UNITED STATES SPECIAL OPERATIONS COMMAND

Proposal Submission

The United States Operations Command's (USSOCOM) mission includes developing and acquiring unique special operations forces (SOF) equipment, material, supplies and services. USSOCOM is seeking small businesses with a strong research and development capability and an understanding of the SOF operational characteristics. The topics represent a portion of the problems encountered by SOF in fulfilling its mission.

Inquiries of a general nature or questions concerning the administration of the SBIR program should be addressed to:

United States Special Operations Command
Attn: SOAL-KS/Ms. Karen L. Pera
7701 Tampa Point Blvd.
MacDill Air Force Base, Florida 33621
Email: perak@socom.mil

USSOCOM will only accept proposals for those topics stated in this solicitation. The USSOCOM Program Executive Officers (PEOs) responsible for the research and development in these specific areas initiated the topics and are responsible for the technical evaluation of the proposals. Proposal evaluation factors are listed below and each proposal must address each factor in order to be considered for an award. Prior to July 1, 2003, scientific and technical questions may be directed to the topic author, and after that, through the DTIC SBIR Interactive Technical Information System (SITIS).

Selection of proposals for funding is based upon technical merit and the evaluation criteria included in the solicitation. As funding is limited, USSOCOM will select and fund only those proposals considered to be superior in overall technical quality and most critical. USSOCOM may fund more than one proposal in a specific topic area if the technical quality of the proposal is deemed superior, or it may fund no proposals in a topic area.

Evaluation Criteria – Phase I & II

1) The soundness, technical merit, and innovation of the proposed approach and its incremental progress toward topic or subtopic solution.

2) The qualifications of the proposed principal/key investigators supporting staff, and consultants. Qualifications include not only the ability to perform the research and development but also the ability to commercialize the results.

3) The potential for commercial (Government of private sector) application and the benefits expected to accrue from this commercialization.

The maximum amount of SBIR funding for a USSOCOM Phase I award is $100,000 and the maximum time frame for a Phase I proposal is 6 months. A Phase I proposal for less than 6 months and/or less than $100,000 is encouraged where low risk technologies are being proposed.

USSOCOM will request Phase II proposals on a case by case basis. The proposal must be structured as follows: the first 10-12 months (base effort) should be approximately $375,000; the second 10-12 months (option) of incremental funding should also be approximately $375,000. A Phase II proposal for less than 24 months and/or less than $750,000 is encouraged. The maximum amount of **SBIR funding** allocated for a USSOCOM Phase II award is $750,000 and the maximum time frame for a Phase II award is 24 months. Proposals should be based on realistic cost and time estimates, not on the maximum time (months) and dollars. The cost of the project is based on the overall amount of hours spent to accomplish the work required and the overall term of the project should also be based on the same effort. In preparing the proposal, (including the plan of objectives and milestones), firms should consider that workload and

operational tempo will preclude extensive access to government and military personnel beyond established periodic reviews.

Electronic Submission Instructions

All proposal information must be received electronically via the DOD SBIR/STTR Submission site. To submit, proceed to http://www.dodsbir.net/submission. Once registered, a firm may prepare (and edit) Company Commercialization Report Data, prepare (and edit) Proposal Cover Sheets, complete the Cost Proposal form, and upload corresponding Technical Proposal(s). The electronic proposal must be transmitted to the site by 6:00 AM EST on August 14, 2003. The proposal submission, exclusive of the Company Commercialization Report, must not exceed 25 pages.

Paper copies will not be considered. A complete electronic submission is required for proposal evaluation. An electronic signature is not required on the proposal. Please note that there have been problems reported in the past when using AOL for large file uploads; therefore, we suggest using an alternate internet service provider for files larger than 5MB. It is strongly suggested that all firms **submit final, completed proposals 3-5 days prior to the solicitation closing date to ensure complete submission**. *Firms are entirely responsible for complete and timely submission of the proposal.*

Firms are encouraged, but not required, to embed graphics within the technical proposal file. When including images, care should be taken to ensure images are not of excessive size. A resolution of 200 dpi or below is requested for all embedded images. Please use standard fonts in order to prevent conversion difficulties.

Performing a virus check on each proposal to be uploaded electronically is the responsibility of the firm. The detection of a virus on a submitted electronic technical proposal may be cause for proposal rejection. *E-mail submissions will not be accepted.*

The DoD SBIR/STTR Submission site will present a confirmation page when a technical proposal file upload has been received. The upload will be available for viewing on the site within an hour. It is in your best interest to review the upload to ensure the server received the complete, readable file.

For additional information about electronic proposal submission, including uploading your technical proposal, refer to the instructions on the solicitation and the on-line help area of the DoD SBIR/STTR Submission site, or call the DoD SBIR/STTR Help Desk at 866-SBIRHLP (866-724-7457).

SOCOM 03.2 Topic List

03-007	Military Utility of Directed Energy Weapons
03-008	Direction Finding (DF) Module
03-009	Renewal/Service Life Extension of Weapon (Machine Gun) Components
03-010	Team Transportable Communications/Collection Suite
03-011	Innovative Vest Research
03-012	Radar Technologies for SOF
03-013	Battery Modulation for Communications Equipment
03-014	Development of a Family of Modular Light Tactical Wheeled Vehicles (FMLTWV)

SOCOM 03.2 Topic Descriptions

03-007 TITLE: Military Utility of Directed Energy Weapons

TECHNOLOGY AREAS: Weapons

ACQUISITION PROGRAM: Advanced Tactical Laser ACTD

TITLE: Optimize Application of Effects-based Weapons

OBJECTIVE: Conceive and develop an innovative modeling tool that incorporates the diverse methods of employment and transformational effects achievable with emerging weapons to optimize weapon application.

