

The Auditor-General
Audit Report No.34 2006-07
Performance Audit

High Frequency Communication System Modernisation Project

Department of Defence

Defence Materiel Organisation

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of Australia 2007

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Canberra ACT
1 May 2007

Dear Mr President
Dear Mr Speaker

The Australian National Audit Office has undertaken a performance audit in the Department of Defence and Defence Materiel Organisation in accordance with the authority contained in the *Auditor-General Act 1997*. Pursuant to Senate Standing Order 166 relating to the presentation of documents when the Senate is not sitting, I present the report of this audit and the accompanying brochure. The report is titled *High Frequency Communication System Modernisation Project*.

Following its presentation and receipt, the report will be placed on the Australian National Audit Office's Homepage—<http://www.anao.gov.au>.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Ian McPhee', is positioned above the printed name.

Ian McPhee
Auditor-General

The Honourable the President of the Senate
The Honourable the Speaker of the House of Representatives
Parliament House
Canberra ACT

AUDITING FOR AUSTRALIA

The Auditor-General is head of the Australian National Audit Office. The ANAO assists the Auditor-General to carry out his duties under the *Auditor-General Act 1997* to undertake performance audits and financial statement audits of Commonwealth public sector bodies and to provide independent reports and advice for the Parliament, the Government and the community. The aim is to improve Commonwealth public sector administration and accountability.

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Abbreviations

AIR 5392	Project Air 5392 – Replacement of the AOCS.
ALE	Automatic Link Establishment.
AOCS	Air Operations Communication System.
ADF	Australian Defence Force.
DEFCOMMSTA	Defence Communications Station.
DMO	Defence Materiel Organisation.
JP 1324	Joint Project 1324 – Modernisation and Relocation of NAVCOMMSTA.
JP 2043	Joint Project 2043 - High Frequency Modernisation Project.
JORN	Jindalee Operational Radar Network.
NAVCOMMSTA	Naval Communication Station.
RAAF	Royal Australian Air Force.
RAN	Royal Australian Navy.
RANTEAA	Royal Australian Navy Test Evaluation and Acceptance Authority.

Summary

Summary

Background

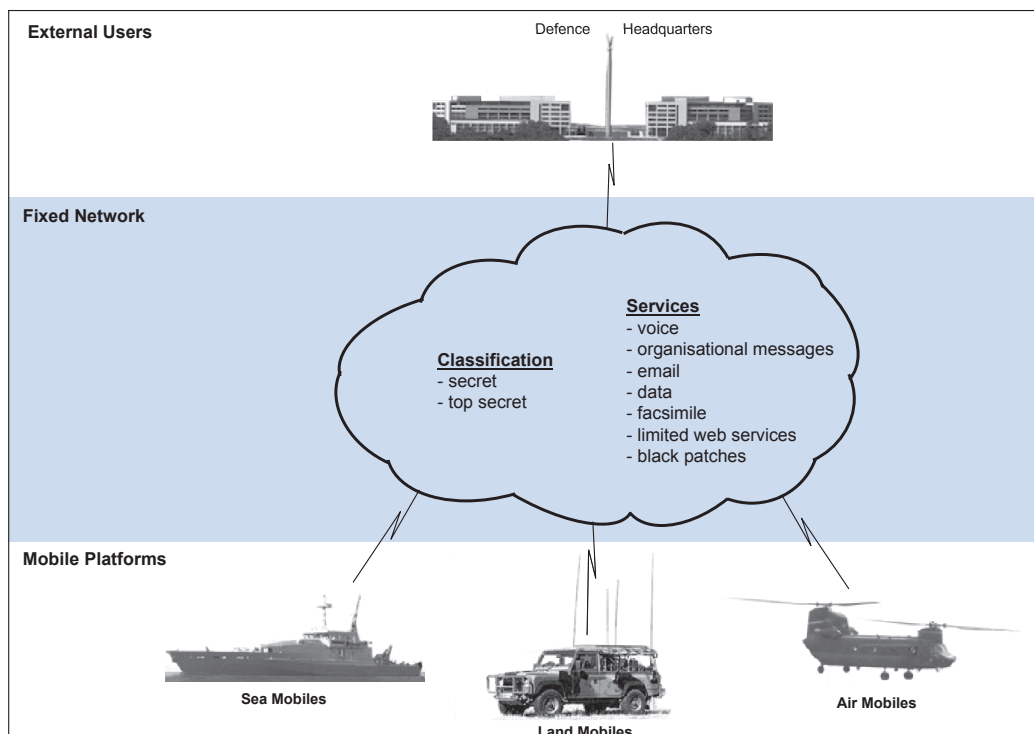
1. Defence utilises satellite communications as the primary system for high and medium speed communication with mobile Australian Defence Force (ADF) platforms such as ships, aircraft and vehicles. Vulnerabilities in satellite communications make it necessary for Defence to have alternative means of long distance communication. The purpose of High Frequency communication capabilities is to provide an alternative means of long range communications; and the primary communication capability for ADF mobile platforms not fitted for satellite communication. Joint Project (JP) 2043 (the Project) was established to modernise the ADF's High Frequency communication system.

2. The scope of Phase 3A of the Project involves the development and implementation of a modernised High Frequency communication fixed network and the upgrade of communications equipment on selected mobile platforms (see Figure 1). This Phase was approved in 1996, with a budget of \$505 million. By June 2006, the budget had increased by \$111 million to \$616 million, primarily through price and currency adjustments.

3. The Prime Contract was awarded to Boeing Australia Limited (the Prime Contractor) in December 1997 for completion in May 2004. The Contract was a fixed price contract initially comprising 40 per cent milestone payments and 60 per cent earned value payments. The negotiated price for the Prime Contract was \$312.20 million (1996 prices). A Network Operation and Support Contract was also executed in December 1997 for \$72.48 million (1996 prices). The Network Operation and Support Contract commences after the final stage of the fixed network is accepted which is currently scheduled for late 2007.

Figure 1

High Frequency Modernisation – communications with mobile platforms



Source: Defence Documentation.

4. The Prime Contract required the development of a High Frequency communication fixed network in two stages which are:
- the Core Communication System, to provide a High Frequency communication capability at a level no less than that provided by the networks being replaced¹; and
 - the Final Communication System, to provide an enhanced High Frequency communication capability².

¹ Core Communication System capabilities include the transmission of organisational messages, voice (both non-secure and encrypted), facsimile and data. The Core Communication System involved the construction and redevelopment of facilities and infrastructure; the procurement of equipment; systems engineering; and software development and accounted for a significant proportion of the value of the Prime Contract.

² Enhancements to be provided by the Final Communication System include greater levels of automation, improved communication protocols, a higher traffic capacity, new traffic types and greater reliability. Following implementation of the Final Communication System there will be separate primary and back-up Network Management Facilities.

5. The High Frequency communication equipment in selected ADF sea, land and air mobile platforms is required to be upgraded to utilise the full capability to be provided by the Final Communication System³. The types of mobile platforms to be upgraded by the Project were altered significantly in 1999 after a review by the Defence Capability Committee to reflect changing strategic circumstances. Following that review a significant number of mobile platforms that were to be upgraded under the original Prime Contract were removed from the Contract in 2004⁴. By early 2007 arrangements for the majority of mobile platforms now required to be upgraded using Project funds were yet to be incorporated into a contract.

6. The objective of the audit was to assess the effectiveness of the management by Defence and the DMO of the procurement of the modernised High Frequency communication capability for the ADF. The audit focussed on Phase 3A of the Project which commenced in the mid 1990's and involved the selection of the Prime Contractor; negotiation of the Prime Contract and the Network Operation and Support Contract; and the development and implementation of the Communication System.

Overall audit conclusions

7. The modernisation of the High Frequency communication system is a complex Project involving the upgrade and construction of facilities and infrastructure; systems engineering; software development; and platform integration. The ANAO found that at the execution of the Prime Contract in late 1997, requirements were not clearly identified and risks associated with systems engineering and software development were acknowledged as being significant to the Project. These risks have materialised because risk mitigation measures applied in the formation of the Prime Contract were less successful than both the Contractor and Defence expected. As a consequence of these issues, and the overall project complexity, the contract schedule was extended three times, each being documented in a Deed. The outcome of these negotiations has been a delay to the Project schedule combined with resolution of a number of issues that had been in dispute.

³ The system is intended to enable communications with platforms that have not been upgraded and with allied forces.

⁴ The Prime Contractor advised the ANAO that the development of a generic mobile for air platforms and a generic mobile for land/sea platforms will support the reintroduction of specific mobile platforms in the future.

8. In the period from contract signature to late 2003, difficulties were encountered in achieving project deliverables associated with systems engineering and software development. A number of significant scope changes were made to the Prime Contract over this period that were not resolved with the Prime Contractor until the Contract was rebaselined in 2004⁵. Rebaselining included scope increases regarded as necessary to support the operation of the Core Communication System; and to ensure the Final Communication System was capable of meeting current and future ADF requirements. The contractual costs of these scope changes were largely offset by cost reductions associated with the removal of the High Frequency Direction Finding capability and the removal of nine of the 10 types of mobile platforms to be upgraded later in the Project.

9. The removal of these platforms from the Prime Contract effectively represents a deferral of capability and expenditure, in that the ability to achieve the contracted levels of system functionality is contingent on mobile platforms being fitted with equipment fully compatible with the Final Communication System. Some of the capabilities such as Automatic Link Establishment will, however, be able to be used by some platforms. The ANAO considers that significant risk remains to the schedule for acceptance of Final Communication by late 2007, and the upgrade of mobile platforms by the end of 2010.

10. This Project identified the need to carefully control risks associated with projects that have a large developmental component. Key areas where the Project outcomes may have been improved include: the identification and resolution of risks in the pre-contract phases; the transition of risk into the contract; and the management of risks as they transpired in the post contract phase. The ANAO acknowledges that over the life of this Project, the DMO and Defence have undertaken significant procurement reforms, including the 2003 Defence Procurement Review. Lessons learnt from this Project provide a range of insights into areas where the DMO and Defence might further refine these processes which are particularly relevant given the prominence of information integration projects in delivering future capability to the ADF.

⁵ The Prime Contractor advised the ANAO that during 2003-04 both the DMO and the Prime Contractor put in place a new project management team that has supported much of the Project recovery and many of the successful results being achieved since that time.

Key Findings

Tender Process

11. The Project has involved three phases with the first two phases involving a series of studies conducted by potential suppliers to reduce the Project risk. During these phases the two short-listed suppliers established teams which needed to be retained in anticipation of being awarded the Prime Contract under Phase 3A. The cost associated with retaining these teams influenced Defence's approach to the tendering process. The normal project approval process was altered to expedite the tendering process; with the Request for Tender being released to the short-listed suppliers in July 1996, prior to the Government's approval of Phase 3A in August 1996⁶. Only one of the two tenders received provided a quoted price, that when combined with other estimated Project costs, was within the approved Project budget.

12. Throughout the tender process a series of internal and third party reviews commented on weaknesses in the requirements set out in the Request for Tender documentation. Both of the tenders submitted had limitations in terms of compliance with the tender requirements and the level of detail provided. These factors and tender evaluation procedural issues resulted in a decision being taken to reassess various aspects of both tenders. Following this process the initial assessment of the preferred tenderer's approach to systems engineering and software development was upgraded. The need to expedite contract negotiations resulted in the resolution of risks being carried forward into the Prime Contract.

13. Risks associated with requirements instability, software development and systems engineering were identified at the time of contract signature. These risks were inadequately addressed through pre-contract negotiations. These risks subsequently had a significant impact on the Project in terms of schedule and the capability delivered under the Prime Contract. This experience underlines the importance of Defence having well defined and stable requirements and contractors having sound systems engineering and software development processes.

⁶ Defence advised the ANAO that the practice of obtaining tender quality prices prior to approval is consistent with the processes introduced following the 2003 Defence Procurement Review.

Contract Management

14. By November 2006, the DMO had expended \$328.82 million, representing 53 per cent of the Project budget. The bulk of this expenditure was against the Prime Contract. The remaining Project budget, as at November 2006 was \$285.4 million with the largest areas of planned expenditure being \$81.7 million for the remaining mobile platform upgrades; \$69.6 million expenditure against the Prime Contract and associated Contract Change Proposals; and \$36.6 million for the first three years of the Network Operation and Support Contract.

15. Over the period from contract signature in December 1997 to mid 2003, contract management issues proved to be problematic with important Contract Change Proposals taking several years to resolve and a series of contract milestones not achieved. Arrangements applied by the DMO were unsuccessful in resolving issues and requirements instability, payment arrangements and ongoing delays compounded project management difficulties. Inappropriate processes for the escalation of issues within the DMO at the time placed the Project at significant risk.

16. The ongoing inability to achieve milestones, particularly those associated with systems engineering and software development, resulted in the DMO suspending earned value payments in April 2003. In early 2004, the Prime Contract was rebaselined with the execution of a Deed of Settlement and Release. Rebaselining involved three key elements including: agreement on delays to the delivery of the Core and Final Communication Systems and mobile platform upgrades; scope changes; and compensation for costs incurred by Defence due to the delayed delivery of the Core Communication System. Following rebaselining, payment arrangements under the Prime Contract transitioned from a combination of earned value and milestone payments to solely milestone based payments.

17. Scope increases associated with the delivery of the fixed network had a combined value of \$32.74 million. These scope increases were considered necessary to support the operation of the Core Communication System and to ensure that the Final Communication System satisfied future requirements⁷. Cost reductions due to the removal of the requirement to deliver certain

⁷ The Prime Contractor advised the ANAO that the scope changes negotiated for Core and Final Systems required new or amended requirements to be engineered into the systems design with a corresponding impact on the delivery schedule. Through a series of Deeds and subsequent Contract Change Proposals many of these delays were approved into the Contract baseline.

capabilities under the Prime Contract meant that cost increases associated with rebaselining only marginally increased the value of the Prime Contract.

18. The amendments to the mobiles to be upgraded under the Prime Contract were based on decisions taken by Defence in 1999 and 2002 to reflect changed circumstances within the individual Services. Following these changes all Air Force airborne mobile platforms and Navy Major Fleet units were removed from list of platforms to be upgraded by the Project. These changes resulted in the number of types of military platforms to be upgraded under the Prime Contract being reduced from 10 platforms to a single platform. The total price reduction to the Prime Contract achieved through the removal of nine mobile platforms types was \$21.90 million (1996 prices).

19. An ongoing requirement under the Prime Contract is the upgrade of a First of Type Chinook helicopter and the provision of five Chinook follow-on upgrade kits which are scheduled for delivery in mid to late 2007. The requirement to develop generic mobile upgrade systems was inserted into the Prime Contract through rebaselining in order to prove concepts prior to upgrading platforms and thereby reduce risk⁸. Defence advised the ANAO that the generic mobile systems will be used to demonstrate enhanced mobiles communications capabilities to the user communities in the individual Services. A cost increase to the Prime Contract of \$5.81 million (1996 prices) was agreed to fund the development of the generic upgrade systems and other costs associated with the upgrade of the Chinook helicopter.

20. The communications equipment on a further eight mobile platforms types is required to be upgraded using Project funds. In early 2007, planning was ongoing for these mobile platform upgrades and for the incorporation of follow-on upgrade kits into the five remaining Chinook helicopters. The cost of upgrading these eight platforms was yet to be clearly identified by the DMO in early 2007 as contractual arrangements for these upgrades were yet to be established.

