

ONR Industry Day Questions  
April 3, 2009

Part I: Contracting/Programmatic Questions (Das)

1. Q. If more than one Phase 1 contract is awarded, will there be additional funding available or will you share/split available funds?  
A. The BAA shows the anticipated amount of funding available regardless of the number of awards. ONR anticipates two or three phase 1 awards “followed by a down selection to one after 18 months (phase 1 demo)”.
2. Q. Should we submit a Phase 1 proposal only, or full Phase 2 and 3 with full cost proposals?  
A. Please note that page 17 of the BAA states that ONR anticipates “to award one or more Cost Plus Fixed Fee contracts for this effort”, which can only be negotiated in good faith if appropriate costs are known to the government.
3. Q. What composition of skills, experience, etc is desirable in proposing teams?  
A. The composition of skills and experience needed to perform the desired work is left to the discretion of the proposers.
4. Q. Will special consideration be given to small, women-owned or minority-owned firms?  
A. The Eligibility Information section on page 18 of the BAA states “no portion of this BAA will be set aside for HBCU and MI participation”.
5. Q. Does the budget profile include funding for the government’s activities in Phases 1, 2, and 3?  
A. The BAA reflects the anticipated amount that will be available to contract with industry.
6. Q. What are ONR’s expectation on the number of awards and funding available per vendor in Phase 1?  
A. ONR may make multiple awards based on the quality of the proposals and the funding available.
7. Q. The BAA says 6.1/6.2 in one place and states 6.2/6.3 level work in another place. Is this an issue for the type of proposal that is acceptable?  
A. The work described by the BAA is anticipated to be 6.2 and 6.3.
8. Q. Can the contractor submit a classified appendix to an unclassified proposal?  
A. Yes.
9. Q. How does this BAA relate to past work between NRL and NovaSol, in particular the \$9.8M award in 2008 for the development of a Dual Mode Optical Interrogator?  
A. The technology anticipated for delivery under this BAA will be fully, competitively evaluated and awarded. We anticipate that technology developed and delivered under this program will exceed all prior funded research.

## Part II: Modulating Retroreflector Technical Q&A (Will Rabinovich)

1. Q. Do the MRRs maintain polarization while being interrogated?  
A. The MQW modulators themselves maintain polarization, but the corner cube reflector will turn a linearly polarized beam into an elliptically polarized beam.
2. Q. Is the MRR expected to be mounted in a gimbal that gives it an automated PAT capability? Or is PAT manual from the MRR end?  
A. This is left for the vendor to decide. The MRR could be mounted in a gimbal if the vendor feels it is necessary to perform satisfactorily in a certain scenario.
3. Q. What is the required Field of View for the MRR?  
A. There is no requirement in the BAA on Field of View. This is left to the discretion of the contractor. NRL has demonstrated ship-to-ship MRR links using an MRR array with a 60 degree field of view.
4. Q. Does the MRR link have data bandwidth requirements in both directions, or is data only intended to be transmitted out of the MRR?  
A. The intention is the data rate is symmetric in both directions. The link may or may not be full duplex, it could be half duplex.
5. Q. What are the details of the GFE photodetector coupled to the MRR?  
A. The GFE photodetector will support the same data rate and field of view as the GFE MRR.
6. Q. For Phase 1, is on-the-move positional stability sufficient to keep the MRR field-of-view pointed at the interrogating terminal, or will the MRR need to be on some kind of gimbal?  
A. There are no Phase 1 pointing requirements on the MRR. It is left to the discretion of the contractor on the configuration of the MRRs (single or array) and field of view needed to satisfy possible scenarios.
7. Q. What is the design support during proposals on limits on the number of MRRs needed for the MRR terminal?  
A. The terminals should be practical. The design is left to the discretion of the contractor, however the SWAP metrics inherently provide some guidance. As a rule of thumb corner cube MRR arrays with more than a dozen MRRs, and cat's eye arrays with more than half a dozen cat's eyes, become unwieldy.
8. Q. What is the MRR mass as a function of Corner Cube vs Cats Eye vs Number of retros?  
A. Cats Eyes weigh about 0.5 lb. Corner Cube MRRs weigh about 10 grams. The array structure adds weight. Specifications can be found in the Industry Day charts.
9. Q. For the Cats Eye MRR, will the integrated package including the lens be provided?  
A. Yes. The Cats Eye optics and packaging are GFE. TTL inputs to the package will be provided.
10. Q. For the Corner Cube MRR, can we assume GFE something like the array shown in the Industry Day Briefing?  
A. Yes, that packaging can be provided. The form factor can also be changed. It is also possible for the vendor to package the units themselves.

