ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeals of --	)	
	)	
Cable and Computer Technology, Inc.	)	ASBCA Nos. 47420, 48846
	)	
Under Contract No. N00039-90-C-0083	)	

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OPINION BY ADMINISTRATIVE JUDGE LIPMAN

These appeals arise out of the captioned contract for the production of five prototype systems for the Navy's Next Generation Computer Resources program. In ASBCA No. 47420, appellant, or CCT, is appealing from the contracting officer's failure to issue a decision on its initial claim for compensation for additional contract costs and for a schedule extension. ASBCA No. 48846 is an appeal from the contracting officer's failure to issue a decision on a subsequent "protective" claim.

The record consists of documentary evidence as well as the transcript of the seven-day hearing. The parties have agreed that we are to decide entitlement only, including the number of days of delay, if any, to which appellant is entitled. Both parties submitted initial and reply briefs.

FINDINGS OF FACT

RFP and Contract Content

1. On 12 June 1989, the Department of the Navy, Space and Naval Warfare Systems Command (SPAWAR) issued the Navy's Next Generation Computer Resources (NGCR) Program Master Plan, dated 31 March 1989. According to the Master Plan, the NGCR program was a Research and Development (IR&D) program to "select/evolve" a set of commercially-based interface and protocol standards, through which the Government could procure standardized and interoperable hardware and software for all Naval weapons systems in the future. The goal was to achieve an Open Systems Architecture (OSA), which exists when its internal and external hardware and software interfaces and protocols are well specified, have undergone public review, and have been published and widely accepted as standards. With strong industry recommendation, it was believed that an OSA approach would allow multiple vendors to supply module level hardware and software products which could be integrated to produce computer systems across a broad spectrum of computing capabilities at a significantly reduced acquisition cost. It would allow the Navy to have the benefit of continual industrial competition and be a part of the larger existing commercial market. (R4, tabs 356, 603)

2. The Master Plan established a three-step process to achieve the purpose of the NGCR program. The first step involved publication of interim standards developed by joint Navy/industry working groups which were established by SPAWAR and chaired or co-chaired by Navy personnel. The Navy personnel who served on those working groups reported to the NGCR Program Manager, Mr. Hank Mendenhall. (R4, tab 356; tr. 1/12-13, 2/26-27, 32)

3. The second step involved the Navy's acquisition of prototype systems, built in accordance with interim standards (particularly the interim Futurebus+ Backplane and SAFENET I and II standards of the Institute of Electric and Electronic Engineers, Inc. (IEEE)) attached to the prototype contracts, and to verify and validate the interim standards. (R4, tab 356; tr. 1/13-14, 67, 2/32, 34-35, 83) In part, the Master Plan described prototyping, as follows:

> . . . Prototyping significantly reduces the risk of publishing an ambiguous or incomplete standard and set of conformance test procedures. Industry participants in the laboratory test model contracts are expected to share in the costs of the prototyping effort. Participation provides a significant incentive for industry investment in that participants have an opportunity to have products conforming to the NGCR standards available to the market much sooner than non-participants.

(R4, tab 356 at 27)

4. The third step involved the Government's development of conformance test procedures through which it could ensure product conformance to the final published standards before production and deployment of standardized and interoperable computer hardware and software products into the fleet (R4, tab 356; tr. 2/32, 35).

5. The Navy's Acquisition Plan No. 89-7, dated 25 April 1989, described the NGCR program as including "limited hardware and software development for the purpose of validating the standards and developing a test bed for validation of NGCR equipments [sic]" (R4, tab 603).

6. In May 1989, SPAWAR issued Synopsis No. 78 for RFP N00039-89-R-0221(Q) (the RFP), in which it announced its plan to award multiple firm-fixed price contracts, at no more than $2 million each, to acquire prototype systems for the NGCR program to validate the draft functional Backplane, SAFENET I and II interface standards which had been developed by joint Navy and industry working groups. Each contract was to require delivery of five prototype systems comprising at least two central processing units with different instruction set architectures (ISA), memory, four input/output devices and power supply, four cable sets, five sets of user manuals, five sets of support software and test equipment to write, debug and load software and monitor computer performance, repair and technical support services, and technical data. SPAWAR stated that it estimated that the costs of meeting the requirements of the RFP would far exceed the planned $2 million contract award price. (R4, tab 9)

7. CLIN 0001 of the RFP and the contract was 5 EA of a "Prototype System to Validate the Backplane and SAFENET I and II Standards." Section C of the Contract, entitled " DESCRIPTION/SPECIFICATIONS/WORK STATEMENT," included the following:

> C-1 Item 0001 shall be provided in accordance with the "Statement of Work (SOW) for Functional Backplane Prototype" dated 25 September 1989 (hereinafter referred to as the "SOW"), the "Functional Backplane Prototype Specification" dated 25 September 1989 (hereinafter referred to as the "Specification"), the "Backplane Standard dated 26 June 1989 . . .," the "SAFENET I Standard, Revision 2" dated 08 June 1988 . . ., the "SAFENET II Standard, Revision 0" dated 12 January 1989 . . . <u>and all subsequent revisions to those three (3) standards from the date of contract award through thirty-six (36) months thereafter in accordance with paragraph 3.4.3 of the SOW.</u> [Emphasis added]

8. The Futurebus+ Functional Backplane Prototype Specification stated, in part:

> 1.1 <u>Scope</u>
>
> This specification establishes the prototype system module requirements for demonstrating the functionality, performance, and testing of the Next Generation Computer Resource (NGCR) Backplane and SAFENET I and II Standards to be implemented in all mission critical computer resources for the full range of Navy surface, sub-surface, airborne and shore-based systems.
>
> 1.2 <u>Purpose</u>
>
> The purpose of this document is to define the specifications for the contractor to use in designing, developing, and constructing the prototype system modules that will function with a motherboard meeting the requirements of the NGCR Backplane and SAFENET I and II Standards.

(R4, tab 1, attach. C)

9. Section G-6 of the contract, entitled "CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE," named Mr. Jerry Murdock as the COTR and stated:

> The COTR will act as the contracting officer's representative for technical matters, providing technical information as necessary with respect to the specifications or statement of work, and will monitor the progress of contract performance. The COTR is not the administrative contracting officer and does not have the authority to take any action, either directly or indirectly, that will change the pricing, quantity, quality, delivery schedule, or any other term and condition of the contract, or to direct the accomplishment of effort which goes beyond the scope of the contract statement of work.
>
> If, in the contractor's opinion, the COTR requests or indicates any expectation of effort which would justify or require an equitable adjustment to the contract, the contractor shall promptly notify the contracting officer in writing, but take no action on that request until the contracting officer has issued a change or otherwise resolved the issue.

(R4, tab 1 at 10)

10. The SOW included the following:

1.1 Purpose

The purpose of this Statement of Work is to develop hardware and software to validate the Next Generation Computer Resources (NGCR) Backplane Standard and the SAFENET I and SAFENET II standards, develop and validate procedures for conformance testing, and to provide prototype systems for the selection/definition of Operating System Standards.

1.2 Scope

The contractor shall provide the personnel, services, materials and facilities to design, develop and deliver five prototype systems in accordance with the NGCR standards identified in paragraph 1.1, the Functional Backplane Prototype Specification, and the requirements herein.

. . . .

3.4.2 Maintenance Support

. . . .

3.4.2.2 Hardware

The contractor shall provide maintenance support for the prototype systems delivered to the Navy to assure their correct and continuous operation for the duration of the contract. When a prototype system has to be returned to the contractor for repair, the contractor shall return the repaired system to the originating agency no later than 5 days after receipt.

3.4.3 Prototype System Updates

. . . .

3.4.3.2 Hardware

The contractor shall provide on-site updates to the prototype systems to meet the requirements of the Backplane and SAFENET I & II Standards within 4 months of each release of the standard by the respective Standard Working Group. Changes shall be constrained to component changes, cuts, and jumpers or software/firmware only for the duration of the contract. [Emphasis added]

. . . .

3.4.5 NGCR Working Group Participation

The contractor's project engineers shall participate and support the Operating System, Backplane, SAFENET, and Conformance working groups. Presentations shall be made to the working groups at each meeting, outlining as a minimum; [sic] progress made since the last meeting, problems in implementing the standards and any recommended solutions as they exist at the time; and other items of interest to the group. Only items of particular interest to that working group need be addressed in the presentation. For planning purposes, each working group meets every six weeks for two days.

3.4.6 Interoperability

To ensure interoperability, the contractor shall meet with all other contractors for this effort and the Government to establish a forum to resolve any issues that affect interoperability. Issues concerning the backplane, operating system, and SAFENET I & II standards shall be taken to the appropriate Working Group for resolution. The contractor shall demonstrate that all modules are interoperable among the different vendors. The meeting to establish the forum to ensure interoperability will be held no later than 60 days after contract award. The interoperability of the SAFENET I & II modules will be assured by the definition during these meetings and the resulting implementation of the Application, Presentation, and Session layers of the International Organization of Standards (ISO) Open System Interconnection (OSI) Reference Model in accordance with the SAFENET I and II standards.

(R4, tab 1)

11. The Navy considered the standards attached to the contract to be in the process of development and it interpreted section C-1 of the contract as requiring the prototype contractors, including CCT, to develop prototype systems in accordance with revisions to the standards issued prior to the delivery of the first prototype system. However, in view of the 12-month delivery schedule for the first prototype system, it did not believe that changes could be made right up to the delivery date, but would end at some undefined point when the Navy and the prototype contractors, in the Interoperability Working Group, would decide that it was time to draw a line and freeze the specification. Upon delivery of the prototype system, changes to the hardware would be limited as described in SOW section 3.4.3.2. At that point, a change like redesign of the hardware modules would be outside the scope of the contract. (Tr. 2/41-44)

12. The last sentence of section 3.4.3.2 was added after Navy discussions with contractors prior to award as an effort to place some limit on required changes. The Navy's Mr. Murdock, the COTR, was primarily responsible for the limiting language. He intended the requirement for updates in section 3.4.3.2 to become operative upon delivery of the first prototype system. Once the first prototype system had been delivered, changes to that and the remaining prototype systems arising from post contract award iterations of the standards were to be constrained to component changes, cuts and jumpers, or software/firmware changes. (Tr. 2/39-40, 43-44, 84-86, 91)

13. Raytheon Company (Raytheon) and Litton Industries (Litton), both of which were awarded prototype contracts, interpreted the last sentence of section 3.4.3.2 as requiring updates to the prototype systems arising from post-award revisions to the interim standards only after the delivery of hardware (tr. 6/74-75, 81-82, 93-94, 149-50).

14. Interoperability, as referred to in SOW section 3.4.6, meant that hardware modules of one vendor are compatible and functional with those of other vendors. At the prototype level, there would be mechanical interoperability, electrical interoperability and logical higher level interoperability among functions on the modules. In the interoperability meetings, the three contractors were to agree to details of the specification they would meet so that hardware would be compatible. (Tr. 6/97-98, 153)

15. The Backplane standard stated on the cover page that it was a "[d]raft [s]tandard, [s]ubject to [r]evision." It consisted of the Futurebus+ P896.1, Draft 8.0, dated 1 June 1989, entitled "Logical Layer Specifications," and Futurebus+ P896.2, Draft 3.0, dated 15 June 1989, entitled "Physical Layer and Profile Specifications." (R4, tab 1, attach. D)

16. The cover page for Futurebus+ P896.1 stated that it was a draft prepared by the P896.1 Working Group of the Microprocessor Standards Committee of the IEEE for working group review only. The cover page stated that "THIS IS AN UNAPPROVED DOCUMENT DO NOT SPECIFY OR CLAIM CONFORMANCE TO THIS DOCUMENT."

The cover page further stated that the draft was "PRELIMINARY —SUBJECT TO REVISION." Both of these caveats were repeated as a footer on each page of the draft P896.1. (R4, tab 1, attach. D)

17. Paragraph 1 of IEEE P896.1, Draft 8.0, described the scope of the specification:

> This IEEE standard specifies the functional electrical, and mechanical requirements for a set of signal lines that constitute a backplane bus, and for the interfacing of boards connected to that bus. It provides a level of specification sufficient to design modules which are functionally, operationally, electrically, and mechanically compatible. However, this standard might also be used as a component within a profile (a group of related standards) to build systems with higher levels of compatibility.
>
> The bus provides the means for the transfer of binary digital information between boards over one or more backplanes. The number of physical modules in a single backplane may be restricted by electrical and mechanical constraints, even though slot addressing allows up to 30 boards in a single backplane. The boards may contain any combination of one or more processors and local resources such as memory, peripheral and communication controllers etc. . . .
>
> . . . .
>
> Many of the protocols in this standard are "compelled", that is, they are governed by a pure cause and effect relationship. This is what gives this standard its technology-independent nature, and is what justifies its title "Futurebus". This compelled signalling provides a designer with a logical simplicity and instinctive understanding of what takes place in the protocols. As a result, there will be maximum compatibility between products designed to this standard throughout an extended operational lifetime.
>
> The standard defines the electrical and signal timing characteristics required of transmitters and receivers in modules plugged into the backplane and of the backplane itself . . . . Certain mechanical parameters are specified, including a range of printed circuit board sizes conforming to the IEC standards and the connector footprint to be used on the

> backplane into which the boards plug. Those mechanical parameters which directly affect the electrical characteristics of the bus are also specified, e.g. the physical length of the bus, the minimum spacing of the connectors on the backplane, and the signal assignments to pins on the connector. . . .

The Backplane standard included the following definitions:

BOARD	A collection of electronic circuitry that connects to a single slot.
BACKPLANE	An assembly that includes a circuit board and connectors. The backplane connects selected pins of the connectors, thus providing the medium for the transfer of signals needed for the operation of the bus.
SLOT	A position where a board can be inserted into a backplane by mating the board' s connector(s) to the backplane connector(s).
BUS LINE	The medium for the transmission of signals.
MODULE	A collection of circuitry that is designed to accomplish a prescribed task.

(R4, tab 1, attach. D at 1-3 to 2-4)

18. The Futurebus+ 896.1 specification included a definition of the signals required to meet the specification. In a subsection entitled "Electrical and Backplane Specifications," the specification stated that the subsection "describes and specifies the power distribution and signal line electrical requirements at the bus backplane interface." It then continued: "[t]he performance requirements of the bus make it necessary for this specification to impose constraints on the design of its modules beyond those normally encountered in a specification for backplane buses." It contained performance requirements as well as required design characteristics, including those with respect to the type of connector required, the connector arrangement, and Futurebus+ interfaces. Specification paragraph 8.2.7, entitled "Control Status Registers [CSRs]," stated, in part: "[b]us specific control status information and/or functions are defined herein. All non-bus specific CSR functions are defined in 896.2 (CSR Interface Chapter) and IEEE P1212 (CSR Architecture Standard)." (R4, tab 1, attach. D at 4-1 to 4-6, 8-6)

19. Paragraph 1 of IEEE P896.2 described the scope of that specification:

> This work resulted in the IEEE 896 family of standards. IEEE 896.1 defines the logical functionality of the set of signals that make up the bus. IEEE 896.2 (this document) describes and specifies the physical layer (the electrical characteristics, pin-outs, connector locations, board sizes, etc) required. It also contains application environment profiles. These profiles are descriptions of functional requirements with pointers to existing standards, including portions of this one, selecting and binding options within those standards. It is to these profiles, not the component standards, that manufacturers should claim conformance. An OEM or end user who then purchases boards complying to a given profile from a range of suppliers is thus assured of interoperability.

IEEE 896.2 stated, with regard to its electrical specification, that "[t]he performance requirements of the bus make it necessary for this specification to impose constraints on the design of its modules beyond those normally encountered in a specification." It contained performance requirements as well as required design characteristics, including those with respect to the Front Panel Design, the Front Panel Layout, Board Size, Connector, and Module Pitch. IEEE 896.2 also discussed CSRs and incorporated the requirements of IEEE P1212 with respect to CSR definition. (R4, tab 68)

20. The Futurebus+ interface module design was dependent upon any change to the backplane or the CSRs (tr. 5/77). Interoperability required consistency on the location (address) and definition of each of the CSRs (tr. 5/27-28).

21. The SAFENET I standard's description of SAFENET included the following:

> This document establishes the requirements for the Survivable Adaptable Fiber Optic Embedded Network I, SAFENET I.
>
> SAFENET I is the first in a series of network standards intended to address the interconnectivity problems associated with shipboard Mission Critical Computers and peripherals. Navy computers tend to be Input/Output [I/O] port intensive, but even so, applications are demonstrating situations where computers interconnected via the current method of point-to-point interfaces are facing limitations due to a shortage of I/O ports. A system engineered network approach would alleviate the port limitation problem by allowing resource sharing at the port level, i.e., the same port can be

> used for communicating with several devices rather than being restricted to a single device per port as is currently the case.
>
> SAFENET is designed as an architecture for a Communication Subsystem which uses a Local Area Network (LAN) for intercomputer and computer to peripheral data transfer. SAFENET will employ a non-proprietary approach based on existing standards for inter-operability and reduced development cost. . . .
>
> SAFENET I employs a layered architecture with several protocol profiles or "stacks" provided to accommodate a range of user requirements. . . . The lower 2 layers comprise the Local Area Network (LAN). These layers are referred to as the Physical Layer and the Data Link Layer, layers 1 and 2, respectively . . . .
>
> The LAN portion of SAFENET I is a Token Passing Ring Network based upon IEEE 802.5 enhanced for survivability of mission critical elements and for fiber optic vice copper media.

(R4, tab 1, attach. E at 2-3)

22. The SAFENET II standard's description stated the language quoted above from SAFENET I and also included the following:

> SAFENET II, like SAFENET I, employs a layered architecture with several protocol profiles or "stacks" provided to accommodate a range of user requirements. . . . The layered architecture allows the replacement of particular layers as technology matures without affecting other layers or functions. Evolving from SAFENET I to SAFENET II requires changes to only the lowest layers . . . .

(R4, tab 1, attach. F)

23. The SAFENET I standard included the following definitions:

INTEROPERABILITY	The capability, provided by compliance with a given set of standards, that enables heterogeneous equipment, generally built by various

vendors, to work together in a network environment.

. . . .

ISO PROTOCOL	A protocol stack available in SAFENET I oriented towards the efficient transfer of large blocks of data. This stack is comprised of standard ISO protocols.
LAYER	A layer is a well-defined, logical and hierarchical subdivision of the network architecture. Each layer is built upon the next lower layer. Each layer can use the services of the next lower layer, plus its own functions, to create services which are made available to the next higher layer. A layer is logically composed of subsystems of the same rank of all interconnected systems.
PROTOCOL	The rules and conventions under which interactions over the network between peer entities are carried out.

(R4, tab 1, attach. E at IV-65, -66)

24. The SAFENET I Standard, Revision 2, dated 8 June 1988, stated in the cover page that it was a "[d]raft [s]tandard, subject to revision." The title page stated that it was an "[u]napproved Draft For Review Purposes Only," and that caveat was stated as a header on each page. The SAFENET II Standard dated 12 January 1989 contained the same statement and caveat. (R4, tab 1, attachs. E, F)

25. The SAFENET I and II standards, among other things, described the requirements for the network's physical medium, and specified the optical and electrical network components. The SAFENET I standard included the following:

1. SCOPE

> This chapter of the SAFENET I document describes the requirements for the network's physical medium. The chapter provides a description of the functional requirements of the medium. This is followed by a detailed description of the SAFENET I topology. The system interface between a station and the physical medium is defined. The technical requirements of the optical and electrical network components are specified. The chapter concludes with a discussion of the network power budget.