Capability Delivery

21. Due to requirements instability and scope change within the Project, a Deed was signed in 1999 granting a seven and a half month schedule delay. The Project continued to encounter schedule slippage through to late 2003.

⁸ There are two generic High Frequency upgrade systems: a generic air upgrade system and a generic land and sea upgrade system. Development of these systems includes non-recurring and platform-independent engineering activities and is scheduled for completion in late 2007.

Through contract rebaselining in early 2004, the acceptance of the Core Communication System was rescheduled to August 2004, and the acceptance of the Final Communication System was rescheduled to November 2007. Table 1 outlines the extent of these schedule delays.

Table 1

Schedule for DMO acceptance of fixed network

Prime Contract deliverables	(1) Original Prime Contract schedule	(2) 2004 Rebaselining schedule	(3) Actual/ planned	(3) – (1) Schedule variance
Core Communication System.	November 2001	August 2004	October 2004	35 months
Final Communication System.	April 2004	November 2007	November 2007	43 months

Source: Developed by ANAO based on Defence documents

22. The delay in the acceptance of the Core Communication System resulted in the DMO claiming that additional costs would be incurred due to the requirement to keep legacy communication stations operational for an extended duration. Through the 2004 Deed of Settlement and Release the DMO reached agreement with the Prime Contractor for the recovery of significant liquidated damages and the provision of work-in-kind as compensation for costs incurred due to the delay.

23. The Core Communication System was delivered in July 2004 and accepted by the DMO in October 2004. Following Initial Operational Release⁹ in November 2004, the system experienced a range of operational issues that required resolution prior to the closure of all legacy communication stations. Following the implementation of measures to resolve these issues the last legacy communication station was closed in late 2005, with the ADF becoming fully reliant on the Core Communication System for High Frequency communications.

⁹ Acceptance by the DMO under the Prime Contract is followed by a two stage process involving Initial Operational Release; and Operational Release. Initial Operational Release is generally undertaken shortly after contractual acceptance. It is the milestone where the relevant authority is satisfied that the operational state of the equipment including deficiencies, training and supportability elements, are such that it is safe to proceed into the Operational Test and Evaluation Period. Operational Release represents the in-service date at which the relevant authority is satisfied that the equipment is, in all respects, ready for operational service. Operational Release is not planned to occur until after the acceptance of the Final Communication System.

24. In May 2005 a Deed of Agreement was negotiated to address schedule risk associated with the delivery of the Final Communication System. Through this process the DMO gained a series of benefits related to warranty provisions for the Final Communication System and reduced costs associated with the ongoing operation of legacy communication stations. These were offset against a reduction in review processes; changes to the software development approach; and the removal of an Intermediate Communication System that was to be delivered as an interim stage between the delivery of the Core and Final Communication System. Challenges remain in achieving the schedule for the Final Communication System as achievement of this schedule is largely contingent on a critical software development milestone being met in mid 2007.

25. The DMO has applied a significant level of effort towards resolving issues associated with the development and integration of the Modernised High Frequency Communication System into the mobile platforms. Much of the work in this area was ongoing in early 2007. A range of complex issues are yet to be fully resolved to finalise the mobile upgrade program by late 2010 and conclude this Project. These encompass platform specific software development and integration and are subject to the acceptance of the generic mobile upgrade systems and the availability of platforms for upgrade. Defence advised the ANAO in January 2007 that a reasonable risk remains in this aspect of the Project, mainly in terms of schedule, and that this risk will remain, if for no other reason than platform availability.

Defence and DMO response

26. The Department of Defence provided a response on behalf of the DMO and Defence (see Appendix 1). The Defence Response stated that:

Defence notes that the report provides a summary of key events that have occurred over the life of the Project. The High Frequency Modernisation Project is a complex software intensive and high risk project involving geographically diverse sites at five major locations around Australia. The Core System, which provides the majority of the contracted functionality, has now been operational for over two years and is providing excellent service to the ADF.

Defence received significant compensation from the Prime Contractor for delays arising from problems with the contractor's system engineering and software development effort. The value of the compensation was consistent with the level of estimated losses caused by the delay and there were no scope

changes as a result. Risk mitigation measures incorporated into the contract based on recognised international practice at that time were not as successful as the Contractor and Defence had expected.

Defence notes that the level of delay experienced in this project is comparable to international experience with similar projects reviewed by the Standish Group International over the period 1994 to 2004. Internationally, the processes, tools and techniques for managing complex software development projects have matured significantly over the past ten years resulting in measurable improvements in project performance. For example, according to the latest Standish Report the average project delay for similar projects has improved from 160% in 1994 to 84% in 2004. The delay to the Core System of the High Frequency Modernisation Project was 72%. DMO continues to monitor progress in these areas and adopt relevant practices.

Since 1997 when the Prime Contract was awarded the DMO has implemented a suite of acquisition initiatives including standard contracting templates for software intensive projects, benchmarking of process improvement based on international best practice using the Capability Maturity Model Integrated developed by the Software Engineering Institute in the US, and improved measurement regimes to further improve project outcomes.

To reduce delays resulting from unstable requirements Defence has instituted more rigorous requirements development processes. Projects now require an Operational Concept Document, Function and Performance Specification and Test Concept Document before approval. These requirements have been further strengthened by changes made following the Defence Procurement Review.

Audit Findings and Conclusions

1. Introduction

This chapter provides an overview of the Project and the audit approach.

Background

1.1 Reliable communication technologies, including High Frequency radio and satellite communication capabilities, are essential components of the command and control of military operations. Defence use satellite communications as the primary system for high and medium speed communications with major ship platforms and ground based units. Vulnerabilities in satellite communications make it necessary for Defence to have alternative means of long distance communication. The purpose of High Frequency communication capabilities is to provide a survivable alternative to long range satellite communications; and a primary communication capability for Australian Defence Force (ADF) mobile platforms not fitted for satellite communication.

1.2 The High Frequency spectrum provides the capability to transmit and receive voice communications and data over long distances, albeit with speed and bandwidth limitations relative to satellite communications. The Modernised High Frequency Communication System utilises the Defence allocated High Frequency spectrum to provide services similar to those available over the Public Switched Telephone Network and the internet for voice communication, facsimile transmission and data transfer.

1.3 The Royal Australian Navy (RAN) and the Royal Australian Air Force (RAAF) each operated their own High Frequency communication fixed networks prior to the Initial Operational Release of the first stage of the fixed network under this Project in November 2004. These networks are outlined below:

- the RAN network of Naval Communication Stations (NAVCOMMSTA) with facilities in Canberra, North-West Cape and near Perth. Prior to 2001, the Navy also had a major station near Darwin; and
- the RAAF Air Operations Communication System (AOCS) commissioned in 1968, with four facilities located in Sydney, Townsville, Darwin and near Perth, supported by a smaller facility at Butterworth, Malaysia.

1.4 Despite progressive upgrades, much of the equipment utilised at these stations embodied old technology that required higher levels of manual operation than comparable modern equipment. Some components of the NAVCOMMSTAs had been in-service for 40 years with facilities constructed over the period 1939 to 1946. Additionally, urban encroachment was increasing the level of radio noise interference and reducing the effectiveness of these networks. This interference particularly impacted on the NAVCOMMSTA receiver station in Canberra and AOCS sites in Sydney, Darwin and near Perth.

Joint Project 2043

1.5 The Defence Communications Corporate Plan 1991–2001 indicated that existing ADF long-range, fixed tactical High Frequency radio networks should be rationalised and modernised. In 1993, Defence decided to combine the NAVCOMMSTA and AOCS systems into a single system for all three Services, providing High Frequency communication capability over continental Australia and to a designated level of performance at a specified distance beyond Australia’s coastline¹⁰. Consequently, the High Frequency Modernisation Project was established in May 1993 by combining the following two projects into a single project:

- Project JP 1324 Phase 2 - Modernisation and Relocation of the NAVCOMMSTA, which commenced in 1974 and acquired the land for the Riverina Node in early 1993; and
- Project AIR 5392 - Replacement of the AOCS.

¹⁰ In mid 1993, Defence considered that extending the life of the existing NAVCOMMSTA beyond 1999 was not feasible without incurring additional costs for an extensive refurbishment program and the ongoing operational costs associated with high-power and manpower-intensive systems.

1.6 The Project is managed by the Radio Frequency Systems Program Office in the Communication Systems Branch of the Electronic and Weapon Systems Division of the Defence Materiel Organisation (DMO). The objectives of the Project were to:

- replace the existing Defence long-range High Frequency communication infrastructure;
- reduce operational manpower and life cycle costs; and
- take advantage of improved High Frequency technology to provide a better Grade of Service¹¹, Quality of Service¹² and Speed of Service¹³ than the High Frequency systems being replaced.

1.7 Phase 3A of the Project involves the delivery of a fixed network in two stages:

- the Core Communication System, to provide a High Frequency communication capability at a level no less than that provided by the networks being replaced. These capabilities include the transmission of organisational messages, voice (both non-secure and encrypted), facsimile and data; and
- the Final Communication System, to provide an enhanced High Frequency communication capability including increased automation, improved communication protocols, a higher traffic capacity, new traffic types and greater reliability.

1.8 Acceptance of the first stage of the fixed network, the Core Communication System, in late October 2004, marked the inception of the Defence Communications Station (DEFCOMMSTA) Australia. DEFCOMMSTA Australia is managed by ADF personnel. The communication system is operated by a combination of military personnel from the RAN and the RAAF, supplemented by personnel engaged by the Prime Contractor. The Final

¹¹ *Grade of Service* is the probability, expressed as a percentage that traffic will be passed in its entirety with the required Quality of Service and Speed of Service within a specified range. This percentage takes into account the capacity and availability of the fixed network, ionospheric propagation, and radio frequency channel availability.

¹² *Quality of Service* is a measure of the useability of a communications service for passing a particular type of traffic.

¹³ *Speed of Service* for an item of non-real-time traffic such as data, or messages, is the time interval from its submission to the communications system interface until its delivery (in its entirety and with the required Quality of Service) to the interface at the destination. Speed of Service for an item of real-time traffic such as a voice call, is the time interval from request for service to the time the channel is capable of transferring traffic.

Communication System was originally scheduled for acceptance in April 2004. Development of the Final Communication System was ongoing in early 2007, with acceptance planned to occur in November 2007.

1.9 The original Prime Contract also included an Intermediate deliverable stage for the fixed network. This stage was removed in 2005 through a Deed of Agreement to reduce complexity and duplication in the development processes for the Final Communication System.

1.10 The Project also involves the upgrade of High Frequency Communication equipment on selected mobile platforms. The upgrade of this equipment is necessary to enable the utilisation of the full capability to be provided by the Final Communication System. In early 2007, no mobile platforms had been upgraded. Only one mobile platform type, the First of Type Chinook helicopter upgrade, was contracted at that time.

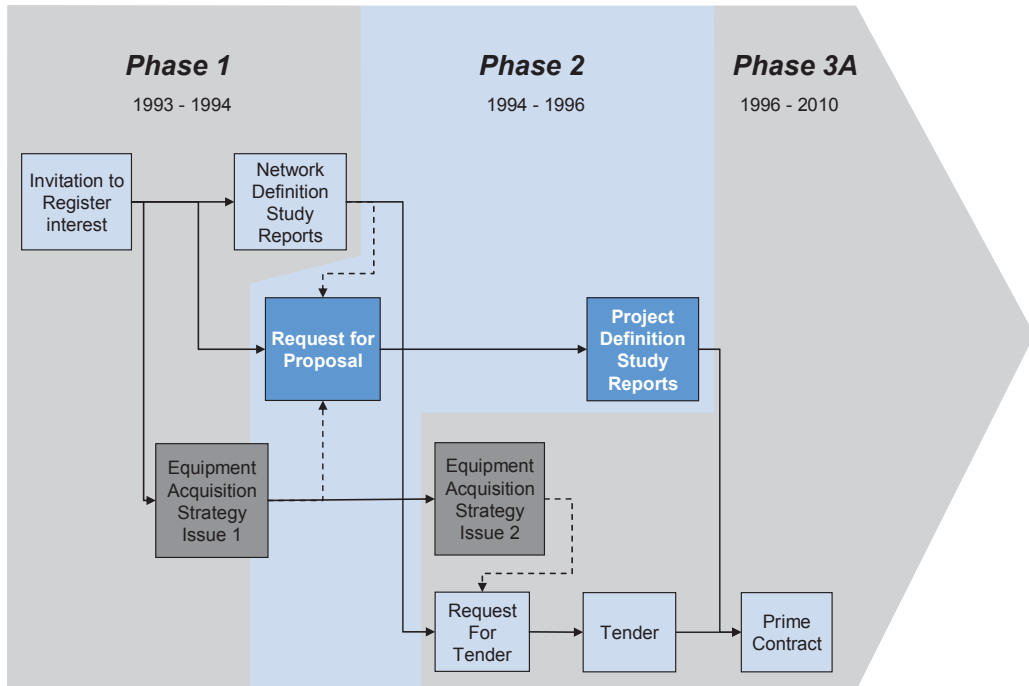
Project Phases

1.11 The November 1994 Equipment Acquisition Strategy detailed three Phases of the Project. The first two phases have been completed and provided the foundations for awarding the Prime Contract for the development and implementation of the Communication System (see Figure 1.1). Initially Phase 3 was divided into two sub-phases:

- Phase 3A, which was ongoing at the time of audit fieldwork, involved the selection of the Prime Contractor; the negotiation of the Prime Contract and the in-service support contract; the development of the fixed network; and the upgrade of selected mobiles. This Phase was approved in the context of the 1996–97 Budget with a budget of \$505 million (December 1996 prices); and
- Phase 3B, cancelled in 1999, was to involve the upgrade of other mobile platforms within the Project scope.

Figure 1.1

JP 2043 – Project phases



Source: Developed by ANAO based on Defence documents

Feasibility and planning studies - Phase 1 and Phase 2

1.12 Phase 1 of the Project involved a Network Definition Study conducted in the second half of 1994 by five potential suppliers who had been selected through an expression of interest process. The purpose of the Network Definition Study was to provide the basis for a top level specification of the Modernised High Frequency Communication System. It aimed to:

- determine the feasibility of, and the risks associated with, the High Frequency wide area communication system concept;
- select sites for fixed network transmit and receive stations;
- develop a reference network architecture to assist in proposal evaluation;
- provide a characterisation of mobile noise to assist in the determination of the required strength of High Frequency radio signals; and
- define the required operational capability and acquisition strategy.

1.13 Phase 2 involved Project Definition Studies conducted in parallel by two contractors that were short-listed through a Request for Proposal process undertaken after the Network Definition Study. The Project Definition Studies were conducted in two parts by each contractor. These were an Options Study and a main Project Definition Study. The purpose of these Studies was to further develop a joint understanding of the High Frequency Modernisation Project and consolidate information required in Phase 3A for the development of the Request for Tender and the Statement of Work. The Project Definition Studies were completed in December 1996. Table 1.1 below outlines the key dates relating to Phase 1 and Phase 2.