11. Q. Are there any Spice or other models available for the MRR?  
A. Not specifically. MRRs use TTL inputs and power inputs. Analog photodiode signals are output. Generally speaking MRRs act electrically as capacitors with capacitance between 2-5 nF and a required drive voltage of about 5 V.
12. Q. What are the MRR spectral characteristics? It is flat with respect to phase and power?  
A. MRRs are amplitude modulated devices, not phase modulated. If you need to know analog response, details can be provided on the analog mode, but you would need to temperature control the modulator.
13. Q. Who will do the temperature control?  
A. The temperature control will be integrated into the MRR and GFE. It will make the package larger.
14. Q. Is it more desirable to temperature control the MRR or not?  
A. The choice is left to the discretion of the vendor. The choice will depend on the scenario the device is used in. For example, if the device was in a sleep mode, it would need a longer time to wake up and reach its preferred temperature if the MRR was temperature controlled than if it was not. In general, an MRR that does not require temperature control will produce a more compact and desirable MRR terminal. However, if adding temperature control increases the performance of the link it may be worth the cost.
15. Q. What kind of modulation does the MRR use?  
A. On-off keying is typical.
16. Q. Do we need to use the GFE communications detector for the MRR?  
A. This is not a MRR development program. If a small change in receiver/detector can be made at no significant cost impact, this would not be an issue.
17. Q. Are there any intellectual property issues with the GFE hardware that need to be addressed during the proposal?  
A. There are patents on the MRR technologies. It is intended that a technology transfer process will transition this to industry during the program. NRL may issue government purpose rights for this technology.
18. Q. Are the MRR optics GFE?  
A. Yes.
19. Q. Does the MRR need to receive communication with the sun in the Field of View?  
A. It would be beneficial if it could operate with the sun in the FOV, but it is not a requirement.
20. Q. What is the size of the MRR electronics package?  
A. The MRR driver electronics is a penny-sized package. The modem would be larger.
21. Q. Is the photodetector receiver behind the same aperture as the MRR, or is it a separate aperture?  
A. The photodetector has a separate aperture.
22. Q. Does the photodetector have a Transimpedance amplifier attached to it?  
A. Yes. It emits a signal on the order of a few mV to Volts.

23. Q. What is the Field of View of the photodetector?  
A. The government will match the FOV of the detector to that of the MRR element.

#### Part III: Network Interfaces (Ray Cole)

1. Q. What are the interfaces between the internal terminal and the router/crypto gear?  
A. The intention is to have a common standard between multiple types of terminals. The government will provide an interface standard. The government will provide a data stream and information on where to point the terminal. If a vendor has a unique need, please bring it to the attention of the government.
2. Q. For phase 3, it was mentioned the system needs to have government accreditation before integration into onboard networks. Who is responsible for this, and how long will it take?  
A. No costing is needed for Phase 3 accreditation and approvals.
3. Q. What type of Ethernet is needed at the terminal interface?  
A. The system should have 10/100/1000 Mb Ethernet auto-negotiating to the outside world.
4. Q. Will you delay network interface development to phase 2?  
A. Networking is external to the terminal. Modem development is required as part of Phase 1.

#### Part IV: Direct Terminal (Chris Moore)

1. Q. What are the pointing accuracy requirements on the terminal? Will the platform provide attitude and orientation information? What defines the “GFE bearing” information?  
A. Pointing accuracy requirements while tracking are determined by beam divergence from terminal and requirement to maintain pointing between terminals. The platform will provide attitude and orientation information. For acquisition, vendors should design for at least a  $\pm 1^\circ$  pointing error between GFE provided bearing and actual bearing to target. When the vendor is under contract, more details on the GFE bearings will be provided.
2. Q. Many COTS airborne turrets have hidden weight (ie. External control interfaces, power conditioning, INS/GPS electronics, etc are not included in the weight specification). Can we use just the weight of the turret portion for the purposes of the BAA?  
A. The SWAP values listed in the BAA are notional metrics, not requirements. It is important for the government to know the SWAP of all of the components of the gimbal, not only the turret. The government will provide a bearing, so INS/GPS is not required.
3. Q. For the laser safety requirement on page 9 of the BAA, can more details be provided?  
A. Details on the Navy Laser Safety Review Board (LSRB) standards and process can be found at: <http://safetycenter.navy.mil/acquisition/laser/index.asp>. Navy

instructions and design criteria are at the bottom of that website page. OPNAVINST 5100.27B, May 2008/Marine Corps Order 5104.1B, Navy Laser Hazards Control Program is especially relevant. The Navy LSRB is hosted out of NSWC Dahlgren. More details and LSRB contact information can be found at: <http://www.nswc.navy.mil/wwwDL/G/LASER/index.html>.

