Ltd is a prominent ANSP in the region; Tonga the host location of the PAIP, an influential aviation program in the region.	Moderate-High. Host country of PASO; More expensive to reach other states than if located in Fiji.
Acceptability to other States	Low-Moderate. Earlier initiatives to implement new upper airspace arrangements were curtailed due to concern within the region about increasing Fiji's influence.	Moderate-High. Samoa seems well regarded in region.	Moderate-High. Tonga seems well regarded in region; Tonga the host of the PAIP project, which is providing aviation infrastructure to island states.	Moderate. Reasonable aviation influence in region.

Fiji and Vanuatu are likely the best positioned to host the Pacific Owned Provider among the four potential countries reviewed. However, Fiji is disadvantaged through its withholding tax, which results in 15% being deducted from international transactions. Furthermore the implementation of recommendations from previous upper airspace studies have been dismissed by other States over concerns that the outcomes would lead to an increase in the aviation bureaucracy and regional influence of Fiji. A Pacific Owned Provider located in Fiji may raise similar objections.

Vanuatu does not have a history of sophisticated ATM service provision, and concerns over lack of governance and political stability could impact its reasonableness in choice. However, Vanuatu is the location of the PASO regional office, which provides the opportunity for an alignment between the two organizations around safety services. It also provides the opportunity to achieve cost savings through sharing facilities. Vanuatu has a favorable regulatory environment to undertake business. Taking account of the relative merits of Fiji and Vanuatu, Vanuatu would likely be the preferred location of the Pacific Owned Provider.

Each of the participating nations would have the opportunity to provide staff to the upper airspace organization. The upper airspace organization would take responsibility to train ATCs and technical staff. After a period of time performing roles in the upper airspace organization, it is expected that these staff would return to their nation to take senior roles in civil aviation.

This cycling of staff from Pacific Island nations through an upper airspace organization should improve aviation capability development within the participating nations. Senior management should be selected on best person for the role and preferably originate from one of the participating States. However, in the implementation phase, where significant skills are needed to create a new commercial ATM organization, experienced foreign nationals are expected to assume senior roles. Once the organization has been stabilized it is expected that suitably qualified locals would replace foreign managers.

The table below summarizes the key features of all three options.

[We could include table below summarizing the key points of all three options.]

Option	Key Features
Shared ATM Service Provision	• The upper airspace of Nadi FIR is split into two parts. Responsibility for the eastern part is assumed by Airways, while Airservices takes responsibility of the western half; • Participating States enter into an agreement with Airways and Airservices for the provision of ATM services in the upper airspace of this area; • States negotiate the term and service fee with Airways and Airservices for the provision of this ATM service delivery. A term of five years and a service fee in the range of 20-25% is possible; • Airways and Airservices introduce their air navigation charges within their respective airspaces. Gross charges less

	the agreed service fee is returned to the participating States. States receive a proportionate share of income based on volume of airspace provided and traffic levels; • ATM service provision will be governed by the domestic laws of the provider state i.e., Australia and New Zealand as appropriate. Safety oversight would be undertaken by the provider state through its civil aviation authority.
Regional ATS Contractor	• Participating States incorporate an operating company to manage their upper airspace interests; • Operating company will tender and contracts for the provision of ATM service delivery in the unified Pacific upper airspace above FL245. This process will foster a commercial contest between ANSPs. Term of contract is likely to be at least 16 years; • Objective of the operating company is to balance income received from the ATM service delivery contract with the expenses of the operating company plus delivering an agreed distribution of upper airspace revenue to the States; • Selected contractor responsible for providing ATM infrastructure and implementing air navigation charges and billing arrangements
Pacific-Owned Provider	• An organization, located in one of the Pacific Island States, is created to provide ATM services in the unified Pacific upper airspace; • A not-for-profit government owned corporation is the recommended entity. Although each State will receive different levels of income, in the interests of equity, each has the same shareholding and voting rights i.e., one vote per State irrespective of its size; • The organization will be responsible for providing ATM services in the unified Pacific upper airspace above FL245. It will be responsible for determining ATM policy within the unified Pacific upper airspace. ICAO obligations are assigned to the host state. The organization would be subject

	to the domestic laws of its country of incorporation and the country of operation; • Each participating nation would have the opportunity to provide staff, of suitable standard, to the upper airspace organization. The upper airspace organization would take responsibility to train ATCs and technical staff; • The organization would be responsible for providing ATM infrastructure plus implementing air navigation charges and billing processes.

Analysis Required to Support Decision Making

Evaluation of the three options involved assessing each against parameters including financial costs, revenue for participating States, practicality of implementing each option considering the political environment in the region and capability development of the aviation sector in the Pacific.

The lowest cost of the three options was an important consideration since it assists the financial viability of airspace users. Costs associated with the establishment, ATM infrastructure and operations were estimated for each option. Establishment costs were those needed for each of the options to enter operation such as specialist advice, tendering for services and equipment, establishing corporate structures and processes, appointing and training management and staff, and resolving regulatory issues. The capital cost of the required ATM infrastructure was estimated. These major infrastructure costs included an ATM automation system, and communications equipment.

One of the objectives of the PAIP is to improve the financial viability of aviation in the Pacific. Lowering costs is one strategy, another is to increase the financial return that participating States receive from upper airspace revenue. Increased revenue provides the opportunity for States to invest in aviation activities and infrastructure. Achieving equity in the methodology to distribute upper airspace revenue will also overcome the dissatisfaction that is being experienced with the current revenue allocation methodologies. This parameter assessed each option on being able to return the greatest return to participating States, based on expected revenue figures from the unified Pacific upper airspace. It also considered the likelihood that revenue could be increased to meet the revenue expectations of the participating States.

Recommendations from previous Pacific upper airspace studies have not been implemented despite presenting compelling benefits. This report has made a subjective assessment about the support that the participating States and influential stakeholders would have for each option. Feedback was gained from various organizations to

understand the reasons recommendations presented in earlier reports did not receive substantive support.

