White Paper

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Dynamic Reverse Auction Streamlines Procurement and Increases Readiness

Life Cycle Support of Critical GPETE Commodity drives Procurement Innovation

Overview

The procurement of electronic test equipment through Dynamic Reverse Auctions (DRA) will dramatically improve the government's acquisition efficiency compared to current practices. Specifically, this Internet-enabled procurement tool removes the traditional and other significant problems associated with the acquisition of specialized older equipment used in the life cycle support of field and depot test systems.

History and Background

General Purpose Electronic Test Equipment (GPETE) has been a key component in the life cycle (long-term) management of electronic systems since the earliest communication systems were deployed in both field and shipboard programs. Today, GPETE continues to play a most valuable role for the maintaining of operational readiness for our military services at home and abroad.

GPETE product types range from a simple hand-held voltmeter for general troubleshooting to an extremely complex signal analyzer for radio spectrum testing. This equipment--portable, benchtop or part of automatic test systems--is required to support all electronic operations --from the field to the depot. Because military systems evolve and in many cases, have their operational life extended, the original test systems (and the GPETE that is an integral part of it) must still be available and maintainable to fill the support role for these systems.

Recently, a support dilemma has grown more acute due to the obsolescence of the key GPETE instruments originally used to build and test the (weapons) systems. Two factors are combining to make system support for all types of systems more tenuous :

First, GPETE product lifecycles are shortening even as the move to Commercial Off the Shelf (COTS) equipment accelerates. From an industry norm of 5 to10 years, product lifecycles have decreased to today's 3 to 5 year range. Further, GPETE manufacturers are not stocking spares for long-term support to the extent they did in the past. This makes GPETE harder to support and maintain. Also, GPETE manufacturers are adopting a "Planned Obsolescence" marketing approach to fight competition from other vendors. By introducing newer/better features in the "B" or any such subsequent follow-on model of a product, the GPETE manufacturer can leapfrog their competitor with a "New" product. This feature shift makes it even harder to identify appropriate replacement units.

Second, the lifespan of military systems is being extended as the government struggles with the dual budget pressures of being squeezed by rising personnel costs and being hit by massive increases in the acquisition cost of new systems. Programs like the B52, the F16, the M1A2 Abrams tank, etc. have had their lives extended far beyond the original program goals. (See the Boeing Web site for a discussion of the B-52's 50th anniversary celebration and its life extension for another 40 years!) Therefore, in many cases, the procedures to test these older systems are based on GPETE that if unsupportable, must be replaced with product that is a form, fit and function substitution, or proper system functionality will be at serious risk - requiring a software rewrite and a complete system re-validation.

Aging Product Creates Maintenance, Repair and Replacement Challenges

As the test equipment and the weapons test systems that employ integrated GPETE instruments age, test system maintenance becomes more problematic. Mechanical switches wear out and critical components become unavailable. As the military logistics systems run out of spares, the support commands have ever increasing difficulty in maintaining readiness. Once their own support chain is unable to continue to maintain a GPETE instrument and the manufacturer has no more replacement parts or makes the cost of repairing prohibitively expensive and time

consuming, support commands have a serious problem.

Today there are far fewer government-operated repair and calibration facilities available, and a lesser-trained cadre of technician staffs those remaining labs. This is due in part to the reliance on subassembly level diagnostics and repair and a pullback from traditional component-level troubleshooting. This makes it far more difficult to diagnose and repair a problem in older equipment since they were not designed with this support rationale. Also, there is less likelihood that spare parts are available (especially OEM parts) once a problem has been diagnosed. The manufacturers' solution is to supply a next generation "Replacement" instrument. The problem is that the new unit is, in many cases, neither form, fit nor function compatible with the original.

Re-engineering Poses Barriers to Integrating Replacement Instruments in Existing Systems

Before integrating such a replacement instrument, the support facility must consider the "Switching" costs carefully. There are a number of factors to consider, including, but not limited to: physical size and weight, power consumption, cooling requirements, electrical specifications, programming language and interface, software drivers, etc. While the integration of new products to replace older units in the system can sometimes be relatively straightforward, the real-world complexities of integrating a next generation product into the system and its support chain can be significant.

The real problems (and costs) in the integration of replacement instruments lie in the areas of functionality, documentation and software compatibility. Each time an older product is replaced by a superceding model, there is a resultant cost in the re-crafting of procedures, software routines and the accompanying required documentation for next generation GPETE (generally hundreds of hours). This is especially true in Automated Test Systems (ATE). Historically, the investment in procedures, software routines and documentation (ATE software, test procedures, operations manuals) is the most costly part of test system's design and development. Therefore, in most cases modifying these items to accommodate a newer replacement unit may be significantly more expensive and time consuming than the alternative of exact replacement. And, although next generation instruments usually have better capability than their predecessors, that extended capability is usually not needed. As an example, the following differences are noted between a popular (but no longer manufactured nor supported) signal analyzer and its current replacement:

- Interface timing different (Software Compatibility)
- Measurement timings different (Software Compatibility)
- Physically different shape (May require ATE rack modifications)
- Cooling intake/exhaust in different location (May require ATE rack modifications)
- Front panel controls/readouts different (User documentation change required)
- Front panel connectors are different and/or are in different locations (Cabling changes)
- Front panel nomenclature different (User documentation change required)
- Rear panel layout and connector positions different (Requires changes in cable routing)
- Rear panel nomenclature different (User documentation change required)

Replacing a GPETE instrument in a test system with anything other than an original piece of equipment requires engineering expertise, not only in the understanding of the original test procedure, but also the characteristics of the original Device Under Test (DUT) and the specifications and capabilities of the original instrument. Further, in the case of ATE, expertise in the original programming languages is necessary. Complicating the migration procedure are the subtleties in the software that depend on unique characteristics of the original instrument such as RF switching speed, input switching timing, function command timing, etc. In many cases, next generation GPETE may not be able to emulate the required features/measurement of original GPETE.