4. Q. Will the government provide all vehicles (boat and aircraft) for the demos at no cost to the contractor?  
A. Yes, the government will provide all demonstration platforms during the program.
5. Q. Who does the integration onto the platform for each phase?  
A. The government will perform the integration of the terminal onto the platform, both mechanical and network integration. The contractor would provide support, including an electrical, mechanical, and data Interface Control Document (ICD). The contractor will be expected to support the government as needed.
6. Q. Is there a requirement to leave behind equipment used for the demos?  
A. This is expected to be a spiral development program. The contractor deliverables will be left for the end of the contract.
7. Q. What is the location of the planned demos?  
A. The locations are TBD.
8. Q. Who provides the "COTS Gimbal"? Does it provide coarse pointing and tracking?  
A. The contractor provides the "COTS Gimbal(s)" required to perform coarse pointing and tracking.
9. Q. Will zodiacs be used as platforms? Is data on the accelerations of the platforms available?  
A. It is plausible that a RHIB type platform would use a MRR type terminal only. Vibration for MRR type terminals is not applicable owing to the large field of view of these terminals. For direct terminal design, accelerations vary considerably with platforms. As a worst-case scenario guideline, maximum roll angles of  $\pm 20^\circ$  with a 10 second period and maximum accelerations of  $10^\circ/\text{sec}^2$  should be used for design purposes.
10. Q. Please provide EMI environments during required operations.  
A. Shipboard operations are typically the most stressful with numerous high power RF sources. Exact details of these sources cannot be provided at this time. Good EMI design practices are a starting point.
11. Q. Are the relay nodes on the ship and air platforms bent-pipe (so the contractor provides the routing), or is the interface to the platform Ethernet and then the platform routes to the second terminal (or elsewhere, depending on the traffic)?  
A. NRL will do any routing.
12. Q. Phase 1 requires demonstration of the maritime direct link to the horizon, and the MRR link to max range and on the move. This implies that in 18 months, the contractor should have completed all development and integration of the Products 1 and 2 lasercom system. The remainder of the program would then be dedicated to building more carbon copies of the same phase 1 hardware, and conducting more demonstrations in different scenarios. Is this a correct summary of the program phases?  
A. No. This is a spiral development program. Significant further development will take place in Phase 2. Development will also take place early in phase 3 with no

changes later in phase 3 to ensure ample time to obtain security accreditation and installation approvals for operational platform integration.

13. Q. Does Phase 1 have both direct lasercom and MRR links?  
A. Yes.
14. Q. Is the contractor responsible for networking or just terminals?  
A. The contractor is responsible for terminals and 10/100/1000 Mb Ethernet interfaces and modems.
15. Q. How much attention should the contractor give to test plans for each phase of the proposal?  
A. The government is leading the testing, and will complete the test plans. Opportunity for contractor input will be available.
16. Q. Provide clarification on the process the Navy LSRB uses for eye safety certification?  
A. The LSRB does not provide eye safety certification. LSRB grants permission to operate systems that use lasers. Further information is on the websites in Part IV, Question 3.
17. Q. Does the control computer/chassis count against the terminal SWAP?  
A. Yes. The notional metrics provided are for guidance purposes, and include terminal SWAP including all external electronics/power/etc.
18. Q. Does the Phase 2 airborne relay use direct links, and thus 2 airborne laser terminals?  
A. Yes. Two airborne terminals are needed for the Phase 2 relay demonstration.
19. Q. In Amendment 2, are you bypassing the modem with the external fiber port?  
A. Yes, an external modem would be used in that case. Only the optical part of the terminal would be used, not the internal modem.
20. Q. Are external modems not included in the development of this system?  
A. Modems are required as part of system and can be external or internal to the terminal head as part of this BAA.