Table 1.1

Key dates Phase 1 and Phase 2

Phases	Year	Activity
	May 1993	The establishment of Project JP 2043 through the merger of Project JP 1324 Phase 2 - Modernisation and Relocation of the NAVCOMMSTA, and Project AIR 5392 - Replacement of the AOCS.
	August 1993	Cabinet Approval for Phases 1 and 2.
Phase 1	August 1993	Invitation to Register interest released.
	June 1994	Five potential Prime Contractors short-listed.
	October 1994	Network Definition Study commenced.
	October 1994	Equipment Acquisition Strategy Issue 1 endorsed.
	December 1994	Network Definition Study completed.
Phase 2	December 1994	Request for Proposal issued.
	August 1995	Two potential Prime Contractors short-listed.
	August 1995	Project Definition Options Study commenced.
	November 1995	Project Definition Main Study commenced.
	December 1996	Project Definition Studies completed.

Source: Defence Documentation.

Phase 3A – Network implementation

1.14 The Request for Tender for the development and implementation of the modernised High Frequency communication system under Phase 3A was issued in July 1996 to the two contractors involved in Phase 2, prior to Phase 2 being completed. Boeing Australia Limited was selected as the preferred tenderer in May 1997¹⁴.

1.15 Issues identified during tender evaluation were the subject of review and clarification in mid 1997. Contract negotiations occurred in late 1997 and the Prime Contract and Network Operation and Support Contract were signed on 31 December 1997. Completion of the current Project is planned for late 2010. The key dates relating to Phase 3A - Network Implementation are outlined in Table 1.2.

¹⁴ During the tender evaluation period Rockwell Australia was acquired by Boeing Australia Limited.

Table 1.2**Planned and Actual Dates of Major Project Events for Phase 3A**

Year	Activity
January 1996	Phase 3A approved by Force Structure Policy and Programming Committee.
July 1996	Request for Tender released.
August 1996	Equipment Acquisition Strategy endorsed.
August 1996	Cabinet Approval for Phase 3A with a budget of \$505 million (1996 prices).
September 1996	Request for Tender closing date.
May 1997	Preferred tenderer selected.
December 1997	Contract for the Supply of a Modernised High Frequency Communication System signed for \$312.10 million (1996 prices).
December 1997	Network Operation and Support Contract signed for \$72.48 million (1996 prices).
June 1999	Deed of Agreement executed due to requirements instability.
November 2001	Original planned acceptance of the Core Communication System.
February 2004	Deed of Settlement and Release relating to schedule slippage, scope change, and planning for the Core and Final Communication Systems.
April 2004	Original planned acceptance of the Final Communication System.
October 2004	Actual Core Communication System Acceptance by the DMO.
November 2004	Initial Operational Release of the Core Communication System.
May 2005	Deed of Agreement to address schedule risk for the delivery of the Final Communication System signed.
July 2005	Materiel Acquisition Agreement between DMO and Defence Capability Development Group signed.
November 2005	Final legacy communication station closed.
October 2007	Planned delivery of Chinook First of Type.
November 2007	Revised planned acceptance of Final Communication System and commencement of the Network Operation and Support Contract.
October 2010	Planned completion of upgrading selected sea, air and land mobile platforms that are in project scope but were not in-contract in early 2007 (subject to platform availability).

Source: Defence Documentation.

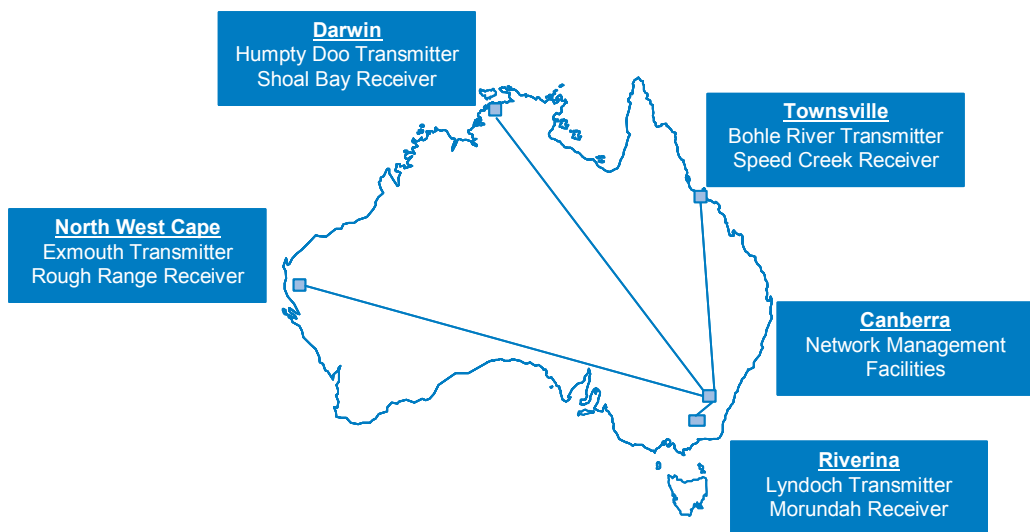
Fixed network configuration

1.16 The fixed network comprises four remotely located radio stations referred to as Nodes. The Nodes are situated in the Townsville, Darwin and North West Cape areas; and the Riverina region (see Figure 1.2). The Riverina Node was established at new sites procured under the former Project JP 1324.

The other nodes utilised existing Defence sites and new buildings at the Townsville Receiver Site, and redeveloped facilities at other sites. The North West Cape Receiver Station was established at the site of the disused US Navy Receiver Station which was decommissioned when responsibility for North West Cape was transferred from the US Navy to Australia in the early 1990s. The Prime Contractor was responsible for the design and construction of the new buildings, the antennas, the services, and the redevelopment of the existing facilities.

Figure 1.2

Modernised High Frequency Communication System - Node sites



Source: DMO Documentation.

1.17 Each Node comprises two sites, a Receive site and a Transmit site situated approximately 50 kilometres apart, with a Local Management Facility located at one of these sites. The Local Management Facility within a Node manages the radio assets located at the Receive and Transmit sites. Inter-Site Links connect the Transmit site to the Receive site within a Node.

1.18 The Nodes are connected by Inter-Node Links to the Network Management Facility. The Network Management Facility is the control access point for all communication traffic to and from external and mobile users. Under the Final Communication System there will be separate primary and back-up Network Management Facilities.

1.19 The Network Management Facility for the Core Communication System is located at Russell Offices in Canberra. When the Final

Communication System is accepted, control and management is planned to shift from the Russell Offices to the new Network Management Facility at the Defence Network Operations Centre at HMAS Harman. The Russell Offices Network Management Facility will subsequently be upgraded to become the back-up Network Management Facility. The Prime Contractor is responsible for the design, development, testing, installation, acceptance, and transition to operation of communications equipment and software at Nodes and the Network Management Facilities.

Mobile platform upgrades

1.20 The original Prime Contract included the upgrade of High Frequency communication systems in 10 ADF air, land and sea mobile platform types. The number and type of platforms to be upgraded by the Project were reviewed and altered by the Defence Capability Committee subsequent to contract signature to reflect changing circumstances in all three Services. These changes resulted in a reduction in the platforms to be upgraded within the Prime Contract to include a First of Type Chinook helicopter upgrade, with follow-on upgrade kits provided for the remaining five helicopters. The arrangements for the installation of follow-on upgrade kits into the Chinooks had not been contracted in early 2007.

1.21 The Modernised High Frequency Communication System is intended to provide backward compatibility to enable communications with those mobile platforms with existing High Frequency capability; it is also to enable communications with allied forces. Eight types of mobile platforms are required to be upgraded utilising a portion of the remaining project funds. Arrangements for the upgrade of these mobile platforms were yet to be contracted in early 2007. Platform types to be upgraded, other than the Chinook helicopter, are outlined below:

- Black Hawk helicopters;
- Armidale Class Patrol Boats,
- Minehunter Coastal Ships;
- Hydrographic Ships;
- Army Strategic High Frequency Systems;
- Local Mine Countermeasures Headquarters;
- RAAF No. 1 Combat Communications Squadron; and

- Defence Force School of Signals.

In-service support

1.22 In-service support arrangements for the Modernised High Frequency Communication System are initially provided for under a Service Level Agreement, which is a schedule to the Prime Contract. The Service Level Agreement applies from acceptance of the Core Communication System to acceptance of the Final Communication System and specifies the level of support and maintenance that the supplier is to provide.

1.23 The Network Operation and Support Contract sets out logistic support arrangements following the acceptance of the Final Communication System, currently scheduled for November 2007. The scope of the Network Operation and Support Contract encompasses work necessary to maintain fixed network sites at the contractually required levels of availability and grade of service. Following the initial term of five years, the Network Operation and Support Contract has options for term extensions of between one and five years.

1.24 At the time of this audit, the DMO was also assessing the requirement for an Engineering Services Agreement with the Prime Contractor. This agreement is intended to address engineering requirements additional to those covered in the Service Level Agreement or the Network Operation and Support Contract.

Audit approach

1.25 The objective of the audit was to assess the effectiveness of Defence's and the DMO's management of the procurement of this communication capability for the ADF. The audit focussed on Phase 3A of the Project which involved the selection of the Prime Contractor; negotiation of the Prime Contract and related support contracts; and the development and implementation of the communication system. This Phase commenced in 1996 and was ongoing at the conclusion of audit fieldwork.

1.26 Audit fieldwork was conducted from April 2006 to January 2007. The audit team met with staff from areas within Defence including the Program Office in Brisbane and Canberra; the Capability Development Group; Network Management Facility personnel; Contractor staff at the Riverina Node; and representatives of the Prime Contractor in Brisbane. Issues Papers consolidating the findings of this audit were provided to Defence and the DMO in December 2006 followed by a draft report in March 2007.

1.27 The audit was conducted in accordance with the ANAO auditing standards at a cost to the ANAO of \$360 000.

Report structure

1.28 The remainder of this report is structured into three chapters. Chapter 2 outlines tender selection and contract negotiation processes. Chapter 3 examines Defence's management of the contract including expenditure and changes to scope. Chapter 4 examines progress against the Project schedule, acceptance of the Core Communication System, the ongoing development of the fixed network and the mobile platform upgrade program.

2. The Tender Process

This chapter examines aspects of the tender process which subsequently impacted on the delivery of the capability to be provided by this Project.

Background

2.1 During the selection and contract negotiation phases Defence undertook a series of studies to reduce the risk associated with this Project. The ANAO notes that a range of issues were not adequately resolved by these studies or studies undertaken during previous Phases of the Project. Three key areas of risk were repeatedly identified during the tender evaluation and selection process. These were associated with establishing and formalising requirements, systems engineering and software development. These issues subsequently contributed to significant slippage and scope change within the Project.

2.2 Participation in the tendering process for Phase 3A was limited to the two companies that had participated in the Phase 2 Project Definition Studies. Defence documentation indicates that the timetable for preparation of the Request for Tender and associated documents was driven by the cost to contractors of retaining teams established under earlier Phases of the Project to meet possible Phase 3A requirements. An August 1997 internal audit report confirmed this conclusion and indicated that this cost was estimated by Defence to be of the order of \$400 000 per company per month. The DMO advised the ANAO that at the time this tender was being evaluated there was a significant emphasis on reducing the cost of tendering.

2.3 The Request for Tender was released in July 1996 prior to Cabinet approval for Phase 3A, which was given in August 1996. At the time Phase 3A was initiated, Capital Equipment Projects costing more than \$20 million required Cabinet approval. Normally Cabinet approval would precede the release of the Request for Tender. The primary justification for releasing Request for Tender before Cabinet approval was to address concerns that delaying the release of the Request for Tender would increase the quoted price, as both Contractors would recover costs associated with maintaining teams during this period.

Tender evaluation

2.4 Tenders were submitted in September 1996. Both tenders were rated similarly against the majority of criteria. However, there was a large variance between the prices quoted in the tenders for the Prime Contract and in-service support contract. Based on the Tender Evaluation Board calculations, the price quoted by the preferred tenderer, when combined with other Project costs, was marginally less than the Project budget. In contrast, the competitor's quoted price, combined with other Project costs exceeded the Project budget by 28 per cent.

2.5 The value for money assessment within the Source Evaluation Report indicated that the preferred tenderer's offer clearly provided the best value for money and was the only tender that could be accommodated within existing funding approval limits. The ANAO notes that the significance of the price difference was such that only one tenderer could be considered to be eligible for selection as the preferred tenderer without significant renegotiation being undertaken or the Project budget being increased.

System engineering and software development risks

2.6 The Tender Evaluation Board noted that there were inconsistencies in the way tenders had been rated by the Tender Evaluation Working Groups against the requirements of the Tender Evaluation Plan. To address these inconsistencies, the initial tender assessments were reviewed and reassessed during the preparation of the Source Evaluation Report. This reassessment changed the overall ratings of some Technical Assessment Sheets, and the levels of confidence or assessment of risk associated with ratings were altered. Systems engineering was a key area of reassessment of both tenders. This reassessment resulted in the rating of the preferred tenderer's technical solution being increased from non-compliant to compliant.

2.7 The two tenders were evaluated over a five-month period beginning in October 1996. A Tender Evaluation Board meeting in December 1996 acknowledged serious limitations in both tenders. Most significant among these were a lack of technical detail; perceived operational and engineering difficulties in the preferred tenderer's bid; and a lack of compliance with contract provisions in the alternative tenderer's bid.

2.8 A Source Evaluation Report, completed in February 1997, noted that the extended acquisition process involving various studies prior to the release of the Request for Tender had not provided tenders with a high level of

compliance and reduced level of risk. Due to concerns in these areas, the Source Evaluation Report outlined three alternative options for proceeding with the Project. These were:

- Option A: Select Boeing as the preferred tenderer, notify the other tenderer of its non-preferred status, and proceed to negotiate a contract;
- Option B: Select neither tenderer and seek from both companies that submitted tenders a limited re-bid (best and final offer) in an attempt to obtain better definition of the technical solution, reduced technical risks, and more acceptable contractual conditions; or
- Option C: Withdraw the Request for Tender and re-tender probably for a system with reduced scope that provided closer integration with future satellite communications systems.

2.9 Option A was considered to provide an acceptable level of confidence that a satisfactory contract could be negotiated, and was accepted. Option B was not recommended, as it was considered that it would result in additional costs to industry, while not assuring a material improvement in the quality of the tenders. Option C was not accepted as it was expected to result in a delay of up to two years and deferral of savings from anticipated reduced operating costs and site closures.

2.10 Defence wrote to the preferred tenderer in mid 1997, outlining a series of tender clarification issues which were to be discussed prior to commencing contract negotiations. These issues are summarised in Table 2.1 and encompass capability, systems engineering, software development and mobile platform upgrades. A number of these issues had significant impact on the Project in terms of schedule and cost subsequent to contract signature.

Table 2.1**Pre-contract issues for clarification: mid 1997**

Category	Issue
Capability	<ul style="list-style-type: none"> • message handling; • communication security issues; • range extension; • Inter-Node Links; • the locations of the Network and Local Management Facilities; • High Frequency Direction Finding; and • transition from single service networks at Core Communication System implementation.
Engineering	<ul style="list-style-type: none"> • system performance modelling; • software development; • revision of Function and Performance Specifications and definition of the levels of functionality to be provided by the Core and Final Communication System; • system security; • systems engineering; and • systems integration.
Mobiles	<ul style="list-style-type: none"> • examination of the cost to include Collins Class Submarines, Anzac Frigates and Minehunter Coastal in Phase 3A of the project; • price reductions from removing Army MEDPORT transportable High Frequency communication shelters from Phase 3A; • deliveries options for Phase 3B mobiles; and • cost and schedule of the preferred tenderer undertaking all mobile upgrades.

Source: Defence Documentation.

