A Future Force Structure for the Australian Defence Force

Carlo Kopp
BE(Hons), MSc, PEng, MAIAA, MIEEE
Defence Analyst, Melbourne
email: Carlo.Kopp@aus.net

April 21, 2002

A Response to the Green Paper

(August 30, 2000)

UNCLASSIFIED

1 The Wider Regional Strategic Context

The 1990s have seen important changes in the wider region. Of most importance are the fall of the Soviet Union and the large scale industrialisation of the PRC and India. A number of important consequences follow:

- Both India and the PRC are developing an increasing dependency upon imported oil and gas.
- Both India and the PRC have more money to spend on military hardware, and this has been reflected in large and ambitious programs to field modern weapons.
- Both India and the PRC are competing in strategic weapons, both conventional and nuclear.
- Both India and the PRC perceive themselves to be disadvantaged, in political and military terms, against the West.

For all practical purposes, these points all reflect trends which are unlikely to change direction in coming decades. The long term outlook is for both the PRC and India to continue to grow, economically and militarily, against other nations in the region. The expectation that the gradually escalating arms race between these nations will abate is at best naive, the precedent of early industrial age strategic competition in Europe led to the Great War.

In strategic terms, the possession of nuclear weapons by both nations is likely to deter both from large scale direct military confrontations, and force both to emulate the strategies pursued by the US and USSR during the Cold War. The consequence of this is likely to be a sustained effort to inflict strategic economic damage, and military damage, by threatening each other's vulnerabilities. The vulnerability of most interest is the shared shortage of oil, and the potential for lines of supply to the Middle East to be cut.

For both India and the PRC, the possession of naval and air bases in South East Asia would return important strategic dividends, as it would expose shipping lanes and lightly defended parts of both India and China to potential attack by aircraft, cruise missiles and intermediate range ballistic missiles. Therefore, even a modestly sized permanent deployment in Malaysia or Indonesia could produce a disproportionate strategic advantage for the party who can do so.

The military modernisation and growth programs which are being conducted by both of these nations are of significant concern.

The PRC has ordered anything up to 400 Russian Sukhoi Su-27SK and Su-30MKK long range fighter bombers, a type which is equivalent or superior in some respects to the US F-15C/E fighter. Indeed, technology upgrades for these Russian fighters now include phased array radars, ramjet long range guided missiles, thrust vectoring engines and a wide range of very modern long range anti-ship and land attack missiles. While Israel recently cancelled an order by the PRC for the A-50I AWACS, to have been equipped with the same radar bid for the ADF's Wedgetail program, it is likely that the PRC will merely acquire the basic Russian item. Russian sources indicate that an effort is under way to sell the Tupolev Tu-22M Backfire supersonic strategic bomber to the PRC. Aerial refuelling aircraft have also been declared to be on the PRC's shopping list.

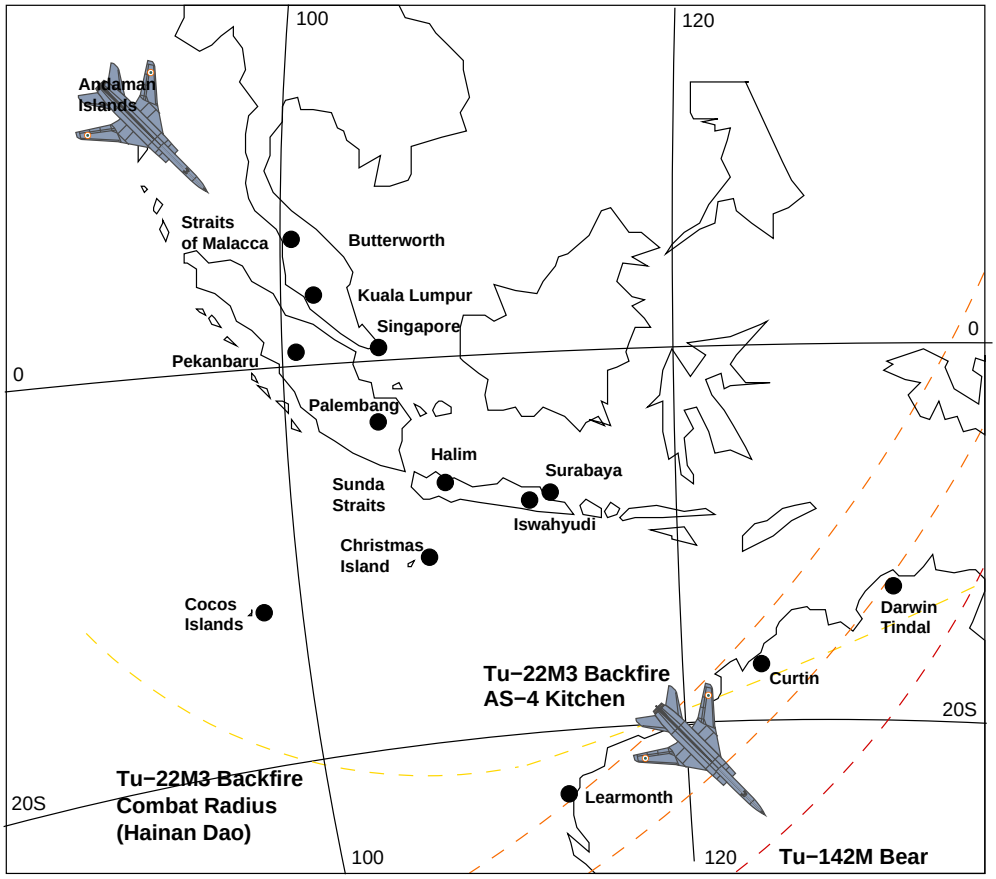
The PRC has also been actively growing its large force of intermediate range ballistic missiles, and importantly, it has been acquiring further Russian built blue water naval vessels, armed with long range supersonic missiles. The very modern Russian S-300 SAM system, equivalent to the US Patriot, has been in service since the mid 1990s.

India's contribution to this strategic weapons arms race is also notable. The Indian Air Force has orders for 50 Su-30MKI fighters, with a stated intent to have Hindustan Aircraft Limited build up to 200 aircraft. India has been trialling the Russian A-50 AWACS and negotiating with Israel for the purchase of the more capable A-50I. Aerial refuelling aircraft have been declared to be on the shopping list.

The Indian Navy is having its fleet of Tu-142M Bear long range maritime and strategic aircraft refurbished, additional numbers being acquired, and an upgrade incorporating anti-shipping cruise missiles is planned. The supersonic strategic Tu-22M Backfire is currently being leased, and Russian sources suggest that pressure is being applied to India to buy the type. The Russian 3M-54 Alfa cruise missile is now being retrofitted to Krivak class warships and Kilo class attack submarines, and possibly the Tu-142M Bear. A Mach 2.9 capable supersonic variant of this missile is planned for deployment, and land attack cruise missile variants are being publicly discussed in the Indian press. A ship launched land attack ballistic missile, the Dhanush, was recently tested by the Indian Navy.

The massive and sustained military growth programs of both India and the PRC, especially in conventional strategic power projection capabilities, have important consequences for the region. Within the coming decade, both India and China will have the capability to project strategic air power into South East Asia. Moreover, strategic bombers such as the Backfire have the range to cover the Pilbara, Kimberley and Northern Territory from bases in Indian or Chinese territory. As it is very much in the long term strategic interests of both nations to gain basing access within South East Asia, there is a high probability that one

or both of these nations will aim to politically, and later militarily, penetrate the nearer region.



Indian Naval Air Arm Backfire Striking Radius (FOB Andaman Is.)
Operating radius for probable PLA−AF Backfire deployment in yellow.