(R4, tab 1, attach. E, chapter III) The SAFENET II standard contains a description of its "scope" in identical language (R4, tab 1, attach. F, chapter III).

26. The Backplane standard contained detailed design parameters (*e.g.*, the number and location of CSRs) to be followed by the prototype contractors in manufacturing their prototype systems. Both the SAFENET I and II standards required the applicable data transfer service to be as defined in the NATO Network Independent Interface Specification Annex A-1 (NIIF). The NIIF's Introduction stated: "This standard specifies the format and content of the Transport Interface Data Units which support a connection mode Transport Service (Including Multipeer operation)." The NIIF standard contained detailed design information, including definitions, and details of parameters, types of connection, and byte patterns. (R4, tab 1, attachs. E, F, tab 113, tr. 5/125, 7/16-17, 53-55)

<u>Working Groups</u>

27. In the context of the prototype contracts, there were two forums for resolving various issues: the Interoperability Working Group, a forum comprised of the three contractors to whom awards were made and the Navy; and, the working groups, consisting of the SAFENET Working Group (comprised of Navy personnel) and the Futurebus+ Backplane Working Group. Industry was invited to, and did participate in, both groups prior to and after award of the prototype contracts. Companies were not eligible to become members of working groups, but their individual engineers were eligible for membership. Companies would send representatives to the working groups so that they would be involved at the earliest stages of standards development in order to be one of the first to understand the evolution of various technologies in order to rapidly reproduce those technologies for the commercial market. (Tr. 1/14-15, 34, 2/26-28, 67-68, 3/52-56, 6/7-8, 7/90)

28. The members of the Interoperability Working Group were to identify various issues, classify them as either implementation issues or standards issues, resolve the former amongst themselves and forward the latter to the appropriate Navy working group (either the Futurebus+ Backplane Working Group or the SAFENET Working Group) to be analyzed (tr. 7/183-85).

29. The Navy's contracting officer's technical representative had no authority over the Navy working groups to direct them to perform any action. The working groups would have to obtain agreement from the IEEE Commercial Group/Standards Committee or the American National Standards Institute (ANSI) Commercial Group's SAFENET Committee to a particular solution recommended within the working group. Agreement was by consensus of all voting members. Although the NGCR program established both the Futurebus+ Backplane and SAFENET Working Groups, the Commercial Group/Standards Committee of the IEEE was the custodian of the Futurebus+ standards incorporated by reference into the contract. The IEEE is comprised of members from the Government, private industry, academia, and of individuals; it is not an agency of the Government. (Tr. 2/26-27, 3/52-57, 6/35-36, 7/89)

<u>Proposal Preparation and Submission</u>

30. The Navy estimated that each prototype contractor would contribute $4 million to $6 million to meet the requirements of the RFP. That estimate came from the NGCR program office and could have included investments in technology made by the contractors either prior to or during performance of the contracts. (Tr. 1/19-23, 2/29-31)

31. In May 1989, Radix II, a Maryland company, informed the SPAWAR contracting officer that it would not bid or participate in the prototype contract RFP because of: (1) the large volume of attached documentation "which, upon closer scrutiny, turned out to be mainly preliminary concepts"; (2) the $4 million investment expected of the contractor; and, (3) "the short time-frame" (R4, tab 602).

32. Unisys Defense Systems Computers Systems Division (Unisys) analyzed the RFP and decided not to bid as a prime contractor for the prototype systems contract. Unisys was concerned about its ability to recover its costs and that, because of risk factors including the imprecise requirements and the number of industry advisor groups and standards bodies involved, the contract would end up being an investment program for Unisys which had already invested in SAFENET over a number of years. (Tr. 4/45-47)

33. On 14 July 1989, Unisys offered to provide SAFENET I and II modules to appellant for use in performing the NGCR prototype contract. Its letter offer included the following:

> The risk areas for the NGCR RFP are highlighted as follows:
>
> - The current development and availability of the prime contractors [sic] Futurebus+ interface implementation that will be used with the SAFENET coprocessor to meet scheduled delivery of SAFENET I & II nine months ARO.

- The open ended issue of the NGCR RFP's interoperability requirement and the specification requirement upgradeability of the SAFENET I & II and Futurebus+ specifications over the length of the contract will require contractual boundaries established between Unisys CSD and the prime contractor to mitigate the risk.
- Unisys, Computer Systems Division is in the process of costing the total SAFENET workscope of the NGCR RFP and specifications. The initial cost data will be available 14 July 1989, and will be forwarded in the proposal.

(R4, tab 470)

34. On 26 July 1989, Unisys informed CCT that its engineering estimate "for planning purposes only" was $1,500,000. That total included an amount of $1,064,000 for certain development costs. (R4, tab 471) CCT's NGCR Program Manager, Mr. David Jackson, reached an agreement in a telephone conversation with Unisys that the latter would provide the SAFENET modules to CCT for $155,000. Unisys agreed to eliminate $1,060,000 in development costs because those costs were viewed as "something Unisys was already endeavoring to develop, and already investing in, for purposes of the SAFENET marketplace." Unisys also agreed to reduce its prices for the remaining elements. Under the agreement, CCT would be procuring the SAFENET parts and fabricating the SAFENET modules, Unisys would be conducting the integration and testing and then delivering the modules to CCT. Unisys and CCT agreed that it would be faster and less costly for CCT, rather than Unisys, to fabricate the modules. Unisys believed that CCT, as a smaller company, was better positioned to respond to the risks of performance relating to cost recovery than a large company such as Unisys. (Tr. 4/24, 50, 6/206-08)

35. In 1989, CCT was a small company, with annual gross revenues totaling approximately $6 to $8 million. Mr. Jackson, who had joined CCT in 1986, served as CCT's NGCR Program Manager throughout the term of the contract. At some point, he also became CCT's Chief Financial Officer. Mr. Jackson's educational background was in business administration, finance and accounting, and he had no engineering or technical degree. Prior to coming to CCT, he had experience in the cost accounting group at Rockwell International, as a cost accounting manager in the Government and Industrial Electronics Division of Magnavox, as a plant comptroller with Arrowhead Products, and in an undefined position with Computing Application Software Technology, a software house. (Tr. 1/24-25, 6/184-86, 199-200, 7/174)

36. On 31 July 1989, CCT submitted its technical proposal in response to the RFP. It stated that it intended to satisfy the requirements of the RFP and that "a CCT designed, Futurebus+ based architecture, very closely aligned to several existing CCT designed

microprocessor platforms, appears readily achievable in both a cost effective and timely manner." CCT further stated:

> CCT's collective experience, covering every facet of microprocessor and computer control design, amounts to hundreds of man-years and represents millions of dollars in operating hardware. Since 1980, CCT has designed and installed hundreds of high performance, commercially based systems world wide.

CCT indicated that it intended to adapt several of its existing product subsystems to meet the requirements of the RFP. In order to perform, CCT intended to use (a) a 68030 processor; (b) a 29000 processor; (c) an NTDS interface, memory boards; (d) an Intel i860 RISC processor board and (e) a Motorola 96002 Digital Signal processor board. CCT intended to develop items (d) and (e) in parallel but outside the scope of the prototype contract. CCT stated that it felt that "the most important part" of the program was to "rapidly implement the Futurebus+ common interface to provide early definition for each of the functional backplane circuit cards," and that it planned to complete the preliminary design for the Futurebus+ interface circuit card prior to the date of contract award. The CCT proposal stated, further, that Unisys "will team with CCT to provide technical and sub-contract support for the development of SAFENET I & II modules and test support," which was to be the only subcontractor effort. CCT's "Program Schedule" reflected that CCT planned "Contractor Support Services," including Software/Firmware, Hardware Support, Technical Support, Software/Firmware Updates, and Prototype "HW" Updates to occur following delivery of the first prototype system. (R4, tab 10 at Bates 5-6, 10, 14, 34-177; tr. 2/168)

37. The technical portions of CCT's proposal were written by Messrs. Marlin Clark, Erasmo Brenes and Jim Moidel after their review of the RFP. Mr. Clark was initially a subcontractor to CCT, first part-time and then full-time beginning in December 1988, and he later became an employee of CCT in October 1990. Mr. Clark possessed a degree in mechanical engineering and a master's degree in control systems. His experience included work on the Titan ICBM guidance control system, the control system for the Shillelagh anti-tank missile, the control system for the Apollo lunar excursion module, as well as the design and manufacture of hybrid computing systems and computer interface equipment. Mr. Clark, based upon a general review of the RFP to prepare his portion of the CCT proposal, believed that the standards could be implemented within the planned 12 month delivery schedule. He recognized that the specifications were interim and anticipated that "minor problems would be solved by the time of contract award." Mr. Clark was unable to remember whether he was a member of the IEEE Futurebus+ working group at the time of contract award. In the absence of any evidence of membership, we find that he was not a member. (R4, tab 10 at Bates 22; tr. 4/97-100, 6/189, 7/50-51, 90, 92, 96, 136) Mr. Brenes, a senior design engineer at CCT, wrote the Futurebus+ portions of the technical

proposal and was the principal CCT designer of the Futurebus+ interface module. The record does not contain details of his qualifications, nor is there any indication in the record that he was a member of the IEEE Futurebus+ standards working group. (R4, tab 10 at 23; tr. 7/85-86) CCT proposed a generally competent design and presented overall block diagrams "from the first day" (ex. A-1 at 57).

38. Mr. Jackson was responsible for compilation of the entire CCT proposal and personally prepared the management portions of the proposal, including the cost proposal and, with technical input, the milestones and schedule. At the time of CCT's proposal submission, Mr. Jackson did not review the backplane or SAFENET interim standards, but he received technical input from CCT engineers who evaluated each of the interim standards. The CCT engineers reported to Mr. Jackson that they believed the interim standards attached to the RFP could be implemented in prototype systems within the range of assessment they provided. (Tr. 4/99, 6/188-94, 7/50-53, 92, 136-42)

39. On 8 August 1989, CCT submitted its Cost Proposal in response to the RFP to deliver the five prototype systems for $1,978,553.08, with no profit. CCT's Cost Proposal reflected a subcontract cost estimate from Unisys of $155,000 for SAFENET I and II modules. It described the subcontract effort as "design support and assistance to support design and development and/or procurement of SAFENET ring circuit cards, software development and integration, and update support for specification changes and validation-conformance testing." CCT's proposal included an estimate that it would incur $14,351 in FY 1990 and $14,795 in FY 1991 to prepare for and attend working group meetings. It also included an estimate for direct labor, "recurring cost" and "sustaining engineering" costs for FY 1991 and FY 1992 for Futurebus and SAFENET "updates (subsequent to baseline)." (R4, tab 10 at Bates 181, 201, 217)

40. Based on the subcontract price and its stated plan to use existing technology, which had significant value, CCT believed that it could meet the RFP requirements at $300,000 to $400,000 below the Navy's planned contract price ceiling of $2 million with no company investment in the project. In his personal copy of CCT's Cost Proposal, Mr. Jackson recorded estimated reserves associated with various elements of CCT's labor costs. CCT estimated a reserve of 10 to 20 percent for Hardware Design and Development, 15 to 25 percent for Firmware/Software Design, 25 to 30 percent for Hardware and Firmware Integration and Test, and 25 to 30 percent for System Integration and Test. (R4, tabs 10, 451; tr. 6/190-97)

41. On 3 August 1989, Raytheon submitted its technical proposal for the prototype system. Some of the requirements of the RFP were related to technology being developed under Raytheon's ongoing IR&D program. Raytheon intended to leverage technology then being developed through certain of its IR&D programs. It requested that the scope of work of the prototype contract not duplicate any specific IR&D efforts and an acknowledgment that the following were not a funded effort under the prototype contract: (a) design and

development of Futurebus+ to MIL-STD-1553B interface; (b) design and development of Futurebus+ to NTDS interface; and (c) design and development of Futurebus+ Processor Module. (R4, tab 604, cover letter)

42. Raytheon offered its own expertise and selected its team members from companies that had already developed products for open systems. Raytheon teamed with BICC Vero, Nanotek, and Ferranti to offer expertise in the standards areas of backplane/enclosure, Futurebus+ design, high performance processor modules, and SAFENET LAN interfaces. Raytheon's proposed program envisioned a "sizable investment" on the part of team members. A key factor in Raytheon's selection of team members was that each company had played a lead role in the development of the commercial standards and would continue active participation as key members of industry committees. Raytheon recognized that the Navy's Backplane and SAFENET standards were "immature" and that a "primary objective of this program is to rapidly mature these commercial specifications by pinning down ill-specified requirements, and finding and eliminating inconsistencies and errors within the specifications." (R4, tab 604 at i, ii, v, x, 3, 7-8, 20)

43. Raytheon's program manager, Mr. Robert Milholland, an experienced electrical engineer, worked with two Raytheon engineers who actively participated in the Futurebus+ Backplane working group. Mr. Milholland knew that the interim draft standards attached to the RFP were incomplete in some areas and that additional work was going to be required. (Tr. 6/6-7, 12, 80-81)

44. Mr. Mark Bunker, an electrical engineer with a masters degree in computer science, was Raytheon's lead engineer for the contract and was a major contributor to Raytheon's technical proposal. Mr. Bunker was also a member of the Futurebus+ standards committee and was Raytheon's representative on the Backplane study work group. At the time of Raytheon's proposal, he was aware that although the standards contained basic definitions, different implementation choices remained and certain areas were not fully defined. Mr. Bunker believed that the draft interim standards could lead to some level of interoperability, but he recognized that, without a full set of defined specifications, interoperability could not be guaranteed. (Tr. 6/84-87, 98)

45. Based on its team's in-depth understanding of the interim standards, Raytheon's proposal listed issues affecting interoperability and requiring resolution (R4, tab 604 at vi, 49). Because the interim draft standards would be updated on a regular basis and the contractors would be contractually required to modify their equipment in accordance with such updates, Raytheon was of the opinion that the RFP was "somewhat open-ended" and thus requested in its proposal that the number of updates be limited to two. (R4, tabs 604, 606 at response to question 10; tr. 6/16, 26, 89-90) In order to protect itself, Raytheon also contemplated making its design as flexible as possible to accommodate future changes (R4, tab 604 at vii, xviii, 20).

46. On 8 August 1989, Raytheon submitted its cost proposal in the amount of $2 million. It estimated that the cost of work required by the contract was $243,685 greater than the $2 million it proposed, and its proposal did not include a fee which represented an additional investment of approximately $270,000. It, therefore, estimated that it would cost $2,500,000 to perform the contract. That figure included $257,143 for the design and construction of SAFENET modules by Ferranti, its SAFENET subcontractor, and was independent of Raytheon's investment in IR&D programs. (R4, tab 605; tr. 6/12)

47. On 31 July 1989, Litton submitted its technical proposal for the prototype system. It saw a major issue in the functionality of the system and whether different vendors could achieve compatibility so they could communicate effectively across the Backplane or LAN. Litton found high technical risk and challenge in the design phase because of the planned short delivery time for the first prototype system coupled with the immaturity of the specifications and the "high probability" that the specifications would change during design. Litton, however, planned to minimize the risk by using its existing ability and technology. (R4, tab 613 at cover letter, 1-3 to 1-5, 1-11)

48. Litton intended to use its own expertise in SAFENET and it teamed with Force Computers (Force), a memory systems and computer board supplier, in defining the Futurebus+ standard. Force's General Manager chaired the Futurebus industry committee. Litton and Force were both active members of the NGCR working groups prior to the proposal submission. Litton employees were regular participants at the SAFENET committee and the NGCR Operating Systems Committee. Force employees chaired two subcommittees of the Futurebus+ committee. (R4, tab 613 at 1-3, 1-5, 2-46)

49. Mr. Michael Ebl, Litton's electrical/mechanical engineering manager, anticipated that Litton would have to spend approximately $2 million in company investment or IR&D funds in excess of the contract price to perform the contract and its proposal and program manager, Mr. Bill Chivers, was aware of that fact. (Tr. 6/143, 147-48, 172, 175) Litton was aware that, although the draft specifications attached to the RFP were "rather mature," they contained "many open ends" requiring a joint effort by all involved to further define the specifications. Mr. Ebl considered (1) that the SAFENET I standard was fairly mature, (2) that the SAFENET II standard was one-half to two-thirds firmed up, and (3) that the Futurebus+ standard had preliminary definitions but required considerable work on the signaling between modules on the backplane. Litton decided to bid on the contract because it felt that its participation would provide its personnel with sufficient familiarity with the NGCR program to make Litton competitive with respect to future commercial and military opportunities. (Tr. 6/155, 173-76)

50. On 8 August 1989, Litton submitted its cost proposal in the amount of $2 million. It noted that, with a $2 million ceiling, the prototype contract would require significant investment by Litton and Force. Force and Litton agreed that each would receive

$1 million. A Litton IR&D program for "Fiber Optic Technology" paralleled the design effort for part of the prototype effort and was part of the Litton investment not included in the cost proposal. Force projected that its total price of performance would be $3,767,704 and that its share of investment would, therefore, be $2,767,704. (R4, tabs 614, 615)

Contracting Officer Questions

51. On 24 August 1989, the contracting officer sent CCT a series of "Technical" and "Contractual" questions relating to its proposal, and requested written responses. Contractual question 6 stated:

> As noted in the synopsis for [the RFP], "SPAWAR estimates the cost of meeting the requirements of this RFP is far in excess of the planned $2 million contract award price for each contract." Please provide an explanation of the financial and management resources your firm plans to use to ensure the successful completion of the requirements set forth in [the RFP].

(R4, tab 11, encl. 2)

52. CCT responded under cover letter of 1 September 1989. Its response to Contractual question 6 included the following:

> [CCT] has been in the firm-fixed price design and development arena for the past ten years. Our designs have been predominantly oriented for the military community in general and have been extensively based on current state of the art technologies. We are fully cognizant of SPAWARs [sic] estimate that the cost of meeting the requirements of this RFP is far in excess of the $2 million award price for each contract. We do not dispute this fact. Furthermore we are aware that the design effort for such a task for a medium to large size company would fall somewhere in the $3 to $5 million dollar range.
>
> There are several significant factors which clearly support a low cost completion approach to this project which have been embodied in the proposal which we provided to the Navy. First, the microprocessor platforms which we have selected for the NGCR functional backplane have already been developed in the case of the 29K RISC processor or are in process of development, in the case of the 68030 processor, in parallel,

> ongoing programs/products. This fact alone results in extensive cost savings relative to these items, as well as the off-the-shelf availability of the NTDS and SAFENET modules. Secondly, we have the in-house technical expertise to rapidly develop the Futurebus+ interface daughtercard modules for each of these boards. These items, taken together in a normal large company environment, might approach several million dollars in and of themselves whereas in our case, they represent several hundred thousand dollars given our proximity to these technologies, our in-house technical capability and low cost (competitive) company and management structure.
>
> . . . While we recognize the cost and management challenge on this, as with all programs, please be assured that if our experience and judgement [sic] proves erroneous, we have carefully weighed and analyzed all risks attendant with this program and will absorb any attendant costs.
>
> We view the NGCR Program as a technology design and development and validation project and have accordingly priced this effort on a cost only (no fee) basis. . . .
>
> CCT views the development of all of its products from the perspective that if required, investments or cost contributions on the part of the corporation can and will be made. We do not view that as a necessity on this program given the pricing provided. Our proposal, past experience, and technical capabilities, we believe, speak for themselves in the sense that we have offered the Navy a technically superior, low risk, solution to this solicitation. [Emphasis in original]

(R4, tab 12, encl. 2)

53. On 24 August 1989, the contracting officer sent Raytheon a series of "Technical" and "Contractual" questions relating to its proposal, and requested written responses. Along with a cover letter dated 1 September 1989, Raytheon submitted its responses to the Navy's technical questions. Following its responses to specific questions, Raytheon included the following "SUMMARY COMMENT."