Defining requirements

2.11 A key lesson learnt from the evaluation of Phase 3A tenders was that further study and education was required on the use of Function and Performance Specifications and how they should be used to develop a satisfactory contract. The Function and Performance Specification sets out the requirements of the system and provides the basis for design and qualification testing.

2.12 The ANAO noted that the development of a Function and Performance Specification for the Modernised High Frequency Communication System had proven to be problematic. The case study in Figure 2.1 outlines issues encountered in the development of this key document.

Figure 2.1**Case Study 1 - Development of the Function and Performance Specification**

In recommending the selection of the preferred tenderer the Defence Source Definition Committee noted that the Tender Evaluation Board had assessed that the Function and Performance Specification required considerable adjustment during contract negotiations. Consequently, third party consultants were employed to develop a Function and Performance Specification to emphasise the requirements for the Core and Final Communication Systems and improve testing and acceptance mechanisms. The Committee noted that the process of refining the Function and Performance Specification during contract negotiations would require great care to preserve the validity of the preferred tender.

A specialist review to evaluate the Function and Performance Specification completed in late 1997 noted a series of weaknesses in the specification and made associated recommendations. Defence considered that implementing the recommendations of the specialist review would have delayed the finalisation of contract negotiations. Consequently, Defence decided to finalise the Prime Contract based on an updated Function and Performance Specification, addressing the concerns raised by the review wherever possible, and to clarify requirements through normal systems engineering processes leading to agreement on a System Segment Specification by the time of the Preliminary Design Review. The Integrated Product Development Team approach was negotiated into the contract to manage this process.

By the time the implementation contract was signed, a Function and Performance Specification had been agreed by both parties and had been split into Core, Intermediate, and Final requirements for incremental delivery. The ANAO notes that requirements instability subsequently contributed to additional costs being incurred by Defence and was a contributing factor to schedule slippage within the Project.

Source: Analysis based on Defence Documentation.

Contract negotiations

2.13 Contract negotiations for Phase 3A commenced in early November 1997 and concluded in mid December 1997. The report on the outcomes of the contract negotiation process indicated that the contract master schedule was realistic and that an Integrated Baseline Review¹⁵ was to be scheduled for month five of the Prime Contract. That review was to vary the schedule for milestones other than the Core and Final Communication System milestone dates.

2.14 The December 1997 DMO Proposal and Liability approval for the Prime Contract noted that the Request for Tender requirements for systems and software engineering were considered to be inadequate for a project of this size. That document indicated that to address these issues, a number of new requirements were included in the Statement of Work and except for a few specific areas related to mobile platforms, it was agreed that the Prime Contractor would use internal procedures for the analysis, design, development and testing of the Modernised High Frequency Communication System. The Project Office was to monitor the development process via reporting and review mechanisms including through Integrated Product Development Teams. The ANAO notes that the amendments to the Statement of Work during negotiations and the establishment of Integrated Product Development Teams proved to be less successful than expected in overcoming the risks associated with systems engineering and software development. This subsequently presented the DMO with a number of difficult management issues following contract signature which impacted on the progress of the Project.

¹⁵ An Integrated Baseline Review is a review conducted by the DMO to determine the adequacy of the Contractor's Performance Management Baseline. The Review focuses on schedules and cost accounts and their associated documentation including the Contract Work Breakdown Structure, work authorisation documents, detail schedules and cost account plans. The Review comprises both data review and discussions concentrating on the following areas; confirming that the Statement of Work accurately reflects the Contract Work Breakdown Structure; work authorisation plans; planning and budgeting processes; schedule realism and quality; earned value techniques; and maintenance of budget baseline logs.

The Prime Contract

2.15 The negotiated price for the Prime Contract was \$312.20 million¹⁶ (August 1996 prices) and \$72.48 million for the Network Operation and Support Contract¹⁷. The Prime Contract was a fixed price contract comprising 40 per cent milestone payments and 60 per cent earned value payments. The Prime Contract was also to include a number of provisionally priced options valued of \$57.82 million¹⁸ and fixed price options valued at \$16.51 million¹⁹. The Project is to fund the first three years of Network Operation and Support Contract. Both contracts were executed on 31 December 1997.

2.16 In early 2004 the Prime Contract was rebaselined. Rebaselining was given effect through a Deed of Settlement and Release signed in February 2004, and consequential amendments to the Prime Contract through Contract Change Proposals. Rebaselining involved three key elements including:

- agreement on delays to the delivery of the Core and Final Communication Systems and mobile platform upgrades;
- scope changes; and
- compensation for costs incurred by Defence due to the delayed delivery of the Core Communication System.

2.17 The Deed of Settlement and Release was the second Deed relating to the Prime Contract with the first executed in 1999 due to requirements instability and scope change within the Project. These scope changes resulted in the Prime Contractor claiming additional costs, with Defence agreeing to the first Deed involving an increase to the contract price of \$2.72 million and a seven and a half month schedule delay. A third Deed was signed in 2005 in relation to issues of obsolescence and for the development of the Final Communication System and included compensation for associated changes (see Chapter 4). Figure 2.2 outlines the timing of these Deeds and progress towards completion of this Project.

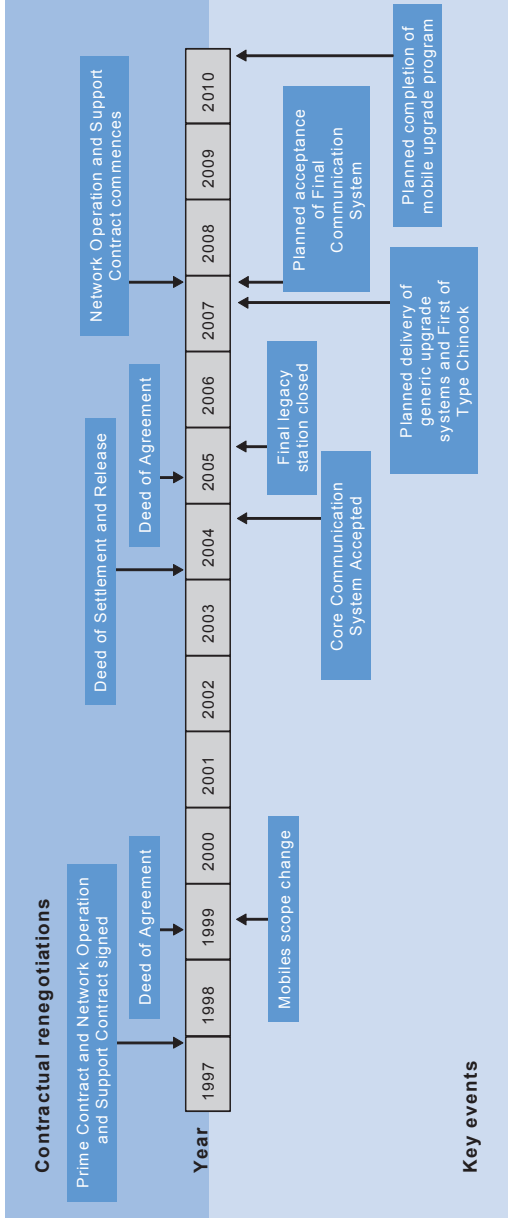
¹⁶ This figure includes \$2.559 million which funded the Pre-Contract Risk Reduction activities.

¹⁷ \$72.48 million represents the cost of the Network Operation and Support Contract to Defence for Five Years. Only the first three years were to be funded by the project at a cost of \$43.49 million.

¹⁸ Anzac Frigates, Collins Class Submarines and Minehunter Coastal represented 65 per cent of this figure and the Network Management Facilities represented 17 per cent.

¹⁹ 49 per cent of this figure related to mobiles and 36 per cent to range extension.

Figure 2.2
Progress towards completion of the Project



Source: Defence Documentation.

3. Contract Management

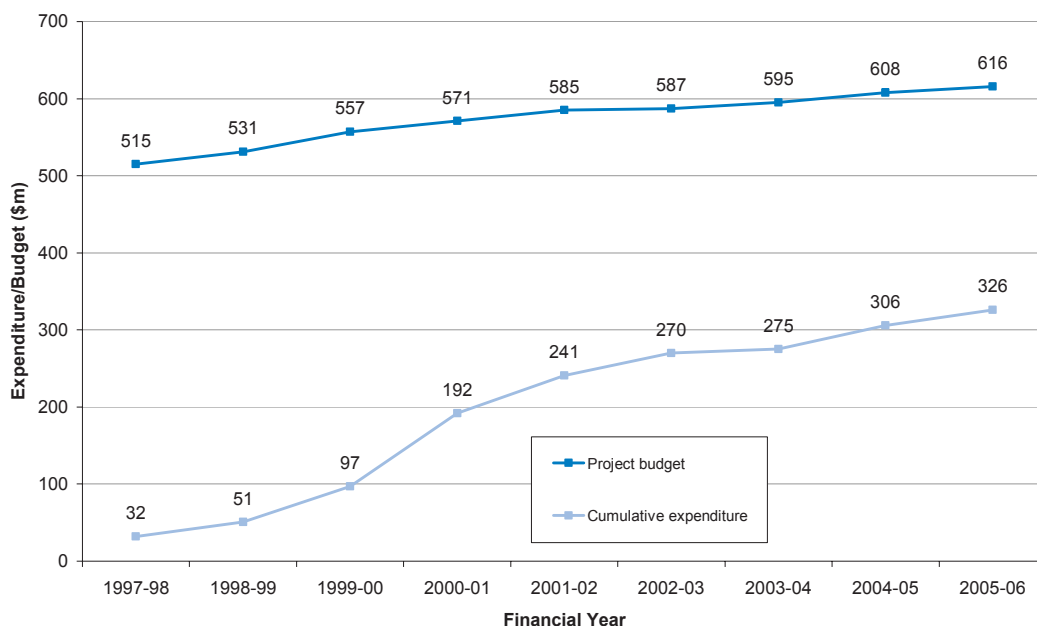
This chapter examines Project expenditure, amendments to the Prime Contract and changes to the Project scope.

Background

3.1 The approved budget for Phase 3A had increased by \$111 million from \$505 million at approval in 1996, to \$616 million by June 2006 primarily due to price and exchange rate variations. Figure 3.1 outlines expenditure against the Project and the budget for the period from 1997–98 to 2005–06. Expenditure in 1997-98 primarily comprised a mobilisation payment of \$30 million which was payable as the first milestone on execution of the Prime Contract. By June 2006, \$290 million, representing 47 per cent of the Project budget, had not been spent for a project that was originally planned to be completed in 2004.

Figure 3.1

Cumulative expenditure and Project budget

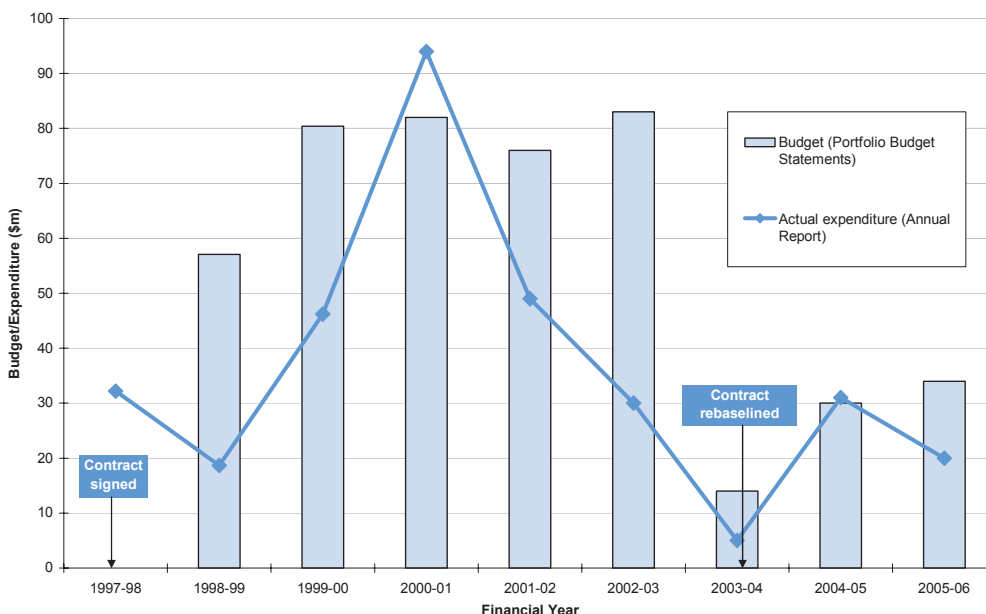


Source: Defence Annual Report

3.2 A factor contributing to the large variation between the cumulative expenditure and the Project budget illustrated in Figure 3.2 was under expenditure against the annual budget in the period 1998–99 to 1999–2000 and the period 2001–02 to 2002–03. The under expenditure in 1998–99 and 1999–2000 corresponds with a period where requirements instability was impacting on the Project. The under expenditure in 2001–02 and 2002–03 corresponds with a period where significant difficulties were encountered, particularly in the areas of systems engineering and software development resulting in the Prime Contract being rebaselined in early 2004.

Figure 3.2

Comparison of annual Project budget to actual expenditure



Source: Defence Portfolio Budget Statements and Annual Reports

3.3 The majority of expenditure against the Project budget has been for payments made under the Prime Contract which are outlined in Table 3.1. Expenditure during 2003–04 was significantly less than expenditure in surrounding years. This financial year corresponds with a period of contractual dispute during which earned value payments were suspended due to milestones not being achieved. Following contract rebaselining in 2004 the earned value payment arrangements were removed from the Prime Contract.

Table 3.1**Expenditure against Prime Contract**

Year	Pre 2000-01 \$m	2000-01 \$m	2001-02 \$m	2002-03 \$m	2003-04 \$m	2004-05 \$m	2005-06 \$m
Actual expenditure (August 1996 prices)	86.87	86.09	37.91	20.57	1.14	25.48	12.08
Price and exchange variations	1.38	0.93	2.58	0.96	0.35	2.35	2.89
Sub total	88.25	87.02	40.48	21.52	1.49	27.83	14.96
Cumulative expenditure	88.25	175.27	215.75	237.28	238.76	266.59	281.56

Source: DMO documentation.

3.4 As indicated in Table 3.1, \$281.56 million has been spent against the Prime Contract up until June 2006. This represents four-fifths of the Prime Contract price. The Core Communication System which represented about 75 per cent of the contract price and involved the development of facilities and infrastructure; the procurement of hardware; systems engineering; and software development had been accepted. The development of the Final Communication System was ongoing, and primarily involves systems engineering and software development. No mobile platforms had been upgraded at that time. The bulk of the mobile platform upgrades included in the original Prime Contract were removed from the Prime Contract following rebaselining in 2004. Other Project expenditure amounted to \$44.91 million.

Remaining Project budget

3.5 In November 2006, the Project had a total budget of \$616 million with the unexpended component representing \$290 million. From July 2006, the largest areas of planned expenditure for the Project included:

- \$69.57 million for the remainder of the Prime Contract, future Contract Change Proposals and other associated work;
- \$18.94 million for support equipment;
- \$4.32 million for Professional Service Providers;
- \$81.75 million for mobile platform upgrades; and

- \$36.27 million to fund the first three years of the Network Operation and Support Contract.

Changes to Prime Contract scope

3.6 By early 2007, some 85 Contract Change Proposals had been prepared for the Prime Contract. Of these Contract Change Proposals seven had been rejected; 15 had been cancelled; and three were yet to be approved. Of the 60 Contract Change Proposals that had been approved, nine related to terms and conditions and administrative issues; seven related to scope adjustment; 18 related to the resolution of requirements detail; and 20 related to engineering issues. Contract Change Proposals relating to High Frequency Direction Finding and mobile platform upgrades provide examples of the more significant areas of scope change.