DESCRIPTION: A model to evaluate emerging weapon technologies in a variety of mission scenarios would assist in the development and application of these weapons. For example, directed energy weapon capabilities are often misunderstood (both over- and under-estimated) by users. These users can improve chances of mission success by understanding the limits of the system lethality envelope. Integrating directed energy weapons into military operations remains dependent on two restrictors: 1) a cumbersome lethality assessment process and 2) no ready method to communicate new weapons capabilities to warfighters. As long as lethal and non-lethal effectiveness against a robust range of targets is uncertain, the full value of innovative weapons will remain unexploited.

This proposed modeling tool harvests existing performance models to integrate dissimilar weapon types into a unified lethality model. The research and development aspect of this effort is challenging. The envisioned modeling tool provides an inventory of weaponry (directed energy sources at first, but expandable to include other weaponry) and target types (with a selectable description of vulnerabilities). The effort will compare and contrast the variety of methods used to describe weapon performance and target vulnerability, and bridge modeling differences. This tool will guide developer understanding of weapon lethality to consider a broader range of targets, and inform operators and mission planners which targets can be engaged, and what engagement effects (disable, disrupt, kill) are possible.

The Advanced Tactical Laser (ATL) provides an opportune first application: it is designed for tactical engagements, already has several modeled targets but has capacity against a much larger array of targets, and provides the operator with ancillary capabilities (long range optics, active imaging) that might prove militarily useful.

PHASE I: This phase is focused on developing and demonstrating a prototype model architecture flexible enough to apply a variety of weapons types (beginning with directed energy weapons in development), their methods of employment, operational constraints, and target effects. The Phase I tasks include:
1. Construct an inventory of models available to incorporate
2. Develop a methodology that accommodates the available lethality data, models existent, and weapon employment schemes
3. Demonstrate simulations to illustrate the effectiveness of the model flexibility to include various targets and weapons, and suggest engagement options to the user (angle of attack, day/night operations, weapon type, effect, possible collateral effects, and other targets of opportunity).

PHASE II: Phase II tasks will be directed towards the implementation of the innovative concepts and approaches outlined in Phase I on USSOCOM's ATL ACTD program, leveraging the target lethality testing process, existing system performance models and lethality data. The Phase 2 company will develop the appropriate model interfaces and analytical models of the ATL weapon system to incorporate the ATL into joint and Special Operations Forces (SOF) simulations and wargames to assess the military utility of this emerging weapon technology. The successful proposer would also utilize existing DE target vulnerability data provided by the project officer and conduct vulnerability tests on selected targets to validate model performance. This model will be applied to evaluate ATL effectiveness in a variety of mission scenarios, supporting development of concepts of employment, ancillary capabilities, and assist

mission planners in wargaming environments.

PHASE III DUAL USE APPLICATIONS: The proposed modeling tool has application to a variety of civilian uses, including effectiveness of new technologies in civil search and rescue operations (e.g. best use of long range imaging, is active illumination useful/necessary, what is the resolution available to the operator), and law enforcement operations (systems usable for mob control and in support of SWAT operations).

KEYWORDS: SIMULATION, MODELING, DIRECTED ENERGY WEAPONS, HIGH-ENERGY LASERS, WARGAMES, MILITARY UTILITY, JMEMS.

03-008 TITLE: Direction Finding (DF) Module

TECHNOLOGY AREAS: Information Systems

ACQUISITION PROGRAM: Joint Threat Warning System

OBJECTIVE: Special Operations Forces (SOF) lack a dynamic small package that will give them the ability to direction find (DF) emitters they encounter. Having this capability will save lives during dangerous missions.

The purpose of this SBIR is to research, design, and create a state of the art package that will permit on-the-move and stationary direction finding of an emitter, integrated into present and future SOF equipment. This capability will be part of the "toolbox" that a SOF user can pull off the shelf to use.

DESCRIPTION: Development of low power, miniature electronics to assist with the direction of emitters, offers placement possibilities not formerly possible. The designer will use the latest in commercial and government developed technologies to design a DF package to be used by deployed SOF personnel.

In keeping with our "toolbox" mentality, this SBIR seeks to design and build a family of DF products that a soldier can choose from and plug into existing receiving systems (body worn or manpack). The Proposer's design should not be "stove-piped" or standalone.

It is envisioned that this capability will be used the following way. SOF will enter an area, wearing SOCOM's developed Body Worn Antenna (BWA) and SIGINT/threat warning receiver. As they encounter possible threat signals, the software (automatically or manually) powers up the DF module to find the direction (relative bearing) of the signal, then reports the direction to the operator.

The DF module should work with any DF antenna, although for this SBIR it will be tested with the BWA. The DF module should work with many types of SIGINT/threat warning receivers, although for this SBIR it will be tested with the SBIR, SOCOM 02-002, Portable Wireless Monitoring Station. The purpose of this SBIR is to build a small, manpack SIGINT/Threat Warning receiver. Digital Receiver Technology (DRT) and Applied Signal Technology (AST) are the Phase II winners.

Proposers should have as an objective that the DF module work with present receivers (as mentioned above), and if the soldiers does not have a receiver, he can attach an external receiver to the DF module.

JTWS uses the NT operating system, but innovative proposals will allow the software to be operating system independent. The software will attempt to be Joint Component Architecture and Framework (JCAF) compliant.