> While it is true that the Navy . . . did advise that "SPAWAR estimates the cost of meeting the requirements of this RFP is far in excess of the planned $2 million contract award price for each contract", this acknowledgment, in and of itself, does not

> absolve the Government of the responsibility as set forth in the Federal Acquisition Regulations to ensure that contractors receive impartial, fair and equitable treatment (FAR 1.602-2 (b)). FAR 16.202-2(d) advises that a fixed price contract is suitable for use when performance uncertainties can be identified and reasonable estimates of their cost impact can be made. Raytheon's responses . . . are an attempt to bound the performance uncertainties attendant to the NGCR Program. Raytheon is willing to accept its responsibilities under any contract to which it is a party; however, we have an equal obligation to keep those responsibilities within reasonable bounds. At the same time, the Government has an obligation to insure that its monopsonistic power is not utilized in a way that entices contractors into economically destructive contracts.

(R4, tab 362 at 20)

54. Raytheon later submitted its responses to the Navy's contractual questions. The Navy's contractual question 7 to Raytheon was the same as the question 6 posed to CCT, as related above. Raytheon responded that it recognized its obligations to meet all of the contract requirements and that it had the financial and management resources to ensure the completion of the NGCR program. It pointed out that it was an $8.2 billion company and it listed and described the experience of its own and its subcontractors' company divisions and personnel that would be involved in performance. Raytheon stated that it recognized the validity of the Navy notice that the costs of meeting the RFP's requirements were far in excess of the planned $2 million contract award price, and it continued, as follows:

> . . . In view of this situation, the prime approach taken by [Raytheon] and its subcontractors to meet the requirements of the program is to make maximum use of development efforts that have been completed or are underway to meet multiple purposes utilizing other sources of funds. The anticipated contract, which is addressed in our technical and cost proposals, in turn will cover specifically only those tasks that are required to extend and apply the cited development efforts to achieve the end requirements of the RFP and the associated deliverables.

Raytheon also observed that it was absorbing estimated costs of $243,685 and a fee of $270,000, and that it estimated the value of its IR&D effort and that by subcontractors was several times the value of the prototype contract. The Raytheon response also stated:

> . . . we are willing to make the necessary commitments to insure the program's success. It must be noted that as indicated in our letter of 01 September 1989, the inclusion of open ended requirements which can be invoked without any limitation severely strains that commitment. Our position is to bound these performance uncertainties by applying reasonable limitations to these requirements without denying the Navy needed services and support.

(R4, tab 361)

55. On 24 August 1989, the contracting officer sent Litton a series of "Technical" and "Contractual" questions relating to its proposal, and requested written responses. The Navy's Contractual question 13 to Raytheon was the same as the question 6 posed to CCT, as related above. Litton responded to the Contractual questions by letter of 7 September 1989. Its response to question 13 stated that Litton recognized that the cost of performance would exceed $2 million, that it would continue its IR&D programs for SAFENET I and II designs, and that "it will supplement the contract funding for the NGCR program as necessary out of company funds." It stated the following regarding Force, its planned subcontractor:

> . . . Force Computer, being a commercial company with over $30 million on [sic] sales, normally devotes a large percentage of its sales in developing new products. Therefore, the resources are not only available but they are used in significant amounts for investment in product development.

(R4, tab 617 at 3)

<u>Contract Award</u>

56. On 13 October 1989, the Navy awarded CCT the captioned contract on an incrementally funded, firm fixed price basis, for $1,978,553. The contract required CCT to produce and sequentially deliver five prototype systems in accordance with the interim Futurebus+ Backplane standard and the SAFENET I and II standards attached to the contract, with support software and cable sets, a user manual, accompanying data, prototype system repair services and technical support services. The contract required delivery of the first prototype system within 12 months of the contract date and delivery of the remaining 4 prototype systems within 18 months, 19 months, 20 months and 21 months of the contract date, respectively. (R4, tab 1)

57. The Navy simultaneously awarded two materially identical contracts to Raytheon and Litton (R4, tabs 607, 619). The Raytheon contract included the following:

> Raytheon company has on-going Independent Research and Development (IR&D) programs that will benefit the subject procurement and have multiple application to Raytheon products for other U.S. Government and/or commercial customers. Notwithstanding the specific requirements of the Statement of Work (SOW), the scope of work and pricing of this contract do not not [sic] duplicate or include specific efforts that are planned to be done as such IR&D. The list below identifies those areas of the SOW scope which will be satisfied by Raytheon's IR&D technology.
>
> . . . .
>
> This acknowledgement of Raytheon's on-going IR&D programs does not in any manner limit the government's rights or any of the contractor's duties under any other section of this contract.

(R4, tab 607 at 2-3)

58. The three contracts were funded solely with FY90 Navy RTD&E appropriations. They contained standard FAR clauses found in fixed-price research and development contracts and included the "FAR 52.243-1 Changes - Fixed Price - ALT V APR 84" clause. The contracts' Order of Precedence clause included the following order of precedence: (a) Backplane, SAFENET I and SAFENET II Standards*; (b) SOW; (c) Specification. The contract included the asterisk at the end of item (a), with reference to the following statement: "Any conflicts among these documents will be resolved in accordance with procedures set forth in paragraph 3.4.6 of the SOW." (R4, tab 1; tr. 2/49-50, 3/140-43, 176-80)

59. In awarding identical contracts to three contractors, the Navy sought to obtain three independent design implementations of Futurebus+ based prototypes in order to validate these systems (compl. & answer; tr. 1/17-18).

60. At the time of contract award, the Navy and each of the three contractors believed that prototype systems could be implemented by the contractors. All three contractors' technical proposals informed the Navy that prototype systems could be built to the draft interim standards and the Navy relied upon those representations. Raytheon and Litton recognized the challenge of interoperability at the time of proposal submission. Raytheon understood prior to contract award that only limited interoperability might be achieved at some level and Litton's technical proposal also recognized that interoperability presented a major challenge. The Navy believed that the interim standards could be used to

build hardware, but that the prototype systems built by each contractor would not be interoperable at the time of award and that the purpose of the interoperability working groups was to identify the standards' deficiencies affecting interoperability and to develop the standards to achieve interoperability. At the time of contract award, the Navy knew that referring issues affecting the interim standards to the appropriate working group might pose a risk to the schedule, but nevertheless required CCT and the other prototype contractors to make the referrals and to deliver the first prototype systems within the required 12 months. At the time of award, the Navy believed that prototype systems could be delivered within the required 12 months despite the interim nature of the standards and the lack of Navy control over the working groups which would be developing the standards. (R4, tabs 604, 613; ex. A-1 at 14, 35-36; tr. 2/38-39, 46-52, 68-70, 98-101, 134-36, 3/58-59, 4/92-94, 6/13-14, 45-48, 80-81, 98, 155-56, 175-76, 7/191-92)

61. Raytheon's Mr. Bunker interpreted the SOW section 3.4.5 requirement that the contractors' project engineers "participate and support" the working groups to mean more than making presentations of problems that had arisen in the interoperability group. He considered that it included actively working to understand the specifications, attending committee meetings, making suggestions, engaging in engineering discussions, obtaining consensus, and voting on the specifications and on the drafts. (Tr. 6/95-96, 118-19)

62. Litton's Mr. Ebl interpreted the SOW section 3.4.5 requirement to include attendance at SAFENET meetings, IEEE Futurebus+ meetings, the Navy operating system meetings and to be active participants in those working groups. He understood active participation to include working on the specifications with other members of the committees. (Tr. 6/152)

63. When the Navy awarded the contracts on 13 October 1989, it did not attach to the contract one of the interim standards, IEEE P896.2 Draft 3.0, nor did it attach IEEE P1212 (R4, tab 1; 7/52-53). Section 8 of IEEE P896.1 Draft 8.0, which was attached to the contract, specified CSRs for each module. Section 8 contained the following note: "(Note: due to a recent computer failure, a more recent version of this chapter was not available in time for inclusion in this document)." (R4, tab 1, attach. D at 8-1) At the time of contract award, the IEEE Futurebus+ Working Group was in the process of restructuring and updating the P896.1 specification (R4, tab 389). CCT expected to receive the missing information soon after contract award (tr. 7/53).

64. The interim standards attached to the contract provided for and purported to ensure system interoperability (R4, tab 1, attach. E, sec. 0 at 4; sec. IV at IV-2, IV-24, IV-65, sec. V at V-12 through V-16, V-24, V-26, sec. VI at 6, 18, 19, Appendix B at 3, 5; attach. F, sec. I at 2, sec. II at 3, sec. IV at 6, 18, 19, 24, 25, 27, Appendix B at 3 through 5; R4, tab 68 at 7, 10, 43, 47, 48, 50; tr. 2/47-48, 6/64-66, 68-70, 112)

65. It was not possible to design an interoperable prototype system until the contractors received an adequate version of IEEE P896.2 and adequate definitions for the CSRs (R4, tabs 281, 389, 391, 415; ex, A-1 at 30, 34-38, 42-44; tr. 2/53-54, 98-102, 122-24, 4/16-21, 26-29, 32-39, 92, 6/49, 7/178-79, 192.

Government NGCR Personnel

66. Ms. Dina Hyde, a contract specialist at SPAWAR, ran the NGCR prototype procurement (tr. 1/41, 45, 47). The contracting officer, Mr. Michael Geist, delegated responsibility for running the NGCR prototype procurement to Ms. Hyde (tr. 3/112-18). Typically, Ms. Hyde would review fixed-price proposals to determine price reasonableness and realism. This RFP was not typical because cost had no weight and offerors could not bid more than $2 million. (Tr. 1/43) Ms. Hyde accepted as plausible CCT's rationale as to how it felt it was able to perform for less than the $2 million in the contract. She understood that, like the other contractors, CCT planned to leverage existing technology developed at private expense or through other programs. (Tr. 1/44-49) She did not believe that the prototype contractors would have to undertake a significant development effort (tr. 1/74-75).

67. Ms. Hyde served as the contract specialist responsible for administering the contract until the fall of 1990. She attended the post award conference, but did not attend any other post award meetings with the prototype contractors. (Tr. 1/51, 75-76) Mr. Murdock served as COTR throughout performance of the contract (tr. 2/79-80). He attended post award meetings with the prototype contractors which were not attended by Ms. Hyde. Mr. Murdock did not necessarily keep Ms. Hyde apprised of what he learned during the post award meetings with the prototype contractors because Ms. Hyde believed that she had no need to know of the discussions, which she felt would "probably" be technical. (Tr. 1/76-77)

68. Mr. Matt Barringer, an engineer at Naval Avionics Center (NAC), Indianapolis, and Mr. Karl McClure, an engineer at Naval Surface Warfare Center (NSWC), Crane, provided technical advice and support to Mr. Murdock throughout contract performance (ex. A-1 at 17-18; tr. 2/150-51, 7/177-78). Messrs. Murdock and Barringer participated in the preparation of the SOW. For approximately three years, Mr. Barringer sat on the joint Navy/industry working group responsible for developing the interim Futurebus+ backplane standard attached to the contract. (Ex. A-1 at 5-6, 8, 30; tr. 2/83-86)

69. Ms. Betty Cawthorn served in the position of contract specialist beginning in the fall of 1990 (tr. 1/66). In administering the contract, she interacted with Mr. Murdock on a regular basis (tr. 3/144).

Contract Performance

70. Unisys participated on both the SAFENET and Futurebus+ working groups prior to award of the contract (tr. 4/13-14). Both Raytheon and Litton were active participants on the same groups prior to award (tr. 6/8, 144-45). Litton and Raytheon's participation in the working groups helped formulate, develop, mature, and give definition to the standards over the course of the prototype contracts (tr. 6/96, 152).

71. CCT had no presence on any of the working groups prior to contract award. During contract performance, CCT made presentations to the working groups about problems which had been raised at the Interoperability Group. At times, the Navy forwarded to CCT drafts of work accomplished at the working groups. CCT made no presentations to the SAFENET committee prior to awarding a definitized purchase order to Unisys on 1 May 1990. (R4, tab 623; tr. 3/66-67, 7/181-82)

72. For approximately four years, Mr. Steven Markheim served as the NGCR Program Coordinator between SPAWAR and the Office of Chief of Naval Operations (tr. 1/8-10). In late October 1989, he attended orientation meetings between the Navy and the prototype contractors. Mr. Markheim prepared a trip report in which he described the architecture proposed by each of the contractors and indicated, generally, that each of the contractors would be funding the effort in the amount of $4 to $5 million. Those figures were given to Mr. Markheim by Mr. Mendenhall, and Mr. Markheim did not discuss specific amounts with any of the contractors. He wrote that each of the contractors had given essentially the same explanation that the investment "gives them an up front opportunity to market and compete with their products." He further wrote that "CCT, a small business concern centering its marketing strategy on emulating current standards . . ., is interested more from an entry point into the market place." CCT's Mr. Jackson related that information to Mr. Markheim. (R4, tab 608; tr. 1/19-22, 26, 34-36)

73. During its orientation briefing, Raytheon raised interoperability issues, including those which it had raised in its technical proposal; Raytheon also made recommendations (R4, tab 300). Many of the interoperability problems Raytheon anticipated in its proposal and in its orientation briefing became issues during performance (R4, tabs 389, 604; tr. 6/77-78, 87-88).

74. Interoperability Working Group meetings were held with attendance by CCT, Raytheon and Litton, their subcontractors and Government representatives on at least 28-29 November 1989 (R4, tab 215), 16-17 January 1990 (R4, tab 218), 19-20 March 1990 (R4, tab 219), 24 May 1990 (R4, tab 221), and 17 and 26 July 1990 (R4, tab 223). Other conferences were held telephonically (ex. A-1 at 42). Mr. Clark was CCT's representative at the first two Interoperability Group meetings and also participated in most telephone conferences. CCT's Mr. Jackson did not attend any of the meetings. Mr. Andersen of Unisys, CCT's SAFENET subcontractor, did not attend any

Interoperability Group meetings until the fourth meeting on 24 May 1990. Mr. Ebl of Litton, Mr. Bunker of Raytheon and Mr. McClure of the Navy attended all of the meetings. (R4, tabs 215, 218, 219, 221, 223; tr. 4/101, 6/98, 145)

75. Issues raised to the Interoperability Working Group were assigned Interoperability Problem Report (IOP) numbers. From 27 November 1989 to 28 February 1981, 87 reports were filed; the final two reports were filed on 15 August 1991. The reports contained a description of the problem, a recommended resolution, the date by which resolution was required, and the ultimate resolution. The reports were signed by the Navy employee assigned to keep the reports and by CCT, Litton and Raytheon representatives. (R4, tabs 266, 629; ex. A-1 at 27)

76. The signatures on the IOPs represented the consensus of the Navy, CCT, Litton and Raytheon that the technical resolution was adequate to meet the particular problem. These agreements were considered to have no contractual significance unless they were included in a contract modification. (Ex. A-1 at 28; tr. 3/107-08)

77. The contract contained no provision requiring CCT or any of the prototype contractors to further develop the interim standards or to correct deficiencies in and among the interim standards; representatives of the Navy and of all the prototype contractors had that understanding (R4, tabs 1-7; ex. A-1 at 26; tr. 2/45, 57, 112, 3/10-11, 6/49, 117-18, 166-70, 7/99-100, 193).

78. During the Interoperability Working Group meetings, the Navy told CCT and the other prototype contractors to follow the newly revised standards as they were issued (R4, tabs 297, 389; tr. 4/53-54, 6/153-54).

79. The issues raised at the first Interoperability Working Group meeting on 28-29 November 1989 were largely those identified by Raytheon in its proposal and in its orientation briefings and reflected possibly defective or incomplete interim standards. For the most part, the issues were those that CCT later claimed constituted specification defects. The issues included CSRs, Global Clock Synchronization, Byte Ordering Convention, Module Size, Monarch Selection, Power Fail Arbitration Message, Intermodule Pitch, and the Recommended Navy Profile Document. (R4, tabs 215, 608; tr. 2/104-05, 202)

80. On 19 December 1989, CCT issued a purchase order to Unisys in the amount of $100,000 for "ONE MANYEAR OF ENGINEERING SERVICES TO SUPPORT CCT NGCR SAFENET DEVELOPMENT." Unisys was to commence work on that date and the parties were to enter into a definitized agreement at a later date. (R4, tab 645) Unisys' Mr. Andersen commenced supporting CCT's effort from that date (tr. 4/14-15).

81. On or before 8 January 1990, the SAFENET working group "invited" the prototype contractors to make presentations to the SAFENET working group on 25 January 1990 (R4, tab 291).

82. The contract's SOW required the implementation of only the bottom four layers of seven layers of SAFENET. On 11 January 1990, the contracting officer issued a draft modification to the three prototype contractors which included the addition of a new requirement to implement all seven layers of the SAFENET ISO (International Organization of Standards) at no cost to the Government. On 16 January 1990, the Navy opened IOP 44 concerning implementation of all seven layers of the SAFENET stack. The Navy was aware that implementation of the proposed modification would result in increased costs to the contractors (the Navy estimated the cost to be $2 million for each contractor) and that the contractors would contend that the proposed modification was beyond the scope of the contracts. Nevertheless, it issued the draft modification at no cost in order to receive the contractors' cost estimates. (R4, tabs 20, 208, 293; tr. 7/195-200) Each of the contractors responded that the addition of the requirement was unacceptable, beyond the scope of the contracts, and would require significant additional funding and schedule extension (R4, tabs 23, 288, 620; tr. 7/187). After receiving the responses, the Navy dropped the matter and closed IOP 44 which, it said on 19 March 1990, had become a "contractual issue" (R4, tab 266 at Bates 544; tr. 6/180, 7/187-88).

83. In a 30 January 1990 letter to the contracting officer, CCT noted a slippage of the date for the Preliminary Design Review (PDR) and warned that any additional delay would have "further programmatic impacts" on its performance (R4, tab 290; tr. 1/63-65, 7/104-06).

84. At the PDR conducted on 6-7 February 1990, CCT reported that its hardware detailed design status was 60 percent complete for Futurebus+ and 20 percent complete for SAFENET with the schematic layout for the same items being 40 percent and 20 percent completed respectively (R4, tab 49, ex. 33).

85. On 12 February 1990, CCT sent a preliminary statement of work for development of the SAFENET I and II modules for the prototype contract to four potential suppliers, including Unisys, Martin Marietta and Ferranti (R4, tabs 631 to 634).

86. The Futurebus+ P896.1 specification, which was not available in current form at the time of contract award because it was being revised by the IEEE Futurebus+ Working Group, became available in usable form on 14 February 1990 (R4, tab 389).