High Frequency Direction Finding

3.7 The March 1994 Operational Requirement and Capability Baseline indicated that the Modernised High Frequency Communication System was required to support High Frequency Direction Finding for search and rescue, electronic counter counter measures and frequency management. The system was to achieve this by having dedicated equipment at each of the four Nodes able to locate emitters within the area of coverage of the communication system. In July 1998, the then Capability Systems Division requested the Project to investigate the provision of a wideband High Frequency Direction Finding capability.

3.8 The initial Contract Change Proposals for the Prime Contract related to enhancing the High Frequency Direction Finding capability to be provided under the Prime Contract. Subsequent to a study, conducted by the Prime Contractor, a Contract Change Proposal was submitted in mid 1998 for the implementation of wideband High Frequency Direction Finding. The estimated cost of this proposal was \$20.85 million, comprising \$11.94 million associated with the contracted narrowband capability and an additional \$8.91 million to enhance this to a wideband capability. In November 1998 Project approval was increased by \$11 million to provide the increased capability sought by Defence²⁰.

²⁰ The cost increase comprised \$8.91 million (1996 prices) real cost increase; \$1.09 million price and exchange adjustment to December 1998; and \$1 million contingency.

3.9 In mid 2000, concerns were expressed within Defence that the wideband High Frequency Direction Finding solution did not meet Defence requirements and Defence requested the DMO to place on hold development in this area pending further review²¹. As a result, the associated Contract Change Proposal was not approved. The DMO notified the Prime Contractor in mid June 2002 that the High Frequency Direction Finding elements under the Prime Contract were terminated for convenience. Approval was given in March 2001 to write-back to the contingency budget \$10 million in Project funds allocated to this Contract Change Proposal.

3.10 The cost impact of the termination of the High Frequency Direction Finding was the subject of ongoing discussion between the DMO and the Prime Contractor for several years. Associated cost reductions were not agreed until the Prime Contract was rebaselined in 2004.

Mobile platform upgrades

3.11 The upgrade for mobile platforms is intended to provide the following capabilities: Automatic Link Establishment²²; automatic end-to-end voice communications; and automated data services. A small number of ADF mobile platform types, such as the AP-3C Orion Maritime Patrol aircraft, had Military Standard Automatic Link Establishment and limited High Frequency data capability in 2003. This is a lesser level of functionality than the Final Communication System is intended to provide.

3.12 The 1996 Major Capability Submission for the Project outlined the strategic requirement to enhance High Frequency communication capabilities to major fleet units due to limitations experienced on operations in the capacity of the legacy systems. That submission recommended that 27 platforms be considered for upgrade. This figure comprised 15 priority one combatant and training platforms, eight priority two combat support platforms and four priority three non-combatant platforms.

²¹ A proposal and liability approval for \$168 073 was approved in October 2001 to cover costs incurred by the Prime Contractor associated with the wideband High Frequency Direction Finding capability.

²² The Modernised High Frequency Communication System is intended to support MIL-STD-188-141-A Automatic Link Establishment and second generation fully automated Automatic Link Establishment. Military Standard Automatic Link Establishment operations allow interoperability with Allies and appropriately fitted civil services. Traffic connectivity is largely manual. Modernised High Frequency Communications System Automatic Link Establishment operations will apply a complete session and traffic management Automatic Link Establishment at a layer above the basic Military Standard Automatic Link Establishment protocol to allow automatic traffic scheduling; traffic establishment; traffic precedence handling and termination.

3.13 The 1996 version of the Operational Requirement and Capability Baseline included 16 platform types for upgrade under Phase 3A of this Project. Under the original Prime Contract 10 platform types were required to be upgraded (see Table 3.2). The original Prime Contract also included, as options exercisable by Defence, a further 13 platform types for upgrade.

3.14 In 1999, the Defence Capability Committee reviewed the Project and revised the types of mobile platforms to be upgraded. This resulted in a reduction in the number of mobile platforms to be upgraded under the Prime Contract, and changes to the types of platforms considered as candidates for upgrade. These changes removed all Air Force airborne mobiles and the Navy's major fleet units from Project scope.

3.15 The Prime Contractor first submitted a Contract Change Proposal in 2000 to amend the contract to reflect the 1999 scope changes. The DMO requested an additional Contract Change Proposal to reflect further alterations to the mobile platforms to be upgraded under the Prime Contract in 2002. This resulted in a further reduction in the number and types of mobile platforms to be upgraded under the Prime Contract. The requirement for the supply of a generic mobile upgrade system for sea and land mobile platforms; and a generic air mobile upgrade system was added into the Prime Contract through this Contract Change Proposal.

3.16 The addition of the generic mobile upgrade systems to the Prime Contract was intended to reduce Project risk by providing a fully functional High Frequency Communication System incorporating non-recurring engineering for generic design features and common environmental testing requirements. It was regarded that this would reduce the cost of individual platform engineering by limiting this to specific platform integration design.

3.17 The DMO performed a mobile upgrade Business Case Review in 2003. This review recommended that there be no change to the mobiles that had been approved for upgrade by the Defence Capability Committee in October 1999. As a result the Prime Contractor was to upgrade a single Chinook helicopter; provide follow-on modification kits for a further five Chinooks; and develop generic air and land/sea mobile upgrade systems in mid to late 2007 (see Table 3.2). The acquisition strategy for the integration and installation of the upgraded capability into platform types not currently under contract is being reviewed to take account of changes that have occurred in Defence policies and environment since original approval and to reduce risk. The review is scheduled for completion in mid 2007²³.

3.18 There was a significant delay in the finalisation of Contract Change Proposals relating to the reduction in mobile platforms to be upgraded. A key contributing factor to these delays was the inability to reach agreement with the Prime Contractor on associated cost reductions. Two Contract Change Proposals were approved in 2004, following rebaselining, to amend the Prime Contract to reflect the changes to mobile platforms to be upgraded.

²³ Existing Navy and Air Force Mobile platforms are currently using the Core Communication System in legacy mode and are gaining some advantages from the modernised system.

Table 3.2**Changes to mobile platforms upgrades included in the Prime Contract: 1997 and 2007**

Platform type	1997 Original Prime Contract	2006 Prime Contract	In-project scope but not in-contract early 2007
School of Signals.	1	-	1
Guided Missile Frigates.	4	-	
Landing Platform Amphibious (Manoora and Kanimbla).	2	-	
Local Mine Countermeasures Headquarters.	1	-	3
Auxiliary Oiler Replenishment (Success).	1	-	
S70-B-2 Sea Hawk helicopters.	1 (15 ^(a))	-	
Chinook helicopters.	1 (3 ^(a))	1 (5 ^(a))	
P3C Orion Aircraft.	1 (18 ^(a))	-	
Transportable Shelters (Army Strategic HF).		-	16
RF-111C Aircraft.	1 (3 ^(a))	-	
Black Hawk Helicopters.			35
Armidale Class Patrol Boats.			12
Hydrographic Ships.	4		2
Minehunter Coastal Ship.			6
RAAF Combat Communications Squadron.			4
Generic Land/Sea High Frequency Upgrade System.	-	1	
Generic Air High Frequency Upgrade System.	-	1	
Number of platforms to be upgraded.	17	1	79
Follow-on modification kits.	39	5	-
Generic Mobiles Upgrade Systems.	0	2	-
No of platform Types.	10	1	8

Note (a): The original Prime Contract required that the Prime Contractor perform the First of Type upgrades for all platform types and follow-on upgrades for land and sea mobiles only. The figure in the parentheses indicates the number of follow-on modification kits to be provided under the Prime Contract.

Source: DMO Documentation.

Contractual payment arrangements

3.19 A critical contract milestone associated with the Core Communication System software build slipped by six months in early 2002. By mid 2003, a number of milestones had not been achieved. The most significant among these was the delay in Core Communication System acceptance, as this postponed the decommissioning of the legacy High Frequency stations being replaced. Table 3.3. shows that extensions of 12 to 28 months for a number of milestones proved to be insufficient to assure delivery, notwithstanding significant management action by the DMO and the Prime Contractor to address risks in these areas. The milestones outlined relate to software development and systems engineering processes. These are areas where risks were identified in the tender evaluation and contract negotiation processes.

Table 3.3

Critical milestones not achieved by mid 2003

(1) Milestone number	(2) Milestone description	(3) Original delivery date	(4) Amended delivery date	(5) Extension (4) – (3) = (5) (months)	(6) Amended delivery date achieved
22C	Core Software Build 1 Complete	November 2000	February 2002	15	No
47C	Intermediate System Preliminary Design Review	-	April 2002	-	No
20C	Final System Preliminary Design Review	July 2000	November 2002	28	No
26C	Core System Accepted	November 2001	November 2002	12	No
27C	Final System Detailed Design Review	December 2001	May 2003	17	No
29C	Intermediate System Software Build 2 Complete	January 2002	April 2003	15	No

Note (a): Delivery date is calculated by adding the number of months to the execution date for the Prime Contract which was 31 December 1997.

Source: DMO Documentation.

3.20 Acceptance of the Core Communication System occurred in late 2004. The requirement to deliver an Intermediate Communication System was removed from the Prime Contract in May 2005 to reduce Schedule Risk for the

Final Communication System. The DMO advised that the Preliminary Design Review for the Final Communication System was completed in August 2005 and the Detailed Design Review was completed in September 2006.

Payment for incomplete milestones

3.21 The milestone relating to the Detailed Design Review for the Core Communication System represented a key event in the system development process. This milestone involved the Prime Contractor submitting various configuration, specification, interface and security documents; acceptance test procedures; and a schedule of corrective actions for DMO approval.

3.22 Under the original Prime Contract, the planned achievement date for this milestone was November 1998 and the associated payment was valued at \$9.39 million (1996 prices) plus price escalations. In late 2000, the DMO advised the Prime Contractor that up to 85 per cent of the milestone payment would be paid, notwithstanding that several significant issues associated with the milestone had not been resolved. The Project Office authorised the payment of the remaining 15 per cent against this milestone in March 2001.

3.23 By mid 2002, the delivery date for the Core Communication System had slipped to July 2003 with software development and system instability identified as key factors contributing to this delay. These issues related to critical Milestone 22C - Core Communication System Software Build 1. This milestone comprised integration of computer software configuration items in accordance with the System Integration Plan, and approval of category three acceptance test procedures in accordance with the Test and Acceptance Master Plan.

3.24 Under the Prime Contract, if the Prime Contractor failed to complete a critical milestone, the DMO was entitled to withhold all or part of the earned value payments until the milestone was achieved. In March 2002, the Project Office renegotiated milestone 22C into a number of sub-milestones and through this arrangement allowed the Prime Contractor to continue to claim earned value payments. Subsequently these sub-milestones were not achieved and the DMO wrote to the Prime Contractor in April 2002 indicating that earned valued payments were suspended until the milestone schedule was achieved.

Contractual dispute

3.25 In early 2003, the DMO advised the Prime Contractor that it reserved its contractual rights in whole, or in part, should the Prime Contractor fail to deliver the Core Communication System by late July 2003. The DMO wrote to the Prime Contractor again in similar terms in March 2003, based on a late October 2003 planned delivery for the Core Communication System. In July 2003, the DMO wrote to the Prime Contractor outlining its entitlement to exercise its rights and remedies under the Prime Contract including: the recovery of damages; rights against securities; and to terminate the Prime Contract.

3.26 The Prime Contractor subsequently responded indicating that delays by the DMO in finalising Contract Change Proposals, Engineering Change Proposals and Contract Data Requirement Lists had contributed to schedule slippage. The Prime Contractor indicated to the DMO that it regarded the withholding of earned value payments, other than those associated with Milestone 22C as inappropriate and suggested that delays in the delivery of the Inter-Node Links by the DMO had impacted on delivery of the Core Communication System.

3.27 The Prime Contractor's most significant claim was that unsatisfactory partnering arrangements had contributed to delays in finalising the System Segment Specification. The System Segment Specification was an area of risk identified prior to execution of the Prime Contract which was to be managed through the Integrated Product Development Team approach²⁴. Under the Prime Contract, the Prime Contractor was to deliver the System Segment Specification in accordance with the Statement of Work and Contract Deliverable Requirement List.

3.28 The relevant Contract Deliverable Requirement List item states that the System Segment Specification is the primary definition of the Modernised High Frequency Communication System. The Specification identifies the requirements for the Communication System and the method to be used to ensure that each requirement is achieved. The Specification was required to delineate the definition of Core, Intermediate and Final Communication

²⁴ Tenderers were required to develop a System Segment Specification, which is a principal systems engineering document, from the tender documentation. During the tender evaluation period the preferred tenderer's System Segment Specification was found to be unsuitable for use in the further development of the Contract. The Board of Reference Meeting of July 1997 noted that a revised approach to systems engineering and the development of the System Segment Specification had been adopted by the Preferred Tenderer and acknowledged improvement in this area.

Systems; and divide the Communication System into two distinct components, the fixed network and mobile platform upgrades. The ANAO notes that clear definition in these areas was critical to guiding system development and testing.

3.29 Under the original Prime Contract, the final System Segment Specification was to be delivered by November 1998, as part of the System Preliminary Design Review Milestone. The System Segment Specification was the subject of ongoing negotiations in August 2003. Defence advised the ANAO that the System Segment Specification was first developed in 1999 and updated progressively through to 2003 to accord with the evolving system design with the version for the network to be delivered being approved in December 2003²⁵. That specification was evolved for the Final Communication System and was first approved in October 2004.

3.30 While there was a level of disagreement between the DMO and the Prime Contractor on the factors that had contributed to the Project experiencing difficulties, the escalation of the schedule issue through associated correspondence acted as a catalyst for discussions at senior levels in both organisations on mechanisms to progress the Project.

Prime Contract rebaselining

3.31 The then Minister for Defence, wrote to the Prime Contractor in relation to the Project status in October 2003, indicating that the extent of the delay in the delivery of the Communication System was not acceptable and encouraged the Prime Contractor to reset the Prime Contract. In late 2003, the DMO and the Prime Contractor met to discuss options and approaches to rebaselining the Prime Contract. These discussions focussed on schedule; liquidated damages; other costs incurred due to the delayed delivery of the Core Communication System; outstanding system requirements; and yet to be finalised Contract Change Proposals.

3.32 Based on the outcome of these meetings, and subsequent negotiations, a Deed of Settlement and Release between the DMO and the Prime Contractor

²⁵ The Prime Contractor advised the ANAO that as with many complex projects it is not uncommon for ongoing clarification of requirements to occur as the project progresses. Of note is the level of stability versus the number of requirements subject to clarification. While the Systems Segment Specification was subject to ongoing negotiations, beyond the scope amendments resulting from the 2004 Deed of Settlement and Release, the requirements by this time were relatively stable and the clarifications limited to a small subset of requirements.

was executed in February 2004. The Deed of Settlement and Release encompassed a range of outstanding and ongoing Project issues, including:

- liquidated damages and compensatory work-in-kind for costs incurred by Defence due to the delayed delivery of the Core Communication System;
- finalising unresolved issues relating to mobile platform upgrades and High Frequency Direction Finding;
- changes to the Prime Contract scope associated with the System Requirement Review for the Final Communication System; and
- revised contractual payment arrangements.

