

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE
DO-C9

PAGE OF PAGES
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2. AMENDMENT/MODIFICATION NO.
0001

3. EFFECTIVE DATE
26 AUG 2002

4. REQUISITION/PURCHASE REQ. NO.

5. PROJECT NO. (If applicable)

6. ISSUED BY CODE
N00173

7. ADMINISTERED BY (If other than Item 6) CODE

CONTRACTING OFFICER
NAVAL RESEARCH LABORATORY
4555 OVERLOOK AVENUE SW
WASHINGTON, DC 20375-5326
ATTN: CODE 3220.AT

8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)

TO ALL OFFERORS

(X) 9A. AMENDMENT OF SOLICITATION NO.
N00173-02-R-AT04

X 9B. DATED (SEE ITEM 11)
02 AUG 2002

10A. MODIFICATION OF CONTRACT/ORDER NO.

10B. DATED (SEE ITEM 11)

CODE FACILITY CODE

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.
Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
(a) By completing items 8 and 15, and returning 2 copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

N/A

13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

SEE PAGE 2

Any questions concerning this amendment should be directed to:
Evangalina R. Toledo, Contract Specialist (202) 767-2021

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
<i>(Signature of person authorized to sign)</i>		<i>(Signature of Contracting Officer)</i>	

The purpose of this amendment is to correct the closing date in Section L-2 and to answer questions raised by potential offerors.

1. Closing Date in Section L-2 is corrected to September 3, 2002 as shown on the SF 33, Block 9.

2. Questions and Answers:

(1) The Requirements call for a 6U VME based system. Would a system based on some other bus architecture such as PCI be acceptable as long as it met, or exceeded, all the other requirements of the system?

Answer: No. VME is required for future Real-Time Processing that will be based on Mercury's Race++ products.

(2) The RFP calls for a 1 GB/sec Fiber Channel based RAID for storage. Would a disk array with an Ultra SCSI (160 or 320 MB/sec be acceptable)? Such a system would allow for higher data throughput rates at a lower price. Disk access by the host computer would not be a problem since the data could be stored to a ufs file system (native to Solaris) and could be accessed via other networked computers over a Fiber Channel (or other network media such as gigabit Ethernet) as an NFS mounted disk system.

Answer: Yes, as long as each individual 2 channel receiver/Ram/Processor subsystem can save its data directly to the disk array at Fiber Channel equivalent or better speeds and the data is not being saved over Ethernet via NFS. Also, the fit and form factor must be equivalent to a fiber channel solution with a disk array.

(3) The Specifications call for a SUN CPU-50 host computer. We assume what is meant here is a Force Computers CPU-50 VME-based SPARC board. Are we restricted to using this board or will any SPARC machine with performance equal to or better than the Force CPU-50 be acceptable? This machine could be from Sun Microsystems or another vendor such as Themis Computer.

Answer: Yes. Any SPARC VME based machine with performance, reliability, and i/o capability equal to or better than the Force CPU-50

(4) The specification says that the IF is at 45 MHz with a bandwidth of 10 MHz, yet the system is required to sample a 30 MHz bandwidth. Is this to account for the guard bands from the RF front-end?

Answer: NRL will be testing advanced waveforms in the future and will be utilizing the additional bandwidth.

- (5) The specifications ask for an ADC with a minimum sampling rate of 80 MHz. Why is this necessary when the external clock is at 60 MHz?

Answer: NRL wishes to use the AD6645 14 bit A/D converter. That chip is capable of acquiring data at speeds up to 80 Mhz.

- (6) Could the Government provide us with a better understanding of the functionality to be implemented in the FPGA?

Answer: The FPGA will contain Government developed code. The FPGA will receive an external Range window signal to during processing. The FPGA will have 14 bit 60 Mhz digitized input. It will perform decimation and I Q generation. The final I and Q will be 32 bits each. 64 bits total -27 bits of radar data and 5 bits of header type information for each I and Q sample. The final data rate will be 15 Mhz. See Question 7 for more info about the data rate.

- (7) The signal bandwidth around the IF is 10 MHz. Where does the data rate of 39.36 MB/sec come from?

Answer: We are direct sampling the IF of 45 Mhz. at 60Mhz. Then the FPGA performs decimation and generation of I and Q data from the complex A/D data. The final output of the FPGA is 32 bit I, 32 bits Q at 15 MHz. for a 20 Nautical mile range window. The data then needs to be transferred from the FPGA to ram or storage medium during the rest of the PRI dwell i.e.