Capability development of people within the Pacific's aviation sector was also considered. Each option was evaluated against its ability to train and develop people within the ATM industry.

Summary Comparison of Service Delivery Options

Table below summarizes the strengths and weaknesses of each of the three service delivery options.

Table: Summary of Strengths and Weaknesses of ATM Service Delivery Options

Option	Strengths	Weaknesses
Shared ATM Service Provision	Quick and easy to implement; Low risk to all nations involved; Most practical way to overcome resistance to reform of upper airspace ATM service delivery; ATM services provided by sophisticated, well resourced, organizations; States benefit from the introduction Airways and Airservices air navigation charges; All States will receive a greater share of upper airspace revenue; Airways and Airservices are able to generate service delivery efficiencies. These efficiencies will likely mean a reduction in oceanic air navigation charges for users; It enables AFL to improve its financial position by generating increased revenue and reducing costs, without providing an oceanic service for the Nadi FIR.	Would mean an end to the ATM service delivery by AFL in the upper airspace of the Nadi FIR; Cross subsidization of Fijian domestic air navigation charges from oceanic revenue would end. It would likely cause domestic charges to increase; It will be difficult for AFL and Government of Fiji to accept the loss of service provision in the upper airspace of the Nadi FIR; AFL would incur significant decommissioning costs that would need to be addressed through a negotiated settlement; It would mean the loss of technical capability in the region through reduced need for air traffic controllers and technical staff.
Regional ATS Contractor	Establishes a commercial contest between sophisticated ATM service providers in the region; It enables AFL to remain as a contender to continue to provide ATM services for the region. But AFL would need to increase its air navigation charges to meet the revenue allocation expectations of the States.	Compared to Shared ATM service provision model, regional ATS contractor involves higher implementation and on-going costs; Involves greater complexity and a longer period to implement, compared to Shared ATM service provision; May require legislative changes to domestic laws of host country for the organization to undertake the full range of commercial activities.
Pacific Owned Provider	Would ensure that ATM service provision for the unified Pacific upper airspace would remain in the region for the long term; A commercial ATM organization located in the region would ensure a level of aviation capability development for all participating States; Provides the opportunity to expand services to cover other regions sometime in the future e.g., Papua New Guinea, Tahiti.	Requires changes to ICAO airspace delegations; May require changes to domestic laws of nominated host country for the organization to undertake full range of commercial activities; Pacific Owned Provider would need to increase revenue from USD11.8m to USD16.25m to meet revenue distribution expectations of participating States; Involves the longest and most complex implementation period; Implementation and on-going costs are significantly higher than the other two options; Requires PASO to add capability to undertake safety oversight.

Section 4
Recommended Option

Proposed Arrangement

The findings of this report suggest the most feasible option for ATM service delivery for a unified Pacific airspace would be a Shared ATM Service Provision. The shared services would be provided by Airways New Zealand for the eastern half of the Pacific nations as an extension of the Auckland oceanic sector; with the western half of nations provided services by Airservices Australia as an extension to the Brisbane oceanic sector. This airspace incorporates the areas of eastern Polynesia, Nadi FIR, plus the Honiara and Nauru FIRs. It would apply to FL245 and above. An eventual phase-out of current AFL services would need to be agreed and negotiated as a part of this arrangement.[23]

States will enter into an arrangement with Airways and Airservices to provide ATM services within this unified Pacific upper airspace. States will individually contract with Airways and Airservices for these upper airspace ATM services by way of a common administrative agreement. The term of the agreement should be for five years. Airways and Airservices provide the ATM services, lead ATM policy for the area, impose their ATM charges and collect upper airspace revenue. A service fee will be negotiated with Airways and Airservices. The target level for this service fee is 20-25% of gross airspace revenue. Air navigation services revenue of USD24.8m is expected from this airspace. States receive a share of upper airspace revenue based on the proportion of airspace provided to the agreement and traffic volume.

The eleven states in the South Pacific will agree to collectively govern their sovereign interests over the upper airspace in this region[24] through a treaty. An amendment to the PICASST treaty would provide the framework for the agreement of the participating States. The Regional Transport Ministers Forum will provide governance of the upper airspace treaty and ATM service delivery arrangements.
PASO would provide management oversight, on behalf of the participating States, of the arrangements with Airways and Airservices. This involves reviewing financial and operational performance. PASO would receive a fee for these management services. A deduction could be made from the upper airspace revenue payable to each State (net of the Airways and Airservices service fee) to meet the States' annual financial obligations to PASO. It is estimated that USD420k would need to be collected from the eleven participating states for PASO to provide this management oversight.

States could make an application to ICAO to incorporate the full extent of the sovereign territory of Kiribati into the unified Pacific upper airspace. However, it is not necessary to achieve these FIR boundary changes for the Shared ATM Service Provision model to operate.

Benefits

Several benefits can be gained by implementing a Shared ATM Services model.

[23] A negotiated settlement will need to be made with AFL to offset their redundant investment in staff and infrastructure that is no longer required for the delivery of oceanic ATM services. The value of the negotiated settlement could be approximately USD1.7m.
[24] The 11 states comprise: Tonga, Samoa, Cook Islands, Niue, Fiji, Kiribati, Tuvalu, New Caledonia, Vanuatu, Solomon Islands, and Nauru.

Financial: Based on the report's analysis, a Shared ATM Service Provision provides the opportunity for the greatest financial benefit to participating States. Even if the full potential revenue of USD24.8m does not materialize – because of the cost savings expected through this arrangement – States will continue to receive at least their current share of upper airspace income, and States in the Nadi FIR will receive a substantially greater amount.

Efficiency Gains: Airservices and Airways are both well-known and well-respected entities by the participating States. Similarly they are well-regarded by users of the airspace. Both organizations have the human resource and technical capabilities to provide a modern ATM service environment in a unified Pacific upper airspace for the long term. Airways and Airservices are able to generate service delivery efficiencies through achieving marginal cost benefits. Increases in air navigation service charges within the Nadi FIR portion of the unified Pacific upper airspace can be offset by lower charges over the entire Australian and New Zealand oceanic areas because air navigation charges over eastern Polynesia, Honiara FIR, and Nauru FIR will likely decrease.