Mobile platform de-scopes

3.33 The mobile platform de-scopes represented the culmination of ongoing dialogue and correspondence between the DMO and the Prime Contractor dating back to 1999. Table 3.4 outlines the changes to the mobile platforms to be upgraded and the impact on the Prime Contract price brought about by Contract Change Proposals.

Table 3.4**Negotiated Prime Contract cost reductions resulting from mobile platform scope changes (August 1996 prices)**

Contract Change Proposals	Description	Value (\$ million)
20, 34, 62	Various Chinook helicopter requirements	1.88
24	Removal of: <ul style="list-style-type: none"> • 4 RF-111C Aircraft; • 19 AP-3C Orion Aircraft; • 16 Sea Hawk helicopters; • 4 Guided Missile Frigates (FFG); • 2 Landing Platform Amphibious (Manoora and Kanimbla);and • Auxiliary Oiler Replenishment (Success). 	(13.76)
69	Removal of: <ul style="list-style-type: none"> • 4 Transportable Shelters (1 Communication Support Squadron); • 1 ADF School of Signals (HMAS Cerberus); • 1 Local Mine Countermeasures Headquarters and; • other additional costs Addition of: <ul style="list-style-type: none"> • 2 CH 47 Chinook helicopters; • 1 Generic Air mobile system; and • 1 Generic land and sea mobile system. 	(1.71) 3.93
	Negotiated additional hand back of funds to DMO	(2.50)
	Cost of scope increases	5.81
	Value of Scope Reductions	(21.90)
	Net cost reduction due to changed mobile scope	(16.09)

Source: DMO Documentation.

Rebaselining Items

3.34 The rebaselining items comprised finalising a number of outstanding matters, and resolving issues associated with the Final Communication System Requirements Review. The Review had been the subject of ongoing discussion and correspondence between the DMO and the Contractor during 2002 and 2003. Factors impacting on the finalisation of the Review included delays in the delivery of the Core Communication System; ongoing discussions surrounding the mobile platform de-scopes; the termination for convenience of High

Frequency Direction Finding; and the requirements baseline for the Intermediate and Final Communication Systems. Through negotiations a Deed of Settlement and Release resulted in a \$32.74 million (2004 prices) increase in the Prime Contract price. Cost reductions finalised through rebaselining associated with items being removed from the Prime Contract resulted in a marginal overall increase to the value of the Prime Contract (see Table 3.5).

Table 3.5

Cost impact of scope changes

Description	\$ million
Increases in Prime Contract scope primarily attributed to the Core to Final Communication System Requirement Review.	18.58
Costs associated with schedule prolongation.	11.16
Provision of Network Management Facility operators by the Prime Contractor in period from Core Communication System to Final Communication System.	3.00
Total increase (2004 prices).	32.74
Less removal from scope of High Frequency Direction finding and other items.	(11.98)
Net Prime Contract price increase (2004 prices).	20.76
Less adjustment to August 1996 base date prices.	(2.99)
Net Prime Contract price increase (August 1996 prices).	17.76
Net cost reduction due to changed mobile scope.	(16.09)
Net Prime Contract price increase from Deed of Settlement and Release and associated Contract Change Proposals (August 1996 prices).	1.67

Source: DMO Documentation.

3.35 The Deed of Settlement and Release documentation indicated that changes to data interfaces for mobiles represented some \$9.8 million of the increased cost associated with the Systems Requirement Review for the Final Communication System. This was to resolve issues associated with the existing mobile platform data interface baseline providing a solution that offered limited scope for integration with other modes of transmission, such as satellite and terrestrial media. As a consequence an alternative approach was developed to provide for the transport of messages across High Frequency radio using Internet Protocol; thereby providing compatibility with other transmission media.

3.36 The implementation of these data interfaces involves the development and fitting of specific software to terminals, servers or computers on mobile platforms; and where the equipment is not fitted, such as on the Chinook

helicopters, the supply of terminal equipment. It was regarded that this would also allow for the incorporation of High Frequency communications into Network Centric Warfare Developments which have been gaining increasing significance within Defence.

3.37 The 1997 Source Evaluation Report contained three options on the way to proceed with the project due to concerns identified through the tender evaluation process. Option C, which was not accepted, involved the withdrawal of the Request for Tender and re-tender. This approach was intended to provide a High Frequency system more closely integrated with future satellite communication systems. At that time the estimated delay resulting from this approach of up to two years would have meant final system implementation in 2004, which was close to the date for introduction of JP 2008 Phases 4 and 5 - Military Satellite Communications (currently unapproved)²⁶. The primary reasons cited for rejecting this option was that it would defer cost savings to Defence and impose further cost on industry.

3.38 The termination for convenience of High Frequency Direction Finding represents \$10.70 million of the \$11.98 million scope reduction outlined in Table 3.5. The contingency log for Project JP 2043 included a reduction in November 2006 of \$12.00 million as a provision for High Frequency Direction Finding to fund the development outside of the Prime Contract. Under revised arrangements High Frequency Direction Finding is now to be supplied under a phased approach with another Contractor. The full cost of this approach will not be finalised until ongoing phases are progressed and planning for remaining phases is complete.

3.39 Contract Change Proposals associated with the Deed of Settlement and Release resulted in the removal from the Prime Contract of a significant proportion of mobile platforms and the High Frequency Direction Finding capability. The removal of mobile platforms means that all of the advantages intended to be provided by the Final Communication System, at acceptance, will not be able to be fully utilised or tested at that time. The cost of integrating the upgraded High Frequency communication capabilities into all of the mobile platform types in Project scope is yet to be clearly defined with planning in this area ongoing in early 2007.

²⁶ Defence advised the ANAO that the High Frequency Modernisation Project provides a complementary capability and back up to the JP 2008 satellite capabilities in ensuring robust communications support to the ADF. Project JP 2008 involves a series of Phases which are either completed, ongoing or yet to be approved.

Revised payment arrangements

3.40 Prior to reaching agreement on the Deed of Settlement and Release in early 2004, the Prime Contract involved a combination of earned value and milestone based payments. Through the Deed of Settlement and Release the remaining Prime Contract payments became entirely milestone based once the amount paid against the Prime Contract exceeded \$212.42 million.

3.41 Under the revised payment arrangements, if the Prime Contractor fails to achieve a milestone within 30 days of the date specified in the Prime Contract, the DMO can rollover 15 per cent of that milestone payment until Final Communication System acceptance. In early 2007 the DMO advised that it had withheld 15 per cent against 12 milestone payments totalling some \$A2.34 million and \$US349 582.

3.42 Through the Deed of Settlement and Release, milestone payments are split into old, pre-Deed of Settlement and Release work, and new work. Old work does not attract contractual price variations after mid January 2006, if they have not been achieved by that date. New work attracts these price variations until the milestone date, or the achievement date, whichever occurs first.

Changes to the Network Operation and Support Contract

3.43 Inter-Node Links interconnect the Network Management Facility and the Backup Network Management Facility (yet to be operational) with the four Nodes. In June 1997, it was recognised that use of the Defence Switched Data Network may offer savings to the Project, when compared with the Prime Contractor providing the Inter-Node Links, as was subsequently included in the Prime Contract. The costs and options for the provision of Inter-Node Links had been an issue identified for further consideration at the time of contract negotiations in late 1997.

3.44 Following a contracted study into options for providing the Inter-Node Links, the Prime Contractor submitted a Contract Change Proposal in early 2000 estimating a cost reduction to the Prime Contract of \$7.54 million associated with utilising the Defence Switched Data Network for the Inter-Node Links. The Project Contingency Log shows an increase of \$2.24 million to the contingency budget associated with the removal of the Inter-Node Link requirements from the Prime Contract. Approval was given in early 2003 for a real cost decrease to the Project of \$1.96 million. This amount was transferred to the then Corporate Services and Infrastructure Group to fund three years of

Inter-Node Link support charges associated with managing the Defence Switched Data Network. Defence advised the ANAO that the remaining \$3.38 million was used to upgrade the Defence Switched Data Network and other related communication links to allow it to carry High Frequency traffic.

3.45 The changes to Inter-Node Link arrangements had implications for Network Operation and Support Contract, which were not resolved until Prime Contract rebaselining occurred in 2004. Through an associated Contract Change Proposal, the Network Operation and Support Contract was updated to reflect changes in scope to the Prime Contract. The combined value of these scope changes was a price reduction of \$13.82 million (1996 prices). The removal of costs, due to Defence assuming responsibility for the Inter-Node Links, represented 90 per cent of this reduction.

3.46 Through this process the Network Operation and Support Contract was also amended from an initial five year term with the option to extend for a further five years, to a rolling contract option after the fifth year. Under this arrangement the DMO is able to extend the Network Operation and Support Contract by a period from one to five years. The prices for the sixth and seventh years are fixed at the price of the fifth year. The Network Operation and Support Contract will come into effect after the acceptance of the Final Communication System, which is planned to occur in late 2007.

4. Capability Delivery

This chapter outlines delays in the achievement of key project deliverables; the acceptance of the Core Communication System; development of the Final Communication System; and planning for upgrades of yet to be contracted mobile platforms.

Schedule

4.1 In May 1997, the Defence Source Definition Committee noted concerns surrounding the Function and Performance Specification contained in the Request for Tender. Consequently, during the tender evaluation process two reviews were conducted which provided differing views on the soundness of these Specifications. The ANAO notes that during the tender evaluation period the Defence Source Definition Committee commented that care was necessary in the refining of the Function and Performance Specification to preserve the validity of the tender.

4.2 Defence and the Prime Contractor entered into a Deed of Agreement in mid 1999 in response to claims by the Prime Contractor that it had been delayed by Defence in the performance of its work under the Prime Contract and had incurred additional costs due to events beyond its reasonable control. These events included Defence reviewing and refining certain contract requirements, which were unstable and required review beyond that contemplated in the Prime Contract. Through a Deed of Agreement, Defence agreed to increase the Contract price by \$2.72 million as settlement of the Prime Contractor's claims. An associated Contract Change Proposal granted the Prime Contractor a seven and a half month postponement to the Prime Contract schedule.

4.3 In accordance with the implementation of a new project management methodology within Defence in 1999, the Prince Project Management Board directed that a Prince Business Case be developed for the Project. A Business Case was presented to the Board in December 1999²⁷. The Minutes of the associated meeting indicate that the Core Communication System was

²⁷ Defence advised the ANAO that the Project was developed in accordance with the processes and procedures extant in the early to mid 1990's which included Major Capability Submission, Force Strategy Programming and Planning Committee agenda papers, Cabinet Submissions etc. These documents effectively provided the Business Case for the project. The Business Case requested by the Prince Project Management Board was a Prince Business Case to accord with the project management methodology adopted by the Defence Acquisition Organisation in the late 1990's.

expected to replace existing systems by mid 2002, and the Final Communication System was expected to be commissioned by the end of 2004.

4.4 An external review was commissioned by the DMO in 2001 to assess the Project. That review noted that the Business Case for the Project needed revision; alternative approaches for mobile upgrades were necessary; and that the Project schedule was likely to slip. A Project schedule simulation conducted by that review indicated the extent of possible delays to the Project (see Table 4.1). The ANAO notes that even the high confidence date proved to be optimistic.

Table 4.1

2001 simulated projection of schedule slippage

Deliverable	Revised contract date	Most likely	90% probable
Core Communication System accepted.	14 June 2002 to 15 October 2002	23 April 2003	16 June 2003
Intermediate Communication System accepted.	1 October 2003	29 September 2004	29 November 2004
Final Communication System accepted.	1 December 2004	5 January 2006	5 April 2006

Source: DMO Documentation.

4.5 An internal Defence audit conducted on the Project in 2002 concluded that there was a high risk to achievement of the schedule for acceptance of the Core Communication System with flow-on implications for design and acceptance of the Final Communication System. The report indicated that while there was a low risk of project cost increase there was a medium risk to the cost of the Final Communication System due to uncertainty surrounding mobile platform upgrades. Mobile platform upgrades were regarded to be a medium to high level risk.

4.6 The 1999 considerations of the Prince Project Management Board, the 2001 external review, and the 2002 internal audit all indicated that the Project was likely to continue to experience difficulties, particularly in terms of schedule. This suggests that significant measures were necessary by the DMO, in conjunction with the Prime Contractor, to deliver improved Project outcomes at that time. While both parties applied significant effort to the Project, these tended to focus on practices and processes which had proven to

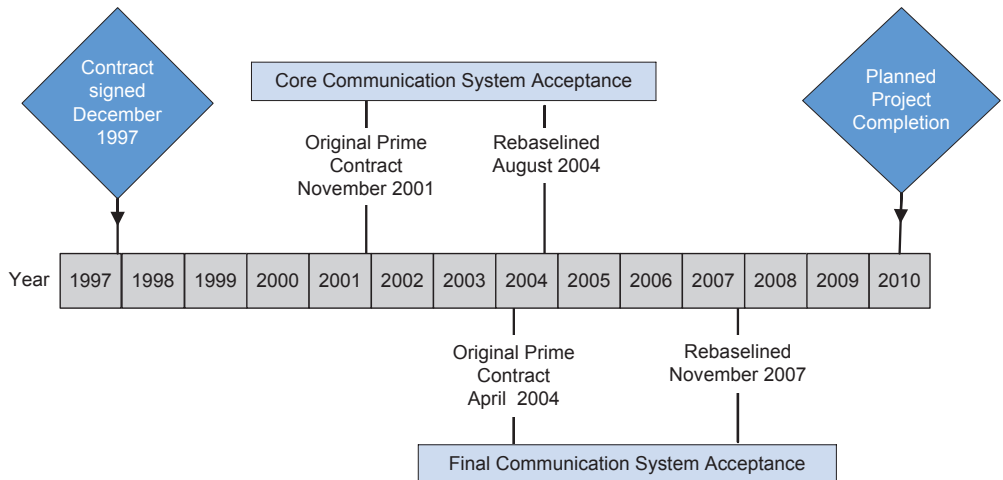
be ineffective, and a number of important issues remained unresolved²⁸. These factors contributed to a steady decline in the contractual relationship. Resolution of many of these issues was not achieved until the Prime Contract was rebaselined in 2004.

Rebaselined schedule

4.7 A key aspect of the Project’s 2004 rebaselining was to reach agreement on a revised schedule for acceptance of the Modernised High Frequency Communication System. Figure 4.1 compares the schedule for acceptance of the Core and Final Communication Systems, as was required under the original Prime Contract, to the rebaselined schedule. The figure shows that following rebaselining, acceptance of the Core Communication System was to occur 33 months later than originally contracted; and acceptance of the Final Communication System was to occur 43 months later than originally contracted.

Figure 4.1

Delays to planned acceptance of the fixed network following rebaselining



Source: DMO Documentation.

²⁸ Defence advised the ANAO that the major issue was that contractor-prepared documentation was poor and consequently was rejected, meaning that milestones were not met.

4.8 Under the original Prime Contract 10 types of mobile platforms were to be upgraded in the period between Core Communication System acceptance and Final Communication System acceptance²⁹. Under the rebaselined arrangements, achievement of milestones for generic mobile systems acceptance, the upgraded First of Type Chinook helicopter and supply of five Chinook modification kits is planned for the second half of 2007. Mobile platform upgrades, not currently in-contract but within Project scope, are planned to occur over the period from mid 2007 to late 2010.