2 The Nearer Regional Strategic Context

The nearer region is in considerable difficulty, be it economic, military or political. The most evident example of this problem is Indonesia, which may not be capable of maintaining cohesion over the coming decade.

Much of the developing world is in serious economic difficulty. This is as much as consequence of the ending of the Cold War, which has denied them the opportunity to further extort aid from the West and the Soviet Bloc, in exchange for allegiance, as it is a consequence of a much more competitive world economic

regime, under globalisation. Other factors, such as the "brain drain" of educated professionals by growing Western economies, have not aided this situation.

The consequence is that today we see the "Arc of Instability" extend from Burma through to Fiji. Unless dramatic changes arise in the world's economic regime, this situation is unlikely to change.

The instability and economic-military vulnerability of these nations has important consequences for Australia. Nations which are in difficulty will frequently shift their alignment to the highest bidder. With both China and India in the position to significantly benefit, we face the prospect of many of these nations selling basing access in their territory.

Indonesia, as noted, may not be capable of overcoming the divergent forces of local ethnicity and religion, and may fragment into a gaggle of successor states, many of which may be hostile to the West, or simply so desperate for aid that they will align with any available player with the interest in doing so.

Where does Australia's strategic interest lie in this situation ? Clearly humanitarian, domestic and international political considerations would favour a strong commitment to peace-enforcement and peace-keeping operations throughout the nearer region. However, it is not evident how such operations could prevent either India or the PRC from directly penetrating a politically and economically fragmented region.

Indeed, it is likely that the "Balkanisation" of Indonesia would lead to ongoing territorial disputes by successor states. Australian intervention, unilateral or via a UN sponsored coalition, would most likely produce a situation whereby one successor state aligns with Australia, and its opponent against Australia.

From a strategic perspective, the least favourable outcome is one which leads to India or the PRC gaining basing access in Java. Such a situation must be resisted by Australia using all means which are available. Since Java will most likely play a similar role to Serbia in any "Balkanisation" scenario, the likely odds are that any Australian intervention would rapidly cause a Javanese successor state to align against Australia. As a result, Australian intervention in such a situation may prove to be highly counter-productive at a strategic level, even if it is perceived to be desirable from a domestic or international political perspective. It follows that a strategy aimed at deterring India and the PRC from seeking basing in Java is a much more robust approach to dealing with this difficult issue.

3 Australia's Growing Strategic Vulnerability

Historically Australia has enjoyed the advantage of geographical isolation. Australia's most vital economic assets, and its biggest population centres, were all

situated conveniently along the nation's southern and eastern coastlines. Unless an attacker possessed a naval fleet or strategic bomber force of significant strength, Australia's most vital economic components, its manufacturing industry and major population centres, would be well out of the reach of any attacker. Even during the Cold War, Australia was only ever exposed to an attack by Soviet strategic Submarine or Inter-Continental Ballistic Missiles (ICBM) or submarine launched strategic cruise missiles. With higher priority targets on the Soviet tasking order, Australia enjoyed an enviable position.

Australia's greatest vulnerability during this period were its shipping lanes, which could be interdicted by submarines and long range maritime aircraft, sortied from the Soviet base at Cam Ranh Bay. With small numbers deployed, these Soviet naval assets never constituted an overwhelming threat to Australia's economic well being.

Since the end of the Cold War we have seen important changes in Australia's economy. Much of the manufacturing base collapsed during the early 1990s, and the export of commodities, be they agricultural products or iron ore, coal, minerals and gas, became an increasingly important fraction of the nation's total income. Economically, Australia is today vitally dependent upon its ability to produce export commodities and ship them overseas.

The most important economic development over the last decade, from a long term perspective, is the exploitation of the very large reserves of natural gas and related petrochemical deposits in the Pilbara and the Timor Sea. The Pilbara was the site of oil industry activity as early as the 1960s, but only achieved prominence after the opening of the Woodside Petroleum offshore wells and construction of the large Burrup Peninsula facility. Today, the export of Liquefied Natural Gas (LNG) from the Pilbara rivals iron ore as Western Australia's leading export commodity. With the prospect of a major petrochemical feedstock refinery in the Pilbara, the importance of the oil and gas industry to this state's economy can only increase.

The Timor Sea gas and oil fields are described in Northern Territory government literature as "Australia's North Sea", and seen to be the economic future of this state. With established reserves and wells in this area widely considered to be one of the world's major gas reservoirs, a major effort is under way to open these up for exploitation. With plans afoot to lay no less than three major seabed pipelines to Darwin, it is likely that LNG and other petrochemical products will become the key export revenue earner for the N.T. over the coming two decades. Moreover, the availability of cheap energy in the form of natural gas will allow the mining industry in the Kimberley, N.T. and possibly even Queensland to shift from the export of raw ore, to the export of processed or refined minerals and metals.

With the developed world favouring a reduction in greenhouse gas emissions,

hydrogen rich LNG is a commodity which will increase in value, as the world's collective energy consumption soars in coming decades. Therefore it is reasonable to conclude that the Pilbara and Timor Sea gas and petrochemical industry will become an increasingly important export revenue earner for Australia.

Should this industry or the sea lanes used to ship its product abroad be successfully attacked in a military confrontation, Australia could find itself in a desperate economic situation very quickly. Any situation which would close shipping lanes, or lead to the destruction, damaging or shut down of the offshore production platforms would result in an immediate loss of LNG export revenues, but also a likely loss of revenue from all other mining industry areas dependent upon natural gas to process their product[1]

It follows that the accepted premise that Australia is only critically vulnerable to attacks upon its south eastern coastline will no longer hold true. Even a modestly sized cruise missile attack against the Timor Sea and Pilbara facilities, delivered by aircraft or submarine, could produce a disproportionate amount of long term economic damage to the nation.

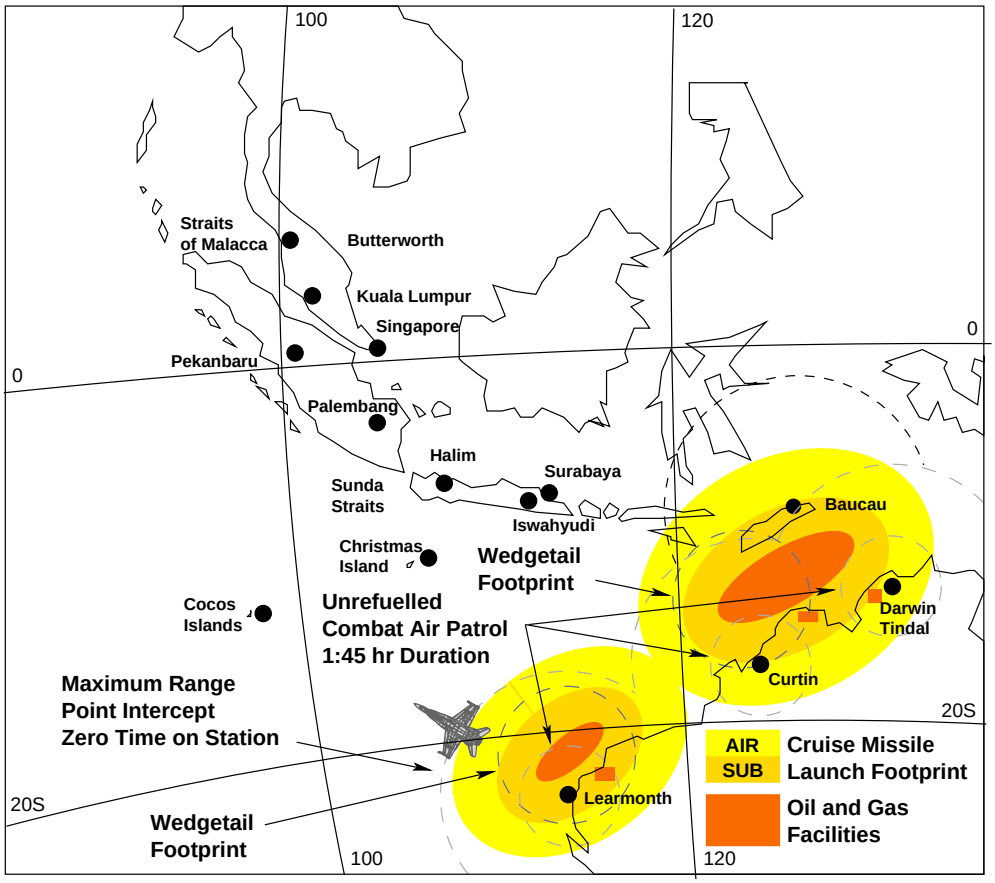
Offshore production platforms which handle large volumes of high pressure gas are vulnerable to attack by a range of weapons, including air delivered bombs, anti-shipping and land attack cruise missiles, terminally guided ballistic missiles and arguably, even torpedoes. Should a serious fire develop, the platform may be lost[2]