Innovative proposals will:
* Permit the DF module to "sleep" to conserve battery life until awakened by the soldier's call for direction finding from his receiver.
* Make the software flexible, to permit other software applications to call for DF's and receive the

information.
* Be as small, low power, and lightweight as possible.

Proposers should budget for a single day trip to Tampa, Florida for a Phase 1 kickoff meeting.

Successful proposals will show previous or proposed use of novel technology to achieve substantial enhancements to equipment size, weight, performance, reliability, power consumption, and/or cost.
Pluses include:
* Employees who have operational experience in the tactical and/or SOF arena;
* Leveraging of previous relevant SBIR, military, or commercial related technologies (please specify in detail);
* Fully demonstrating the proposing company's past and present experience;
* Supplying references on proposing company's products/programs (particularly government program managers);
* Giving detail on its proposed technologies to show expertise.
* Showing expertise in direction finding, micro-receivers, or geo-location.

The proposal should detail the firm's experience in innovative advanced hardware and software design and familiarity on working with hardware. The proposer should be prepared to deliver products in accordance with the general information outlined in each of the phases as listed below:

PHASE I: The proposer in Phase 1 will perform the required research of needed technologies to meet and hopefully exceed the above requirements. Develop design for submission for a phase 2. Limited lab prototype verifying design a plus. The driving force behind this SBIR will be to make the DF module as small and low cost as possible; provide a design and cost estimate for Phase 2.

PHASE II: Develop two system prototypes, one within one year of start of Phase II for user feedback. Incorporate feedback from users into a final design. A final test will be required to demonstrate in a realistic tactical environment Conduct limited testing to prove feasibility over a seven-day mission scenario. Conduct environmental testing to determine feasibility of use from –10 to 50 C.

PHASE III DUAL-USE TECHNOLOGIES: This system will have immediate use on the war in terrorism. Although designed primarily for SOF tactical operations, it will have applications in at least two PEO-IIS programs. It will also have application with the other military services (Marines and Army have expressed interest) and law enforcement agencies. Commercially this product could be spun off to enable remote monitoring of assets

REFERENCES:

SBIR, SOCOM 02-002, Portable Wireless Monitoring Station, located at: http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir021/socom021.htm. Phase II winners: DRT and AST.
Digital Receiver Technology (DRT) web page and contact info: www.drti.com, Ms. Cindy Solomon, Marketing Director, 301-916-5554 x151, csolomon@drti.com.
Applied Signal Technology (AST) web page and contact info: www.apsig.com, Mr. Kenneth Cumings, kcumings@appsig.com

SBIR, SOCOM 01-007, Tactical Body Worn RF Antenna Vest
http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir012/socom012.htm;
Phase II winners: Windermere: Eric Kohls, ekohls@witsusa.com, Megawave: Glynda Genham, gbenham@megawave.com

For an unclassified copy of the JTWS Operational Requirements Document (ORD), see the SITIS page.

Penn State University Applied Research Lab (PSU ARL) has expertise in the areas of propagation, antenna modeling/simulation, conformal design, fractal design, signal detection and geolocation, and SIGINT environment. Contact Mr. Jim Ross, jfr5@psu.edu, 814-863-2733.

Southwest Research Institute (SwRI), a nonprofit research institute in San Antonio, has extensive expertise in SIGINT, receivers, geolocation, and body worn antennas; contact Bobby Perez, boperez@swri.org, 210-522-2803.

KEYWORDS: DIRECTION FINDING, EMITTER, INTELLIGENCE, SIGINT, RF, RADIO FREQUENCY, DF

03-009 TITLE: Renewal/Service Life Extension of Weapon (Machine Gun) Components

TECHNOLOGY AREAS: Materials/Processes, Weapons

ACQUISITION PROGRAM: 5.56 and 7.62 Lightweight Machine Guns

OBJECTIVE: Determine feasibility, demonstrate prototypes, and produce a product/process that will extend the life of small arms weapon components/parts such as machine gun barrels. Objective is to reduce weapon system acquisition costs through service life extension, reduction in parts consumption & failure rates, and demonstrate ability to re-use (vice replace) components such as gun barrels after treatment/coating.

Currently sustainment costs for USSOCOM weapons, primarily machine guns, are substantial due to relatively low barrel life when combined with barrel replacement costs. An example is the MK46 (5.56 lightweight) machine gun, nearly 80% of the per year sustainment costs are due to barrel replacements. The overall objective of this SIBR program would be cut this figure by 50%.

DESCRIPTION: Determine and demonstrate processes such as metal coating and material treatment technologies to extend system/metal life of military small arms. Many new technologies have been successfully applied in the commercial sector, but not specifically to small arems/small arm components used in a SOF/military environment. The desire is to prove/demonstrate applicability of these new technologies on SOF weapons to reduce system procurement/sustainment costs.

PHASE I: Determine feasibility and technical merit of achieving extended service life of SOF Weapons and their components (specifically machine gun components) through coating/treatment processes.

PHASE II: Demonstrate prototype weapons and weapon components with both new (treated) and used (treated) components (used components would be provided by the Gov't for coating and provide for SOF user testing). Actual component life data is available and would be used for comparison purposes.

PHASE III DUAL USE APPLICATIONS: Continue with the commercialization of a process as it relates to military small arms and equipment. This coating/material could be used on a variety of military applications where metal wear can be reduced and parts can be returned to service after use through treatment/coating.