Damages and compensatory work-in-kind

4.9 Under the provisions of the Prime Contract, the DMO was entitled to claim liquidated damages if the Core Communication System was not delivered as originally contracted in November 2001. The DMO wrote to the Prime Contractor in September 2003, indicating the DMO's intent to recover liquidated damages based on a delivery date of mid November 2002.

4.10 The DMO wrote to the Prime Contractor again in October 2003 indicating that the amount of liquidated damages had increased by 64 per cent based on a June 2004 delivery date. That letter also outlined costs that the DMO claimed that Defence would incur due to the delayed delivery of the Core Communication System. The composition of costs outlined in Table 4.2 includes site management and personnel costs associated with the ongoing operation of the legacy High Frequency communication stations, which were to be decommissioned at operational acceptance of the Core Communication System. The ANAO notes that the decommissioning of these sites due to obsolescence was a primary driver for the schedule at project initiation. In 1993, it was considered that maintaining the existing NAVCOMMSTA network beyond 1999 would be problematic.

²⁹ Four of these platform types were air mobile platforms. Under the original Prime Contract only the First of Type was to be upgraded for air mobile platforms with follow-on upgrade kits provided for the remaining platforms. The original Prime Contract provided for both First of Type and follow-on upgrades for land and sea mobile platforms.

Table 4.2**Initial claim for additional costs incurred due to the delayed acceptance of the Core Communication System – October 2003**

Description	\$ million
Maintenance contracts for existing Naval Transmit Stations and AOCS Support.	7.5
ADF Personnel costs associated with extending the operation of the existing system.	7.0
DMO Personnel costs for operating and maintaining the project office.	5.0
Facilities costs associated with the delayed sale of six sites and associated utility costs at those sites. ^(a)	11.5
Total	31.0

Note (a): Through negotiations it was agreed that appreciating land values exceeded the costs calculated by Defence and as a result this amount was excluded from the claim.

Source: DMO Documentation.

4.11 In early 2004, the DMO recovered significant liquidated damages and accepted significant compensatory work-in-kind from the Prime Contractor. Approximately one-quarter of the total agreed compensation was represented by liquidated damages which were offset against additional maintenance costs associated with the delayed delivery of the Core Communication System and future milestone payments.

4.12 The ANAO notes that the decision to accept the damages, relative to the costs incurred, required the evaluation of complex longstanding matters which caused or contributed to schedule delay. Overarching these considerations were the ongoing requirements to replace legacy communication stations and the risks associated with contractual termination, given the extended duration of the Project.

4.13 Of the agreed damages three-quarters was acquitted as work-in-kind, the components of which are outlined in Table 4.3. This work-in-kind comprised some 1.8 per cent that related directly to the DMO estimate of additional costs expected to be incurred due to the delayed delivery of the Core Communication System. The remaining work-in-kind was not specific to the High Frequency Modernisation Project or legacy radio stations but was considered to be of benefit to other areas in Defence.

Table 4.3**Compensatory work-in-kind (January 2004 Prices)**

Work-in-Kind	Proportion of Work-in-kind (per cent)
Removal of profit margin from contract with the Prime Contractor for the operation and maintenance of the Harold E Holt base at North West Cape. ^(a)	0.3
Removal of profit margin from contract with the Prime Contractor for the maintenance of the Belconnen site. ^(a)	1.5
Access to the Prime Contractor's systems analysis laboratory with associated support to facilitate experimentation and simulation activities planned in the development of Network Centric Warfare Capabilities for fixed number of hours.	60.1
Three year unrestricted licences to the Prime Contractor's analytical simulation environment software with support and training in the use of that software.	30.0
Contract amendment to include firm fixed-price for installation of Automatic Narrowband Digital Voice Terminal into F-111 aircraft fleet.	8.1

Note (a): These were profits derived by the Prime Contractor under other contracts associated with the ongoing operation of legacy High Frequency communication stations.

Source: DMO Documentation.

4.14 Under a Service Level Agreement contained in the Prime Contract, the Prime Contractor is required to provide specified levels of support to the fixed network during the period where the Core Communication System is operational. Through the Deed of Settlement and Release it was agreed that the Service Level Agreement would be amended to provide trained fixed network operators to supplement Defence operators at the Network Management Facility at a fixed price until the Final Communication System milestone date. Under this amendment to the Service Level Agreement, if the Final Communication System has not been accepted by that date, the Prime Contractor bears the costs of these operators until acceptance is achieved. The provision of fixed network operators under the Prime Contract assisted Defence in overcoming shortages in personnel to operate the network in the period between acceptance of the Core and Final Communication System, which had been identified as a high risk to the Project in July 2000.

Acceptance of the Core Communication System

4.15 Some six years after the original Prime contract was signed, the 2004 Deed of Settlement and Release set out the criteria for delivery of the Core

Communication System. In July 2004, the Prime Contractor advised the DMO that the Core Communication System had been delivered in accordance with these requirements. This was approximately six weeks late and additional liquidated damages were recovered by the DMO. In late October 2004, the DMO accepted the Core Communication System on the basis of a Form SG1 - Supplies Acceptance Certificate and associated supporting documentation submitted by the Prime Contractor.

4.16 Acceptance by the DMO under the Prime Contract is followed by a two stage process involving an Initial Operational Release followed by Operational Release which is managed by the Royal Australian Navy Test, Evaluation and Acceptance Authority (RANTEAA). Initial Operational Release is generally undertaken shortly after acceptance. It is the milestone where the relevant authority is satisfied that the operational state of the equipment including deficiencies, training and supportability elements, are such that it is safe to proceed into the Operational Test and Evaluation Period. Operational Release represents the in-service date at which the relevant authority is satisfied that the equipment is, in all respects, ready for operational service.

4.17 The Chiefs of the three Services were advised in late October 2004 of the Initial Operational Release of the Core Communication System, with transition to full system operation scheduled for 8 November 2004. Following this transition, the Core Communication System was subject to Operational Test and Evaluation by RANTEAA.

4.18 Operational Release was planned to occur in 2005. The DMO advised that the initial Operational Evaluations did not achieve a satisfactory standard for Operational Release. A second Operational Evaluation was scheduled for August 2005. This evaluation was not conducted due to a decision to defer Operational Release until after acceptance of the Final Communication System.

System performance

4.19 At the time of Initial Operational Release there were a number of performance and operational limitations with the System. These were identified in the Form TI 338 – Report of the Material and Equipment and Performance State for Project, which was prepared by the DMO with input from the Prime Contractor. Submission of a Form TI 338 by the Prime Contractor was not a requirement under the Prime Contract.

4.20 Limitations outlined in the Form TI 338 covered a range of issues including: system stability and availability; speed of service; graphical user

interface lockups; and organisational messaging. The October 2004 Hazard Risk Assessment for the Core Communication System, prepared by the Acceptance Test and Evaluation Working Group, noted that stability and availability of the Core Communication System were key areas of concern. There were also a number of issues associated with the supply of Government Furnished Materiel, such as 10 kilowatt transmitters, which were being moved from existing sites and installed in the Nodes. These transmitters were considered necessary to extend the communication range of the system.

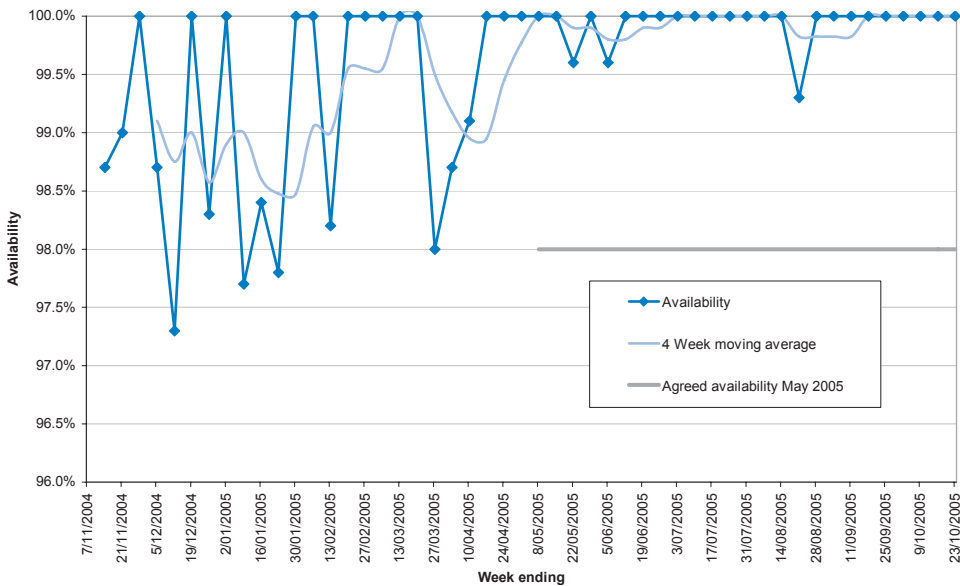
4.21 The fixed network operators were surveyed by the DMO to improve the understanding of operational issues being encountered. This survey confirmed operational concerns and grouped them into several categories. These categories encompassed the grade of service; system outages; system reliability; data management; problem reporting; training; system maintenance; and frequency management.

4.22 The Prime Contractor acknowledged the existence of operational issues in March 2005. The Core Communication System achieved its availability goals in May 2005, except for a few instances of outages. Figure 4.2 shows that the availability of the Core Communication System had improved by April 2005 and was relatively stable for the remainder of 2005. In May 2005, Defence and the Prime Contractor agreed to a target availability for the operational system, for urgent voice services and data service, of 98 per cent based on a four week moving average³⁰.

³⁰ The Prime Contractor advised the ANAO that there are no specific availability requirements for the Core system contained in the System Segment Specification although Boeing have adopted the Final System availability requirements as the appropriate levels to use for assessing the Core System availability and Defence and Boeing have agreed on the approach to be used for determining the availability of the operational system. Following the settling in phase typical in the delivery of large complex projects the Core System availability has stabilised and is now proving to be highly reliable and is achieving performance values consistent with the requirements for the Final system.

Figure 4.2

Core Communication System availability



Source: DMO Documentation.

4.23 The DMO and the Prime Contractor worked on identifying and resolving ongoing operational issues over the remainder of 2005. This was the responsibility of a joint team comprising members from the Prime Contractor and the DMO. The objective of this team was to obtain quantitative data on system performance and underlying operational issues, and rectify faults and configuration issues in the operational system. The DMO agreed to disband the team in August 2005 based on the progress achieved toward rectifying the operational issues. Routine arrangements were to be applied to the resolution of remaining issues³¹.

4.24 The Contract Progress Report for December 2006 indicated that there were 43 Deviations and Waivers, 92 Software Problem Reports and five Operational System Problem Reports yet to be finalised for the Core Communications System. There were also 119 open Trouble Reports for both the Core Communication System and Final Communication System, with some 51 per cent overdue against the forecast finalisation date. The DMO advised

³¹ In January 2007, the DMO advised that of the 53 operational issues identified through the survey of users of the System 43 had been closed. One issue remains open in relation to Organisational Message Switch Stability. The Project Office has agreed that the remaining nine are to be rectified as part of Final Communication System capability.

that many of these are relatively minor or will be resolved with delivery of the Final Communications System and that while all high priority Trouble Reports will be fixed, the Prime Contract allows for a significant number of lower priority Trouble Reports not to be corrected.

4.25 In late November 2005, the ADF closed its last legacy site and became completely reliant on the Core Communication System for all High Frequency Communications. This was some 12 months after Initial Operational Release of the Core Communication System. Table 4.4 details the extent of system outages that have occurred in the period from December 2005 to September 2006.

Table 4.4

System outages December 2005 to September 2006 (hours:minutes)

	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
System outage duration	3:00	0:56	0:00	5:44	0:00	0:57	4:20	0:19	1:00	3:01
Impact on operations duration	4:22	0:56	0:00	7:47	0:00	2:20	6:00	0:34	1:42	3:15
Organisational Message System outage duration	1:10	1:59	0:20	0:00	0:24	1:00	0:16	0:06	0:24	0:21

Source: DMO Documentation.

Delivery of the Final Communication System

4.26 A Deed of Agreement was executed in May 2005 between the Prime Contractor and the DMO. This Agreement was developed in response to schedule risks associated with the planned approach to delivery of the Intermediate and Final Communication System, and to address additional costs incurred by the DMO associated with Core Communication System operational issues. Negotiated benefits to the DMO covered a range of issues including:

- a three year fixed network hardware and software warranty from Final Communication System acceptance, subject to some limitations; and
- the Prime Contractor absorbing some of the costs associated with keeping North West Cape Transmit Site and Canberra Transmit Site operational beyond June 2005, due to the Core Communication System not having proven that it could meet the required Grade of Service.

4.27 Previously there was no warranty after acceptance of the Final Communication System; therefore the inclusion of the warranty at delivery of the Final Communication System represents a positive outcome.

4.28 The Deed of Agreement also provided that the DMO shall negotiate an Engineering Services Contract covering periods addressed by the Service Level Agreement and the Network Operation and Support Contract. The intent of this Contract is to cover changes to items such as operating systems and interfaces with other systems which may impact on the High Frequency Communication System; and to address technical regulatory requirements which have changed over the life of the Project. At the time of audit fieldwork, limited effort had been applied within the DMO to developing the Engineering Services Contract.

4.29 A component of the Deed of Agreement was to upgrade the workstation hardware and operating system to overcome obsolescence. Servers for the system were also subject to similar obsolescence issues, but a study undertaken by the Prime Contractor, on behalf of the DMO, indicated that updating the workstation and deferring the servers best addressed the risk to Final Communication System delivery. This resulted in the approval, in October 2005, of a \$1.73 million increase to the Prime Contract funded from contingency³². The upgrade was expected to result in a one month delay in the delivery of the Final Communication System. Through the Deed of Agreement the Prime Contractor agreed to bear some of the staffing costs associated with this extension.

4.30 The schedule risk associated with the delivery of the Final Communication System giving rise to the 2005 Deed of Agreement was attributed to a range of factors. These included the delayed delivery of the Core Communication System; a large technical review program; and resource shortages. In response to these risks to the schedule the DMO agreed to:

- less frequent but more comprehensive reviews;
- an incremental software development approach with progressive acceptance testing conducted at the Defence Network Operations Centre; and
- removal of the requirement to deliver an intermediate capability to provide a single development path for the Final Communication

³² This was partially offset by a \$0.08 million reduction in cost to DMO in recognition that the upgrade provided the Contractor with some efficiencies in system development.

System, thereby delaying the operational availability of Military Standard Automatic Link Establishment functionality until the Final Communication System is accepted.

4.31 The Prime Contractor submitted a Contract Change Proposal to give effect to the revised approach for Core to Final Communication System in late 2005. This Contract Change Proposal was approved in November 2006.

4.32 An Integrated Baseline Review of the revised baseline set out in the 2005 Deed of Agreement was conducted in late 2005. This concluded that the Final Communication System development appeared to be realistic and accurately scheduled. However, concern remained about the adequacy of resource levels available to meet the Final Communication System delivery date of September 2007³³.

4.33 The ANAO notes that arrangements agreed through the 2005 Deed of Agreement represent a significant change to the software development approach for the Project and that several key design milestones for the Final Communication System had been achieved, albeit with slight delays. In early 2007 it was not possible to reliably assess the probability that the Final Communication System would be delivered in accordance with the current schedule, due to a key software development milestone not being scheduled to occur until mid 2007. The inability to achieve a similar milestone for the Core Communication System contributed to significant Project delay and processes that resulted in the 2004 rebaselining of the Prime Contract. In March 2007 the DMO advised that all schedule float associated with the delivery of the Final Communication System had been exhausted and that as a result the schedule was considered to be at risk.