The geographical exposure of these vital economic assets must be seen in the context of developing wider regional capabilities, and the potential for changes in the political and military alignment of nations in the nearer region.

Within the next two years, India will have the operational capability, using its Bear and Backfire bombers, or its Kilo class attack submarines, to attack this infrastructure. Should the current Russian interest in selling the Backfire bomber to the PRC yield the intended outcome, the PRC would acquire a similar capability. This means that in any possible political or military dispute between Australia and either of these nations, both would have the option of performing punitive strikes against the Pilbara and Timor Sea industries. This could be used as a tool for political coercion, or as a means of retaliating against Australia for actions elsewhere.

[1] The Victorian experience of losing natural gas supplies for a two week period, following a processing plant accident and fire, provides ample illustration of the systemic effects of losing a key portion of the energy supply infrastructure.

[2] The North Sea Piper Alpha platform disaster provides an ample illustration of such an outcome.



Air Defence Learmonth to Darwin Arc – F/A–18A

Should Java become available either to the PRC or India as a site for the deployment of fighter aircraft, submarines, surface warships or Intermediate Range Ballistic Missiles, then the exposure of the Timor Sea and Pilbara to a possible attack increases dramatically. Of particular concern would be the deployment of the Su-27/30 fighter, as it can carry a range of anti-shipping and land attack missiles, yet is more than a match for the RAAF's F/A-18A in air combat.

At this time, the ADF is ill equipped to defend the Pilbara and Timor Sea, even against a turbo-prop Bear bomber delivering cruise missiles. Key weaknesses can be summarised thus:

1. The small number and poor fuel offload performance of the RAAF's four Boeing 707-338C tankers results in an inability to mount defensive fighter Combat Air Patrols in the required numbers, to the required distances.

2. The small size and thus fuel and weapons payload capacity of the F/A-18A

Hornet results in a situation, where large Combat Air Patrols would need to be mounted, exacerbating the aerial refuelling problem[3]

3. The APG-73 radar acquired under the HUG program is a mid range system, with a limited capability to acquire small cruise missiles at long ranges.

4. The absence of Airborne Early Warning & Control aircraft, and possible delays or cancellation of the Wedgetail program, deny the ADF the means of early detection of a cruise missile attack, especially if launched by submarine.

5. JORN can provide valuable warning of a bomber attack, but cannot detect and track reliably very small targets such as cruise missiles. With an update rate of tens of seconds per sweep, it is not well suited for the control of interceptors.

6. The absence of adequate satellite communications capability, and datalink relays to satellite links, significantly complicates the control of interceptors over the ocean.

This reflects only the capabilities required for a last ditch reactive defence of the Pilbara and Timor Sea. Should Australia wish to cover relevant shipping lanes to reasonable distances, further limitations become very apparent:

1. While the RAAF's F-111C force provides an exceptionally potent capability to destroy blue water surface warships with the Harpoon, AGM-142E and guided bombs, the absence of an aerial refuelling capability compatible with the F-111 limits its operating radius to around 1,000 nautical miles.

2. The poor operating radius of the F/A-18A Hornet and the small number and poor fuel offload performance of the RAAF's four Boeing 707-338C tankers result in a situation where a fighter escort cannot be provided for the F-111 or the AP-3C maritime aircraft, should airspace be contested by other fighter aircraft. Moreover, the F/A-18A Hornet suffers the same diversion range problems as exhibited in air defence operations.

3. The limited Anti-Air Warfare (AAW) and Anti-Surface Warfare (ASuW) capabilities of the RAN's ANZAC and FFG frigates make them non-viable

[3] To engage and destroy a dozen cruise missiles, a CAP must carry up to 24 missiles. Should a Hornet be loaded with 10 radar guided missiles, it cannot carry external fuel on wing stations and thus cannot safely divert to a runway, from a CAP station over the Timor Sea, should its aerial refuelling equipment fail. Refer Kopp C., "Wedgetail and the Region", Australian Aviation, October, 2000.

in any situation where they may have to confront anti-ship cruise missile firing aircraft[4]

There is little which can be done with the RAN's inventory to redress its limitations, since the problem of defending a vast area of ocean is by its nature best performed by air power. The Collins SSK could provide a useful capability to patrol potential cruise missile launch zones and interdict hostile submarines.

While the RAAF has in the F-111 an unmatched asset for maritime surface strike operations in the defence of sea lanes, the absence of suitable numbers of aerial refuelling tankers of suitable size, combined with the small size and uncompetitive aerodynamic performance of the F/A-18A Hornet, mean that the RAAF cannot with its current force structure address Australia's growing vulnerability.

4 Strategic Responses for Australia

Australia faces a twofold problem in the coming decades. The first problem is that India and China will eventually possess the capability to directly project strategic air power and guided missiles into Australia's territorial air space and waters. The second problem is that the possible breakup of Indonesia, or a shift in the alignment of Indonesia, its possible fragments, or even Malaysia, could see either India, China or both gain basing access for fighter aircraft, surface warships, submarines and ballistic missiles in the Malaysian peninsula and Indonesian Archipelago.

Both problems essentially stem from the growing economic and military strength of India and the PRC, and the long term economic and political side effects of the uncompetitive performance of ASEAN nations. These are large scale trends, neither of which can be reversed by any unilateral political or economic action by Australia.

A wide range of military and related strategic responses could be mounted by Australia, especially in coalition with the United States, to deal with either Indian or Chinese political and military penetration of South East Asia.

The fundamental issue of interest, from a force structuring perspective, is that of identifying the most viable unilateral responses by Australia and their implications for the ADF's force structure.

[4] Contrary to the popularly held belief, equipping these ships with the SPY-1F Aegis radar does not confer a decisive advantage over a supersonic sea-skimming cruise missile, since the cruise missile cannot be detected until it is 15-30 nautical miles from the ships and perhaps less than a minute from impact.

Accordingly, the author defines two 'prime objectives' for a future ADF force structure[5]:

1. The capability to robustly defend the Pilbara-Kimberley-Darwin arc, western sea lanes and air routes against missile attack by aircraft, warships, submarines and possibly ballistic missiles, or deter against such attack. Of key concern is the ability to engage and destroy cruise missile firing aircraft and submarines before they release their weapons, or cruise missiles once launched.

2. The capability to deter or prevent the use of geographically important regional land-masses such as Java from becoming used as basing areas for air, naval and ballistic missile attack.