KEYWORDS: WEAPONS, WEAPON COATINGS, WEAPON COMPONENTS, MACHINE GUN, NICKEL BORON, SPECIAL OPERATIONS

03-010 TITLE: Team Transportable Communications/Collection Suite

TECHNOLOGY AREAS: Information Systems

ACQUISITION PROGRAM: Joint Threat Warning System (JTWS)

OBJECTIVE: Military units need a portable Command Center that will permit them to setup a temporary communications and/or collection suite. Having this capability will permit forces to quickly setup and

perform functions such as communications with local and outside forces, monitor local communications, receive National communications, etc.

The purpose of this SBIR is to research the latest in communication and collection technologies, then recommend and build a plug and play, scaleable architecture that will fulfill this need.

DESCRIPTION: US Forces need a configurable, scaleable, plug and play architecture that will permit them to put a collection/communication package together quickly, and in the format they need. This could be anywhere from a large backpack, to a unit put in a mobile platform (e.g. HMMWV), to a large rack in a safe location. This system needs to be configurable to the mission.

The purpose of the Team Transportable Communications/Collection Suite is to permit the local commander the opportunity to setup a command post or mobile platform that will provide him with at least the following capabilities (which he may choose to use one, many, or all of them):

* Communications to and from forces out in the field.
* Communications to and from U.S. and coalition forces (JTRS comp).
* Reception of information from/communication with unattended sensors.
* Reception of National broadcast information
* Reception of the latest imagery or any intelligence information.
* Permit front forces to send back advanced signals for analysis (and send the result back forward if needed).
* Permit access to linguists located at a safe location (or would be at the TT location providing support to forward deployed forces).
* Updating of threat information to the soldiers threat computer/map.
* Assist with a forward deployed soldier's geolocation if the TT is located in the area.

From the SOCOM JTWS Operational Requirements Document (ORD), "The JTWS remoted capability will be employed on those special missions when the risk of a forward-manned cryptologic operation is too high, inappropriate for the particular situation, or when expanded electronic force protection capabilities are required to support the SOF force commander. The team transportable "front end" receivers/processor/antenna are installed in the vicinity of, or co-located with the SOF element in the mission area to characterize the signal environment and begin collection operations in support of the local commander or other element depending on the mission."

Innovative ideas are encouraged to make this SBIR the state of the art and a benefit for forces in the field. Leveraging of existing technologies, especially software, is encouraged.

The recipient of this technology at USSOCOM is its next generation of threat warning and communications equipment. The threat warning equipment is under the Joint Threat Warning System (JTWS) program. The communications equipment is under the Multiband Inter-Team Radio (MBITR) and the Multiband Multimission Radio (MBMMR) programs. In order to keep up with the fast pace of technology, JTWS and JTRS are using software definable receivers (SDRs) and plug and play technology.

Design considerations:
• The Team Transportable Communications/Collection Suite should be both AC and DC powered.
• Safe to the soldier.
• Backup energy source required. Energy source be renewable and/or rechargeable.
• Not be "stove-piped"! Looking for designs that will leverage existing developments, be scaleable, permit reuse of technologies (eg plug and play cards), and permit forces in the field to update the software to meet their needs.

SOCOM uses JCAF, the Joint Component Architecture and Framework. With JCAF, equipment is easily interchangeable. The present preference for receivers by SOF are the family of software definable receivers by Digital Receiver Technology (DRT) and Applied Signal Technology (AST). SOCOM uses the Microsoft operating system, but innovative proposals will allow the software to be operating system

independent. The software will attempt to be Joint Component Architecture and Framework (JCAF) compliant.

Proposers should budget for a single day trip to Tampa, Florida for a Phase 1 kickoff meeting.

Proposals should reflect the Proposer's expertise, especially in communications and intelligence and what they propose to research. Successful proposals will use novel ideas to improve soldier usability, create future commercial markets, and increase . Pluses include:
* Fully demonstrating the company's past and present experience;
* Supplying references on proposing company's products/programs (particularly government program managers);
* Giving detail on its proposed technologies to show expertise.
* Showing detailed expertise in technologies related to this SBIR.

The proposer should be prepared to deliver products in accordance with the general information outlined in each of the phases as listed below:

PHASE I: The proposer in Phase I will perform the required research of needed technologies to meet and hopefully exceed the above objectives/requirements. Develop design for submission for a phase II. Limited lab prototype verifying design a plus.

PHASE II: Develop a system prototype within one year of start of Phase II. The prototype will then be sent out for SOF tactical use and feedback. Incorporate feedback from users into a final design. A final test will be required to demonstrate in a realistic tactical environment Conduct limited testing to prove feasibility over a seven-day mission scenario. Conduct environmental testing to determine feasibility of use from –10 to 50 C.

PHASE III DUAL USE APPLICATIONS: A number of organizations in the Intelligence Community have teamed together and are interested in this SBIR. In addition, this technology could revolutionize wireless communications in the military. Although this SBIR is designed primarily for military tactical operations, it will also have applications with the other military services and law enforcement agencies. An enterprising company could spin this product off into the commercial market as a product to be used companies who need to monitor their own communications, and for companies that need to setup a command center for group events (e.g. Olympics). In addition, this variant can be directly leveraged for the air and maritime versions of JTWS.

REFERENCES:
For an unclassified copy of the JTWS Operational Requirements Document (ORD), see the SITIS page.

MBITR: http://www2.thalescommunications.com/details.asp?tgs=66868:10259827&cart_id=&item_id=1

Darpa's Wolfpack program: www.darpa.mil/ato/programs/wolfpack.html
POC for JCAF information is Mike Niermann, SPAWAR Systems Charleston, niermanm@spawar.navy.mil, with "Request for JCAF information" in the subject line.