Overcoming Political Barriers: Implementation of changes to the Pacific nations' upper airspace arrangements is highly political and has been curtailed on a number of previous occasions. Adoption of the Shared ATM Service Provision model provides the opportunity to negotiate an agreement that overcomes the political resistance to change. It provides the framework to achieve a resolution with AFL and other States during the engagement process around this report. This option also provides AFL the opportunity to improve its financial position by generating increased revenue and reducing its costs without providing an oceanic service in the Nadi FIR.

Separation of Governance and Delivery: Arrangements for the governance of the unified Pacific upper airspace and the ATM service delivery are separated. This helps to ensure that the same entity responsible for delivering services is also not responsible for governing itself. Establishing a treaty among States for the collective governance of this airspace will provide for a high level of stability in these agreements and arrangements. There is also low establishment and on-going contract management costs associated with this option. **FIR Boundaries:** The service delivery model can be implemented without any changes to existing FIR boundaries. While it is recommended that changes to FIR boundaries over the sovereign area of Kiribati are undertaken, these boundary changes can take place independent of the implementation of the new service delivery arrangements. However, making these changes concurrently to implementing a new arrangement would be a feasible approach.

PASO Funding: PASO operating costs would now be directly funded from upper airspace revenue. This direct funding means that States will not have to make payments to PASO from their general government funds, and PASO no longer has to be concerned over collecting funds from individual States. Airways and Airservices can directly channel the States' financial obligations to PASO before distributing income to States. This would mean States would receive payments from Airways and Airservices net of their financial obligation to PASO.

Risks and Disadvantages

AFL Resistance: The most significant risk associated with implementing a Shared ATM Services model would be AFL's resistance to a new arrangement. The implementation of this model means the eventual phase-out of AFL providing oceanic ATM services in the Nadi FIR. AFL has provided these services for many years and it is a source of national prestige. Although the financial advantages through adopting the Shared ATM Service model are strong, no monetary compensation

may overcome the loss of national prestige. Should AFL be unwilling to accept the Shared ATM Service Provision model, States within the Nadi FIR will need to assertively push for change in service delivery arrangements.

Increase in Nadi FIR Charges: Although airspace users will see a reduction in total airspace costs from the implementation of the new ATM service delivery arrangements, users operating within the Nadi FIR will see a sharp increase in costs with the implementation of Airways and Airservices air navigation charges. The increased charges within the Nadi FIR will need to be offset by lower overall charges within other oceanic areas.

Operational Assessment

Only a small administrative function is needed to provide commercial and operational oversight over ATM service delivery within the unified Pacific upper airspace. The PASO General Manager would be appropriate to undertake this upper airspace administrative function. Major responsibilities of this administrative function would include:

- Reviewing the commercial performance of upper airspace ATM service providers in relation to the contract for service;
- Reviewing the safety and operational performance of the ANSPs for services delivered in the unified Pacific upper airspace;
- Being the point of contact with States about upper airspace matters; and
- Preparing reports about the performance of the unified Pacific upper airspace to the Regional Transport Ministers Meeting.

An estimate of USD100k per year has been allocated for the costs of PASO in supporting the upper airspace contract.

Some additional consultant support will likely be needed for the PASO General Manager during the implementation phase of this arrangement. This additional support involves:

- Amend the PICASST to incorporate reflect the agreement of participating States to establish the unified Pacific upper airspace;
- Preparing States for new contractual arrangements including development of administrative agreements;
- Negotiating arrangements with AFL concerning the end of their upper airspace service delivery;
- Negotiating service delivery contracts with Airways and Airservices; and
- Initiating airspace changes with ICAO to include the full extent of the sovereign territory of Kiribati into the unified Pacific upper airspace.

Additional specialist consultant costs of USD200k have been assumed during the establishment phase.

Airways and Airservices would assume responsibility for: providing the ATM infrastructure needed to deliver upper airspace services; undertaking service delivery; establishing air navigation charges; and undertaking billing activities. These organizations would also take responsibility for the legal and commercial risks in delivering services in the Pacific upper airspace.

The Shared ATM Service Provision model does not require any changes to existing FIR boundaries. An initiative to have the entire area of the sovereign territory of Kiribati incorporated into the unified Pacific upper airspace could be undertaken independent of changes to the service delivery arrangements. However, the report Implementation of the Shared ATM Service Provision option will not be impacted by the time needed to navigate the ICAO protocols to effect these airspace changes;

ATM service provision will be governed by the domestic laws of the provider states, i.e. Australia and New Zealand as appropriate. Safety oversight would be undertaken by the provider state through its civil aviation authority. Cost recovery for these services will be a matter for Airways and Airservices to address with their regulator.

The term of the agreement should be five years, thereby keeping future commercial and service delivery options open. It also keeps commercial pressure on the ANSPs providing these upper airspace oceanic services. Airways and Airservices would receive a service fee for the provision of upper airspace ATM services. This service fee will be a matter of negotiation.[25]

Airways and Airservices would collect air navigation charges, deduct their service fee and distribute the net revenue to the participating States in accordance with **Table** below. An issue of complexity is the method of revenue distribution given the differences in air navigation charges and currency exchange rates. To provide equity amongst all States, it is recommended that both Airservices and Airways distribute the agreed proportion of revenue irrespective of which ANSP provides the service to an individual State.[26]

Table: Proportion of Upper Airspace Revenue by State - Full Kiribati Area

State	Proportionate Share (Percent)
Tonga	6.18%
Samoa	5.84%
Cook Islands	5.15%
Niue	2.40%
Fiji	44.00%
Kiribati	12.75%
Tuvalu	1.75%
New Caledonia	6.46%
Vanuatu	6.46%
Nauru	2.40%
Solomon Islands	6.61%
Total (USD)	**100.00%**

Compared to AFL, the revenue earned by the participating States will increase through ATM service provision being undertaken by Airways and Airservices. To illustrate the additional revenue, a

[25]A rationale to estimate an appropriate service fee is contained later in this section.
[26] Indicative analysis conducted for traffic operating over the sovereign area of Kiribati has found that the revenues generated by the Airways and Airservices charging formulae are almost identical.

calculation was made on the traffic figures gathered for the CAPA (2013) report. Details were gathered about aircraft flying over the Kiribati sovereign territory. These details included the type of aircraft and route. Using this traffic date as a base, the charging formulae of both Airways and Airservices were applied. The rates in the formulae were those applicable as at 1 July 2013.