87. On 8 March 1990, CCT's project engineer advised the Navy that CCT would not make a presentation at the SAFENET Working Group meeting on 22 March 1990 because it was still in negotiations with three potential subcontractors for the NGCR SAFENET requirements. The letter stated that CCT would "endeavor" to make a presentation with its

subcontractor at the May SAFENET meeting. (R4, tab 623) CCT's Jim Moidel attended the 22 March 1990 meeting (R4, tab 212).

88. One of the action items assigned at the third Interoperability Working Group meeting stated that the "contractors were tasked with jointly creating a Network Independent Interface (NIIF) based on Futurebus+ by April 20, 1990" (R4, tab 219).

89. By the time of the third Interoperability Working Group meeting in March 1990, it was apparent that the process established in section 3.4.6 of the SOW for resolution of issues affecting the interim standards would not provide results in a time period consistent with the contract delivery schedule. The Interoperability Working Group would identify issues affecting the standards and take them to the standards bodies, such as the Backplane and SAFENET working groups. However, the pace of decision-making by the standards bodies was slow, often took months, and proved unable to adequately or timely resolve issues affecting the interim standards which had been referred by the Interoperability Working Group. The reasons for the delays included the complexity of the issues, the involvement of the IEEE and the lack of motivation by the commercial standards bodies (served on a volunteer basis) to quickly respond. (R4, tabs 389, 413; ex. A-1 at 25-26; tr. 2/37, 102-04, 134-35, 6/46-47, 52, 55-56, 99, 103, 160-62, 7/102, 182, 185, 206-07)

90. The Navy could not dictate to the IEEE when to publish the standards. Since it was not in a position to drive the schedule of the commercial standards development, it was up to the prototype contractors in the Interoperability Working Group to "put a stake in the ground" and make decisions regarding implementation of the standards for purposes of continuing the contract work. (Tr. 2/37-38, 7/185-86)

91. At some point prior to May 1990, despite the ongoing functioning of the SAFENET and Backplane working groups, Raytheon determined that it was necessary to make decisions within the Interoperability Working Group as to details in building the prototypes so that contract performance could be achieved (tr. 6/104-05).

92. By May 1990, the prototype contractors and the Navy recognized that delivery of the first prototype system could not be accomplished within the required 12 months. Work on the prototype contracts was delayed due to delays in completion of the industry standards documents and the inability of the appropriate working group to provide resolution in a reasonable time to issues affecting the interim standards raised by the Interoperability Working Group. The open issues were in both the Backplane and SAFENET standards. (R4, tabs 389, 414, 423; tr. 6/180-81) Upon direction by the Navy's Mr. Murdock that the prototype contractors had to take control to resolve outstanding issues, the prototype contractors and the Navy agreed to define amongst themselves the baseline so that each contractor could proceed with building and delivering hardware (tr. 2/111-12, 3/96-105, 4/34-35, 6/106, 153-55, 7/185-86).

93. Two of the issues delaying design implementation at that time were CSRs and the NIIF. CSRs are the mechanism used in the Futurebus+ environment to communicate across the backplane between various components. Among the issues, determinations had to be made about (1) the definition of the bus specific CSR register space within the Futurebus+ address range, (2) the number of required Futurebus+ registers for interoperability, and (3) which settings to employ for the registers from the options or profiles existing in the standard which were not fully defined. Raytheon's Mr. Bunker developed a list of standard CSRs that each of the contractors agreed would be used for the settings. (R4, tab 629, item 12; tr. 4/33, 6/107-08, 161-62)

94. NIIF is a required interface of SAFENET between the SAFENET transportation layer and the Futurebus+ backplane that defines how one module works with another. At the time of contract award, the SAFENET I and II standards referenced the NIIF specification as the source for defining Connectionless Mode Data Transfer Services (which provides the user with the ability to transmit a single unit of data without the requirement of establishing a connection) and Connection Mode Data Transfer Services (which provides the user with the ability to establish, use and terminate connections to other user entities). At that time, the draft standard did not define the interface. At some point, all of the participants realized that there would have to be a NIIF addendum created for Futurebus+ and, under the leadership of Mr. Andersen of Unisys and the Navy, the Interoperability Working Group prototype contractors participated in developing a Futurebus+ based NIIF specification. (R4, tab 1, attach. E, tab 266, IOP 32A, Bates 416, tabs 285, 286, 418, 427; ex. A-1 at 33, 39; tr. 2/36-37, 57-59, 155, 3/151-52, 4/16-18, 6/109-10, 162-63, 7/133-36)

95. By letters to Raytheon and Litton dated 9 May 1990, the Navy noted that hardware deliveries under the prototype contract would "not be in accordance with the contract schedule" and requested that the contractors describe their efforts "to correct the schedule deficiency," provide a "recommended schedule for hardware deliveries," and describe "all alternatives available that comply with the contract schedule" (R4, tab 394).

96. On 24 May 1990, Raytheon responded to the Navy's 9 May 1990 letter. It cited the incompleteness of, and lack of definition in, both the Backplane and SAFENET standards and delays in responses from the working groups. Raytheon further listed specific issues relating to each of the standards. The letter listed examples of Backplane issues which, due to "incompleteness of the Navy's Backplane standard and the Futurebus+ specifications it references necessitated the definition by SPAWAR of many of the requirements in the Interoperability Working Group." Raytheon stated:

> Raytheon recognized that it was not possible to develop a prototype that would be interoperable using the existing Backplane standard, and as specifically required by the contract, these issues were formally raised by Raytheon at the

> Interoperability Meeting on November 28, 1989 . . . . The current status of the items is that partial resolution was provided at Second Interoperability Meeting on January 16, 1990, and final resolution at the Third Interoperability Meeting on March 20, 1990. Waiting for the final resolution of these items contributed to the delays in the Backplane requirements baseline.
>
> The Futurebus+ specification, which is required by the Backplane standard, was in the process of major restructuring and update by the IEEE Futurebus+ Working Group at the time of NGCR contract award. At the Interoperability Working Group meetings SPAWAR recognized this and indicated the updated version of these specifications should be used for NGCR as documented in SPAWAR's meeting minutes. A key item is the IEEE P896.1 document which describes the base protocols. It was not available in usable form until 14 February 1990.

Raytheon then listed outstanding key SAFENET issues and, in part, stated:

> Raytheon recognized that with these open issues an interoperable SAFENET I/O was not possible and raised these and other issues at the Interoperability meetings as required by the contract and as clearly documented in the meeting minutes. Our schedule was then impacted because the issues brought to the SAFENET Standard Committee have not been resolved in a timely manner. For an example, the NIIF issue was raised by Raytheon/Ferranti as Item 32 at the 28 November 1989 meeting and the SAFENET Working Group did not respond with a VME/NIIF proposal until 20 March 1990. This proposal was not usable in the present form. It required extensive modifications, and SPAWAR assigned two people to assist the contractors in accomplishing the modification task.

The Raytheon letter attached a Table 3, entitled "EFFORTS TAKEN TO COMPLY WITH SCHEDULE," which listed issues including the following: (1) Futurebus+ P896.2 lacked definition of CSRs required for NGCR prototyping; (2) P896.2 did not specify how to synchronize distributed clocks on Futurebus+; (3) Futurebus+ physical layer specifications were overly restrictive in some areas and could not be implemented as specified; (4) NIIF was not defined for Futurebus+; (5) Dimension tolerances specified in P1101.2 for Metral connector were not implementable. (R4, tab 389)

97. CCT notified Mr. Murdock about deficiencies in the interim standards at its Program Management Review Meeting (PMR) of 30-31 May 1990 (R4, tab 49, ex. 6; tr. 7/105-06).

98. By letter dated 8 June 1990, CCT provided Unisys a purchase order, dated 1 May 1990 and signed by CCT's Mr. Jackson on 2 May 1990, for SAFENET design and development support for the CCT prototype contract at a firm fixed price of $170,000. This purchase order definitized the December 1989 purchase order between the parties. It enclosed a Statement of Work, dated 17 April 1990, which provided that Unisys would design the Ring Interface Module for CCT, CCT would procure components, build the Ring Interface Modules, and provide documentation to Unisys showing which I/O pins on the Futurebus+ connector were to be used to support full VSB capability between the Ring Interface Module and the Protocol Processor Module. CCT was required to provide Unisys with a test bed to expedite production and integration of the modules. Unisys would debug the Ring Interface Modules produced by CCT to Unisys design specifications and CCT would design all System Acceptance Tests. The purchase order contained a delivery schedule which called for delivery of the SAFENET modules to CCT beginning prior to 13 October 1990 and concluding on 3 December 1990. CCT and Unisys took measures to ensure delivery of the SAFENET modules within the original contract delivery schedule. (R4, tab 452; tr. 6/206, 210-13)

99. By letter dated 8 June 1990, CCT included its "revised/rebaselined program schedule as discussed during the CCT Program Management Review held on May 30-31, 1990." It reflected a "six month slip," from 15 October 1990 to 15 April 1991, for delivery of the first prototype system and a 60-day slip in delivery of prototypes two through five. CCT identified "seven impacting items" resulting in schedule delay and stated that it considered six of those to be "completely uncontrollable on the part of CCT." Of the total listed schedule impact of 22 to 32 weeks, the two issues identified with the greatest schedule impact were the NIIF interface for SAFENET I and II (6-8 weeks) and CCT's subcontract negotiations with Unisys (4-6 weeks). (R4, tab 29)

100. With regard to NIIF, the letter stated that implementation of the NIIF interface for SAFENET was an undefined requirement in the specifications "which was mandated by the Navy to be implemented to support the deliverables" under the contract; that CCT engineering "was forced, in essence to define the specification for NIIF in order to allow for design implementation"; that, while "' [d]esign implementation' for adequately defined specifications is clearly a requirement of our contract," "' [s]pecification definition' is not considered part of the contractual scope within CCT's contract under NGCR." The letter stated that, under the assumption that "there are no additional undefined areas of the Safenet Specifications which would preclude design implementation," CCT's revised schedule "should be readily achievable." (R4, tab 29)

101. The contract specialist, Ms. Hyde, discussed CCT's letter of 8 June 1990 with Mr. Murdock and brought it to the attention of Mr. Geist, the contracting officer (tr. 161-62). The contracting officer did not respond to CCT's 8 June 1990 letter.

102. At different points during performance, the Navy and each of the prototype contractors discovered that defects in the interim standards attached to the contracts made it impossible to develop interoperable prototype systems based on those standards (R4, tabs 389, 391; ex. A-1 at 30, 35-38; tr. 2/53-54, 98-104, 122-24, 6/45-46, 120-25, 165-66, 7/178-79, 192). During program review meetings, CCT, Raytheon and Litton notified the Navy about defects in the interim standards (tr. 7/201-03). Confirmation of the defects came only with the passage of time because of the complexity of the specifications and the inability of the working groups to respond to issues raised by the Interoperability Working Group, causing problems due to the cumulative effects of unresolved issues (tr. 6/45-47, 103, 134-36, 4/92, 6/160, 7/178-79).

103. The Navy, at the time of contract award, did not expect the magnitude, or complexity, of the problems encountered by the prototype contractors regarding the interim standards attached to the contract (tr. 2/55, 134-36, 6/81-82, 7/209-10). However, the Navy also believed that the prototype contractors, at the time of contract award, would have a greater understanding of the problems than would the Navy because of their experience and expertise in building hardware to specifications (tr. 2/55-57).

104. Of the 89 issues that became the subjects of IOPs, at least 42 issues involved "standards refinement" or "standards compatibility." The remaining issues involved "implementation problems." (R4, tab 443)

105. Defects in and among the interim standards that precluded interoperability included: (a) problems with specifications in the Backplane standard for CSRs, Global Clock Synchronization, Byte Ordering Convention, Module Size, Monarch Selection, Power Fail Arbitration Message, Intermodule Pitch, and the Bus Interface Unit (R4, tabs 389, 391, 415, 424; ex. A-1 at 34-35, 37-38, 42-44; tr. 2/101-02, 4/18-22, 26-39, 6/53-59, 71-72, 132, 160-62); (b) problems with the specifications in the SAFENET I and II standards for Media Access Controller (MAC) addresses, Network Timing Protocol (NTP), NIIF, Express Timing Protocol (XTP), Global Time Synchronization, and Power Budget (R4, tabs 389, 391, 415, 425; tr. 2/143-45, 4/14-24, 26-35, 54-55, 73-75, 80, 91, 6/53-59, 132, 164-65); (c) problems with the electrical specification in the Futurebus+ System Layer Specification (IEEE P896.2) (R4, tabs 415, 424, 611; tr. 3/34-35, 4/36-39, 50-51); (d) inconsistencies within the standards, including lack of NIIF, addresses specified for NTP in the SAFENET Standards, XTP maturity shortfalls, and Global Time Services among the Backplane and SAFENET I and II standards (R4, tabs 435, 437; ex. A-1 at 49-50; tr. 2/154-55, 6/53-59); and (e) "moving" or "unstable" standards, generally (R4, tabs 435, 437; ex. A-1 at 52).

106. On and after 14 May 1990, Navy program personnel, in a "lessons learned" context, acknowledged internally that the prototype contracts had been let approximately one year too early because of shortcomings within the interim standards attached to the contracts. The shortcomings were described as "incomplete specifications" rather than "unknown holes or quirks" in the standards. (R4, tabs 415, 416, 434, 437; ex. A-1 at 45-48; tr. 2/59-60, 7/203-05). The NGCR program office did not disclose that opinion to the contracting officer (tr. 3/153-55).

107. On or about 18 September 1990, CCT and the other prototype contractors requested that the Navy delete the SAFENET I requirement because (a) they could not find users for the SAFENET I product, (b) the TI chip set did not support the 802.5C reconfiguration as then currently defined, and (c) they did not want to expend resources on a product they could not market. The Navy denied the requested relief. (R4, tab 274)

108. In the fall of 1990, Mr. Gilbert Field became the branch head of the contracting office responsible for administering the contract. Mr. Murdock met with Mr. Field approximately once every three weeks. (Tr. 3/136-38)

109. Unisys did not deliver the SAFENET I and II modules to CCT in October 1990 as prescribed by the May 1990 purchase order. It did not deliver the modules until December 1991. (Tr. 7/113)

110. On 1 November 1990, approximately two weeks after the first prototype system was scheduled for delivery under the contract, the Navy's Mr. Field asked DCMAO not to issue DLA Form 1654 (Delay in Delivery) because the delay was due, in part, to actions by the Government and difficulties in coordinating the three contracts. Mr. Field advised that SPAWAR planned to issue a contract modification extending the delivery schedule of the contract without monetary compensation. (R4, tab 329)

111. On 19 November 1990, the Navy notified CCT that the Critical Design Review (CDR), then scheduled for 27 and 28 November 1990, was being canceled. In a letter dated 5 December 1990, CCT advised the Navy: that the SOW required the CDR to be conducted "not later than 360 days after contract award; that that time period ended in mid-October 1990; that all parties had agreed upon the November dates; that CCT had spent much time preparing for the CDR and had, upon Navy request, submitted some preliminary data; that the Navy's reasons for the cancellation were "insufficient to warrant a delay"; and, that the Navy's action "may have consequential program impacts, both financially and upon the scheduled deliveries." (R4, tab 35)

112. Prior to 7 December 1990, the contracting officer sent CCT a proposed draft of contract Modification No. P00004. In response to the draft modification, CCT proposed the following "clarifying statement with respect to this and future incorporated updates to these documents:"

> Incorporation of these updated documents and specification references does not authorize or mandate implementation of any changes to the current definitized contractual requirements as defined in the contract statement of work, specifications, including CCT's original proposal response and all approved design baseline parameters. (This would include tailored design implementation reflected in Interoperability Meetings and closed Interoperability Reports.)

CCT also requested additional compensation for extended maintenance coverage. (R4, tab 268)

113. On or about 1 February 1991, Ms. Cawthorn, Mr. Murdock and Mr. Jackson held a telephone conversation concerning CCT's response to the proposed draft of Modification No. P00004. During the conversation, CCT continued to request that language be included in the modification clarifying that CCT would not be required to implement design changes arising from the revised standards being incorporated into the contract. The Navy agreed to the language and, on 22 March 1991, CCT agreed to waive any claim arising from the Navy's three-month postponement of the CDR. The damages arising from the postponement included only costs associated with rescheduling the CDR, including the three-month delay and the updating and regeneration of agendas and program review materials. (R4, tabs 46, 268; tr. 2/91, 7/112-13, 162-63)

114. The CCT CDR was held on 5-7 February 1991. At that time, CCT informed the Navy that its schedule was further delayed in the total amount of 18 to 29.5 calendar weeks and that it incurred a "cost impact" of $210,000 to $300,000 due to the following issues: Design Stub Length (P896.1); Parity Error (Detection & Reporting) and Recovery Implementation; Broadcast/Broadcall Not Adequately Defined (P896.1) for Implementation; Locked Operations and Software Directed Reset Not Adequately Defined (P896.1) for Implementation; Read Partial and Write Partial Transactions Not Adequately Designed for Implementation; Managed Objects Undefined (For XTP), NIIF Not Adequately Defined (For 802.5/NTP), and an issue called "FDDI Reconfiguration Open Items." (R4, tab 39)

115. Unisys charts presented at the CDR identified issues affecting interoperability which it understood had been completed and those which were still open. The completed items were Futurebus+ NIIF Profile Specified (6/90); NIIF Directory Register Extension Specified (8/90); Addressing Structure Defined/Documented (8/90); IEEE 802.5 Wrap Specified (8/90); and NIIF Extension For XTP Specified. The open issues were Managed Objects (insufficient definition); Addressing, IEEE 802.5 (need agreement on specification); ANSI FDDI Reconfiguration; and NTP. (R4, tab 44, at last two pages)

116. CCT had not submitted any of those issues to the Interoperability Working Group which was handling both implementation and standards issues. CCT's requested schedule slippage from April 1991 to July 1991 was in line with the other prototype contractors. Beginning in April 1991, the Navy assigned an on-site representative to be resident at CCT. (R4, tab 45)

117. On 15 February 1991, the Navy's Mr. McClure prepared a trip report regarding a SAFENET briefing. The report included the following:

> . . . As can be seen in the variety of comments that were listed above there is still a lot of work to be done before the SAFENET I standard is complete. Several issues that are being worked in the SAFENET II standard should be included in the SAFENET I standard prior to the SAFENET I standard being approved. These changes are needed so that hardware and software can be designed in accordance with the standard can be implemented. [sic]

(R4, tab 273)

118. Contract Modification No. P00004, effective 23 April 1991, extended CCT's delivery schedule to 23 months for the first prototype systems and 24 months for the remaining systems. In CCT's contract, the modification also deleted SOW section 3.4.6 and replaced it with the following, with new language underscored:

> 3.4.6 Interoperability
>
> To ensure interoperability, the contractor shall meet with all other contractors for this effort and the Government to establish a forum to resolve any issues that affect interoperability. Issues concerning the backplane, operating system, and SAFENET I & II standards shall be taken to the appropriate Working Group for resolution. <u>The Working Group resolution shall be discussed during these meetings in order to achieve an implementation of the resolution which is agreeable to both the Government and the contractor. The agreed-to resolution of the interoperability issues which affect the Statement of Work, specification, or other contractual documents shall be formally incorporated in the contract. The contractual incorporation of the resolutions of interoperability issues shall reflect accurately the agreed implementation between the Government and contractor. The administrative function of contractual incorporation of updated or changed</u>

> specifications and standards does not in and of itself require implementation of any changes to the existing contractual requirements as defined in the contract Statement of Work, contract specifications, the approved design baseline, or tailored design implementations defined in the Interoperability Working Group meetings or reports. The requirements stipulated in the Statement of Work, paragraph 3.4.3, remain in full force and effect with respect to incorporation of such updates. The meeting to establish the forum to ensure interoperability will be held no later than 60 days after contract award. The interoperability of the SAFENET I & II modules will be assured by the definition during these meetings and the resulting implementation of the Application, Presentation, and Session layers of the International Organization of Standards (ISO) Open System Interconnection (OSI) Reference Model in accordance with the SAFENET I & II standards. The contractor shall assist the Government in demonstrating that the modules are interoperable among the different vendors. [Emphasis added]

Modification No. P00004 was bilateral and stated that the parties agreed "that no change to the price or other terms and conditions of the contract is required as a result of the above changes to the contract." (R4, tab 6 at 1, 3-4, 9) Mr. Field signed the modification on behalf of the Government and he testified that it did not address CCT's allegations of out-of-scope work or Government-caused delay (tr. 3/164-66, 168-69). We so find.