Penn State University Applied Research Lab (PSU ARL) has expertise in the areas of propagation, antenna modeling/simulation, conformal design, fractal design, signal detection and geolocation, and SIGINT environment. Contact Mr. Jim Ross, jfr5@psu.edu, 814-863-2733.

Southwest Research Institute (SwRI), a not-for-profit research institute in San Antonio, has extensive expertise in maritime and tactical SIGINT detection and recognition capabilities, receivers, DF algorithm and geolocation development, and body worn antennas; contact Bobby Perez, boperez@swri.org, 210-522-2803.

SBIR, SOCOM 02-002, Portable Wireless Monitoring Station, located at: http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir021/socom021.htm. Goal: Build the next generation

small, low power SIGINT/threat warning software definable receiver. Phase II Winners: DRT and AST.

Digital Receiver Technology (DRT) web page and contact info: www.drti.com, Ms. Cindy Solomon, Marketing Director, 301-916-5554 x151, csolomon@drti.com.

Applied Signal Technology (AST) web page and contact info: www.apsig.com, Mr. Kenneth Cumings, kcumings@appsig.com

KEYWORDS: INTELLIGENCE, SIGINT, RECEIVER, NATIONAL, TACTICAL, COMMUNICATION, TEAM, TRANSPORTABLE, MAPPING

03-011 TITLE: Innovative Vest Research

TECHNOLOGY AREAS: Information Systems, Materials/Processes, Sensors, Human Systems

ACQUISITION PROGRAM: Joint Threat Warning System (JTWS), Multiband Inter-Team Radio (MBITR)

OBJECTIVE: SOF tactical users lack a dynamic vest that will give Special Forces a lighter load and increased capability. Having this capability will permit the soldier to carry more ammunition/food, and/or to stay on mission longer.

The primary purpose of this SBIR is to research improvements to SOF vests that could include technologies such as power, fire retardant materials, solar cells, sensors, integrated power/cabling/etc, cooled vests, directional sensors, smart clothing (e.g. chameleon), etc.

DESCRIPTION: According to the article, "Wearable Tech," Wearable technology "From cell phone necklaces and camera wrist watches to nanotech pants that don't stain or wrinkle - high tech is morphing into high fashion. New materials like nanofibers and fresh designs like wearable keyboards are emerging from think tanks and corporate labs around the world, setting the stage for a slow and steady fashion evolution."

The purpose of this SBIR is to pull together some of the advanced technologies in the commercial sector, and add capabilities to the SOF vest. What today's soldier needs is the "toolbox" mentality; the capability to pick off the shelf what he needs for a particular mission, put it together and go. No waiting years for the capability. Recommend that designs keep the toolbox mentality, permitting the soldier to pick and choose the capabilities needed.

The vest will need to be as lightweight as possible. It should allow the connection of different battery packs, chosen by the soldier depending on his needs. Different vest variants are needed, including one that integrates power, equipment, and communications. Other variations of the vest could include fire and/or chemical protection and other such commercial possibilities.

Other ideas could include an emergent technology using the tactile/haptic channel is the Tactile Situation Awareness System (TSAS) which utilizes a matrix of tactile stimulators (tactors), embedded in a garment worn by the warfighter, to present intuitive information concerning orientation/movement in space and the ranges & bearings of targets or items of interest in the environment.

SOF are diverse in their needs and desires, but we foresee at least two general situations where the technology will be integrated into (but are open to other ideas):

1. The integration is built into SOCOM's Body Worn Antenna (BWA), SOCOM SBIR (01-007). The goal of this SBIR is to build a wideband omni and direction finding (DF) antenna that can be worn by a soldier.

2. Integration built into a SPEARS or uniquely designed vest.

The main USSOCOM recipient of this SBIR technology will be its next generation threat warning and communications equipment. The threat warning equipment is under the Joint Threat Warning System (JTWS) program. The communications equipment is under the Multiband Inter-Team Radio (MBITR) and the Multiband Multi-mission Radio (MBMMR) programs. In order to keep up with the fast pace of technology, JTWS and JTRS are using software definable receivers (SDRs) and plug and play technology.

Options for connection to the above mentioned receivers is encouraged. Ideal for SOF would be a pocket that would permit the soldier to easily place the MBITR or other small receiver into it and have connections for power and antenna. For the soldiers who do not want to use the BWA (or don't need the wideband capability, such as a soldier with just a communications radio), a limited antenna in the communications range that can be "connected" to the vest.

Design considerations:

Design should not be for connection to a particular power technology. The design should allow new power technologies to be quickly and easily incorporated into the design in the future.

* Vest should be as lightweight as possible.
* Total soldier power consumption can be assumed to be less than 50 Watts, and we are hoping for less than 25W.
* Safe to the soldier.

Although much of this solicitation is concentrating on the whole picture of a vest, individual ideas to be incorporated are encouraged.

Proposers should budget for a single day trip to Tampa, Florida for a Phase I kickoff meeting.

Phase II integration and testing with this developed product(s) will use SOCOM's currently being developed threat warning receiver (SOCOM SBIR 02-002, Portable Wireless Monitoring Station), or an equivalent SIGINT/threat warning receiver. For a communications radio, the MBITR will be used. The attempt should be made to allow the package to be used many receivers.