Table presents an estimate of the revenue generated by aircraft flying over the entire Kiribati sovereign territory, applying the AFL, Airservices, and Airways charging formulas. The entire Kiribati sovereign territory includes the portions within the Oakland and Tahiti FIRs. A comparison of the three formulas illustrates that Airways and Airservices charging methodologies generate almost identical amounts of revenue over the Kiribati area, which is three times greater revenue than that obtained from the AFL charging methodology. This means it is likely that if Airways and/or Airservices charging methodologies were applied to the entire Nadi FIR, the potential revenue could be up to three times greater than that currently generated by AFL.

Table: Revenue from Kiribati Sovereign Territory

	Revenue from Kiribati Sovereign Territory using AFL Charging Formula[27]	Revenue from Kiribati Sovereign Territory using Airservices Charging Formula[28]	Revenue from Kiribati Sovereign Territory using Airways Charging Formula[29]
Scheduled Services	883,988	2,781,172	2,774,465
Unscheduled Services	155,998	490,795	489,612
Total (USD)	**1,039,986**	**3,271,967**	**3,264,077**

Source: CAPA (2013) Report

Table presents a summary of the total potential revenue from the unified Pacific upper airspace. It is based upon existing service arrangements and assumes that AFL charges are applied over the entire sovereign territory of Kiribati as well as the Nadi FIR[30]. No updated figures were able to be obtained about the Honiara and Nauru FIRs from the data included in the CAPA (2013) report. To reflect regional traffic growth within the Honiara and Nauru FIRs, a 4.5%[31] increase in revenue on the 2013 figures was assumed. This shows that the unified Pacific upper airspace area currently generates annual revenue of around USD11.8m.

Table: Unified Pacific Upper Airspace-Potential Revenue

	Current: AFL Charges in Nadi FIR and Entire Sovereign Territory of Kiribati	Proposed: Adoption of Airways and Airservices Charges in Nadi FIR

[27] An exchange rate of 0.55 was applied between the FJD and USD.
[28] An exchange rate of 0.94 was applied between the USD and AUD.
[29] An exchange rate of 0.88 was applied between the USD and NZD.
[30] The figures have been updated following information received by AFL and the latest version of the Airways Upper Airspace Management Annual Report Year end June 30, 2014.
[31] Source: Boeing Corporation (2013) Traffic Growth Forecast for Oceania 2013-2032

Eastern Polynesia	3,252,480	3,252,480
Kiribati-Outside Nadi FIR	785,993	2,475,000
Nadi FIR	5,651,184	16,953,552
Honiara FIR	1586,884	1,586,884
Nauru	500,080	500,080
Total (USD)	11,776,622	24,767,996

Sources: AFL; Upper Airspace Management Annual Report (2013), CAPA (2013) Study.

A Shared ATM Service Provision model would involve the adoption of Airways and Airservices charging methodologies over the entire Nadi FIR. Following the results of the analysis of potential revenue over the Kiribati area, a factor of three has been applied to the Nadi FIR revenue. The analysis indicates that the revenue from the unified Pacific upper airspace would likely more than double under a Shared ATM Service Provision model. This approach could generate up to USD24.8m in annual total upper airspace revenue.

At present Airservices retain a service fee of between 23% and 40% from the gross revenue that they collect from the upper airspace in the Honiara and Nauru FIRs. Airways adopts a methodology whereby it retains 50% of gross revenue as a service. After deducting expenses, it enables Airways to earn profits of 34% and above from this service fee.

An estimate has been made of the costs that Airways and Airservices are likely to incur in providing ATM services in the unified Pacific upper airspace. The total cost of services is estimated to be approximately USD4.7m including profit.

Table provides an estimate of costs that would comprise the total service fee payable to Airways and Airservices. It assumes that air traffic control services over the unified Pacific upper airspace can be incrementally added to existing oceanic control sectors. No additional control sectors are required in either Brisbane or Auckland. Each nation would earn approximately 50% of the USD4.7m total.

Table: Estimate of Total Service for Shared ATM Service Provision

Item	Cost	Assumptions
Staff Remuneration	2,850,000	Equivalent of: -1 manager @ USD190k; -2 supervisors @ USD175k; -12 air traffic controllers @ USD140k; -6 HF operators @ USD105k.
Equipment	580,627	Leased Lines plus VSAT costs. Assume: leased lines and AFTN USD580k; VSAT cost of USD57k per State
Transportation	90,000	Attendance by officials at meetings to review upper airspace contract for service
Information	35,000	Costs of aeronautical publishing
NOTAM/Navigation Development	60,000	Cost of Pacific NOTAMS and procedure design
Depreciation/overheads	300,000	Depreciation on ATM system and HF infrastructure plus allowance for corporate overhead allocation
Profit	783,125	Assume 20% on expenses
Total (USD)	**4,698,752**	

Sources: Airways Annual Report 2012-2013; Upper Airspace Management Agreement-Annual Report 2013

A service fee of USD4.7m amounts to approximately 19% of upper airspace revenue of USD24.7m. This means that a service fee in the range of 20-25% should be the target outcome from negotiations with Airways and Airservices.

Table presents the revenue allocation that would be earned by each State, which reflects upper airspace revenue of USD24.7 million. From this gross upper airspace revenue a 20% service fee for upper airspace services conducted by the two ANSPs is deducted.