Clearly dealing with direct power projection by India or the PRC into Australian territorial air space and waters will place a premium upon capabilities needed to control air space and oceans, and destroy any hostile assets which may be deployed. The necessary response is to deploy and maintain such capabilities in sufficient strength to mount a credible response should a confrontation develop between the West and either India or the PRC. Key capabilities are:

1. A sufficient number of competitive fighter aircraft and aerial refuelling tanker aircraft to engage and destroy any air or sea threat which has penetrated Australian air space or waters.

2. Sufficient surveillance, early warning and command-control-communications assets to detect, track and control engagements against any air or sea threat which has penetrated Australian air space or waters.

3. Sufficient Anti Submarine Warfare assets and submarine capabilities to engage and destroy any hostile submarines which approach within cruise missile launch range of the Pilbara and Timor Sea.

A more complex question is that of dealing with the potential outcomes of the fragmentation of Indonesia, with its concomitant potential for changes in the political and military alignment of nations in the nearer region.

It is clear that Indonesia or its successor states will not possess the military wherewithal in the forseeable future to present a serious threat to Australia's north. However, their potential as basing areas for Indian and/or Chinese air,

[5] Cited from Kopp C., "ADF Force Structure - Options for the Future", draft monograph, 120+ pages.

naval and missile assets must be of serious concern to Australian defence planning.

Peace-keeping and/or peace-enforcement operations in the Indonesian archipelago are unlikely to yield strong dividends in terms of preventing the penetration of this region by either India or the PRC. It follows that any capabilities maintained in the force structure to deal with such contingencies represent little more than luxuries, maintained for the purpose of domestic and international political display by Australia. While there may be strong moral and political arguments for involvement in such operations, within themselves they do not constitute a vital aspect of the nation's defence.

Ultimately Australia has only one truly vital interest in South East Asia - preventing its use as a staging or basing area for attacks mounted against Australia's north, as occurred in 1942.

The only unilateral response available to a defence force of the ADF's size in dealing with this problem is that of rendering South East Asia unattractive to the PRC or India as a staging and basing area.

The author has proposed the *Strategy of Regional Denial* to achieve this aim[6].

Regional Denial requires the capability to either destroy or render unusable any air, naval or missile base of substance situated within a radius of 2,000 nautical miles of the Australian continent, and engage and destroy any hostile air or naval assets in operating within this radius. Possession of such a capability produces an important disincentive to both China and India, insofar as penetration of the nearer region applies. Moreover, it produces a significant military risk to any nearer regional nation which may choose to change its alignment away from the West.

Rather than focussing on the highly risky approach of becoming entwined in local regional politics by intervention on the ground, Australia would focus the ADF's capabilities into dealing with the most serious strategic problem which could arise from regional instability: basing of potentially hostile military assets in the nearer region.

The capabilities required for Regional Denial could be usefully applied in dealing with many regional political or military problems which could arise from the breakup of Indonesia or long running low level military disputes. The ability to destroy or mine ports and airfields which are being used to resupply problem areas with military hardware could be very useful.

Implementing Regional Denial requires two core capabilities:

1. A sufficient number of competitive fighter aircraft and aerial refuelling tanker aircraft to overwhelm the situ defences of any target of interest

[6] Refer Kopp C., "**Regional Denial: An Alternative Deterrent Strategy for the ADF**", June, 2000, Unpublished Submission to the Minister of Defence.

within a 2,000 nautical radius, and destroy it.

2. A sufficient number of long range reconnaissance assets to perform pre-strike reconnaissance and post-strike damage assessment against any target of interest within a 2,000 nautical radius.

Other useful, but not critical capabilities are those conferred by Army and RAN assets which could be used in support of Regional Denial operations. The Army could perform pre-strike reconnaissance and post-strike damage assessment of land targets using Special Forces, and the recovery of downed aircrew. RAN submarines could perform analogous functions in maritime engagements.

5 Force Structure for a Future ADF

The central conclusion of the preceding analysis is that the ADF's future force structure must be focussed upon meeting the two 'prime objectives' first, as these are most relevant to the nation's long term economic prosperity and security. All other objectives, such as peace-enforcement, peace-keeping, UN and other coalition operations are secondary objectives. Where possible, Australia's contribution to such operations should be performed using capabilities developed and maintained to fulfill the two 'prime objectives'.

The nature of capabilities which are being developed across the wider region indicates that long range aerospace power must become the core combat capability of the ADF. No other capabilities, such as naval power or land forces, can address the potential threat capabilities being deployed or developed by the PRC and India.

Accordingly, future force structuring must address the needs of the RAAF first and foremost, and the needs of the RAN and Army in supporting RAAF operations in the defence of the continent, sea lanes and Regional Denial operations.

The following force structure model is based upon a range of analyses and publications by the author, dating from 1997. It reflects the distillation of almost 4 years of systematic analysis, much of which is detailed in the three associated submissions. Accordingly, this document will not provide detailed justifications for these capabilities, as these may be found in the supporting documents and other related publications.

The central rationale of this force structure model is that it exploits the flexibility of aerospace power to address the needs of the defence of the continent and sea lanes, while using the same capability package to address the deterrent and possible operational needs of Regional Denial operations. In this respect, it represents the most economical possible deployment of limited resources.

5.1 RAAF Force Structure

The RAAF's extant force structure is inadequate to address future needs. Many assets currently in service are exceptionally well suited to the developing environment, specifically the F-111 and AP-3C wings, others are less well suited. Key deficiencies are the inadequate F/A-18A Hornet and the Boeing 707-338C tankers.

Accordingly, the author proposes a *Target Force Structure*, to be operational in the period between 2010 and 2020, and a *Transitional Force Structure*, to span the period from 2000 to 2010.

5.1.1 Target RAAF Force Structure

The *Target Force Structure* comprises two core elements, a *Combat Force* and a *Support Force*. Operational deployment of elements of both forces would be as part of *Composite Operational Groups*, each group being capable of essentially independent operations, with assets assigned to reflect the operational needs of specific military operations.

Combat Force elements comprise:

1. **3-5 Multirole Fighter Squadrons** of F-22A Raptor multirole fighter aircraft (total 36-75 aircraft). These aircraft would be employed for the following roles: offensive counter air, defensive counter air, counter air strike, defence suppression, maritime strike and mining, precision land strike, strike support of land forces. The F-22A Raptor is the only type in existence which can wholly address these diverse needs.

2. **Up to 2 Multirole Fighter Squadrons** of strike optimised multirole fighter aircraft, most likely the JSF or a similar type (up to 30 aircraft). These aircraft would be employed for the following roles: counter air strike, defence suppression and support jamming, maritime strike and mining, precision land strike, strike support of land forces. These aircraft would be a low cost supplement to the F-22A Raptor, should more than 3 squadrons prove to be unaffordable.

3. **1 Strategic Tanker/Transport Squadron** of 12-15 KC-25/KC-747-300 strategic tanker-transport aircraft, equipped with boom and hose refuelling equipment, and satellite communications/JTIDS datalink relay equipment. These aircraft would provide aerial refuelling for the fighter squadrons in all applicable roles.

4. **1 Airborne Warning And Control Squadron** with Wedgetail AEW aircraft or a mix incorporating Wedgetail and possibly a future MESA AEW radar equipped RQ-4A Global Hawk or Proteus high altitude UAV[7].

5. **1 Strategic Reconnaissance Squadron** with 12 RQ-4A Global Hawk UAVs, in a mix equipped for high resolution radar, optical and electronic reconnaissance.

6. **1 Strategic Command-Control-Communications Squadron**, with multiple satellite ground stations to provide mobile connectivity to suitable geosynchronous communications satellites.

This force structure can robustly address all developing needs in the defence of the continent, sea lanes and Regional Denial operations. Moreover, the Strategic Tanker/Transport Squadron can contribute important airlift capabilities to the *Support Force*.
Support Force elements comprise:

1. **JORN Early Warning Radar Units** to provide long range early warning of air and sea threats.