Successful proposals will use novel ideas to improve soldier usability, create future commercial markets, and lower future costs of upgrades to the system. Pluses include:

* Employees who have operational experience in the tactical and/or SOF arena;
* Fully demonstrating the company's past and present experience;
* Supplying references on proposing company's products/programs (particularly government program managers);
* Giving detail on its proposed technologies to show expertise.
* Showing detailed expertise in technologies related to this SBIR.
* Experience working with the technologies proposed.

The proposal should detail the firm's experience. The proposer should be prepared to deliver products in accordance with the general information outlined in each of the phases as listed below:

PHASE I: Selected participants will research the technologies proposed. A report on the status of the technologies proposed will be expected. Develop system design for submission for Phase II.

PHASE II: Incorporation into the BWA will be performed first and/or a stand-alone vest. Interaction with SOF tactical users will be required to ensure that the system being designed will meet their needs. The program will be run in phases, in order to get the hardware out to the users for feedback. A threat receiver and MBITR receiver will be provided GFE to the Phase II contractor.

PHASE III DUAL USE APPLICATIONS: A number of organizations in the Intelligence Community have

teamed together on the JTWS system, and are interested in this SBIR. In addition, this technology could revolutionize wireless communications in the military. Although this SBIR is designed primarily for military tactical operations, it will also have applications with the other military services and law enforcement agencies. An enterprising company could spin this product off into the commercial market as a product to be used with cell phones, personal computer games, fire fighters, and maintenance personnel.

REFERENCES:

MBITR: http://www2.thalescommunications.com/details.asp?tgs=66868:10259827&cart_id=&item_id=1

SBIR, SOCOM 02-002, Portable Wireless Monitoring Station, located at: http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir021/socom021.htm

SBIR, SOCOM 01-007, Tactical Body Worn RF Antenna Vest
http://www.acq.osd.mil/sadbu/sbir/solicitations/sbir012/socom012.htm

"Are Fuel Cells Ready for Prime Time," Portable Design, April 2002, http://pd.pennwellnet.com/Articles/Article_Display.cfm?Section=Archives&Subsection=Display&ARTICLE_ID=141260&KEYWORD=fuel%20cell%20prime%20time

"An SBS Manager can help charge Li-ion batteries safely and efficiently," Portable Design, April 2002, http://pd.pennwellnet.com/Articles/Article_Display.cfm?Section=Archives&Subsection=Display&ARTICLE_ID=54780&KEYWORD=2002%20lithium%2Dion%20batteries%20portable

"Low Power Design Techniques for Portable Embedded Systems," Portable Design, April 2002, http://pd.pennwellnet.com/Articles/Article_Display.cfm?Section=Archives&Subsection=Display&ARTICLE_ID=141261&KEYWORD=2002%20lithium%2Dion%20batteries%20portable
"Wearable tech: Tiny microchips and futuristic materials inspire designers to create electronics you can really get into,"
http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2002/11/04/focus1.html

"Smart paint creates chameleon tanks," http://news.bbc.co.uk/1/hi/technology/2386731.stm

"Smart Fatigues Hear Enemy Coming," Wired Magazine, 10/23/02.

Oklahoma State University has expertise in developing battery-powered, flexible textile cooling system for use with personal protective equipment (PPE) using both thermoelectric (TE) cooling technology and adsorptive material-based cooling technology. Contact info: Dr. Donna M. Branson, 405-744-5049, mailto:marieha@okstate.edu

Southwest Research Institute (SwRI), a nonprofit research institute in San Antonio, has expertise in body worn SIGINT, antennas, and power; contact Bobby Perez, boperez@swri.org, 210-522-2803.

For an unclassified copy of the JTWS Operational Requirements Document (ORD), see the SITIS page.

"UA Scientists Are Developing 'Self-Assembling' Solar Cells,"
http://www.solardaily.com/news/solar-tech-01b.html

KEYWORDS: INTELLIGENCE, THREAT WARNING, POWER, SIGINT, RECEIVER, SOFTWARE DEFINABLE RECEIVER, SDR, THREAT, WARNING, FUEL CELL, BATTERY, NANOTECHNOLOGY, ANTENNA

03-012 TITLE: Radar Technologies for SOF

TECHNOLOGY AREAS: Sensors, Electronics

ACQUISITION PROGRAM: Joint Threat Warning System (JTWS), Joint Tactical Radio System (JTRS)

OBJECTIVE: SOF's integrated capabilities are currently limited to 3GHz. However, units now face threats from targets in the GHz range. SOF need miniaturized electronic components that will give them a lighter load and advanced detection algorithms that will increase detection capability. Having this capability will permit the soldier to carry more ammunition/food and stay on mission longer.

The purpose of this SBIR is to research and develop capabilities that use miniaturized RF receivers, capable of detecting threats up to 40GHz.

DESCRIPTION: The biggest problem for SOF, and for any mobile unit, is the size, weight, and power (SWaP) of electronics. SwaP is an on-going problem with military units in remote locations.

This SBIR seeks to push the state of the art in miniature receivers and/or radar frequency detection capabilities. This SBIR seeks ideas in two different areas:

1. State of the art downconverters that would feed into and work with SOF's present receivers,

2. Enhanced algorithms/capabilities to detect radar type emissions (such as anti-personnel radars), and any other ideas that would aid in threat warning and the safety of special operations forces.

The recipient of this technology at USSOCOM is its next generation of threat warning equipment, under the Joint Threat Warning System (JTWS) program. In order to keep up with the fast pace of technology, JTWS uses software definable receivers (SDRs) and plug and play technology. Present systems only reach to 3GHz.