119. The new Interoperability section language was written by CCT's Mr. Jackson and incorporated into the contract at his request. Mr. Jackson intended the new language to "ensure and clarify" that (a) the process of incorporating specification updates or specification standards into the contract did not require CCT to effect any design changes, (b) "the contract as awarded with the interim standards, statement of work, updates, constraints and limitations contained therein were still in full force and effect, so [that CCT] did not have to implement design changes or modifications," and (c) after CCT's delivery of the first prototype system SOW section 3.4.3.2 "would be the operative limitation in terms of what types of changes and the constraints on those changes that [CCT] would be required to implement." Mr. Murdock's understanding was that the new language in the interoperability section did not change anything, including CCT's update and maintenance obligations under the contract's SOW. (Tr. 3/73-76, 7/108-11)

120. On 14 May 1991, CCT informed the Navy on-site representative that the earliest that CCT could test the SAFENET cards was two or three months from that date because of a lack of connectors, required to efficiently test SAFENET from Dupont,

CCT's supplier. (R4, tab 626) The unavailability of the connectors was due, in part, to the lack of definition in the specifications (tr. 7/44-46, 49-50)

121. On 19 June 1991, CCT reported at its PMR that its "company financial investment" was "approaching $800,000" and "estimated @ $1 million plus" (R4, tab 624). At that time, CCT's Mr. Jackson advised Navy representatives that CCT was financing out of scope efforts due to the defective nature of the specifications and substantial redesign, and that the company could not continue to do that and needed to be paid (tr. 7/108).

122. At the PMR of 19 June 1991 and 16 October 1991, CCT reported that the "pacing item" was the SAFENET modules which, after delivery from Unisys, would have to be integrated with the processors and shared memory and then integrated with the entire CCT system (R4, tabs 624, 625). Pursuant to their subcontract, CCT had provided Unisys with a test bed to keep the companies developmentally parallel with respect to the modules, which facilitated CCT's ability to integrate the modules expeditiously (tr. 6/210-13).

123. At the PMR of 16 October 1991, CCT advised of a schedule slip because Unisys would not be delivering the SAFENET hardware until 15 November 1991 and that, to allow for unforeseen problems, CCT required at least four weeks to integrate the SAFENET modules within the CCT prototype system (R4, tab 627). On that same date, a Navy representative's memorandum reflecting oral discussions indicated that the "[m]ain objective of the contract is to develop <u>specifications</u> so that other contractors can build hardware" and that SPAWAR was "not too concerned over progress—CCT seems to be accomplishing more to date than the other two contractors (Litton/Raytheon)" (R4, tab 335 (emphasis in original)).

124. In late 1991, the Navy's Mr. Murdock offered to CCT's Mr. Jackson to remove SAFENET I from its contract. Mr. Jackson replied that CCT either already had the SAFENET modules or was about to receive them and that it was, therefore, pointless to remove that contract requirement at that time. (Tr. 3/41-42, 7/113) The SAFENET I requirement was deleted from the Litton and Raytheon contracts for consideration (R4, tabs 373, 611).

125. In an internal memorandum dated 16 December 1991, Ms. Cawthorn, the Navy's contract specialist, expressed concern that Mr. Murdock had entered into "informal agreements" with Litton which violated Section G-6 (the COTR clause) of the contract. She wrote, further, that, since Litton was delinquent on its delivery schedule since 13 October 1991, the informal agreements be incorporated into a contract modification or the contract be terminated for the Government's convenience. (R4, tab 398) She also wished to terminate for convenience the CCT contract (tr. 7/211). Mr. Murdock and SPAWAR opposed the suggestion of termination because they wanted to obtain the hardware being produced under the prototype contracts (tr. 3/27-29).

126. Unisys delivered the SAFENET I and II Modules to CCT in December 1991 (tr. 7/113).

127. Contract Modification No. P00005, effective 22 January 1992, made "changes to the specifications and the Statement of Work" and extended the CCT delivery schedule "for the convenience of the Government" for three prototype systems to 22 January 1992 and for two prototype systems to 31 March 1992. The modification was bilateral and provided that no change in price or terms and conditions was required as a result of the changes to the contract. (R4, tab 7) Mr. Field signed the modification on behalf of the Government and he testified that it did not address CCT's allegations of out-of-scope work or Government-caused delay (tr. 3/164-66, 168-69). We so find.

128. CCT delivered the first three prototype systems on 7 January 1992 and the remaining two systems on 10 April 1992. The Government accepted the systems on those dates. (R4, tab 336; tr. 3/9-10)

129. Between contract award and CCT's delivery of its first prototype systems, numerous iterations of the interim standards were issued. IEEE P896.1 was revised eight times, IEEE P896.2 was revised 12 times, and IEEE P1212 (referenced in IEEE P896.1 and IEEE P896.2) was revised twice. In addition, NIIF and SAFENET I and II evolved during contract performance until the first official issuance of SAFENET in September 1992. (R4, tabs 56-63, 67-78, 89-90; tr. 4/26-28, 31, 50-52)

130. A contract modification to the Raytheon contract, effective 6 April 1992, extended its delivery schedule to 21 April 1992 for Raytheon to deliver its SAFENET II modules. Raytheon delivered the modules within that schedule; it had delivered the Futurebus+ portion of its prototype system on 31 August 1991. The Raytheon contract modification contained clause H-8, entitled "Government Recognition of Contractor Investment," which was placed in the contract modification at Raytheon's request and which included the following:

> The Government recognizes the following investment by the contractor, over and above the existing and planned investments for Futurebus+ and SAFENET by the Contractor, in providing unanticipated technical support during the development work associated with the [NGCR] laboratory test model effort. These additional efforts, coupled with the investments made by associated subcontractors, are sufficient to offset anticipated expenditures for SAFENET I, and is thereby accepted in consideration thereof.

The modification stated that the “Recognized Investment Beyond Original Contract Plans” totaled $1,190,800. (R4, tab 611; tr. 3/33-35, 6/43-44)

131. On 8 June 1993, CCT sent a letter to Mr. Field, the contracting officer, alleging Government-caused delay, constructive changes, and associated extra-contractual costs and schedule impact (R4, tab 47).

132. On 16 June 1993, Mr. Field responded to CCT’s 8 June 1993 letter, stating that CCT had “provide[d] no basis upon which the Government can make a substantive response” and that if CCT intended “to submit a claim, it must also meet the requirements of FAR 52.233-1” (R4, tab 48).

133. By letter of 1 October 1993, CCT submitted a certified claim to the contracting officer in the amount of $2,790,956.92. We find that the contracting officer received the claim on 2 October 1993. The claim alleged that the following areas of the interim standards caused delay, waste, disruption and extra-contractual work: (1) NIIF Interface for SAFENET I and II Modules, (2) CSR Register Definition, (3) Board Physical Definition, (4) Futurebus+ Clock Synchronization, (5) SAFENET Power Budget and (6) SAFENET Time Synchronization Requirement. (R4, tab 49)

134. The claim identified the initial “period of Government caused delay and impact” as being from 9 December 1989 to 3 November 1990, during which time CCT alleged that its management and design engineers worked to define and develop specification requirements in order to perform design implementation for approval at CDR. It further alleged that because the “design ‘ target’ was non-existent or constantly moving” its design “efforts were not usable or, at best, only remotely salvageable due to the specification deficiencies.” The claim stated that the period of impact commenced within 30 days of contract award upon CCT’s initiation of detailed system design and functional design partitioning, but that CCT had excluded from the claim the first 60 days of impact to “remove any doubt as to the entitlement” of its claim. CCT claimed 137 weeks of delay, as follows: (a) 48 weeks of delay (9 December 1989 to 3 November 1990) due to “Defective Government documentation . . . and undefined contract requirements”; (b) 13 weeks of delay (11 November 1990 to 9 February 1991) due to “Government Cancellation of Critical Design Review”; and, 76 weeks of delay (10 April 1992 to the date of the claim) due to “Government Delay of Contract Completion.” CCT’s claimed costs included its total actual direct labor (engineering and program management) incurred and costs due to delay, including those for alleged unabsorbed overhead. (R4, tab 49 at 18, 23)

135. At some point, Litton notified the Navy that it could not continue performance under its NGCR prototype contract unless it received additional IR&D funding. (Tr. 6/164-65)

136. In 1994, Litton's NGCR program manager requested that the Government terminate its prototype contract for default because Litton was expending too much of its own funds in performing the contract. The Navy denied the request. (Tr. 6/181-82)

137. A contract modification to the Litton contract extended the Litton delivery schedule for its prototype systems to 30 September 1995 (R4, tab 367). Litton delivered within that schedule.

138. Raytheon's program manager, Mr. Milholland, and its representative on the Interoperability Working Group, Mr. Bunker, did not believe that any actions taken by Raytheon in its activities with the Interoperability Working Group were beyond the scope of its prototype contract. Mr. Milholland never reported out-of-scope work to Raytheon senior management. (Tr. 6/40-41, 111). Raytheon did not undertake development work on specification IEEE 896.2 and the SAFENET and Futurebus+ backplane standards under the prototype contract, but it did undertake such work with IR&D funds (tr. 6/49, 53-59).

139. Litton's Mr. Ebl did not believe that any work it performed on the prototype contract, including work for the Interoperability Working Group, was beyond the scope of the contract (tr. 6/158). Mr. Chivers, Litton's program manager, never received any reports from Mr. Ebl of out of scope work on the contract (tr. 6/158). Litton used IR&D money to fund SAFENET specification development work required to perform its prototype contract (6/162-65).

140. The Navy considered and audited the claim (R4, tabs 49-52, 55, 348, 352, 646). The contracting officer did not issue a decision on CCT's certified claim of 1 October 1993. On 4 April 1994, CCT filed its notice of appeal with the Board and it was docketed as ASBCA No. 47420.

141. On 20 May 1994, the Navy filed respondent's motion to dismiss for lack of jurisdiction predicated on the antecedent dispute requirement articulated in *Dawco Construction, Inc. v. United States*, 930 F.2d 872 (Fed. Cir. 1991), *overruled*, *Reflectone, Inc. v. Dalton*, 60 F.3d 1572, 1579 (Fed. Cir. 1995) (*en banc*).

142. On 8 June 1994, CCT submitted to the contracting officer a "protective" certified claim which was virtually identical to its claim of 1 October 1993 (R4, tab 52). On 19 June 1995, CCT filed a notice of appeal on its "protective" certified claim, and the appeal was docketed as ASBCA No. 48846 (R4, tab 54). The Board granted appellant's motion to consolidate the two appeals.

143. On 21 June 1995, a newly-assigned Navy contracting officer acknowledged receipt of CCT's "protective" certified claim of 8 June 1994 and promised a response by 20 June 1996 (R4, tab 55).

144. By letter to the Board of 9 July 1996, the Navy withdrew its motion to dismiss for lack of jurisdiction.

145. The contracting officer did not issue a decision regarding CCT's "protective" certified claim of 8 June 1994.

146. By letter to the Board of 13 March 1998, CCT withdrew the critical design review cancellation portion of its certified claim. In its post-hearing brief, appellant withdrew its claim for Eichleay damages for delay incurred after 10 April 1992 (br. at 141 n.28).

The CCT NGCR Prototype System and Its Planned Design Process

147. The NGCR prototype system included the Futurebus+ backplane. The backplane contained connectors for modules. Modules (sometimes referred to as functional elements) consisted of cards or boards, plugged into the connectors on the backplane. The modules that CCT plugged into the backplane were those described above in CCT's technical proposal. Some of the modules were based on designs developed by CCT or Unisys six months to one and one-half years prior to contract award. As part of the contract, CCT designed and developed a Futurebus+ interface module (FBIM) daughter card, which was a part of each module that plugged into the backplane. (R4, tab 1, attachs. B, C; tab 10 at Bates 1-3, 5-7, 10, 65-66, 73, 76-80, 118; tr. 5/78, 99-101, 7/6, 21-22)

148. Information flowed from the backplane to a processor functional element, an I/O functional element, or a memory functional element, passing through the FBIM on each functional element. CCT's purpose in developing the FBIM and the separate interface between the FBIM and each module was to allow parallel development of the components of the prototype system. CCT also designed and developed a separate interface between each of the modules and the FBIM. Use of the separate interface allowed CCT to utilize a common FBIM for the modules. (R4, tab 10 at Bates 65-66; tr. 5/77-78, 99-101, 112)

149. CCT followed the classical stages of design, including: (a) establishing the architecture at the block diagram level based on the design requirements in the specifications; (b) following a review process to ensure that what was in the block diagram at that level of detail represented accurately the requirements of the design specifications; and (c) working on individual details, including partitioning the design from the block diagrams. At the detailed design level of the design approach, CCT developed schematics. CCT developed schematics for the daughter cards (circuit cards on the module), including the FBIM. Iterative versions of schematics resided on computers maintained by CCT's engineers. As changes in the specifications required changes in design and, consequently, the schematics, CCT engineers revised the schematics in their computers. CCT partitioned from the block diagrams (a) the FBIM and (b) a separate interface between the FBIM and all the other modules. (Tr. 5/75-76, 82-83, 101-03, 119-21, 7/33, 42-43, 79-82)

150. Because a significant portion of the design of each module involved the separate interface with the FBIM, a change in the separate interface with the FBIM affected the majority of the design effort on each module (tr. 5/78).

Impact of Redesign Upon CCT's NGCR Prototype System

1. General

151. When CCT got into the detailed implementation of the design specifications, it became obvious that further definition of the specifications was needed. The combined effect of the process of redefining portions of the specifications "essentially meant that the Futurebus+ interface module was redesigned a page at a time many times." As CCT developed the schematic level of detail on computers, it would repeatedly redo the same page of the schematics to implement solutions to problems of definition found in the specifications. (Tr. 7/42-43) It was difficult to define the extent of the rework by individual designers in trying to keep up with a moving target on what was a very complex system (tr. 5/120).

152. Design changes resulted in changes in software, hardware or both. A software change is a design change that required CCT to redesign software, with the attendant scrapping or modification of portions of the relevant software. Each design change that affected hardware required significant redesign effort at both the block diagram and schematic level, with the attendant reviewing of the relevant block diagram and schematic to determine how far the changes propagated through the circuit card, redoing the block diagram and schematic, revising the equations if the change involved a programmable logic device, and where new parts were required, researching parts and then recalculating all of the timing margins to ensure that the new part would maintain the integrity of the design established by CCT. (Tr. 5/71, 75-76)

2. NIIF Interface for SAFENET I and II Modules

153. Initially, locked operations were required to ensure that multiple processors, communicating with a SAFENET module essentially at the same time, did not cause confusion. CCT implemented locked operations on its designed FBIM card. IOP 6 was opened on 8 November 1989 and it described as a problem that not all processors would support lockable operations and that locked operations could affect the speed of the bus. Implementation of locked operations involved a significant amount of hardware on the FBIM. On 8 December 1989, the prototype contractors and the Navy agreed that they would incorporate hardware for locked transactions. CCT proceeded with locked operations until 17 July 1990, at which point, in IOP 6A, it was determined that the contractors would not implement locked operations but would be required to ensure that the read, modify, write operations were in place for each of the processors. CCT proceeded to

implement the modified design, its design efforts on locked operations having been wasted. (R4, tab 266 at Bates 274-75; tr. 7/6-10)

154. IOP 32 dealt with the definition of where the physical interface would be between the protocols stack for the SAFENET modules. It involved the definition of control and status registers that were specific to the SAFENET modules for communication between the processor modules and the SAFENET modules. As such, the IOP very much affected the design or definition of the FBIM. The problems reflected in IOP 32 affected hardware and software. They affected the design or definition of the FBIM, the software within the SAFENET modules and the software within the processor modules. As reflected in IOP 32A, it was determined that the contractors would develop a "VME-based" interface. From November 1989 to 24 May 1990, the resolution date of IOP 32, CCT, following iterative drafts of the specifications, was adding CSRs which caused a cycle of redesign of the FBIM. Following 24 May 1990, it took weeks to complete the actual implementation of IOP 32. (R4, tab 266 at Bates 416-496; ex. A-3; tr. 7/11-13)

155. Other IOPs (24, 25, 33, 35, 64 and 69) affected CCT's development of the prototype system in a manner similar to IOPs 6 and 32. They affected (a) the design of software for the CCT processors and the software being developed by Unisys for the SAFENET I and II modules, and (b) the design of hardware on the FBIM. The problems addressed in the IOPs began on 8 November 1989, with the final closing date on 10 August 1990, and the time for implementation extended into September and October 1990. IOP 24 and later iterations, which dealt with the XTP timing protocol, closed on 8 February 1991. (R4, tab 266 at Bates 274-75, 378-82, 497-501, 507, 597-629, 664-65; ex. A-3; tr. 4/121-22, 7/14-15)

3. <u>CSR Definition</u>

156. In general, all of the CSRs were on the FBIM. Accordingly, changes to CSRs, in general, affected the FBIM. If a change to a CSR necessitated the changing of a part or parts, the part or parts would have been located on the FBIM. (Tr. 5/76, 82-83)

157. Interoperability required the CSRs to have the same addresses to allow processors from different manufacturers to operate with devices from other manufacturers. Interoperability also required the same definition for a CSR. Knowledge of the address of the CSR was of no value if each vendor defined the bits differently. (Tr. 5/27-28)

158. IEEE P896.1/D8.0, which was attached to the contract, identified nine CSRs. The address of eight of the CSRs was stated to be "Futurebus system control and status register" (FBSCSR). That term, used to indicate the base address of each of the CSRs, was variable and did not provide a definition of the base address, which rendered the information useless to CCT. IEEE P896.1/D8.0 did not define the relative position of each of the CSRs to the base address. (Ex. A-3; tr. 5/19-20) With respect to the level of definition of each

of the nine CSRs, IEEE P896.1/D8.0 defined three CSRs (with reasonable identification of the bits) and provided "place holders" (with no definition of bits) for the other six, one of which the prototype contractors were not required to implement under the contracts. (Ex. A-3; tr. 5/20-22) (As we found above, the P896.1 standard referred to P896.2 and P1212 as providing the definition of non-bus specific CSR functions, but neither of those documents was attached to the contract.)