Table: Possible Distribution of Upper Airspace Revenue from Shared ATM Service Provision Model

State	Proportionate Share (Percent)	Gross Amount (USD)	Upper Airspace Revenue Allocation (USD)-20% Service Fee Deducted
Tonga	6.18%	1,530,662	1,224,530
Samoa	5.84%	1,446,451	1,157,161
Cook Islands	5.15%	1,275,552	1,020,441
Niue	2.40%	594,432	475,546
Fiji	44.00%	10,897,918	8,718,335
Kiribati	12.75%	3,157,919	2,526,336
Tuvalu	1.75%	433,440	346,752
New Caledonia	6.46%	1,600,013	1,280,010
Vanuatu	6.46%	1,600,013	1,280,010
Nauru	2.40%	594,432	475,546
Solomon Islands	6.61%	1,637,165	1,309,732
Total (USD)	**100.00%**	**24,767,996**	**19,814,397**

The table illustrates that all States will be financially advantaged strongly by the adoption of this methodology.

The estimated share of gross revenue that each State generates has been used to determine the share of upper airspace revenue that each receives. Revenue reflects the volume of traffic and airspace that each State contributes.

Reasonably robust revenue calculations are available for States in eastern Polynesia, Solomon Islands, Nauru, Kiribati, and Tuvalu. The proportion attributed to the eastern Polynesian States was increased to reflect the projected revenue from this region in financial years 2012/13 and 2013/14.

A more subjective allocation has been made for Fiji, Vanuatu, and New Caledonia. A decision was made to attribute the same level of revenue generation to Vanuatu and New Caledonia as that for the Solomon Islands.

The remainder of the potential revenue generated from the Nadi FIR, was attributed to Fiji. Fiji brings the majority of airspace to this unified arrangement with the oceanic area of the Nadi FIR. The gross share earned by AFL would be almost twice the revenue that they currently receive by providing the oceanic services themselves.

Should a Shared ATM Service Provision model be implemented, AFL would incur equipment and staff related costs, as the organization is 'right-sized' to provide only a domestic service. In particular the full capability of the recently purchased ATM system will not be required. There will no longer be a requirement for HF communication equipment. Air traffic controllers and HF operators employed to deliver oceanic services will be surplus to requirements.

Table provides an indication of the costs that could be incurred by AFL while it reorganizes from providing oceanic services in the Nadi FIR to become a domestic ATM organization. The table includes the assumptions upon which the reorganization costs are based.

Table: Possible AFL Oceanic Reorganization Costs

Item	Cost	Assumptions
Air traffic Controller Personnel-Redundancy Costs	229,500	Assume 12 staff at salary USD25.5k. Provide for 9 months salary as redundancy payment
Flight Information Personnel-Redundancy Costs	129,000	Assume 8 staff at salary USD21.5k Provide for 9 months salary as redundancy payment
ATM Infrastructure	1,380,000	Based on capital cost of USD2.3m. 60% of asset attributable to oceanic services
HF Communication Infrastructure	0	Assume that HF Equipment has been fully depreciated
Total Estimated Reorganization Costs (USD)	**$ 1,738,500.00**	

Sources: CAPA (2013) Study;
Report on Sharing Revenues from En-route Charges in the Nadi FIR, ICAO (2003)

The question arises about who should bare these reorganization costs. Based only on the revenue that AFL will earn from their share of upper airspace revenue it is reasonable to have AFL meet these reorganization costs.

On the other hand, there are significant advantages for the participating States and the two ATM service providers for AFL agree to relinquish ATM service delivery in the upper airspace of the Nadi FIR. To remove a potential barrier to achieving this outcome the reorganization costs could be shared between the participating States plus Airservices and Airways.

The loss of oceanic revenue will likely end the cross subsidization of operations within the Fiji domestic airspace, likely meaning an increase in domestic air navigation charges. However, the additional revenue generated from this option would allow a greater level of upper airspace income to subsidize domestic and other activities of AFL.

Projections of upper airspace revenue are based on the assumption that the air navigation charges applied by Airways and Airservices can be extended to incorporate the entire unified Pacific upper airspace. These charges already apply over eastern Polynesia as well as Nauru and Honiara FIRs.

These higher air navigation charges will result in increased costs to airline users for operations in the existing Nadi FIR, which incur AFL air navigation charges. Airservices and Airways determine their oceanic air navigation charges, by following an analysis of predicted revenues and costs over their entire oceanic area. The additional revenue from aircraft over the Nadi FIR, along with the low marginal costs of delivering these services, should result in a reduction in their oceanic air navigation charges. These lower air navigation charges will occur for operations in the entire oceanic areas managed by Airservices and Airways, not just the Pacific.

The revenue from the unified Pacific upper airspace could reduce to approximately USD14.8m for all States to still receive a higher share of upper airspace revenue than they currently receive. Although at this level some adjustment would need to occur to the proportion of upper airspace that is currently being proposed for each State.

The Shared ATM Service Provision model is quick and simple to implement. It is very low risk to the nations involved. No changes need to be made to existing FIR boundaries. It is almost certainly

the most practical way to overcome resistance to reform of the Pacific upper airspace. This option ensures that upper airspace services are undertaken by sophisticated, well-resourced ANSPs.

Comparing the existing upper airspace revenue that States currently receive to that proposed under the Share ATM Provision model, shows that all will receive greater income. Fiji would almost double their current income from upper airspace revenue.

On the other hand, this option would cause an end to ATM service delivery by AFL in the upper airspace of the Nadi FIR. AFL would incur significant decommissioning costs that ought to be addressed as part of a negotiated settlement. The loss of skilled staff by AFL will mean a loss of aviation technical capability in the Pacific region. It may difficult for AFL to accept the loss of oceanic airspace responsibility. This option still results in around 20% of gross upper airspace revenue from the unified Pacific upper airspace leaving the region.

This model could be used a transition to a different long term service delivery arrangement.

There are no apparent additional risks to either Airservices or Airways by assuming greater responsibility for ATM service provision over the Pacific unified upper airspace. Both organizations are already providing ATM services in the region. Additional airspace responsibilities are merely an incremental extension of these responsibilities.