Incentive to complete the Final Communication System

4.34 The ANAO notes that the imperatives for the delivery of the Final Communication System are not as significant as those that related to the Core Communication System in terms of the extent of associated additional costs incurred outside the Project. Furthermore, the capacity to utilise the additional functionality provided by the Final Communication System will be limited by the status of the mobile platform upgrade program.

³³ In February 2006, the Contractor wrote to the DMO indicating that the delay in providing security clearances conducted by the Defence Security Authority for personnel employed by the Contractor to work on the Project would potentially impact on the schedule.

4.35 There are no liquidated damages within the contract for delays in the delivery of the Final Communication System. The DMO sought to insert liquidated damages into the Prime Contract at the time of contract rebaselining in 2004, but this was not achieved through negotiations. Prime Contract rebaselining did result in the Prime Contractor bearing some costs associated with the provision of fixed network operators to the Network Management Facility, if the acceptance of the Final Communication System is delayed.

4.36 Milestones associated with progress towards acceptance of the Final Communication System represent a small proportion of the total value of the Prime Contract. Notwithstanding this, the Final Communication System is to provide an enhanced High Frequency communication capability including greater levels of automation, improved communication protocols, a higher traffic capacity, new traffic types and greater reliability. The delivery of these capabilities is significant in terms of achieving the overarching objectives set out at commencement of the Project.

Mobile upgrade program

4.37 At the outset of Phase 3A of the Project, it was Defence's intention to upgrade sufficient mobiles to provide a representative high activity loading on the system using a mix of platforms with geographical dispersion for test and evaluation purposes. Similar requirements were reaffirmed in September 2003. Under current arrangements only one platform is scheduled for upgrade prior to acceptance of the Final Communication System. The ability to achieve this is subject to availability of a Chinook helicopter, a number of which are involved in ongoing operations.

4.38 It was also considered that the upgrade of mobiles was necessary to realise the personnel savings envisaged at the Projects outset. The estimate of the extent of these personnel savings has changed over time due to restructuring in Defence and weaknesses in the initial estimates of personnel savings. As a consequence a firm estimate of the extent of personnel savings associated with mobile upgrades was not available in early 2007.

4.39 Some existing platforms already have Standard Automatic Link Establishment that will be able to be utilised following Initial Operational Release of the Final Communication System. This is a subset of the capability that the Final Communication System is intended to provide.

Integration and installation - not in-contract mobile platforms

4.40 In mid 2006, a risk reduction study focussing on the integration and installation of upgraded High Frequency Communication equipment into mobile platforms under Stage Nine and Stage 10 of the Project was approved. Both these stages encompass not in-contract mobile platform upgrades which are planned to be completed by late 2010. Stage Nine is for:

- the integration of follow-on upgrade kits into five Chinook helicopters; and
- modification of the generic air mobile upgrade system for integration into 35 Black Hawk helicopters.

4.41 Stage 10 is for the supply and integration of upgraded High Frequency Communication Systems into the following platforms:

- 12 - Armidale Class Patrol Boats³⁴;
- 2 - Hydrographic Ships;
- 16 - Army Strategic High Frequency Systems;
- 3 – Local Mine Countermeasures Headquarters;
- 6 - Minehunter Coastal ships³⁵;
- 4 - systems into RAAF No. 1 Combat Communications Squadron; and
- 1 - systems for the Defence Force School of Signals.

4.42 Both Stage Nine and Stage 10 are planned to be completed by late 2010. The arrangements for the upgrade of mobile platforms under these Stages were yet to be contracted at the conclusion of audit fieldwork. The DMO advised the ANAO that a key factor impacting on schedule would be the availability of platforms to be upgraded. The upgrades need to be coordinated around the maintenance schedules and operational requirements for these platforms. Other factors include the complexity involved in integrating upgraded communication systems into platforms of varying technical complexity and maturity; and being able to accommodate equipment within the space available on these platforms.

³⁴ In relation to the Armidale Class Patrol Boats, the Projects worked together to ensure radio equipment fitted to the Patrol Boats could be upgraded to the Modernised High Frequency Communications System requirements.

³⁵ In late 2003, the then Minister for Defence indicated that changes to strategic guidance enabled the RAN to lay up two of the six Coastal Minehunter.

Risk assessment of the mobile program

4.43 In 2003–04, the Government announced major changes to the way the Australian Defence Organisation is organised and operates with regard to the development of major proposals for new Defence Capabilities. These changes followed the publication of the 2003 Defence Procurement Review. That review recommended that the Government should mandate, and enforce, via revised Cabinet Rules, a rigorous two-pass system for new acquisitions with Government consideration dependant on comprehensive analysis of technology cost and schedule risks.

4.44 The Project Maturity Score is an initiative of DMO implemented following the Defence Procurement Review. The associated assessment process is intended to quantify in a simple and communicable manner the risk in capital equipment projects as they progress through the capability development and acquisition life cycle. The Project Maturity Score incorporates technology readiness levels required by the Defence Procurement Review, and comprises a matrix of seven attributes that are assigned a score between one, representing the lowest level of maturity, and 10 representing the highest level. These attributes include schedule; requirement; technical understanding; technical difficulty; commercial; and operations and support.

4.45 The 2006 proposal for the mobile platform Risk Reduction Study incorporated an assessment of the maturity of the integration and installation aspects of the Mobile Platform Upgrade Program. This assessment provided a maturity score of 17 out of a potential score of 70. The objective of the Risk Reduction Study is to increase the maturity score to 31. These scores indicate that this aspect of the Project was in the very early phases of the capability definition lifecycle at this time as illustrated in Figure 4.4. The improvement to the maturity of this aspect of the Project was to be achieved in the areas of cost, schedule, requirements, operations and support. The proposal for the Risk Reduction Study indicated that the study needed to be completed by mid May 2006, to allow the Project to achieve closure by 2010. This timeline was not achieved.

4.46 The DMO advised that the risk reduction study commenced in February 2007. The risk reduction study is being undertaken by a professional service provider and is intended to enable the Project to put in place a cost effective implementation program for Stage Nine training asset modifications and Stage 10 upgrades at minimal risk to capability. The Chinook and Black Hawk helicopters are outside the scope of the risk reduction study. The

approach to the Black Hawks is outlined in the following Case Study (see Figure 4.3).

Figure 4.3

Case Study 2 – Black Hawk Upgrade

Based on a withdrawal from service date of 2015, the Army Aviation System Program Office established an aggressive modification program for the Black Hawk helicopter to incorporate the capability provided by relevant projects, including the High Frequency Modernisation Project. The proposed approach to this upgrade is for an interim upgrade to Standard Automatic Link Establishment for the first 12 aircraft. Standard Automatic Link Establishment is a lesser level of capability than that which is to be provided by the Final Communication System. The first interim fit is scheduled to commence in June 2007. Full capability is then to be provided to these 12 helicopters, and the remaining fleet, although the withdrawal from service dates may impact on the Black Hawk modification list.

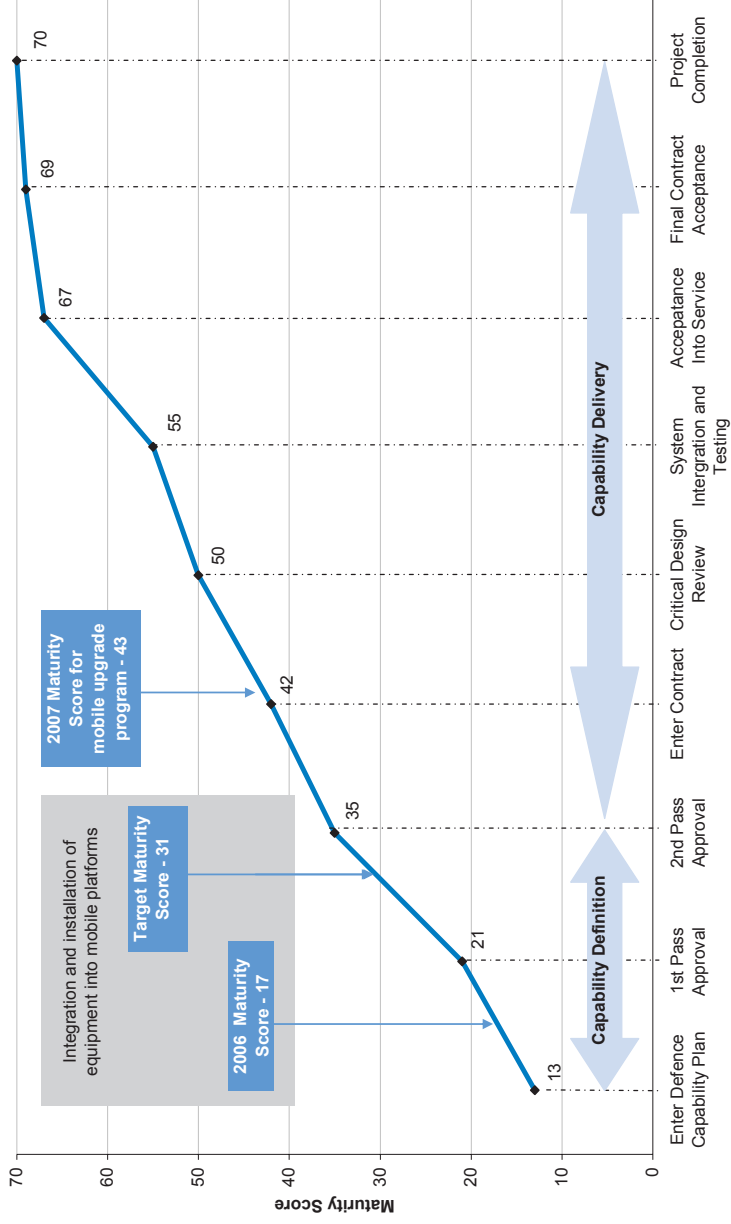
A series of proposal and liability approvals have related to the Black Hawk Upgrade Program. In early 2005, a proposal for the procurement of aircraft control display units was approved at a value not to exceed \$4.92 million. These control display units were for use on the Black Hawk and the Chinook helicopters. In late 2006, a further approval was signed for \$6.05 million to procure equipment required for the Black Hawk upgrade. In early 2007, an approval was given to spend \$3.79 million to fund the integration design effort and First of Type installation of Modernised High Frequency Communication equipment into the Black Hawk helicopter. The ANAO notes that further funding will be required for the supply and integration of upgrade kits into the remaining 34 helicopters and for the upgrade of the Black Hawk Simulator.

Source: Defence Documentation.

4.47 In early 2007, a further assessment of the maturity of the mobile upgrade program was conducted. The scope of this assessment was based, not only on the integration aspects of the mobile platform upgrade program, but also included the generic upgrade systems development and the Chinook integration program. The assessment also acknowledged progress during 2006 which included the conclusion of the Mobiles Detailed Design Review in September 2006; hardware maturity; and progress on Black Hawk and Hydrographic Ships. This review indicated a maturity score of 43 out of 70 for the mobile upgrade program. Based on Figure 4.4 this suggests that the mobile upgrade program is sufficiently mature to enter contract.

Figure 4.4

Project Maturity Score for mobile platform upgrades overlaid on project development lifecycle



Source: Defence Documentation.

4.48 The 2007 maturity assessment notes that until a technical solution has been generated in terms of the generic system it is not possible to fully define platform integration issues of the system. It further states that there is also a significant risk in contracting mobile platform upgrades with any company, other than the Prime Contractor, until the generic upgrade systems are accepted. Acceptance of the Generic Upgrade System is scheduled to occur in the middle of 2007. The DMO acknowledges that the score of 43 is a composite of elements of the mobile upgrade program; and that some elements of the program have a higher level of maturity than 43 while other elements were not sufficiently mature to enter contract at the time the assessment was undertaken.

4.49 The proposal, in mid 2006, for the Risk Reduction Study on the integration and installation aspects of the Mobile Platform Upgrade Program supported this conclusion by indicating that substantial risk remains in adapting the generic upgrade systems to specific platforms, particularly when the radio equipment fitted to the platforms differs from those used in generic upgrade systems. Defence advised the ANAO that a reasonable risk still exists for sea platforms where little work has been progressed but not so for air platforms such as the Blackhawk and the Chinook helicopters where considerable work has been completed.

4.50 The acquisition strategy proposed in late 2006 for mobile upgrades, noted that the mobiles functionality and software is intrinsically linked to that of the fixed network, which is supported by the Network Operation and Support Contract. However, mobile specific software is not covered by this Contract and its support and maintenance may require additional provisions within the Network Operation and Support Contract. Additionally, software development for platforms other than the Chinook, and radios other than those fitted to the two generic upgrade systems, will require new contractual arrangements. The DMO were considering whether the Engineering Services Agreement, development of which was agreed through the 2005 Deed of Agreement, might provide an appropriate mechanism for this activity.

4.51 The DMO has applied a significant level of effort towards resolving issues associated with the development and integration of mobile platform upgrades. Much of the work in this area was ongoing at the conclusion of audit fieldwork. A range of complex issues are yet to be fully resolved to finalise the mobile upgrade program and conclude this Project. These encompass platform specific software development and integration and are subject to the acceptance of the generic upgrade systems and the availability of platforms for

upgrade. The costs associated with upgrading these platforms had not been fully identified at the time of audit fieldwork and contracts were yet to be executed for the installation, integration and in-service support arrangements for these mobile platform upgrades. Defence acknowledged that a reasonable risk remains in this aspect of the Project, mainly in terms of schedule, and that this risk will remain if for no other reason than platform availability problems.



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1 May 2007

Appendix

Appendix 1: Defence and DMO response

Defence notes that the report provides a summary of key events that have occurred over the life of the Project. The High Frequency Modernisation Project is a complex software intensive and high risk project involving geographically diverse sites at five major locations around Australia. The Core System, which provides the majority of the contracted functionality, has now been operational for over two years and is providing excellent service to the ADF.

Defence received significant compensation from the Prime Contractor for delays arising from problems with the contractor's system engineering and software development effort. The value of the compensation was consistent with the level of estimated losses caused by the delay and there were no scope changes as a result. Risk mitigation measures incorporated into the contract based on recognised international practice at that time were not as successful as the Contractor and Defence had expected.

Defence notes that the level of delay experienced in this project is comparable to international experience with similar projects reviewed by the Standish Group International over the period 1994 to 2004. Internationally, the processes, tools and techniques for managing complex software development projects have matured significantly over the past ten years resulting in measurable improvements in project performance. For example, according to the latest Standish Report the average project delay for similar projects has improved from 160% in 1994 to 84% in 2004. The delay to the Core System of the High Frequency Modernisation Project was 72%. DMO continues to monitor progress in these areas and adopt relevant practices.

Since 1997 when the Prime Contract was awarded the DMO has implemented a suite of acquisition initiatives including standard contracting templates for software intensive projects, benchmarking of process improvement based on international best practice using the Capability Maturity Model Integrated developed by the Software Engineering Institute in the US, and improved measurement regimes to further improve project outcomes.

To reduce delays resulting from unstable requirements Defence has instituted more rigorous requirements development processes. Projects now require an Operational Concept Document, Function and Performance Specification and Test Concept Document before approval. These requirements have been further strengthened by changes made following the Defence Procurement Review.

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