159. Core registers were basic CSRs applicable to any backplane environment, including Futurebus+. Following contract award, CCT was provided with IEEE P896.1/D8.02 which referred to, but did not define, the core registers, but rather referred to P1212 for the definitions. Futurebus+ Specific R/W Registers were read/write registers that were located either in random access memory (RAM), which could be read and written from the Futurebus+ side of the CSRs, or implemented in discrete hardware or programmable devices, where it was necessary to deal with individual bits on an individual basis. IEEE P896.1/D8.02 provided an address for each of the Futurebus+ Specific R/W Registers. However, it did not define several other CSRs adequately to allow interoperability or it made reference to P1212. Included in the latter category were CSRs dealing with read only memory (ROM) Entries, which could be read, but not written, from the Futurebus+ side of the CSRs. The monarch, which was the processor in the backplane which was managing the system, needed the information from the ROM Entries to configure the system. (Ex. A-3 at 8; tr. 5/22-23, 26-32)

160. CCT was later provided IEEE P1212/D0.3 which was a totally new document and the first copy of IEEE P1212 to which CCT was privy. IEEE P1212/D0.3 defined the core registers referenced in IEEE P896.1/D8.02. It defined the first seven CSRs and designated them as required for any backplane implementation and indicated that some other CSRs were optional. Although IEEE P1212/D0.3 provided additional information, it also provided different information which caused CCT to change its design approach. (Ex. A-3 at 9; tr. 5/66-67)

161. CCT later received IEEE P896.1/D8.1, dated 8 December 1989, which was the third version of IEEE P896.1 to which CCT had access. It did not specify the addresses or the levels of definition for the core registers, nor did it refer to the core registers as being contained in IEEE P1212. Because the core registers at this level were not defined, CCT assumed that it had to use prior documents to define the core registers. IEEE P896.1/D8.1 contained five CSRs which involved CSR ROM and are read only. To the extent that the five CSRs effected changes to prior CSRs or implemented new CSRs, CCT implemented the changes or new CSRs through new or modified software. IEEE P896.1/D8.1 did not specify addresses, even base addresses, for the Futurebus+ Specific R/W Registers or the ROM Entries. A comparison of IEEE P896.1/D8.1 and IEEE P869.1/D8.02 reflects that the former added new CSRs and redefined CSRs. CCT also had to implement the Error Register CSR as individual bits in a programmable logic device. In particular, the counter

had to be implemented in hardware, and not software. There was significant logic involved in implementing the Error Register CSR. (Ex. A-3 at 10; tr. 5/67-68, 74-75)

162. CCT was provided with IEEE P896.1/D8.1.1, dated 16 January 1990. The names of the CSRs in that document are the same in terms of identification as those in IEEE P896.1/D8.1. The new document did not specify the addresses or the levels of definition for the core registers. It listed IEEE P1212 as a reference, but did not specifically reference IEEE P1212 as the source for finding the CSRs. Further, it did not specify the addresses for any of the CSRs and it changed a number of the definitions of CSRs from what had been stated in the earlier version, IEEE P896.1/D8.1. The new document also made changes in definitions of bits in CSRs needed to be tied into hardware and resulted in design changes. IEEE P896/D8.1.1 also deleted the definition of the Error Register which had been included in the previous version of IEEE P896.1. CCT later determined that the Error Register had been moved elsewhere, but IEEE P896/D8.1.1 did not indicate either its location or definition. (Ex. A-3 at 10; tr. 5/79-81)

163. CCT was provided with IEEE P896.2/D3.82, dated 18 January 1990. The document changed the location where the node addresses, which included the CSR addresses, resided in the overall address space of the backplane. The relocation of the node addresses changed all of the address encoder and address decoder functions that were involved with all of these CSRs. IEEE P896.2/D3.82 also defined four core registers and noted that additional definitions existed in IEEE P1212. While two of the registers defined in IEEE P896.2/D3.82 were reasonably defined, the document also defined two other registers, adding a new function of mailboxes, with a definition which was not sufficiently specific to complete the design relative to those mailboxes. (Ex. A-3 at 11; tr. 5/81-82)

164. IEEE P896.2/D3.82 doubled the address space reserved for the Futurebus+ Specific R/W Registers, thereby requiring possible changes in the address decoders, CSR RAM and CSR ROM, which, in turn, would require changing parts on the FBIM and modifying the schematics. Selecting a new part would require an evaluation of system requirements. There were also instances where IEEE P896.2/D3.82 referred to specific paragraphs of IEEE P896.1 for definitions, without indicating the pertinent revision or draft of that document. The absence of that information caused CCT's design personnel to spend time determining which of the draft versions appeared to be consistent with other information. IEEE P896.2/D3.82 indicated that the Error Register was defined in IEEE P896.1, but IEEE P896.1/D8.1.1 had deleted the Error Register. The CCT design personnel did not have a current definition of the Error Register because the version of IEEE P896.1 having the definition had not yet been published. As a result, CCT had to either try to anticipate the new definition based on IEEE meetings or wait for the answer, with either alternative affecting CCT's timely contract performance. (Ex. A-3 at 11; tr. 5/82-85)

165. IEEE P896.2/D3.82 added more CSRs under the Futurebus+ Specific R/W Registers than had been included in IEEE P896.1/D8.1.1. The new CSRs included the ROM

base high/low register and the RAM base high/low register which had to be identified to complete the design. (Ex. A-3 at 11; tr. 5/85-86)

166. The state register under the Futurebus+ Specific R/W Registers in IEEE P896.2/D3.82 was similar to what was previously defined as a control register. Those CSRs differed in a manner which required a modification in the individual bits of the state register and a more significant change in the basic protocol requiring a change in programmable logic devices. (Tr. 5/86-88)

167. P896.2/D3.82 added more CSRs under ROM Entries and allocated twice as much space for the CSRs under ROM Entries requiring CCT to consider changing the part size. CCT also had to write additional software to load the new registers. (Tr. 5/88)

168. CCT was provided with IEEE P1212/D1.0, dated 31 January 1990, which was the second version of IEEE P1212 to which CCT had access. The first version of the specification, IEEE P1212/D0.3, provided for an address space from zero to 252 for CSRs. IEEE P1212/D1.0, which provided for an address space from zero to 508, had twice the address space for CSRs as had the previous version. It also provided for more CSRs and changed the definitions of some of the CSRs. (Ex. A-3 at 9, 12; tr. 5/89-90)

169. IEEE P1212/D1.0 eliminated the test reset start and test reset status CSRs which had been included in the previous version. The absence of the test reset start and test reset status CSRs created a problem as soon as CCT started validating or testing the software or hardware. The problem was how, after the deletion of those CSRs, to control the diagnostic testing or the test start and test status between boards. The problem became the subject of an IOP. IEEE P1212/D1.0 also included command start and command status CSRs, which differed from test reset start and test reset status CSRs. (Ex. A-3 at 9, 12; tr. 5/89-90)

170. CCT had to check the IEEE P896.1 and IEEE P896.2 specifications that most closely correlated with the IEEE P1212/D1.0 version of IEEE P1212 to identify which, if any, of those CSRs were going to be required for the Futurebus+ implementation for the NGCR contract (tr. 5/90).

171. IEEE P1212/D1.0 provided basic definitions for most of the optional registers. A CSR with only a basic definition meant that there was no indication of its state upon "power up," as well as other unknowns. (Tr. 5/90-91)

172. CCT was provided IEEE P896.2/D4.0 dated 2 February 1990. That document was consistent with IEEE P1212/D1.0 in terms of the size of the space for core registers—both showing an address space of 0-508. However, as compared with IEEE P896.2/D3.82, the prior version of IEEE P896.2, IEEE P896.2/D4.0 cut the address space for the core

registers in half and moved the node addresses from the bottom to the top of the address space. (Tr. 5/91-92)

173. IEEE P896.2/D4.0 referred to IEEE P896.1 for definitions of several of the Futurebus+ Specific R/W Registers and it added CSRs to those registers. The document added diagnostic start and diagnostic status CSRs, which related to diagnostic start, a problem which plagued CCT throughout its performance. IEEE P896.2/D4.0 also added diagnostic parameter high/low, but did not define it. The document did not refer to IEEE P896.1 for the definition of the Error Register, but instead defined 12 fields for the CSR. (Ex. A-3 at 13; tr. 5/92)

174. IEEE P896.2/D4.0 changed some definitions of the CSRs, including the glitch filter retry delay and node status. As indicated above, it also added three CSRs relating to the SAFENET requirements. The most significant additional CSRs in IEEE P896.2/D4.0 related to the Diagnostic Test Register, Diagnostic Status Register and Error Register. The Error Register required hardware connectivity in order to be set appropriately and had to be cleared on reset. IEEE P896.2/D4.0 also moved around the CSRs in the ROM Entries which, in turn, required a change in the software and the programmable devices. (Ex. A-3 at 13, 14; tr. 5/93-94)

175. IEEE P896.2/D4.0 added more definitions in the ROM areas. An added definition related to configuration capability and affected RAM. The predominant resulting change would be in the software area. (Tr. 5/95)

176. At its PDR on 6 February 1990, CCT presented its CSR design which consisted of CCT's estimate of which CSRs were required, along with their likely locations and definitions, based on the latest versions of IEEE P1212, IEEE P896.1, IEEE P896.2 and white papers presented by each of the NGCR prototype contractors. Because of missing information, CCT was unable to complete the design of the prototype as of the PDR. The NGCR prototype contractors, including CCT, prepared and used their white papers to obtain substitute information for missing information in the specifications. Without agreement of the three prototype contractors and the Government to the information in the white papers, CCT did not have a complete set of specifications. (Ex. A-3 at 14-15; tr. 5/25-26, 96-97, 103-07, 122-24)

177. Following the PDR, CCT was provided with IEEE P896.1/D8.2 dated 14 February 1990. That document included no core registers and did not make specific reference to IEEE P1212 as to how many of the optional CSRs in IEEE P1212 should be called out as required for the prototype. IEEE P896.1/D8.2 included few Futurebus+ Specific R/W Registers and ROM Entries and failed to specify addresses for any. The document included few CSR entries, especially when compared with IEEE P896.1/D8.1.1, the prior version of IEEE P896.1, and thereby added to the ambiguity and led CCT to make assumptions in its design effort. IEEE P896.1/D8.2 was incorporated into the contract by

bilateral Modification No. P00004. The contract modification extended the delivery date and included the following: "The parties agree that no change to the price or other terms and conditions of the contract is required as a result of the above changes to the contract." (R4, tab 6; ex. A-3 at 16; tr. 5/107-08)

178. At its PMR on 30 May 1990, CCT presented its design which, because of changes to the specifications and changes established through the NGCR committee process, was different than it had been at PDR. CCT felt that, at that point, it should have been working on the very detail design, but it could not do so because of the changes to the CSRs following PDR. (Tr. 5/111-12)

179. With respect to the FBIM and the separate interface between the FBIM and the modules, CCT had to scrap the detail design presented at the PDR of 6 February 1990 (tr. 5/112). The CSR changes which had been made between the PDR date of 6 February 1990 and the PMR date of 30 May 1990 affected the design of components for the various boards. At PMR, there was twice as much space reserved for the core registers as there had been at PDR. In addition, in the period between PDR and PMR the locations of the core registers had been moved because all but one of the core registers were located above the address range of zero to 508 utilized at PDR. The larger address range affected CCT' s design of the prototype. (Ex. A-3 at 14, 16; tr. 5/109-14)

180. CCT's design at PMR, as compared to PDR, reflected that a number of new CSRs were added, that there were different addresses for many of the CSRs and that, although several of the address locations were unchanged, there were holes in the fields which changed the address decoding. In addition, different definitions were reflected. (Ex. A-3 at 14-15, 17; tr. 5/110-11).

181. CCT was provided with IEEE P896.2/D4.8(.2), dated 9 July 1990, which reflected changes from the PMR of 30 May 1990 to the IDR of 18 September 1990. IEEE P896.2/D4.8(.2) moved the core registers back to the address range from zero to 508, cutting the CSR space in half once again. The document included all of the definitions for the core registers, which meant that IEEE P1212 was no longer relied upon. The CCT designers had to compare the CSRs in IEEE P896.2/D4.8(.2) with the base line established at the PMR of 30 May 1990 to determine if there were any changes. In being transferred from IEEE P1212 to IEEE P896.2/D4.8(.2), a number of core registers were moved, including the state registers, which were also reduced in number from three to two. The node ID was moved, its definition was changed, and, because it was an address decode function, two software changes were required to effect the move. (Ex. A-3 at 12, 18; tr. 5/114-19)

182. Additional changes to the CSRs were made between the Interim Design Review (IDR) of 18 September 1990 and the CDR of 5 February 1991, and the nature of those changes is indicated by the events surrounding IOP 78. IOP 78, which related to the

monarch, solved a diagnostic testing problem by deleting a CSR, which in turn required software changes. The change in IOP 78 occurred at or about CDR, at which time CCT was planning to lay out some boards and to develop associated software. (R4, tab 266 at Bates 676; tr. 5/121-23)

183. IOP 84, which was in the same time period as IOP 78, related to the ability of the monarch to manage the system, which was key to the philosophy of Futurebus+. It enabled the use of systems made from parts from different manufacturers, each of which had been designed in accordance with the design specifications in the Futurebus+ suite of specifications, including IEEE P896.1, IEEE P896.2 and IEEE P1212. However, one of the problems which emerged late in the design cycle was that the monarch could not ensure that a processor or other module had successfully completed its power up test functions. At that point, the monarch had not been thoroughly defined and needed to be further developed by the prototype contractors to ensure interoperability between different manufacturers. (R4, tab 266 at Bates 682; tr. 5/123-25)

184. IOP 88 related to events which occurred in August 1991 regarding the management of diagnostic registers. Specifically, the system design allowed for erroneous results where the monarch would read the results of a status register before a slower processor posted its diagnostic results. The problem was resolved through software changes. (R4, tab 266 at Bates 688; tr. 5/126-27)

185. IOPs 78, 84 and 88 all dealt, albeit somewhat differently, with the aspect of one device being able to control or manage the running of tests and determining the results of those tests on another device in the system (R4, tab 266 at Bates 676, 682, 688; tr. 5/127-28).

186. At the time of PDR, the specifications did not provide sufficient information to define the interrupt MASK high/low CSR, but it was defined by the time of CDR. Implementation of the interrupt MASK high/low CSR required hardware implementation. (Tr. 5/129-32)

187. The changes to the CSRs affected CCT's planned design approach of the prototype system because the changes in the CSRs made CCT's design process more iterative in terms of circling back from higher to lower levels of detail. When CCT received changes that affected the block diagram level, CCT was forced to change the design not only on the block diagram level, but also at any level of detail above the block diagram level. Further, after making a change at the block diagram level and any higher levels of detail, CCT had to determine if the change impacted other aspects of the prototype system design. In developing the higher levels of design detail, CCT would discover deficiencies in the specification, finding an additional required process that was missing from the specification, which required CCT to develop the area of the specification that was missing. (Tr. 5/102-03)

188. The level of impact on the design of the prototype system caused by a change to a CSR depended upon the type of register and where it physically resided. CCT could effectuate address changes to core registers and Futurebus+ Specific R/W Register located in the CSR RAM with a software change, rather than a hardware change, if the address change was within the exact address range previously established for the CSR RAM. If a change to the address CSRs located in the CSR RAM was outside the exact address range previously established for the CSRs located in the CSR RAM, CCT could not effect the change by modifying software, but had to create a new address decoder, which was hardware. When the entire block of CSRs moved from the bottom of the address face to the top of the address face, it required redesign of the address decoder. The IEEE specifications changed the address range for CSRs several times. (Ex. A-3 at 8-19; tr. 5/70-73, 91-92).

189. CCT implemented new or changed ROM Entries, which all reside in CSR ROM, through new or modified software. However, major changes to ROM Entries required CCT to examine the design to determine whether it had to make hardware changes. (Tr. 5/69-70, 74, 88-89)

190. CSRs located in certain areas were implemented through hardware. CSRs that related to hardware functions were implemented in a programmable logic device or some other type of discrete hardware where individual bits could be wired to individual functions, or one could create counters that were set or controlled by hardware functions. The bits required by the CSRs determined the particular size of a programmable part. At the start of the design of its prototype, CCT selected the size of programmable parts based on the number of bits it would have to handle, which, in turn, was governed by the number of CSRs the programmable part would have to handle. CCT reserved a certain number of pins on the programmable parts depending upon the number of signals needed for the CSRs. In the programmable parts, CCT did not necessarily implement all 32 bits of each CSR because not all 32 bits were defined in every CSR. (Tr. 5/70-72)

191. The problems in the IOPs relating to the CSR definition began on 8 November 1989 and were resolved on 15 August 1991, with the resolution of IOP 88. Implementation of the resolution of IOP 88 took until September or October 1991. (R4, tab 266 at Bates 688; tr. 7/18-19).

4. <u>Board Physical Definition</u>

192. To maintain interoperability, it was imperative that the specifications define the mechanical aspects of the system (tr. 7/26).

193. IOP 3 was opened on 28 November 1989 and closed on 19 March 1990. At the time that IOP 3 was opened, the Futurebus+ specification allowed either an 0.8 inch or a

one-inch space between each module (set of connectors) on the backplane. Four months later, on 19 March 1990, the spacing issue was resolved in favor of using one-inch spacing between modules. (R4, tab 266 at Bates 267; ex. A-3 at 5; tr. 7/20-21)

194. Paragraph 3.5.1 of the Futurebus+ Functional Backplane Prototype Specification stated that the board size "shall" be 6.229 inches [160mm] deep." IEEE P896.1/D8.0, which was attached to the contract, permitted use of three different depths of cards ("daughter cards") that comprised the modules that were to plug into the backplane: 160, 220 and 400mm. Without knowing the required depth of the daughter cards, CCT could not determine the depth of the daughter cards and could not design the cage through which the cards would be inserted and plugged into the backplane. IOP 10 was opened on 8 November 1989 to deal with the problem. (R4, tab 1, attach. C, tab 266 at Bates 329-30; ex. A-3 at 5; tr. 7/21-22)

195. IOP 10 was resolved on 28 November 1989 by selection of the 160mm depth size for the cards. It turned out that that depth proved too restrictive and was going to adversely affect performance. Because of that problem, IOP 10A was opened on 16 January 1990. On 19 March 1990, IOP 10A reflected that the problem was resolved by changing to 280mm daughter cards. That change was later (April 1991) included in Modification No. P00004 to the contract, which also stated that "the parties agree that no change to the price or other terms and conditions of the contract is required as a result of the above changes to the contract." By knowing the depth of the daughter cards, CCT could begin preliminary layouts. (R4, tabs 6, 266 at Bates 329-30; ex A-3 at 5; tr. 7/22-23)

196. IOP 20, which dealt with problems relating to connectors, was opened on 8 November 1989 and closed on 19 March 1990 (R4, tab 266 at Bates 370; ex. A-3 at 5; tr. 7/23)

197. IOP 40 dealt with connector pinouts and a wire size problem. Those problems were resolved on 19 March 1990. However, IOP 40A was opened and it related to the use of jumpers between slots in connection with the implementation of the SAFENET ring card and protocol processor connecting their signals. IOP 40A was resolved on 16 July 1990. (R4, tab 266 at Bates 518, 531; ex. A-3 at 5; tr. 7/23-24)

198. Until the spacing issue in IOP 3 was resolved, CCT could not begin the backplane design or board designs because the problem affected every board. Because the board physical definition problem delayed design of the backplane, the problem delayed design of the FBIM. Until the problem in IOP 10 relating to the depth of the daughter cards was resolved, CCT could not determine the depth of the daughter cards and could not design the cage that would hold the daughter cards. The problem in IOP 40A delayed, until about July 1990, CCT's design efforts with regard to daughter card implementation and how CCT would transmit signals between the protocol processor for SAFENET and the ring cards. Each of the IOPs regarding the board physical definition similarly affected the physical

layout and the placement of holes on the boards. The majority of these items were resolved by March 1990 and the one remaining item was resolved on 16 July 1990. The completion of implementation of the problem resolutions took from four to six additional weeks. (Tr. 5/77, 7/20-25)

5. Futurebus+ Clock Synchronization

199. Clock synchronization involved hardware transferring running clock information from a local clock into registers—at the same time as did a master clock—so the system could ensure that the time across the backplane was the same (tr. 7/27-28).