2. **1-2 Long Range Maritime Patrol Squadrons**, comprising around 10-20 maritime patrol aircraft in the class of the AP-3C. These aircraft would provide maritime surface reconnaissance to supplement the RQ-4A Global Hawk UAVs, and Anti-Submarine Warfare capabilities.

3. **1-2 Tactical Tanker/Transport Squadrons** with 10-20 KC-130J, equipped with low speed hose refuelling equipment to support rotary wing aircraft. These aircraft would provide front line tactical transport from sites serviced by the KC-25/KC-747-300 transports, and also extend the range of rotary wing aircraft.

4. **1 Special Operations Squadron** with 12 CV-22B Osprey tilt-rotor aircraft. This unit would perform the insertion and extraction of Army Special Forces tasked with targeting reconnaissance, special operations strike and combat search and rescue.

An important aspect of this Target RAAF Force Structure model is that it is similar in size and numbers of fielded assets to the existing RAAF force structure. Where required, adjustments or incremental additions in capability

[7] The latter subject to future availability. A UAV based AEW capability provides potentially greater endurance and low altitude coverage, with much lower operating costs, but is demanding in the need for substantial satellite communications capabilities.

have been made. The most substantial changes over the existing model are the incorporation of a substantial force of strategic tanker/transports, the addition of a new strategic reconnaissance UAV capability, and the exploitation of the supercruising F-22 fighter to supplant the deterrent capabilities of the F-111 and air defence capabilities of the F/A-18A.

The *Transitional Force Structure* would retain elements of the existing force structure, seeing the progressive replacement of the F/A-18A Hornet and Boeing 707-338C first, while additional new capabilities such as the Wedgetail and Global Hawk are fielded. The F-111 and AP-3C would remain in service for as long as feasible, until replaced by the F-22A Raptor and a replacement LRMP type, respectively.

5.2 Infrastructure for Defending the North

Some additional infrastructure will be required to support RAAF operations in the defence of the continent, sea lanes and Regional Denial. The existing runways at Darwin and Learmonth are suitable in load bearing capacity for the Boeing KC-25/KC-747 strategic tankers, but the latter will require some extension to accommodate the maximum takeoff weight runway needs of this type.

High intensity long range or long endurance combat operations by dozens of tanker supported fighters could consume well in excess of one thousand tonnes of aviation kerosene per day. Therefore, to provide a credible capability to sustain such operations, both Learmonth and Darwin will require a suitable volume of underground fuel tankage, preferably enough for at least two weeks of sustained operations. This would be of the order of 20,000 to 30,000 tonnes at each site.

The prospect of commercial petrochemical refineries being built both in the Pilbara and the Northern Territory, creates the opportunity to provide a direct supply of aviation kerosene to both airfields, thereby significantly reducing the costs of sustaining such operations. While the distance between Learmonth and the Pilbara would make a pipeline unaffordable, it may be feasible to use a shipping pipeline to an offshore terminal. A tanker vessel of suitable capacity could be used to resupply Learmonth from a Burrup Peninsula refinery. Judicious placement of any refinery to be built in the near vicinity of Darwin would allow a direct shipping pipeline to be run from the refinery to fuel tanks at the Darwin airport.

5.3 RAN Force Structure

The RAN's force structure, comprising two core combat elements in the Surface Combatant force and the Submarine Force, can provide important capabilities in

the developing environment. However, the roles of these combat elements will in many respects differ from those which may be currently envisaged.

The Submarine Force is seen at this time primarily as a maritime deterrent asset, with a secondary capability to insert and extract Special Forces. The Surface Combatant Force is seen as an asset for open ocean patrol and escort, in addition to roles involving the escort and protection of coastal shipping and the air defence of coastal assets.

Cruise missile firing submarines will be operationally deployed in the wider region within the next two years, and long range maritime aircraft such as the Bear F, capable of delivering anti-ship cruise missiles, will be operational within a similar timeline. Should Indonesia or Malaysia change alignment, tanker supported tactical fighters with operating radius performance to reach Australian territory become another consideration.

These developments have two important consequences for the RAN, over the longer term:

1. Anti Submarine Warfare (ASW) in defence of the Pilbara and Timor Sea regions must become a very high priority in RAN capabilities.

2. The survivability of RAN surface fleet elements in blue water operations is doubtful, unless JORN and tanker supported fighter cover can be provided[8] .

Both the Submarine Force and the Surface Combatant Force can play a vital role in performing ASW patrols in the defence of the Pilbara and Timor Sea, especially if well coordinated with RAAF LRMP operations. Proper deployment could make a cruise missile attack by a submarine a very risky proposal for an attacker. Moreover, the use of helicopter capable amphibious vessels for the deployment of ASW helicopters in these areas provides the means of fielding many more ASW helicopters than could be supported by the Surface Combatant Force alone. In this manner, it should be feasible to implement a three layered defensive barrier against submarine attack. The submarines and LRMP aircraft would provide the outer layer, the Surface Combatant Force the intermediate layer, and the amphibious vessels the final layer. As the surface fleet elements committed to such operations would be well within the reach of RAAF Combat Air Patrols covering these regions, the risk from air and missile attack is minimised.

Where existing doctrine must change is the area of Surface Combatant Force operations in the 'blue water' environment, typical of extended sea lane defence

[8] The author has previously advocated the acquisition of Kidd class vessels, with the caveat that several frigates be replaced to balance the resulting budgetary demands. This argument predated more recent regional acquisitions in strategic air power and supersonic anti-ship cruise missiles.

and regional operations. Without cover by tanker supported fighter aircraft, the Surface Combatant Force is exposed to potential saturation attacks by supersonic anti-shipping cruise missiles launched by aircraft or submarines. Clearly the acquisition of larger AAW vessels is not a viable solution, since the geometry of such a missile attack does not change by putting a more capable radar on a warship, and no SAM in existence today can outrange cruise missile types being deployed in the region. Therefore blue water naval operations would best be confined to those performed in coalition with the US, where USN carrier based air power provides appropriate defensive capabilities.

The Submarine Force can provide invaluable contributions to the defence of the sea lanes and Regional Denial operations. In both situations, its existing role of torpedo and Harpoon attack on shipping can be significantly extended, by using it as a targeting and strike damage assessment tool in support of long range attacks by tanker supported fighters. In this regime of operations, the submarine neither expends its warload nor betrays its location to opposing ASW assets[9].

In Regional Denial operations, the Submarine Force can provide the important capability to insert and extract Army Special Forces elements.

While priority in ADF capabilities must remain focussed on the two 'primary objectives' defined in this submission, the force structure should retain amphibious support vessels simply due to their potentially valuable role as platforms for the deployment and support of ASW helicopters in the defence of the Pilbara and Timor Sea.

This submission proposes a future RAN force structure of this composition:
Combat Force elements comprise:

1. **6 Attack Submarines** of the Collins class, each equipped with covert satellite datalinks.

2. **8 Multirole Frigates** of the ANZAC class, each equipped with ASW helicopters.

3. **3 Multirole Frigates** of the FFG class, each equipped with ASW helicopters.

4. **3-4 Amphibious Support, Replenishment and ASW Helicopter Vessels**. In the shorter term, this capability can be fulfilled by the Tobruk LSH, Manoora and Kanimbla LPAs and one of the two current support vessels. In the longer term, a vessel similar to the proposed RAN MRA but without substantial AAW systems may be a proposition, subject to unit cost.

[9] Refer Kopp C., "Maritime Deterrence, Submarines and Airpower", Australian Aviation, July, 2000.

It would be preferable that all RAN ASW helicopters carry dipping sonars.