Single Channel Data Rate Calculation

$$c = 3e8 \text{ m/s}$$

$$\text{Nominal PRI} = 1\text{ms}$$

$$\text{Collect time} = 2 * (20\text{nmi}/(c/1852)) = 0.247\text{ms}$$

$$\text{Final Data Rate (post FPGA)} = 15\text{Mhz}$$

$$\text{Final Data Rate} = 15\text{Mhz} * 64 \text{ bits} = 960 \text{ Mbits/sec}$$

$$960 \text{ Mbits/s} * 0.247\text{ms} = 237120 \text{ bits/pulse}(29640 \text{ bytes})$$

$$\text{Time to transfer} = \text{pri} - \text{acquisition time} = 1\text{ms} - .247\text{ms} = 0.753\text{ms}$$

$$\text{Transfer Rate (Min)} = 237120 \text{ bits}/.753\text{ms} = 314.9 \text{ Mbits/sec}$$
$$= 39.36 \text{ Mbyte/sec per receiver}$$

- (8) Ref: SOW para 3.5a: It appears that the SUN CPU-50 host computer is to be supplied by the contractor. Is this true?

Answer: Yes, The VME chassis Slot 1 Computer is also to be the radar controller and provide archiving of the collected data to a to be determined device such as a DLT tape drive. The operating system is to be Solaris.

- (9) Ref: SOW para 3.2c: Would a single 8-pair (16 channel) sub-system be acceptable in lieu of the 4 each 2-channel sub-systems? (Each unused channel could be turned off from the GUI).

Answer: No. The receiver board NRL wishes to use is a Pentek 7131. This board has 2 analog inputs, and a FPGA. Due to bandwidth restraints, 2 analog channels is the maximum per FPGA.

- (10) Ref: SOW para 3.4a: The physical form characteristics of the RAID system is specified as a 19 inch rack mountable system. Will the same form factor also apply to the other system components, i.e., SUN CPU-50, Monitor, Keyboard, and Data Acquisition System?

Answer: The entire system is to be mountable in a standard 19" rack with the exception of the monitor which is to be a 17" LCD which NRL will mount into a rack.

- (11) What company and model numbers are associated with these VME components and is there a similar system currently in use for us to View?

Answer: The digital receiver board we wish to base our system on is a Pentek 7131 16 Channel 2 Input Narrowband receiver & A/D PMC module.

- (12) Your solicitation spells out a specific FPGA but the part number is incomplete it is missing the package type and operating temperature codes can you provide a complete part number as well as all required software and cables you would like the vendor to supply with the FPGA development system.

Answer: The FPGA is already on the Digital receiver. The contractor will provide a cost for NRL to have the ability to Program the FPGA while it is aboard the Pentek 7131. NRL already has a development environment for the FPGA.

- (13) Will there be a line up meeting to show the vendors a similar system or the installation site?

Answer: No. No such system exists here.

- (14) Are there any classification issues with this solicitation?

Answer: No

- (15) The FPGA is listed as an optional Cost Line Item (0004), but 3.3 (2)(Statement of Work) implies the contractor will supply the FPGAs. Do paragraphs 3.3 (a) and (b) apply only to line item 0004 (FPGA)?

Answer: The FPGA is part of the COTS Pentek 7131 Digital Receiver. Tools to load the on-board FPGA are requiring a quote.

- (16) Paragraph 3.1 (i) of the Statement of Work states that the "A/D converters shall have a maximum sampling rate of no less than 80 MHz" and paragraph (j) states that the "A/D conerters shall have a minimum of 14 bits". Most COTS VME A/D converters have 12 bits. Is it anticipated that this will be a custom or COTS item? If it's a COTS item, does the customer have a particular vendor in mind?

Answer: It is a COTS Receiver board. Pentek 7131 with an A/D model number AD6645 14 bit A/D converter. That chip is capable of acquiring data at speeds up to 80 Mhz.

- (17) Ref: 3.2k Each A/D converter shall contain an on board crystal oscillator, a front panel external clock input or a low voltage differential signal (LVDS) clock (for changing) selectable via software. Does this mean that each board with 2 A/Ds needs 2 external clock inputs or is 1 per board acceptable?

Answer: One per board is acceptable.

- (18) What or which are the file formats for the data when stored on the disk subsystem? MARTES, LABVIEW, MATLAB, BINARY, other

Answer: Binary is the file format of choice, with an actual format to be determined. i.e. Single channel I and Q per file, each IQ pair in sequence, etc.

- (19) Is any type of input bandpass filtering required. It appears that a bandpass filter is needed since the signal of interest is between 35 and

55 MHz, but the sampling frequency is only 60 MHz. The provides for a bandwidth of 30MHz. A filter from 30 to 60 MHz should be applied to the front end to remove signals that are out of the band of interest. This would be a filter for each input.

Answer: No. NRL has all filtering built into the radar system.