200. Paragraph 3.4.1.5 of the Functional Backplane Prototype Specification stated:

> System Clock
>
> A method for keeping coordinated time among all modules on the backplane shall be provided. Details shall be worked out in the interoperability meetings as described in paragraph 3.4.6 of the Statement of Work.

(R4, tab 1, attach. C) CCT's technical proposal submitted in response to the solicitation basically repeated this language and did not object to the lack of definition (R4, tab 10 at Bates 89).

201. IOP 7 was opened on 15 November 1989 with the problem stated to be that the "globally synchronous clock mechanism needs more definition" and that "[t]he Navy must decide the requirement and method for keeping time between all modules." Although IEEE P896.3/D0.0, dated 8 February 1990, provided some design information with regard to implementation of specific protocols such as clock synchronization, it did not contain sufficient design information to solve the problem. Resolution of the clock synchronization problem in IOP 7 occurred on 19 March 1990. That solution was not fully implemented until 16 July 1990 because of the time required to procure a crystal that was not readily available. Because the clock synchronization protocol changed many times, CCT had to change the programmable device on the FBIM "many times." (R4, tab 266 at Bates 276, 278, 314; ex. A-3 at 6; tr. 4/149-50, 7/27-31)

6. SAFENET Power Budget

202. IOP 23, which was opened on 20 November 1989, dealt with the requirement to provide specific output power capabilities on the optical transmitter of the SAFENET modules, that is, the power put into the fiber optics for an outgoing signal. IOP 23 also dealt with the specified sensitivity of the receiver. The specific power output of the

transmitter and the specified sensitivity of the receiver, in conjunction, were referred to as the power budget. (R4, tab 266 at Bates 373-75; ex. A-3 at 6; tr. 7/31-32)

203. IOP 23 affected the SAFENET ring card. The SAFENET specification was based on the commercial FDDI specification. The commercial parts meeting the FDDI specification did not have the same range of sensitivities on the input and the output level. The contractors raised the problem of whether they could use the commercial parts. (Tr. 7/32-33)

204. The first resolution to the problem of using commercial parts occurred on 15 December 1989 when the Navy recommended using commercial parts which met the transmit level and the wide range of receiver levels. IOP 23 was closed on that date. On 16 January 1990, it was determined that commercial parts that met the requirements for the NGCR system were not available and IOP 23A was opened on that date. (R4, tab 266 at Bates 373; ex. A-3 at 6; tr. 7/33)

205. IOP 23A was never signed by the prototype contractors or the Navy. It has a "Recommended Resolution" dated 19 March 1990 which states that "[t]he SAFENET transmit and receive budgets should be increased to make the power budget less sensitive." Language drafted by CCT suggested that IOP 23A should be closed out with the following wording:

> THE SAFENET POWER BUDGET WILL NOT BE MET. HOWEVER, THE CONTRACTORS WILL ATTEMPT TO COME CLOSE TO THE POWER BUDGET USING THE BEST COMMERCIAL PARTS CURRENTLY AVAILABLE.

(R4, tab 266 at Bates 376-78)

206. The power budget problem in IOP 23/23A delayed the design of the SAFENET ring card. CCT's program manager informed the Navy on 8 June 1990 that the "calendar impact" to the "NGCR schedule" of the "SAFENET Power Budget" matter was three to four weeks. (R4, tab 29; tr. 7/33-34, 58-59)

7. <u>SAFENET Time Synchronization</u>

207. The SAFENET I and II draft specifications attached to the solicitation included the following:

> 4.2 TIME OF DAY
>
> The definition of this interface is future work required to complete this standard.

(R4, tab 1, attach. E at V-44, attach. F at V-44)

208. IOP 31 was opened on 8 November 1989 with a required resolution date of 15 December 1989. The time synchronization requirement in IOP 31 was similar to the requirement in the Futurebus+ clock synchronization, except that IOP 31 involved synchronization across two elements or multiple elements of a network as opposed to multiple elements on a backplane, as in the case of Futurebus+ clock synchronization. The synchronization problem arose because the SAFENET specification did not include requisite design information. The resolution in IOP 31 was that the NTP (Network Timing Protocol) would be reviewed. (R4, tab 266 at Bates 412; ex. A-3 at 6; tr. 7/35-37)

209. IOP 42 was opened on 16 January 1990 with a required resolution date of 19 March 1990. It involved the same problem as did IOP 31 and contained a recommended resolution referring to a Litton presentation on NTP. (R4, tab 266 at Bates 536; tr. 7/36-37)

210. IOP 42A was opened on 19 March 1990. It described the problem as NTP being too complicated to be built within the contract's time constraints and that NTP was still in the process of being defined. The resolution agreed upon was that implementation was limited to two modes (Broadcast and Client) as a means of providing the time synchronization between nodes on the SAFENET ring. (R4, tab 266 at Bates 540; tr. 7/37-38)

211. IOP 42B was opened on 24 May 1990 and reflected that there were still some open questions regarding implementation of the NTP. The basic question was at what layer of the ISO stack the NTP should be placed. That question reflected that specific coding and final design of the required software was not complete at that time. The matter was resolved on 26 July 1990 with the placement of the NTP at a specific location. (R4, tab 266 at Bates 541; tr. 7/38-39)

212. IOP 82 was opened on 28 February 1991 and indicated that a resolution was required by 15 August 1991. It involved the software predominantly on the SAFENET protocol processor. Certain definitions in a military handbook, which was developed as a supplement to the SAFENET specification, differed from the definitions developed and suggested by the NGCR prototype contractors. The recommended resolution was to update the NTP document to be consistent with the later version of the SAFENET handbook. The resolution was to use a set of definitions prepared by Litton on 2 April 1991. Implementation of the resolution was to be performed by Unisys, CCT's subcontractor, and the implementation (in September or October 1991) contributed to Unisys's delivery of the first SAFENET modules in late 1991. (R4, tab 266 at Bates 680; tr. 7/39-41)

CCT's Use of Personnel and Resources

213. Appellant presented testimony by its Mr. Clark that: (a) while CCT anticipated, within a few days to a few months, a resolution of most of the problems presented in the IOPs, CCT was not certain when the resolution of a particular problem would occur; (b) he did not recall any time during the contract when CCT completely stopped work; and, (c) the number of people working on the contract varied and that if the discovery of a problem made it impossible for someone to work on the contract, "[w]ithin a matter of days they were generally reassigned to another project that CCT had" (tr. 7/9-10, 48-49). We find that CCT did not experience any significant interruption.

214. During 1990 and 1991, CCT generated 10 to 15 proposals for other work, both commercial and Government, and "landed a couple of sizable programs" in 1992. CCT reassigned personnel from the prototype contract to other fixed-price programs at CCT during periods of time when they could not perform efficiently while awaiting resolution of specification issues on the prototype contract. Those other fixed-price programs to which personnel were reassigned offered no financial incentives for acceleration. (Tr. 7/115-18)

215. On 28 January 1997, the Defense Contract Audit Agency (DCAA) issued its audit report on CCT's claim. Out of the total claim of $2,790,957, DCAA questioned $33,990 of labor overhead, $197,163 of profit, and $1,279,375 of unabsorbed overhead; it also gave CCT a G&A credit of $16,063. (R4, tab 646) In the absence of persuasive evidence on these matters offered by appellant, we make the findings below based upon the DCAA audit report.

216. CCT's overhead and G&A rates were higher in the year prior to contract award than during the years for which CCT claims that it incurred unabsorbed overhead as a result of Government-caused delay. DCAA found the following CCT adjusted overhead rates (for CCT fiscal years ending 31 October): FY 1989 – 254 percent; FY 1990 – 167.87 percent; FY 1991 – 167.79 percent; FY 1992 – 176.94 percent; FY 1993 – 187.59 percent. DCAA concluded that the original contract apparently absorbed less indirect expenses (*i.e.*, $155,549) than CCT had originally anticipated. (R4, tab 646 at 9, 13-14, 19)

217. Through a judgmental random sample of timecards (based on high hours within a pay period) for the delay period 9 December 1989 through 9 February 1991, DCAA determined that CCT's direct employees were charging 40 hours a week directly to a job, with all or part of their time being charged to the prototype contract, and some were working more than 40 hours per week during that period. According to those timecards, CCT commenced assembly of at least an element of its first prototype system sometime in mid-September 1990. (R4, tab 646 at 14)

DECISION

I. Preliminary Matter - ASBCA No. 48846

Our findings reflect: (1) that the claim which is the subject of ASBCA No. 48846 was virtually identical to the claim which is the subject of ASBCA No. 47420; that the claim in ASBCA No. 48846 was filed as a "protective" claim as a result of the Government's motion to dismiss in ASBCA No. 47420; and, that the Government subsequently withdrew its motion to dismiss. As a result, we have before us two appeals which are based on the same claim and which contain identical evidence. ASBCA No. 48846 is, therefore, dismissed as duplicative.

II. The Merits

1. General; Contract Interpretation

Appellant (CCT), Raytheon and Litton were each awarded materially identical contracts for the production of five prototype systems for the Navy's NGCR program. The three contracts were funded solely with FY 1990 RTD&E appropriations and contained standard FAR clauses found in fixed-price research and development contracts. CCT and the other contractors were required to produce the prototype systems in accordance with interim standards, or specifications, specifically those for the Futurebus+ backplane and SAFENET I and II standards attached to the contract. The Navy sought to obtain three independent design implementations in order to validate the specifications and systems. The contracts required that the prototype systems to be designed by each of the contractors be interoperable with those of the others, and further required that the contractors establish a forum to resolve any issues that affected interoperability.

Prior to award of the contracts, the Navy advised potential bidders that the contract price would be limited to $2 million, that the Navy anticipated that the costs of meeting the contract requirements would far exceed that amount, and that the Navy expected the contractors to bear those additional costs. The incentive for companies to do so would be the advantage of being on the "cutting edge" of the technology which could lead to commercial advantage.

Raytheon and Litton each bid the contract at $2 million while acknowledging that their costs would be greater than that amount. Because of its prior experience and technology already in its possession which it felt it could use to its benefit, CCT was of the opinion that it could perform the contract for less than $2 million and its bid, and contract price, was $1,978,553.

Based on its certified claim, CCT now claims that it is entitled to recover an additional $2,790,956.92 based on the contention that the interim standards were defective, resulting in performance delay, waste, disruption and extra-contractual work. It describes the parameters of its claim, as follows:

> Accordingly, for the first year of the Contract (13 October 1989 to 12 October 1990), CCT claims 304 days (10 months) of out-of-scope work, beginning on 13 December 1989 and ending on 12 October 1990. For the remaining balance of 453 days of CCT's performance under the Contract (13 October 1990 to 7 January 1992 (the date CCT delivered its first prototype system . . .)), CCT claims the equivalent of 149 days of out-of-scope work. CCT calculated the 149 days by deducting 304 days (10 months) from the remaining balance of 453 days, thereby giving the Navy a cumulative credit of 365 days for the entire period of CCT's performance, which corresponds to the original contract delivery schedule for CLIN 0001. . . .
>
> . . . .
>
> A contractor may recover not only its direct costs, but also its delay costs caused by defective specifications. [Citation omitted] CCT claims no delay costs if the Board awards CCT entitlement to all it direct costs, fully burdened, as calculated [above]. If the Board does not award CCT entitlement [to] all its direct costs, fully burdened, as calculated [above], CCT claims delay costs in the alternative.

(App. br. at 112) The delay costs claimed include those which CCT attributes to the defective specifications and "[e]ven if the specifications were not defective, which they were, CCT could still recover for unreasonable government delay in responding to CCT's requests for technical clarification." (App. br. at 138) CCT's delay claim includes costs for alleged unabsorbed overhead.

CCT argues that: (1) the Government violated the implied warranty of specifications in that the interim standards attached to the contract were defective; (2) it was not possible to design, develop and build interoperable prototype systems in accordance with the interim standards attached to the contract; (3) the Government constructively changed the contract requirements by directing CCT to (a) resolve defects in the interim standards and (b) follow newly revised standards as they were issued; and, (4) the Government breached its implied duties of "nonhindrance" and cooperation when the working groups, established and chaired by the Navy, failed to adequately or timely resolve issues affecting the interim standards as contemplated by section 3.4.6 of the SOW.

The Government argues that the contract was an IR&D contract in which CCT was to "develop hardware and software in order to 'validate' various 'preliminary' and 'draft' SAFENET and IEEE standards . . . and deliver five 'prototype' systems, . . . thus fitting the definition of the word 'development' in FAR 35.001." (Gov't brief at 52-53 (citations omitted)) In essence, the Government contends that the type of the contract and the preliminary nature of the specifications should have alerted appellant to expect changes as the specifications developed.

The Government asserts that "[i]n an R&D environment it can be difficult to determine whether something is inside scope or outside of scope" of the contract and that it "is especially true in the context of this contract, which required appellant to build to a moving target because it was required to build five prototype systems in accordance with draft SAFENET I and II and Futurebus standards 'and all subsequent revisions to those three (3) standards from the date of contract award through thirty-six (36) months thereafter . . . .'" (Gov't brief at 53-54) The Government quote ends with the ellipses and does not quote the remaining language of the sentence, which refers to SOW section 3.4.3.

It is, therefore, the Government's contention that CCT, which was required by the contract to deliver the first prototype system within 12 months, was further obligated under the contract to incorporate into its prototype system changes in the interim standards made after contract award and "to further develop the interim standards or to correct deficiencies in and between the draft standards." (Gov't brief at 52)

The crux of the dispute is the adequacy of the interim specifications and the extent to which, if at all, the contract required appellant, at its own cost, to incorporate into the prototype systems changes to the interim standards attached to the contract made subsequent to contract award.

The determination of contract type is a matter of law, is made by examining its own terms, and it is not controlled by a label or caption in a contract. *Maintenance Engineers v. United States*, 749 F.2d 724, 726 n.3 (Fed. Cir. 1984); *Mason v. United States*, 615 F.2d 1343 (Ct. Cl.), *cert. denied*, 449 U.S. 830 (1980). In construing a contract's terms, we are to read the contract as a whole to find the interpretation which gives a reasonable meaning to all of its provisions. *Hol-Gar Manufacturing Corp. v. United States*, 351 F.2d 972 (Ct. Cl. 1965). Thus, we reject the Government's position that simply because the contract was one for research and development, funded by RDT&E money, CCT was required to perform development work on the interim standards and revisions to those standards. Instead, we will examine the contract terms.

Section C-1 of the contract required CCT to provide the prototype systems in accordance with the SOW, the Functional Backplane Prototype Specification, the Backplane Standard, the SAFENET I Standard, the SAFENET II Standard "and all subsequent revisions to those three (3) standards from the date of contract award through thirty-six

(36) months thereafter in accordance with paragraph 3.4.3 of the SOW." Paragraph 1.2 of the SOW required CCT to design, develop and deliver five prototype systems in accordance with the NGCR standards, the Functional Backplane Prototype Specification and the requirements of the SOW.

SOW paragraph 3.4.3 pertained to prototype system updates relating to hardware, required the contractor to "provide on-site updates to the prototype systems to meet the requirements of the Backplane and SAFENET I & II Standards within 4 months of each release of the standard by the respective Standard Working Group," and stated that "[c]hanges shall be constrained to component changes, cuts, and jumpers or software/firmware only for the duration of the contract."

Appellant would have us read the contract's section C-1 requirement for incorporation of revisions to the interim standards made within 36 months of contract award as not all-inclusive; but as modified completely by SOW section 3.4.3. Appellant would, therefore, read the contract as not requiring it to implement any revisions to the interim standards prior to delivery of the first prototype system and that, thereafter, any hardware changes to the prototype system would be limited "to component changes, cuts, and jumpers or software/firmware only for the duration of the contract."

We believe that, in view of both the language of section C-1 and the contract as a whole, the only reasonable interpretation is that the contract required the implementation of revisions following contract award and that the constraints imposed by section 3.4.3 did not become operative until delivery of the first prototype system. That interpretation is also consistent with (a) the Navy's Acquisition Plan, which spoke of " *limited* hardware and software development for the purpose of validating the standards," (emphasis added) and (b) the prototype contractors' required participation in the interoperability and working groups under SOW section 3.4.5 and the nature of their required activities. Appellant contends that the SOW section 3.4.5 requirement that CCT "shall participate and support" the working groups was limited to the "presentations" to the working groups required by the following sentence. In light of the stated purpose of the contract and of the language of SOW section 3.4.5 itself, we do not concur with that interpretation. As stated above, the contract required the implementation of revisions following contract award, and participation and support of the working groups, to an undefined extent but in excess of just making presentations, was the means by which the prototype contractors were to agree upon the need for and the nature of those revisions.

We observe, further, that appellant has provided no persuasive evidence that, at the time of contract award, it held the interpretation it now advances. It points to its pre-award technical proposal to indicate that it intended to implement changes arising from post-award revisions to the interim standards only after delivery of its first prototype system. It also cites its cost proposal as allegedly reflecting its intent to incur labor expenses to update the prototype systems in FY 1991 and FY 1992. However, neither of the cited documents establishes that it intended to expend no effort to implement revisions to the interim standards prior to delivery of its first prototype system.

Having concluded that the contract required implementation of post-award revisions to the interim standards, we must face the question of when, in view of the contract' s required 12-month delivery period for the first prototype system, the requirement to implement standards revisions into the first prototype system ended. It would be absurd, for example, to contend that a revision issued immediately prior to the required delivery date had to be incorporated into the prototype system delivered on or proximate to that date. Another issue, this one raised by the Government, concerns the alleged lack of a Government ordered change. The Government points to: (a) the Navy COTR's lack of authority to issue changes; and, (b) the fact that revisions to the interim standards were issued through the IOPs with the voluntary approval of the three prototype contractors along with the Navy and that the other prototype contractors did not consider that "a change to the scope of the contract" had been ordered (Gov' t brief at 55). However, our examination below of the adequacy of the specifications as a whole leads to results which override the significance of these issues.

2. Adequacy of Specifications

When the Government provides specifications for a contractor to use in contract performance, it impliedly warrants that the contractor can successfully perform based upon those specifications and that a satisfactory product will result. *United States v. Spearin*, 248 U.S. 132 (1918). Where successful performance based on the specifications is determined to be impossible, or even commercially impracticable, the contractor is entitled to recover its added performance costs for the constructive change. *Hol-Gar Manufacturing Corp. v. United States*, 360 F.2d 634 (Ct. Cl. 1966).