If proposing a downconverter/receiver, SwaP is important. To increase commercialization, unit should be able to use other algorithms and preferably work with other software definable receivers (SDRs). The SDRs of choice for SOCOM is the family of receivers by both Digital Receiver Technology (DRT) and Applied Signal Technology (AST) (both are limited to 3GHz).

If proposing algorithm(s) for detection/demodulation of threats in the 3-40GHz range, preference will be given for a proposal that not only covers the radar detection/capability proposed, but could also in the future cover other threat signals (i.e. upgradeable).

Proposals should reflect the Proposer's expertise, especially in power efficiency, miniature design, and what they propose to research. Phase 1 companies will begin their research and propose what they would continue in Phase 2.

Design considerations:
• SWaP is the main concern; Dynamic range and other receiver specs should be equal to or better than the DRT and AST receivers.
• Innovative interconnection with the above receivers very desirable.
• Technologies that can help the SOF soldier detect the enemy before the enemy detects him.
• Keep in mind that SOF do not like to radiate, especially in a high threat environment. "Active" designs will be scrutinized more closely for benefit versus danger.

Proposers should budget for a single day trip to Tampa, Florida for a Phase 1 kickoff meeting.

Successful proposals will use novel ideas to improve soldier usability, create future commercial markets, and increase capability. Pluses include:
* Fully demonstrating the company's past and present experience;

* Supplying references on proposing company's products/programs (particularly government program managers);
* Giving detail on its proposed technologies to show expertise.
* Showing detailed expertise in technologies related to this SBIR.
* Experience working with receivers.
* Companies that can assist the topic author in commercializing the product.

The proposer should be prepared to deliver products in accordance with the general information outlined in each of the phases as listed below:

PHASE I: The proposer in Phase I will perform the required research of needed technologies to meet and hopefully exceed the above objectives/requirements. Develop design for submission for a phase II. Limited lab prototype verifying design a plus.

PHASE II: Develop a system prototype within one year of start of Phase II. The prototype will then be sent out for SOF tactical use and feedback. Incorporate feedback from users into a final design.

A final test will be required to demonstrate in a realistic tactical environment Conduct limited testing to prove feasibility over a seven-day mission scenario. Conduct environmental testing to determine feasibility of use from –10 to 50 C.

PHASE III DUAL USE APPLICATIONS: A number of organizations in the Intelligence Community have teamed together and are interested in this SBIR. In addition, this technology could revolutionize wireless communications in the military. Although this SBIR is designed primarily for military tactical operations, it will also have applications with the other military services and law enforcement agencies. An enterprising company could spin this product off into the commercial market as a product to be used with cell phones, personal computer games, and maintenance personnel.

REFERENCES:
"Low Power Design Techniques for Portable Embedded Systems," Portable Design, April 2002, http://pd.pennwellnet.com/Articles/Article_Display.cfm?Section=Archives&Subsection=Display&ARTICLE_ID=141261&KEYWORD=2002%20lithium%2Dion%20batteries%20portable

Penn State University Applied Research Lab (PSU ARL) has expertise in the areas of propagation, antenna modeling/simulation, conformal design, fractal design, signal detection and geolocation, and SIGINT environment. Contact Mr. Jim Ross, jfr5@psu.edu, 814-863-2733.
For an unclassified copy of the JTWS Operational Requirements Document (ORD), see the SITIS page.

MBITR: http://www2.thalescommunications.com/details.asp?tgs=66868:10259827&cart_id=&item_id=1

Digital Receiver Technology (DRT) web page and contact info: www.drti.com, Ms. Cindy Solomon, Marketing Director, 301-916-5554 x151, csolomon@drti.com.

Applied Signal Technology (AST) web page and contact info: www.apsig.com, Mr. Kenneth Cumings, kcumings@appsig.com

KEYWORDS: INTELLIGENCE, SIGINT, RECEIVER, MICROWAVE, DOWNCONVERTER, RF, RADIO FREQUENCY

03-013 TITLE: Battery Modulation for Communications Equipment

TECHNOLOGY AREAS: Materials/Processes, Electronics

OBJECTIVE: Design and develop a safe rechargeable battery replacement for the Lithium BA-5590 battery to eliminate hazards resulting from water exposure under SOCOM specific missions. Develop a

rechargeable battery that will provide >175 Watt-hrs/kg energy density to exceed the current BA-5590 battery performance.

DESCRIPTION: US Special Operations Command (USSOCOM) requires safe, lighter-weight, reduced cost, high-energy density waterproof power source to replace the Lithium BA-5590 battery used for man-portable power. To reduce operations costs and allow for extended mission operations, a rechargeable battery design is required. The current BA-5590 is a throwaway primary battery with a limited energy density of 175 Watt-hr/kg. Development of a rechargeable battery having >175 Watt-hr/kg would provide for a direct replacement battery that can be charged in the field and allow for extended operations. Current commercial rechargeable batteries are limited to energy densities to about 120 Watt-hrs/kg. Development of polymer pouch cell designs would enable rechargeable batteries to exceed 175 watt-hrs/kg and provide for an inherently safer design due to their use of nonflammable polymer electrolytes. Since the rechargeable battery is reusable, the cost of utilizing a waterproof design would be minimized. Battery operation is required over the full military temperature range of –40C to 55C and must demonstrate safe and acceptable operation for desert cycle testing.

PHASE I: Develop prototype pouch lithium ion polymer rechargeable cells having >175 watt-hrs/kg. Design pouch cells to form factor of BA-5590 battery. Test cell performance scaled to BA-5590 specifications for electrical performance, environment, and safety. Provide cell deliverables for test and evaluation to specific SOCOM requirements.