Both Airways and Airservices will be able to provide these additional ATM responsibilities utilizing existing ATM infrastructure. The services over the enlarged area are the same as those currently provided by both organizations in the Pacific.

It assumes that air traffic control services over the unified Pacific upper airspace can be incrementally added to existing oceanic control sectors. No additional control sectors are required in either Brisbane or Auckland.

For airlines currently operating in the Nadi FIR it is likely that they will incur an increase in air navigation charges from the imposition of Airways and Airservices rates. Airways and Airservices air navigation charges are higher than those of AFL. These increases, however, will be offset by lower oceanic air navigation charges in other areas of the Auckland and Brisbane FIRs. These lower charges arise from amortizing costs over a larger volume of airspace. Airlines also benefit from having two sophisticated ANSPs investing in ATM technology that promote aircraft operational efficiency and thereby lower costs.

Assessment of Infrastructure Requirements Under this Option

Existing infrastructure

AFL, Airways and Airservices all have similar ATM infrastructure to perform oceanic control over the Pacific. Most significantly this infrastructure includes: ATM processing system with ADS-C processing capability; HF communications; CPDLC communications; and AFTN/AMHS message handling systems.

Required future investments

No additional ATM infrastructure investment is required to implement this option.

Financial Assessment

Earlier a model was created to estimate the costs of service delivery for Airways and Airservices. The underlying assumption for this cost model is Airways and Airservices can provide these services through an incremental increase in staff and other operational costs. No additional sectors would be required at Brisbane and Auckland oceanic control centres to provide services for this enlarged airspace.

A minimalist administrative oversight of the contracts with Airways and Airservices is assumed. The PASO CEO will provide this administration function.

The financial evaluation will extend over a 15 year period. This is the normal life of ATM infrastructure capital investment projects in the ATM industry.

A 4.4% traffic growth is assumed. This figure is based on traffic growth forecasts of the Boeing Corporation for the Oceania region. Costs are anticipated to increase at 2.0% per year.[32]

An 11% cost of capital was used for the net present value calculation. This figure is the typical WACC for low risk airport infrastructure funding in Australia[33].

Table presents the results of a financial evaluation conducted on three revenue scenarios. Option A assumes revenue can be generated from the unified Pacific upper airspace based on Airways and Airservices air navigation charging formulae. This option assumes revenue of USD24.8m.

Option B provides for a reduced upper airspace revenue. This reduced revenue would still enable each participating State to receive greater income than under current revenue allocation methods. The required minimum income to enable a greater distribution of income to all participating States is approximately USD15m.

Option C provides for the current level of income generated from the unified Pacific upper airspace. It involves aircraft operators receiving AFL, Airways and Airservices charges. The estimated existing income of the unified Pacific upper airspace is approximately USD11.8m.

Table: Financial Evaluation of Shared ATM Service Provider

[32] Australian Bureau of Statistics-March Quarter 2014. Note that the New Zealand Consumer Price Index for the March (2014) was 1.5%, however, the long term average was approximately 2%.
[33] Advice from Access Capital Advisors

Item	Option A	Option B	Option C
Airspace Revenue at Year 1	24,767,996	15,000,000	11,776,622
Establishment Costs	1,938,500	1,938,500	1,938,500
Annual Service Contract at Year 1	4,698,752	4,698,752	4,698,752
Airspace Administration Fee at Year 1	100,000	100,000	100,000
Revenue Growth	4.4%	4.4%	4.4%
Expenses rate of increase	2.9%	2.9%	2.9%
Interest Rate	11.0%	11.0%	11.0%
NPV for 15 years	165,293,206	85,121,933	58,665,911
IRR	1035%	531%	365%

In many ways an NPV and IRR analysis is probably less important than the level of revenue required to deliver an increased share of upper airspace revenue to the participating States. A key outcome required by most of the States is whether the service delivery arrangements provide for an improved share of upper airspace revenue than they currently receive. For the Shared ATM Service Provision model this can be achieved at revenue above USD15m.

Revenue of USD15m involves a reduction of almost USD10m from the potential maximum obtainable from the unified Pacific upper airspace. There is a strong likelihood that Airways and Airservices will be able to impose their air navigation charges as part of the Shared ATM Service Provision model. Therefore this model will almost certainly deliver increased revenue to all participating States. There is also opportunity to reduce Airways and Airservices oceanic air navigation charges.

Section 5
Implementation Aspects

Five-stage Implementation Plan

A five-stage implementation plan for carrying-out the proposed recommendation is highlighted below. A summary of implementation aspects for these five stages follows.

6.) Engage AFL/Government of Fiji about Findings from this Report
7.) Engage Other Pacific Island States and Stakeholders about Findings from this Report
8.) Establish a Governance Treaty
9.) Negotiate Agreements with Airways New Zealand and Airservices Australia
10.) Make Changes to the FIR Boundary over Kiribati

Steps 1 and 2: Engage AFL/Government of Fiji and Other Pacific Island States and Stakeholders about Findings from this Report
If the Shared ATM Service Provision model is adopted, AFL would have to slowly phase-out its responsibility for providing oceanic air services in the Nadi FIR. Because the implications of such a phase-out could decrease the revenue Fiji generates, Fiji's response is understandably reluctant for change. However, the proposed option takes a more holistic approach to ATM services that benefit all Pacific Island nations, increase effectiveness of the services being provided, and updates services for readiness into the next phase of ATM for the region. The findings of this report, along with other studies, would have to garner Fiji's buy-in by providing the appropriate rationale for change through a financial and operational assessment that illustrates the benefits of the Shared ATM Service Provision model over the existing arrangement.

Due to the eventual phase-out of AFL services, States will have to negotiate a financial settlement for the staff and infrastructure that would be no longer required by AFL. As a result, States also need to be continuously engaged in the process to ensure a fair and well-negotiated settlement is reached with AFL. Other large States in the region, including Vanuatu, Tuvalu, and Kiribati may need to assertively push for change and help lead the process to demonstrate there is enough political will and support for a newer and improved model of ATM in the region.