The future composition of the Patrol Boat and Mine Countermeasures Forces will need to be reviewed, to reflect future needs in the enforcement of the Australian EEZ and the potential for attack by mining.

The proposed force structure model for the RAN retains a substantial capability for supporting low intensity regional operations, should political circumstances demand that these be mounted. It reduces the role of the Surface Combatant Force in sea lane defence and general blue water operations, shifting it toward the use of tanker supported air power, and expands the role of the Submarine Force to support such operations.

5.4 Army Force Structure

In a developing regional context where military threats are likely to comprise long range capabilities such as strategic bombers, tanker supported fighter aircraft, ballistic missiles and cruise missile firing submarines, the traditional role of an Army in performing land combat operations is not a major factor.

Indeed, the definition of a credible and cohesive force structure model for the RAAF and the RAN is a relatively straightforward, albeit technically complex, process in which relevant regional capabilities are assessed by their potential to damage Australian interests and countered accordingly.

What wider role the Army can play in countering long range power projection by nations such as the PRC and China is less obvious.

One role of significant value which the Army can perform is long range reconnaissance, targeting and strike assessment through the deployment of Special Forces such as the SASR and 4RAR. An ongoing problem with air strikes and missile strikes against hostile land targets, be they strategic or tactical, is the clever use of concealment, camouflage, decoys and deception to defeat aerial and satellite reconnaissance. This can frequently result in a considerable waste of expensive resources being used to strike irrelevant targets or decoys. While future imaging sensors such as radar and optical systems will reduce opportunities for such deception, an observer on the ground will always be capable of providing an unambiguous and accurate assessment of the result of an attack, and will be well equipped to recognise decoys and deception which may fool an remote sensor.

Accordingly, this force structure model employs the SASR and 4RAR in support of pre-strike and post-strike targeting against hostile land assets. The use of submarines and the Special Operations Squadron of CV-22B aircraft is proposed for the insertion and extraction of such Special Forces deployments. An ancillary role would be the recovery of any aircrew from aircraft which may have been lost in the target area. Direct use of Special Forces for strikes on high value targets becomes a viable proposition, should means of rapid extraction be available. The

choice of whether to use Special Forces directly or employ them for targeting a strike by tanker supported aircraft would depend upon operational circumstances.

Another future role which the Army may need to perform is terminal defence of high value land targets against ballistic missile attack, or cruise missile attack should some inbound weapons survive RAAF interceptor attack.

Defence against cruise missiles can be performed by a variety of weapons, ranging from radar directed rapid fire guns up to long range SAMs. Cost considerations and the limited low altitude coverage footprint of large SAMs would indicate that a larger number of highly mobile point defence gun or missile systems would most likely be a better proposition. A system based upon the ASLAV chassis or other C-130 portable vehicle would be the best choice.

Defence against ballistic missiles will be expensive by any measure, more so due to the geography of high value assets such as airfields, ports, cities and petrochemical installations in the north of Australia. Arguably a deterrent strategy, whereby ballistic missile strikes incur retaliation by long range air strikes, or counter-force strikes against ballistic missile launchers using Special Forces and/or long range air power, is a better proposition. Not withstanding this argument, the ballistic missile defence problem will need to be carefully explored in coming years.

The defence of high value assets such as airfields, ports, and onshore or offshore petrochemical installations against hostile Special Forces attack is another important role which the Army can fulfill in support of the 'prime objectives'.

Key issues for the Army in coming decades will be mobility, and the mobility of organic Army firepower. This is true at the tactical, operational and strategic levels.

Strategic mobility is essential, if the Army is to deploy itself rapidly to widely dispersed sites in the north of Australia during a crisis situation. The strategic/tanker transport force of KC-25/KC-747 aircraft proposed in this force structure model provides a substantial capability in this respect, but only if Army assets are transportable by a C-130 sized aircraft[10]. Indeed, the C-130 would be used to transport Army assets from staging airfields in Darwin and Learmonth.

Tactical mobility is essential for manoeuvre warfare, and provides a decisive advantage in small unit land warfare operations. The Army may need to acquire additional assault and transport helicopters for this purpose.

Mobility of firepower is a serious limitation in the current Army force structure. Tanks and heavier artillery lack strategic mobility. Consideration should therefore be given to acquiring C-130 transportable ASLAV based direct and indirect fire support weapons, to replace the Leopard tank and larger artillery pieces.

[10] A Boeing 747 freighter can carry most articles which fit into a C-130.

The issue of attack helicopters hinges on what level of investment can be made into regionally deployable land forces, once the needs of the 'prime objectives' are addressed in the force structure. Should resources be available, the attack helicopter is a viable replacement for tanks and direct fire artillery in a wide range of military situations[11].

The complexity of the Army force structure and diversity of roles it performs precludes a simple force structure model of the ilk proposed for the RAAF and RAN.

Consequently, this submission will confine its recommendations on Army force structure to the preceding comments.

5.5 Non-Viable Force Structure Choices

The Australian defence debate has seen in recent years a number of widely promoted proposals for specific weapon systems and capabilities. No discussion of force structure choices is complete without an exploration of the significant weaknesses of several such proposals.

The foremost proposals in this category are submarine, ship and air launched cruise missiles, ballistic missiles and aircraft carriers capable of deploying fixed wing aircraft.

5.5.1 Cruise Missiles

The BGM-109C/D Tomahawk Land Attack Missile (TLAM) has been repeatedly proposed as an appropriate deterrent weapon for the ADF, specifically to be deployed by the Collins class submarine force. It has been argued that such a capability would be both superior and cheaper than the F-111 deterrent force.

The arguments for a TLAM/Collins capability are in part a fallacy, and in part a deceptive concealment of actual deterrent capability needs[12].

The primary requirement for a deterrent capability is credibility. Credibility in part derives from a willingness to use the asset, and in part from the sustainability of that asset in combat operations. Unless the deterrent asset can inflict significant damage, and continue to inflict significant damage over the duration of a conflict, it cannot be a credible deterrent.

The TLAM, delivered by a Collins class submarine or surface warship, is not a credible deterrent for two basic reasons:

[11] Contrary to the commonly held belief, modern attack helicopters such as the AH-64D Longbow Apache are multirole assets rather than specialised anti-tank assets, indeed the author has coined the term 'rotary wing tactical fighter' to describe them.

[12] Refer C. Kopp, 'Tomahawks, Submarines and the F-111', Australian Aviation, January, 1996.

1. The size of a strike delivered by multiple submarines or warships cannot exceed several dozen rounds, which is barely enough to close down one decently sized military airfield for several days.

2. The slow transit speed (8-20 knots) of both submarines and surface warships results in an exceptionally poor sustained rate of missile firings. Several days if not weeks may elapse between a submarine or warship delivering a cruise missile attack, reloading and repeating the attack.

The cost issue is also frequently misrepresented when cruise missiles are compared to manned aircraft as means of delivering firepower. Two factors must be considered:

1. The problem of targeting a cruise missile is no different than the problem of targeting a precision guided bomb. The same total cost overheads are incurred for pre-strike reconnaissance and post-strike damage assessment. In this respect there is no advantage whatsoever in the use of cruise missiles.

2. The unit cost of a cruise missile is of the order of one million US dollars, whereas the unit cost of a guided bomb of the order of tens of thousands of dollars. In a sustained bombardment 50 cruise missiles expended amount in cost to the value of a modern fighter aircraft.

Indeed, it can be shown that in sustained combat operations, the cost difference between a stealthy fighter aircraft dropping guided bombs and conventional fighter aircraft armed with cruise missiles is amortised in about one week or less of combat operations[13].