The Government points to the limited authority of Mr. Murdock, the Navy's COTR, and contends that he did not possess the authority to order work which constituted contract changes. We agree, and likewise concur in the Government's further contention that the Navy did not issue changes, but that decisions to modify the preliminary standards were made by the Navy and the three prototype contractors during the interoperability group meeting process. This is also why there is no merit to appellant's contention that it is entitled to recover for alleged Government delay in providing guidance to resolve technical problems. However, we do not agree with the Government's conclusion that CCT performed changed work as a volunteer. Where changed work is performed due to defective specifications, the constructive change leading to that work is considered to have been issued by the Government's use of defective specifications in the contract. *See, e.g., Consolidated Diesel Electric Corp.*, ASBCA No. 10486, 67-2 BCA ¶ 6669 at 30,952.

The contractor's right to recover for defective specifications exists only if it did not assume the risk of performance under the defective specifications. *L. W. Foster Sportswear Co., Inc. v. United States*, 405 F.2d 1285, 1290 (Ct. Cl. 1969).

Our record reflects that, at the time of award, the Navy and each of the prototype contractors, including CCT, believed, despite the challenge of interoperability, that the prototype systems could be built to the draft interim standards and that the task could be accomplished within the 12-month period for delivery of the first prototype systems. It also reflects that, within months of commencing performance, the Navy and each of the prototype contractors, including CCT, recognized that, because of defects in the interim standards, delivery of interoperable prototype systems could not be accomplished. None of the contracting parties intended or expected the contract to be one to develop specifications, but they came to realize that, as a result of the defects in the standards, they would have to do so in order to design and build prototype systems that were interoperable. We also found an opinion by Navy program personnel that the extent of the defects in the interim standards indicated that the prototype contracts had been let approximately one year too early.

The Government, citing *Blake Construction Company, Inc. v. United States*, 987 F.2d 743 (Fed. Cir. 1993), contends that the implied warranty of specifications applies only to design specifications and maintains that the interim specifications in the instant contract are performance specifications.

Under design specifications, the Government provides precise details of the materials and the manner in which the work is to be performed, from which the contractor is not permitted to deviate. In contrast, performance specifications set forth an objective or standard to be achieved, and the contractor may use its ingenuity to select the means to achieve that objective or standard of performance while assuming responsibility for meeting the contract requirements. *J. L. Simmons Co. v. United States*, 188 Ct. Cl. 684, 689 (1969).

The distinction between design and performance specifications is not absolute. We quote from *Blake, supra*, the only case cited by the Government on this issue and the decision upon which appellant's brief relies heavily, but without attribution:

> Contracts may have both design and performance characteristics. *See, e.g., Utility Contractors, Inc. v. United States*, 8 Cl. Ct. 42, 50 n. 7 (1985) ("Certainly one can find numerous Government contracts exhibiting both performance and design specifications."), *aff'd mem.*, 790 F.2d 90 (Fed. Cir. 1986); *Aleutain Constructors v. United States*, 24 Cl. Ct. 372, 379 (1991) ("Government contracts not uncommonly contain both design and performance specifications."). It is

> not only possible, but likely that a contractor will be granted at least limited discretion to find the best way to achieve goals within the design parameters set by a contract. *See, e.g., Penguin Indus., Inc. v. United States*, 209 Ct. Cl. 121, 530 F.2d 934, 937 (1976). "On occasion the labels ' design specification' and ' performance specification' have been used to connote the degree to which the government has prescribed certain details of performance on which the contractor could rely. However, those labels do not independently create, limit, or remove a contractor' s obligations." *Zinger Constr. Co. v. United States*, 807 F.2d 979, 981 (Fed. Cir. 1986) (citations omitted). These labels merely help the court discuss the discretionary elements of a contract. It is the obligations imposed by the specification which determine the extent to which it is "performance" or "design," not the other way around.

Blake, supra, at 746.

Contractors have also prevailed in cases where performance requirements could not be met. *See Hol-Gar, supra*, 360 F.2d at 635-36; *Owens-Corning Fiberglas Corp. v. United States*, 419 F.2d 439 (Ct. Cl. 1969); *Johnson Electronics, Inc.*, ASBCA No. 9366, 65-1 BCA ¶ 4628; *Kinn Electronics Corporation*, ASBCA No. 13526, 69-2 BCA ¶ 8061.

It is quite clear from our record that the interim standards and specifications upon which CCT was required to rely contained both design and performance characteristics. The Government's contention that they are entirely comprised of performance specifications is clearly erroneous in view of the interoperability requirement of the contract. As appellant argues, if the prototype contractors were free to use any method to design, develop and build their prototype systems, interoperability could never have been achieved. Our task is to examine the specific "obligations imposed by the specification" with respect to the six areas of CCT's claim in determining whether the Government breached an implied warranty. *See Blake, supra*.

a. <u>NIIF Interface for SAFENET I and II Modules</u>

We have found that the SAFENET I and II standards contained the SAFENET topology and defined operations which were reflected in CCT's design of the FBIM card and the hardware design. Because of problems with the specifications, CCT had to modify those designs. In addition, our findings reflect design defects concerning and affecting: (a) the location of the physical interface between the protocols stack for the SAFENET modules; (b) the definition of control and status registers which were specific to the

SAFENET modules; (c) software design for the CCT processors and the SAFENET I and II modules; and the FBIM hardware design.

b. CSR Definition

We have found that interoperability required CSRs to have the same definition and the same addresses, and that it was determined that the specifications were inadequate with respect to both important features. CSRs were both added and modified and definitions were changed. Those defects required changes which affected both software and hardware design.

c. Board Physical Definition

Our findings reflect that, to maintain interoperability, it was imperative that the specifications define the mechanical aspects of the system, and that definition problems in the board design (*e.g.*, module spacing, card depth, connectors, wire size) adversely affected CCT's design efforts.

d. Futurebus+ Clock Synchronization

We have found that clock synchronization was required to ensure that the time across the backplane was the same, and that the specifications lacked requisite design detail to enable CCT and the other prototype contractors to accomplish the synchronization. Events leading to the ultimate resolution of the problem required CCT to modify its design.

e. SAFENET Power Budget

The problem involved the requirement to provide specific output power capabilities on the optical transmitter of the SAFENET modules as well as the specified sensitivity of the receiver. The SAFENET specification was based on a commercial specification, but the prototype contractors could not determine whether they could use commercial parts which had limitations in their range of sensitivities. The ultimate resolution of the problem delayed the design of the SAFENET ring card.

f. SAFENET Time Synchronization

We have found that this synchronization problem arose because the SAFENET specification did not include requisite design information. The problem led to the issuance of a series of IOPs which dealt with the synchronization problem as well as related matters involving the complexity of the network timing protocol and its lack of definition. Resolution of the problem delayed the design.

With respect to all of the claimed specification defects, the Government contends, essentially, that the risk shifted to CCT and that CCT knew or should have known of the defects in the interim specifications because they were marked "preliminary" or "draft." The Government cites *Lear Astronics Corporation*, ASBCA No. 37228, 93-2 BCA ¶ 25,892, in support of that contention.

We do not agree. In *Lear, supra,* the Government provided the contractor with a "preliminary" Government Test Equipment Documentation Package (GTEDP) "for information only," which the contractor could use "at his discretion" or could "design his own test equipment." The contract also stated that a "final package" would be available at a later date. The Board, there, concluded that the contractor could not reasonably rely upon the "preliminary" GTEDP, but could recover for the untimely delivery of an inaccurate "final" GTEDP. In the instant appeal, by contrast, the contract required CCT to develop, design and build prototype systems in accordance with the interim standards, which were made part of the contract. The expressed purpose for the procurement of the prototype systems was to validate the interim standards; the Navy was, therefore, responsible for their adequacy and CCT was clearly entitled to rely upon them in performing the contract.

Our findings set forth, in much detail, the defects which were found in several areas of the standards and which required change during performance. The Government attacks the qualifications of the CCT witnesses upon whom we relied, in part, in making our findings. In relying upon their testimony, we conclude that CCT's witnesses were credible and possessed the requisite involvement in performing the contract and expertise in their areas of testimony. Our findings also reflect contemporaneous correspondence by Raytheon as well as by CCT and reliance upon the testimony of Raytheon, Litton and Navy employees.

The Government cites the fact that neither Raytheon nor Litton, the two other prototype contractors, alleged that they had to perform out-of-scope work or submitted a claim against the Navy under the contract seeking compensation of added costs of performance. We have found, however, that very early in performance Raytheon identified problem areas of performance, several of which were identical to the specification defects later identified by CCT as elements of its claim. Furthermore, both Raytheon and Litton used IR&D to fund specification development work required to perform the prototype contract.

The Government argues that CCT failed to perform an adequate review of the interim specifications and that its bid was unreasonably low despite Government warnings and those of Unisys, CCT's subcontractor. It contends that, in part because of their activity within the industry standards bodies as compared with CCT's lack of involvement, Raytheon and Litton were better able to assess the magnitude of the contract's required effort.

The record does not support those contentions. Rather, it reflects: (a) that CCT's qualified engineers evaluated each of the interim standards attached to the RFP in concluding that they could be implemented within the 12 month delivery period for the first prototype system; (b) that, at the time of contract award, both Raytheon and Litton believed that the interim standards were sufficiently mature for purposes of designing, developing and building interoperable prototype systems; (c) that the defects did not become known to the prototype contractors until they attempted performance; (d) that Raytheon complained about the extent of the work required and Litton refused to continue work on the prototype contract until it received additional IR&D funding; and, (e) that, ultimately, CCT was the first to deliver its prototype system, which was accepted by the Navy.

The Government also contends that CCT knew or should have known before contract award that it would be required to invest its own funds to perform the prototype contract. The record does not support that contention. We have found that CCT considered that the value of its existing technology was significant, that it could, therefore, perform at less than the Navy's ceiling price, and that the Navy accepted CCT's rationale as plausible. We have found, further, that Raytheon anticipated that its costs would not exceed the Navy ceiling price by a significant amount and that the Navy's own estimate of the required contractor investment in the program could have included investments in technology either prior to or during performance of the contracts. We are unable to conclude that CCT's bid was unreasonable.

We conclude that the specifications upon which CCT was to perform were defective to the extent discussed above and that CCT is entitled to recover its added costs in attempting to perform the contract requirements.

3. <u>Delay</u>

Recoverable performance costs include those caused by delay, and the contractor bears the burden of proving that performance delay resulted from defective specifications. *See, e.g., Laburnum Construction Corp. v. United States*, 325 F.2d 451 (Ct. Cl. 1963).

We found that, due to the defective specifications, appellant's performance was adversely affected during the following general time periods: (a) NIIF Interface for SAFENET I and II – November 1989 through February 1991; (b) CSR Definition – November 1989 through September 1991; (c) Board Physical Definition – December 1989 through July 1990; (d) Futurebus+ Clock Synchronization – November 1989 through July 1990; (e) SAFENET Power Budget – November 1989 through April 1990; (f) SAFENET Time Synchronization – November 1989 through October 1991. However, this record does not enable us to determine with anything resembling precision the delay to overall contract performance from any of the individual claim items.

The Government issuance of contract modifications extending the period of performance indicates that the Government recognizes that the overall project was delayed to the extent of the time extensions and constitutes an administrative determination that the delay was not due to the fault or negligence of the contractor. It also raises a presumption, subject to rebuttal, that the Government was responsible for the delay. *Gottfried Corporation*, ASBCA No. 51041, 98-2 BCA ¶ 30,063; *Robert S. McMullan & Son, Inc.*, ASBCA No. 19023, 76-1 BCA ¶ 11,728. This presumption is especially strong where the time extensions are granted after the delay has occurred. *Papathomas*, ASBCA No. 49512, 50895, 97-2 BCA ¶ 29,317 at 145,780.

We have found here that the Navy issued contract Modification Nos. P00004 and P00005 extending the time for contract performance from the original contract delivery date of 12 October 1990 to 22 January 1992, a total of 467 days. Those modifications, in effect, constituted a recognition that the contract was delayed by 467 days, without the fault or negligence of CCT, and create a presumption that the Government was responsible for the delay. In this case, as in *Papathomas*, *supra*, the presumption is strong, as those contract modifications were issued after the delay was experienced. We conclude that there is a presumption that the performance delay which the Government recognized in its issuance of Modification Nos. P00004 and P00005 was the responsibility of the Government and that, with the exception of our conclusions regarding concurrent delay below, the Government has not rebutted that presumption. Therefore, in the absence of concurrent delay, which we discuss below, the Government is responsible for compensable delay from 12 October 1990 to 7 January 1992, a total of 452 days.

4. Concurrent Delay

A contractor seeking to recover compensable delay has the burden of demonstrating that any Government caused delays were not concurrent with delay for which the contractor is responsible. *Donohoe Construction Co.*, ASBCA Nos. 47310, 47312, 99-1 BCA ¶ 30,387 at 150,190; *see also Sauer, Inc. v. Danzig*, 224 F.3d 1340, 1348 (Fed. Cir. 2000). The contractor is not entitled to recover the costs of delay incurred during the period of concurrency. *Commerce International Co. v. United States*, 338 F.2d 81 (Ct. Cl. 1964).

Here, we have concluded that there is a presumption that the Government was responsible for the delay. However, we also conclude that our record reflects that, to the extent described below, that presumption has been rebutted. We have found that CCT' s subcontract with Unisys was not executed until 1 May 1990. Although our findings also reflect that Unisys was performing some work for CCT under a purchase order issued on 19 December 1989, we do not have evidence of the nature and extent of that work. We have also found that, on 8 March 1990, CCT advised the Navy that it would not make a presentation to the SAFENET Working Group meeting on 22 March 1990 because it was still in negotiations with three potential subcontractors for the NGCR SAFENET requirements. We have found that CCT, by letter dated 8 June 1990 reflecting its presentation during its 30-31 May 1990 program review, advised that subcontract negotiations with Unisys had caused a 4-6 week "schedule impact." Further, our findings reflect that Mr. Andersen of Unisys did not attend any interoperability meetings on behalf of CCT until the fourth meeting on 24 May 1990, after award of the 1 May 1990 purchase order from CCT to Unisys. We conclude that the, at best, limited participation by Unisys in early contract performance was a cause of delay for which CCT bears responsibility, and that the period of that concurrent delay was generally from November 1989 until 1 May 1990, a total of 181 days.

Although Unisys later experienced delays in delivery of the SAFENET cards due to the unavailability of connectors from a vendor, we have found that that unavailability was itself due, in part, to the lack of definition in the specifications. We, therefore, do not conclude, as the Government urges, that there was additional concurrent delay associated with that event.

5. Unabsorbed Overhead

In order for a contractor to recover for unabsorbed overhead under the formula set forth in *Eichleay Corp.*, ASBCA No. 5183, 60-2 BCA ¶ 2688 (1960), *affd. on reconsideration*, 61-1 BCA ¶ 2894, it must demonstrate that (a) it was on standby during the period of Government-caused performance delay and (b) the contractor was unable to take on other work during the period of delay. *Interstate General Government Contractors, Inc. v. West*, 12 F.3d 1053, 1056 (Fed. Cir. 1993).

Appellant has the burden of proving that it was on standby during the delay period. *See Melka Marine, Inc. v. United States*, 187 F.3d 1370, 1375 (Fed. Cir. 1999), *cert. denied*, 529 U.S. 1053 (2000). In order to meet the "standby" requirement, a contractor's work force need not be completely idle. *Altmayer v. Johnson*, 79 F.3d 1129 (Fed. Cir. 1996). The requirement can be satisfied when the work is significantly interrupted and where it is demonstrated that overhead was unabsorbed. *Interstate General, supra*, 12 F.3d at 1057. Where, however, the Government change does not result in a contract suspension, but simply adds additional work that takes more time to perform, thus extending the contract completion date, the contractor's overhead is not unabsorbed and recovery is not available under the *Eichleay* formula. *See C.B.C. Enterprises, Inc. v. United* States, 978 F.2d 669, 675 (Fed. Cir. 1992); *C.E.R., Inc.*, ASBCA No. 41767, 44788, 96-1 BCA ¶ 28,029.

With respect to prong (b), it is not necessary that the contractor prove that it was impossible to take on new work; once the contractor demonstrates that the Government required it to remain on standby and the delay was of uncertain duration, the contractor has established a *prima facie* case of entitlement to damages under the *Eichleay* formula. *Altmeyer, supra*. At that point, the burden of proof shifts to the Government to prove that the contractor was able to either reduce its overhead or to take on replacement work during the delay. *Craft Machine Works*, ASBCA No. 47227, 97-1 BCA ¶ 28,651. The fact that the contractor bids upon and performs new contract work during the delay period is insufficient, alone, to rebut the contractor's *prima facie* case. *Melka Marine, Inc.*, *supra*, 187 F.3d at 1378-79. The additional work has to be true replacement work, as "healthy" contractors regularly take on new work in the regular course of business. *West v. All State Boiler, Inc.*, 146 F.3d 1368, 1376 (Fed. Cir. 1998).

We first examine the "standby" requirement. We have found that appellant's time cards reflected that, during the time period in question, CCT's direct employees were charging 40 hours a week, with all or part of their time being charged to the prototype contract, and that some employees were working more than 40 hours per week. We have found, further, that CCT, generally within a matter of days, reassigned personnel to another project when discovery of a problem made it impossible for them to perform on the prototype contract and that CCT did not experience any significant interruption. In response to the Government's contention that, for the above reasons, CCT was not entitled to receive compensation for unabsorbed overhead, appellant admits, while not conceding it is not entitled to Eichleay damages:

> CCT agrees with the Navy that CCT's employees were working full time during periods of claimed delay. [Citation omitted] CCT's employees were working full-time on the out-of-scope (additional work) in the form of developing specifications and reworking prior work performed to the defective specifications. [Citation omitted] CCT also agrees with the Navy that CCT reassigned personnel to other programs and initiated layoffs when impacted by "standards" and "directed work."

(App. reply br. at 206) We conclude that, during the period of delay, CCT's employees were performing additional work to meet the changing requirements of the specifications, that its emplyees were not on standby, and that the company did not experience unabsorbed overhead. CCT is, therefore, not entitled to recover under the *Eichleay* formula and it is not necessary to further discuss prong (b).

6. CCT's Cost Records

We have found that appellant's claim was, essentially, a "total cost" claim in that appellant did not segregate its performance costs between changed and unchanged work. In their briefs, the parties engage in argument over whether appellant was required to segregate its costs between original and changed work, and whether it had made the proper effort to do so. That issue is one which relates to quantum and is not within the scope of this appeal.

CONCLUSION

We conclude that appellant is entitled to recover an equitable adjustment, including any costs of the nonconcurrent delay other than unabsorbed overhead, as a result of its efforts to meet the requirements of the defective specifications. The appeal is sustained to the extent described above. The matter is remanded to the parties for the determination of quantum and settlement consistent with this decision.

Dated: 27 March 2003

RONALD JAY LIPMAN
Administrative Judge
Armed Services Board
of Contract Appeals

I concur

MARK N. STEMPLER
Administrative Judge
Acting Chairman
Armed Services Board
of Contract Appeals

I concur

EUNICE W. THOMAS
Administrative Judge
Vice Chairman
Armed Services Board
of Contract Appeals

I certify that the foregoing is a true copy of the Opinion and Decision of the Armed Services Board of Contract Appeals in ASBCA Nos. 47420, 48846, Appeals of Cable and Computer Technology, Inc., rendered in conformance with the Board's Charter.

Dated:

EDWARD S. ADAMKEWICZ
Recorder, Armed Services
Board of Contract Appeals