ICAO and the World Bank can continue providing resources and being used as mediators to facilitate the eventual outcome and find resolutions to ensure the smooth implementation of the proposed recommendation and delivery arrangements.

Step 3: Establish a Governance Treaty
States should sign a treaty to express their agreement to collectively govern the unified Pacific upper airspace. This will help provide for the long-term stability of upper airspace arrangements in the region. The PICASST treaty is in need of modification to encompass the scope of activities now being undertaken by PASO. An amendment to PICASST could incorporate an agreement that States collectively govern the unified Pacific upper airspace.

Step 4: Negotiate Agreements with Airways New Zealand and Airservices Australia
Airways New Zealand has previously indicated its willingness to assume greater responsibility for providing ATM services over the Pacific. Airservices Australia has expressed some ambivalence

about increasing the volume of airspace in the Pacific for which it provides ATM services, but it is expected that Airservices will agree to the proposed recommendation.[34]

An administrative agreement that details the scope of services to be provided by each ATM service delivery organization will need to be prepared.[35] Material that could be included in the administrative agreement is included in Appendix.

A service fee needs to be negotiated on behalf of the States with Airways and Airservices. Assuming the potential income of the unified Pacific upper airspace is USD24.8m[36], a service fee of 20-25% should be the negotiating target.

Current service delivery agreements between Airways and States in eastern Polynesia extend until 2017. Airservices have an agreement with Solomon Islands until 2018 and with Nauru until 2023. Part of negotiations around the service fee will likely involve an early end to these agreements and a transition to the new Shared ATM Service Provision arrangements.

Once an agreement is reached on the adoption of the Shared ATM Service Provision model, the administration of the ATM service contracts will be undertaken by PASO. A scope of services and management fee will also need to be agreed.

Step 5: Make Changes to the FIR Boundary over Kiribati

Changes to the FIR boundaries above the sovereign territory of Kiribati do not need to be undertaken for the Shared ATM Service Provision model to be implemented. However, in order for the participating States to exercise governance over the sovereign territories of all nations, the FIR boundaries over the sovereign territory of Kiribati need to be amended. It requires a change to the boundaries of Oakland and Tahiti FIRs.

Obtaining the air navigation revenue from the entire sovereign area of Kiribati enables the income from this service delivery model to be maximized. In particular the revenue generated over this area has a material impact on the financial return for Kiribati.

[34] Please mention in footnote here why Airservices has been ambivalent about increasing the volume of airspace for which it provides ATM in the Pacific.

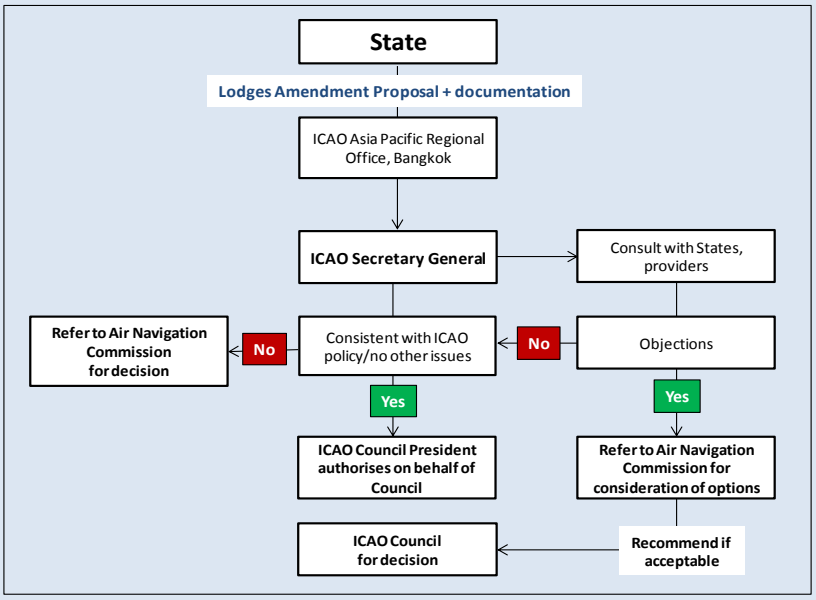
[35] International airspace delegations require that each State has to enter into a separate agreement with Airways and Airservices.

[36] As highlighted in the calculations in Chapter 4

BOX : Amendment Process for ICAO Air Navigation Plan

The starting point in the process to amend the FIR boundaries involves Kiribati notifying ICAO to effect the change and approve a redrawing of FIR boundaries. The amendment process would be consistent with that outlined in the diagram below relating to adjustments in the Air Navigation Plan for the Asia Pacific.

A treaty signifying the agreement of Pacific Island States to collectively govern their upper airspace interests will provide substance to the application to redraw these FIR boundaries. The time to accomplish these FIR boundary changes is likely to be lengthy. An application could be submitted to ICAO once agreement for the governance of the unified Pacific upper airspace is incorporated in the PICASST treaty.



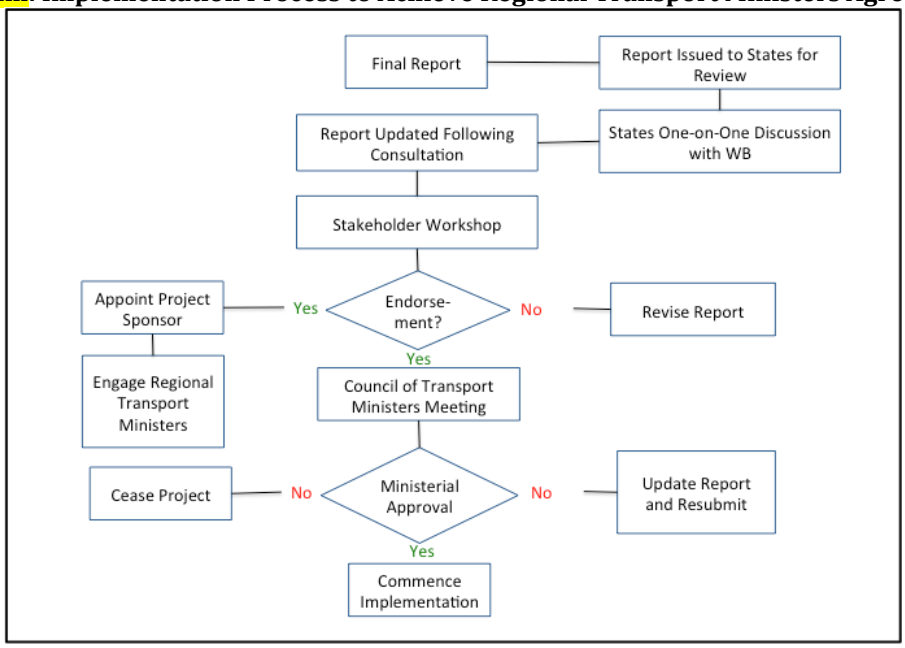
Source: ICAO Asia/Pac Air Navigation Plan, Volume 1, Basic ANP, Updated Version 30 March 2012