PHASE II: Develop prototype rechargeable BA-5590 battery using pouch cell design to deliver >175 Watt-hrs/kg energy density. Test battery performance to BA-5590 specifications for electrical performance, environment, and safety. Develop Safety Assessment Report and provide battery deliverables for field test and evaluation to specific SOCOM requirements.

PHASE III: Develop low cost manufacturing process for polymer cell to provide lower cost production battery.

REFERENCES:
Quallion

KEYWORDS: Rechargeable Battery, Polymer Lithium Ion, Man Portable Power

03-014 TITLE: Development of a Family of Modular Light Tactical Wheeled Vehicles (FMLTWV)

TECHNOLOGY AREAS: Ground/Sea Vehicles, Materials/Processes

OBJECTIVE: Design & build a prototype “core” vehicle which can be produced in a range of dimensions as required. Chassis of varied sized or configurations are powered, suspended and controlled by Interchangeable Modular Common (IMC) component systems which are comprised of 90% identical Line Replaceable Units (LRUs).

Although it may be expedient to utilize modified currently available vehicles in the fleet (HMMWVs) in the long run it would be more practical to produce and employ the correctly designed vehicle in each mission role. A totally new concept other than tube-frame “dune buggies”, enhanced “jeeps”, adapted farm vehicles and militarized pickup trucks is required. The Modular Common Family provides the opportunity to deliver the improved performance of the correct vehicle, and in the long run provide economies associated with LRU high production rates, and Just In Time Supply protocols.

The second major objective will be to provide extremely low Gross Vehicle Weight (GVW) vehicles which can exploit the lift capabilities of helicopters which are so sensitive to operational and atmospheric conditions.

Recent attempts to approve the use of available LTWVs in Osprey have failed because they do not satisfy military requirements. These surrogate vehicles occupy too much volume, are too heavy, have an unfavorable high center of gravity (CG), and are generally not suited to modification to solve their shortcomings. A totally new concept other than tube-frame "dune buggies", enhanced "jeeps", adapted farm vehicles and militarized pickup trucks is required.

A light, powerful, efficient, compact vehicle with covered storage, broad unobstructed cargo loading surfaces at lowest CG, and adaptability of all standard mission variant "bolt on" kits is the objective. Extra "bonus-features" (beyond the basic specifications) will be articulated.

DESCRIPTION: The "family" cargo capacity range spans 2 to 3 tons and crews of 2 to 12 persons seated or on litters. The sole difference will be in the size and configuration of the chassis. The family must include vehicles of such dimensions as can be efficiently transported internally at maximum mission efficiency in rotary or fixed wing aircraft. Specifically this includes Osprey V-22, Blackhawk UH60/S70A, CH47, CH53, and all fixed wing transports from C-130 to C-5.

To provide a basis for utilization by all SOF units the vehicles should be capable of adapting the normal 5 "bolt-on" variant kits (command and control, weapons carrier, medivac, utility/load carrier and recovery vehicle) plus providing for optional "Extended Family" capabilities such as the 12-man Long Range Mobility Vehicle (LMRV) and the Amphibious High Speed Deep Water Insertion Vehicles.

Minimum curb weight and maximum cargo capacity are mandatory to achieve ultimate Payload Fraction for highest performance in air transport, rough terrain mobility and overall mission success.

Proposed areas of investigation for design of this multi-purpose vehicle family are the efforts to maximize commonality (interchangeability) without sacrificing reliability or performance. Critical areas of focus are the modular units listed below:

Power Module: Complete Engine, Transmission, Dual Range/4WD, Cooling (Oil/Water)/Exhaust/Alternator Systems, unitized for quick removal for repair or exchange. Use of an umbilical for monitoring engine performance (offboard) via instrument panel.

Corner Modules: Refinement of "Corner assemblies" including Tire/Wheel, Axle/Hub Carrier/Drive shaft/Rotor/Caliper/Spring/Damper into complete unitized assemblies 1 each L&R Front and 1 each L&R Rear.

Steering Module: Complete Steering assembly of Rack, Housing, Links, Column and Wheel.

Control/Instrument Module: Complete Instrument Panel and hand controls, Drive/Stop/Signal Lights, Master Cylinders, and Pumps.

Payload: Vehicle requirements re Combat Payload (and density). This would include design concepts for quick change-out of equipment, systems, and devices which would configure the vehicle for a broad array of missions from simple transport – to various weapons platform – to reconnaissance platforms – to command and control platforms – to medivac transport - to other tactical and/or service/service support missions to be articulated.

PHASE I: Conceive and illustrate all initial major component designs stressing Modular Commonality, overall interaction, interchangeability, mission compatibility, reliability, affordability and produceability.

PHASE II: Develop and demonstrate prototype systems in a challenging environment to establish feasibility and reliability in operating conditions, and provide metrics and insight for continuing in Phase III. In addition to prototype component systems, a demonstration proposal for Phase III would be one of the products of this phase.

PHASE III: DUAL-USE APPLICATIONS; Some components and sub-systems and concepts thereof could

be used in a broad range of military and commercial vehicles, particularly the Modular Power Pak System. Modular interchangeability of key systems/components between a family of equipment that covers a tactical performance spectrum (reconnaissance-to-cargo, for example) could revolutionize logistic concepts as it provides tactical flexibility in extreme environments.

KEYWORDS: TACTICAL VEHICLES, HMMWV, MODULAR, IDENTICAL LINE REPLACEMENT UNITS, LRU, COMMON