The cost issue also impacts sustainability in combat and thus credibility through the problem of weapon war-stocks. The USAF almost exhausted its war-stocks of B-52 launched AGM-86C cruise missiles, and the USN seriously depleted its stocks of BGM-109C/D TLAMs during the 1991 and 1999 campaigns. In both instances, older stocks of formerly strategic nuclear cruise missiles were remanufactured to make up shortfalls. In both campaigns the cruise missile was used only to supplement manned bombers.

It can be strongly argued that the inability of the US to ever sustain an intense bombardment by cruise missiles has reduced the perceived credibility of the weapon as a means of sustained and thus credible bombardment. The expectation that this perception can be changed is not reasonable. Many nations may simply choose to 'sit out' a cruise missile bombardment.

[13]Kopp C., "**Replacing the RAAF F/A-18 Hornet Fighter**, Strategic, Operational and Technical Issues", May, 1998, Unpublished Submission to the Minister of D erence (114 Pages).

Another consideration is whether cruise missiles will be survivable in the face of mobile air defence systems fielded by the PRC and India. The S-300PMU-1 and S-300V systems deployed in the region can be supplemented by the mast mounted 76N6 low altitude radar, which was specifically designed to detect and engage low flying cruise missiles. A simple counter to an ADF cruise missile deployment would be the fielding of a dozen or more 76N6 radars to supplement existing SAM defences.

The delivery of cruise missiles by widebody transport aircraft does not alter the basic limitations of the cruise missile. It is not sustainable in combat, very expensive per aimpoint destroyed and is not a credible deterrent weapon.

5.5.2 Ballistic Missiles

The ballistic missile has on occasion been proposed as a viable deterrent weapon for the ADF. The argument for the ballistic missile is based upon the premise that it is cheaper to acquire than a manned aircraft and extremely difficult to defend against.

The latter argument is largely true at this time, but should capable anti-ballistic weapons like the S-300V SAM be deployed, a substantial capability to engage and destroy such weapons will exist.

The main problem experienced by the ballistic missile is the same problem seen with cruise missiles: sustainability in combat. Consider a hypothetical ballistic missile designed to provide the ADF with a deterrent capability. It will need a range of about 2,000 nautical miles, a payload of about 1 tonne and terminal guidance using either satellite navigation or imaging radar. Such a weapon is likely to be of similar complexity to a cruise missile, but much larger. As a result, its unit cost will be of the order of a million or more dollars.

While a high rate of fire can be achieved, unlike the cruise missile, and land mobile launcher vehicles can be easily dispersed, the difficulty which arises is the cost of war-stocks to sustain any duration of bombardment. If we assume even a short conflict of 2 weeks duration, involving 100 launches per day, a number chosen since it corresponds in weight of fire to what a force of about 50-75 fighters can deliver over that period, then we require war-stocks of at least 1,400 ballistic missiles at a cost of the order of 3 billion dollars. Yet it is an asset which is wholly expended in two weeks, and cannot be used for any purpose other than a direct bombardment of fixed targets.

As with the cruise missile, the cost overheads of targeting are still incurred.

The essential conclusion is that ballistic missiles, like cruise missiles, are inflexible and expensive deterrent weapons which will lack credibility since they are not sustainable in combat.

5.5.3 Fixed Wing Air Capable Aircraft Carriers

The recent RAN proposals for the LSS category of warship, essentially lightweight aircraft carriers, underscore a commonly held belief that naval air power is viable deterrent capability.

This is in most respects a fallacy. Delivering air power by aircraft carrier is always significantly more expensive than delivering it from land bases. Inevitably, an aircraft carrier requires missile armed escort ships and ideally, ASW assets such as fixed wing aircraft, helicopters and submarines. The basic defence of the carrier battle group against missile and submarine threats incurs a very large cost overhead, and diverts such supporting assets from other roles.

Of more concern with the LLS proposal is the naive belief by its authors' that a second tier combat aircraft such as the F/A-18A/C, AV-8B Harrier or proposed JSF can provide such a carrier with a credible organic air defence capability. Unless the opposing threat is a subsonic maritime aircraft carrying short range anti-ship missiles, or a lightweight fighter aircraft, fighters such as the F/A-18A/C or AV-8B derivatives will be unable to defend the vessel.

In a regional environment where the Su-27/30 Flanker has proliferated, and the Tu-22M Backfire is used, a lightweight carrier with lightweight fighters is not survivable. Indeed, even a large deck USN carrier will be ill-equipped to tackle such capabilities once the large F-14 Tomcat fighter is retired. The F/A-18E will at best match an Su-27/30 in radar and missile capabilities, and is uncompetitive in agility and range against the Russian fighter.

It follows that there is no case for deploying carrier based fixed wing air power in the ADF force structure. The vulnerability of such an asset to current and developing regional capabilities and its high cost raise serious questions about the aims of the parties proposing the LSS vessel.

5.6 Tankers, the F-22 and Deterrence

The centrepiece of the force structure model proposed in this submission is a deterrent force comprising the F-22 fighter and KC-25/KC-747 strategic tanker aircraft. Neither choice is arbitrary, nor hastily considered[14].

The basic reality the ADF faces in the coming decade is that both the PRC and India will have the capability to project strategic air and missile power into

[14] Refer Kopp C., "**Regional Denial: An Alternative Deterrent Strategy for the ADF**", June, 2000, Unpublished Submission to the Minister of Defence (41 Pages), Kopp C., "**Replacing the RAAF F/A-18 Hornet Fighter**, Strategic, Operational and Technical Issues", May, 1998, Unpublished Submission to the Minister of Defence (114 Pages) and Kopp C., "**A Strategic Tanker/Transport Force for the ADF**", Working Paper 82, RAAF APSC, March, 2000.

Australia's north and northwest regions, while Australia's economic vulnerability to any such power projection will continue to increase.

It is an inevitable consequence of this that the ADF must develop the capability to robustly defend the north of the continent, specifically the Pilbara and Timor Sea, from such capabilities, if Australia is not to become hostage to the threat of such attack, or alternately to become wholly dependent upon the deployment of US Air Force assets in the north.

Therefore a large fighter aircraft and supporting tanker aircraft must be acquired as a priority. Only two choices exist in fighters which can credibly perform this role, either the F-22A or an F-15E derivative. With supersonic cruise capability, the F-22A achieves twice the coverage of an F-15E derivative and thus is a more economical choice, since fewer need be acquired. Any fighters smaller than these two types must be purchased in much larger numbers to meet the required needs in missile load per Combat Air Patrol and diversion range should aerial refuelling fail. The arithmetic to demonstrate this is very simple.

In terms of basic air defence capabilities, a single F-22A carries the missile payload of two Hornets, yet it covers potentially twice the footprint of a Hornet Combat Air Patrol. On a trivial comparison, one F-22A can perform the work of four F/A-18A Hornets. Therefore, as few as 20 aircraft could provide the air defence coverage of the RAAF's 72 strong F/A-18A force.

Given the inevitability of a large fighter and supporting tanker force, the next question which arises is that of other uses which they may be put to. Strategic deterrence, in the form of maritime strike and land strike operations performed under the Regional Denial strategy are a first choice.

The F-22A does not require supporting fighters if it is to perform air strikes, the role of the F-111 today, as its combination of stealth and supersonic cruise makes it extremely difficult to intercept. This is not true of the F-15E or any other fighter. Sustained supersonic cruise also allows it to transit long distances at about twice the speed of an F-111, therefore in the time it takes an F-111 to bomb one target, an F-22 can bomb two targets, on average. Therefore, in terms of the basic economics of a deterrent force, the F-22A is at least 2 to 4 times cheaper than any other equivalent in the number of sorties needed to achieve a given aim. About 20 F-22A aircraft can provide the equivalent deterrent strike capability of the RAAF's existing force of 34 F-111s.