Engagement Strategy

Engagement with States and stakeholders to inform them of the report findings will be required. Two outcomes are sought from this process. The first is an endorsement of the report's recommendations by stakeholders. The second is agreement by the Regional Transport Ministers at their biennial decision making forum.

Diagram illustrates the process to complete the review of this report until agreement is achieved by the Regional Transport Ministers Forum.

Diagram: Implementation Process to Achieve Regional Transport Ministers Agreement



The process involves undertaking one-on-one briefings with States to explain the report's findings and recommendations. These briefings will ensure that the concerns or issues that the States may have are understood and, where necessary, make changes to the report. The outcome of the State briefing sessions is to ensure the report is understood and updated ahead of a workshop involving an extended group of stakeholders.

Should AFL remain resistant to change, engagement with Kiribati, Tuvalu and Vanuatu will need to form a consensus about future actions. This could include seeking an amendment to ATM service delivery arrangements above their sovereign territory and designated airspace. Kiribati and Tuvalu will almost certainly require World Bank support to navigate the steps needed to orchestrate service delivery changes.

A stakeholder workshop presenting the report findings will need to include representation from: States, ANSPs, airlines, international regulatory organizations, and donor organizations. The desired outcome of the workshop would be to endorse the recommendations of the report.

Following stakeholder endorsement, further engagement with States will be needed in order for Transport Ministers to understand the report, highlight potential issues, and provide preliminary support. To undertake this engagement it is recommended that a project sponsor be appointed.

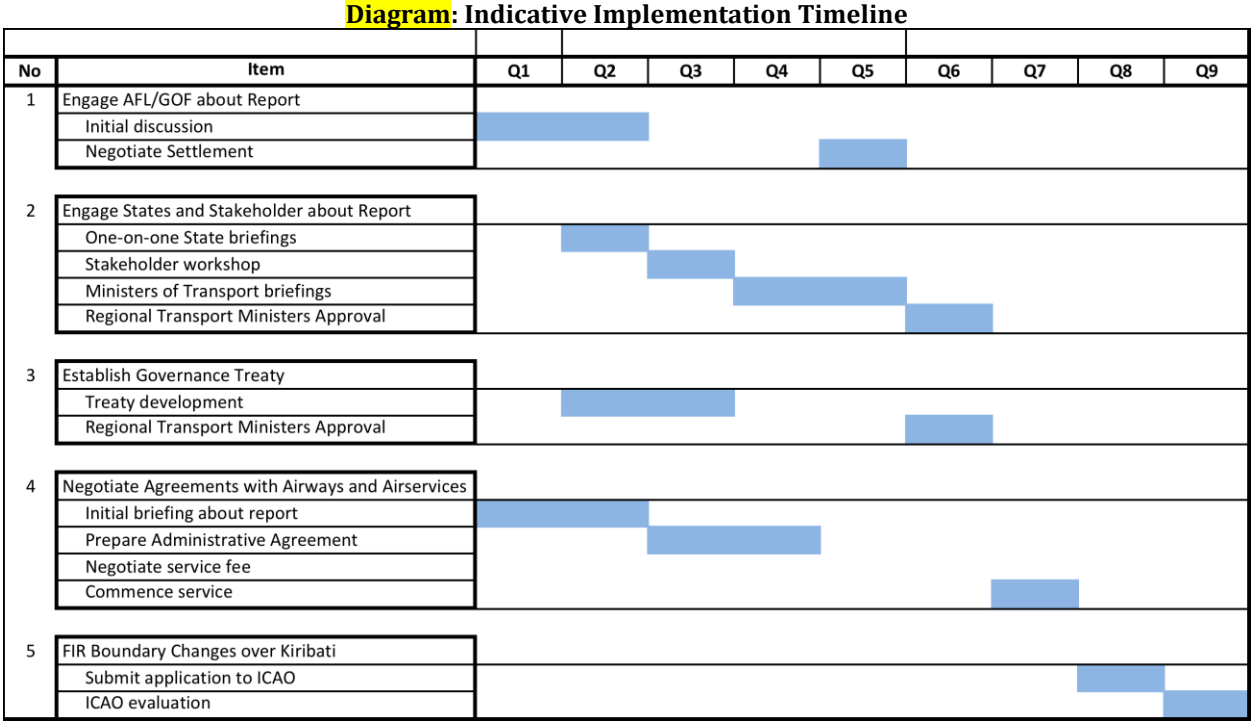
The person appointed as project sponsor should be an influential aviation official who is well versed in upper airspace issues.

Agreement of the States will be formalized at the Regional Transport Ministers Meeting that is held biennially. The next meeting will be in 2016. After this point, implementation of the final proposed recommendation should go into effect.

Implementation Timeline

Below **Diagram** presents a high level graphical representation of the indicative timeline for the activities that will need to be carried out before the proposed recommendation can be implemented. The proposed timeline spans nine quarters i.e., two years three months.

Diagram: Indicative Implementation Timeline



Appendix

Legal Framework

Detailed Analysis of Other Options

Bibliography