It follows that the capabilities of the RAAF's existing force of 72 F/A-18A aircraft and 34 F-111 aircraft could be replaced by as few as 40 F-22A fighters. With allowances for attrition and training aircraft, a buy of around 50 F-22A fighters could robustly replace the RAAF's current inventory in its basic roles[15].

[15] The proposed target force structure allows for an additional 25 aircraft to provide additional growth in capability, this to account for possible further deterioration in the region.

At about twice the unit cost of much less capable conventional fighters, the full replacement of the RAAF's F/A-18A and F-111 force with 50 F-22As is roughly 'revenue neutral' against the one-for-one replacement of the same with a conventional fighter. Unlike conventional fighters which provide only incremental gains in capability over the F/A-18A and F-111, and which fall short of the F-111 in many respects, the F-22A is a robust replacement.

This discussion has not addressed the issue of air superiority performance against advanced fighters such as the Su-27SK and Su-30MK. The F-22A is the only type in existence which holds a robust margin in capability over these types, and most importantly, a margin which cannot be easily eroded by missile and radar upgrades to the Russian types. Therefore, like the F-111 it is an investment which will retain its value for a very long period of time, and is thus a sensible use of taxpayer's money. A single investment solves the air defence and the deterrence problems, which must otherwise be addressed by a complex mix of fighter and missile capabilities.

As the F-22A will be the USAF's prime air superiority and theatre deep strike asset for the coming 3-4 decades, deterrent credibility will be maintained. This deterrent capability encompasses counter air deterrence and surface strike deterrence, at strategic, operational and tactical levels.

The choice of the Boeing KC-25/KC-747 aircraft as a strategic tanker to support the F-22A is based upon two decisive factors: cost and flexibility.

The KC-25/KC-747 is a tanker conversion of the widely used Boeing 747 freighter. Of all established tanker aircraft designs, it offers the lowest unit cost per tonne of fuel offloaded. Yet it is the only commercial transport which is capable of loading freight of the same size as the C-130 Hercules transport, and has payload radius performance competitive against a C-5 Galaxy airlifter.

Specific points in favour of the Boeing 747 as a tanker may be summarised thus:

1. A glut of used commercial airframes results in very low acquisition costs for the basic airframe, and multiple vendors can perform freight conversions.

2. It offers the lowest unit cost per tonne of fuel offloaded of any tanker aircraft in existence.

3. Tanker variants of the 747 were built and extensively tested during the late seventies, thereby minimising costs.

4. It provides a genuine capability for strategic airlift, competitive with the C-5 Galaxy, but limited in size to payloads transportable by C-130.

5. Substantial support and training facilities exist in Australia, and a large pool of reservists are potentially available in Qantas and Ansett aircrew.

6. It is faster than all tankers other than the KC-135R.

The needs of the ADF could be addressed with as few as 12-15 aircraft, against smaller equivalents of which up to 30 would need to be bought. A fleet of 12-15 aircraft would cost between $1B and $2B to acquire.

The only aspect of the Boeing KC-25/KC-747 open to debate is flexibility, since it demands big runways and may be too large to economically support small Combat Air Patrols[16]. However, a mixed force of 10-13 KC-25/KC-747s and a comprehensive upgrade of the extant Boeing 707-338C fleet would address this problem adequately.

While other choices exist to the F-22A and the KC-25/KC-747, none can match these two types in the basic 'bang-for-buck' equation.

6 Acquisition Priorities

In terms of prioritising acquisition of replacement capabilities to address changes in the region, the following model is proposed:

1. Acquisition of Boeing KC-25/KC-747 Tanker Transports ($\approx$ 1B-2B).
2. Acquisition of Boeing Wedgetail AEW&C Aircraft ($\approx$ 2.3B-2.7B).
3. Acquisition of Lockheed/Martin F-22A Fighter-Bombers ($\approx$ 12.5B-15B[17]).
4. Acquisition of Northrop/Grumman RQ-4A Global Hawk UAVs ($\approx$ 0.5-1B).
5. Acquisition of GEO communications satellite capabilities (TBD).

These five capabilities are most critical to the defence of the continent and deterrence and should thus be accorded priority over all other acquisitions.

7 Conclusions

With India and the PRC acquiring conventional strategic power projection weapons and modern cruise missiles, the rationale applied to ADF force structuring in previous White Papers no longer holds. The capability benchmarks must be readjusted to accommodate capabilities being acquired or deployed by India and the PRC.

[16] Its fuel burn is similar to the RAAF's existing 707-338C tankers.
[17] Estimate based on current US production unit costs.

Of significant concern is the future economic vulnerability of Australia to disruption or destruction of the gas and oil production base in the Pilbara and Timor Sea regions.

A force structure model is proposed in this submission. It defines two prime objectives for the ADF: defence of the continent and sea lanes, and strategic deterrence via the Regional Denial strategy. All capabilities which are not required to meet the two prime objectives must be accorded a secondary status in the future force structure and prioritised accordingly.

Five key capabilities are identified for the implementation of the two prime force structure objectives:

1. Strategic tanker/transport aircraft - 12-15 Boeing KC-25/KC-747.
2. Airborne Early Warning & Control Aircraft - Boeing Wedgetail.
3. Counter Air and Deterrent Fighter Bombers - Lockheed/Martin F-22A.
4. Strategic Reconnaissance UAVs Northrop/Grumman RQ-4A Global Hawk.
5. High capacity GEO communications satellites.

Other important adjustments to ADF force structure are proposed.

The RAN would strengthen Anti-Submarine Warfare capabilities, and equip the Submarine Force to support RAAF strategic deterrence operations. No replacements would be acquired for the DDGs and the three oldest FFGs.

The Army would further develop its Special Forces capabilities, especially to provide targeting support for RAAF strategic deterrence operations. Direct and indirect fire support weapons would shift to a mobile, C-130 transportable platform.

The proposed force structure model should be implementable within a 2.5% GDP defence budget.

8 Supporting Submissions

Kopp C., "**Regional Denial: An Alternative Deterrent Strategy for the ADF**", June, 2000, Unpublished Submission to the Minister of Defence (41 Pages).
Kopp C., "**Replacing the RAAF F/A-18 Hornet Fighter**, Strategic, Operational and Technical Issues", May, 1998, Unpublished Submission to the Minister of Defence (114 Pages).
Kopp C., "**A Strategic Tanker/Transport Force for the ADF**", Working Paper 82, RAAF APSC, March, 2000.

9 About the Author

Born in Perth, Western Australia, Carlo Kopp graduated with first class honours in Electrical Engineering in 1984, from the University of Western Australia. In 1996 the author completed an MSc in Computer Science by research and last year submitted a PhD dealing with long range datalinks and mobile computer networks. Both theses were completed at Monash University in Melbourne.

The author has over 16 years of diverse industry experience, including the design of high speed communications equipment, computer hardware and embedded software. More recently, the author has consulted to private industry and government organisations, and lectured in computing topics. He has published more than 60 technical articles and papers on computing and systems engineering topics.

Since 1980, the author has published in excess of a hundred technical articles and refereed papers dealing with air power, military doctrine, technology, strategy, and information warfare. He authored the first doctrine and strategic model for the large scale offensive application of microwave bombs in 1996. His papers in related areas have been published by the Royal Australian Air Force, United States Air Force, and more recently he was an invited speaker at the 1999 ADFA "Control of the Air" conference in Canberra, and the AOC "3rd International EW Conference" in Zurich. He has previously consulted to government on defence matters.

Contact Details

Email: "Carlo Kopp" <Carlo.Kopp@aus.net>
Phone: 03-9905-5229 WH

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Sources

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