Beyond these issues, when contemplating inserting a new item into a test bench or system, there are broad sets of support requirements that need to be addressed:

- Technical specifications will be different, requiring a rewrite of documentation (user manuals, maintenance procedures, calibration procedures)
- Operators must be retrained
- Maintenance and calibration technicians must be retrained
- Logistics support and provisioning (where required) must be developed
- New tools and support equipment may need to be procured

Further complicating the replacement scenario is the dwindling supply of trained and competent hardware and software engineers that can recreate identical test system functionality with a new GPETE instrument(s). This is

primarily due to a loss of expertise through retirements and the transition towards outsourcing on the part of the military.

So what are the alternatives when a critical system needs to be replicated, repaired or made more reliable and maintainable? The answer may lie in the use of "Exact Replacement" instruments that are drawn from a broad pool of existing products in the commercial and government sectors. By applying a rigorous inspection, evaluation and refit process, existing instruments can be brought up to "New" standards with a useful life equal to the original. This essentially makes an instrument "Zero Time" [1] (Refurbished or rebuilt to the same levels of functionality and quality as when originally produced) with the reliability and maintainability of the original "New" product.

Purchasing and Using "Exact Replacement" Instruments

Given the serious implications (and downside) for substituting similar but not exact replacements for the support of older benches and systems, one commonly used and often abused practice is to acquire older equipment through the GPETE secondary marketplace. In most cases, it is possible to source a broad range of exact replacement equipment from the GPETE secondary market supply chain that can directly replace a piece of unserviceable equipment in a test system. In a perfect world, this approach is clearly the lowest cost alternative since no changes in procedure, practice or documentation are required. And, previous investments in operator, maintenance and calibration training are also preserved. In addition, there are many suppliers in the secondary market supply chain that operate refurbishing programs that can bring an existing malfunctioning unit up to the condition and specifications of a new unit, making it a "Zero Time" product that performs as if it were a new item.

Problems in Secondary Market GPETE Procurement for Government Entities

For government entities, procuring Used GPETE in the secondary market is problematic. Although the equipment tends to be more expensive (>$2500) it doesn't lend itself well to the traditional competitive bidding process.

- Acquiring used GPETE is an "asset" based transaction. That is, there is only one of a particular item, in a particular configuration, in a particular condition. This means many suppliers are unlikely to still have the exact item that they bid in stock when a successful bidder is finally chosen. Most bidders are unwilling to hold an item during the entire length of the bidding process and risk foregoing other sales in the commercial sector. So, they end up replacing the original item they offered for sale with one that they had available at the end of the bidding process. Therefore, while the unit provided at the end of the long competitive bid process may be the same make and model number as the unit that had been offered at the beginning of the bid process, the condition, options and accessories may be different.
- It is difficult in the competitive bidding process to exactly specify the condition and quality of the desired item-- there is no standard for "reconditioned" or "refurbished". Therefore, the quality of the items that are bid will vary broadly and the successful bidder may supply an item compliant with the solicitation, but that is not acceptable to the end user for their application, and not as good an offering as those from unsucessful bidders.

The Current Government Process for Buying "Exact Replacements"

The title of this section is an oxymoron, as there currently exists no across-the-board government process for buying "Exact Replacement" GPETE. Practices vary by branch of service and many times are determined at the base or unit level. In some cases the end user buys the product without a competitive bid process using a purchase card with or without the knowledge of procurement or contracts. Other times the procurement goes through a complete competitive bid process. Occasionally a military Inventory Control Point (ICP) handles the procurement either competitively or on an ad hoc basis. Alternatively, an acquisition can be farmed out to a local small business under an SBA or other umbrella program but without a competitive bid process. The reason these acquisitions are all over the map is that there is no approved easy to use process that guarantees a high-quality, value-priced product.

Understanding the GPETE Secondary Market Supply Chain

There are suppliers in the secondary GPETE equipment marketplace that provide different product availability, classes of condition and service, and different warranty and support. For the purposes of this discussion, we have characterized these suppliers into four categories of suppliers each with differing attributes.

The first group of suppliers is comprised of large equipment rental and lease companies that tend to liquidate relatively new equipment (1-3 years) in good condition with well-documented maintenance and calibration history. Since each of these suppliers has a captive repair and calibration facility, equipment offered by this group tends to be well maintained with a well-documented maintenance and calibration history. Offerings from these companies tend to be

1 Zero time is an expression used in aviation and aerospace meaning a complete rebuild of all critical elements rendering the item (usually an aircraft powerplant) essentially good as new.

higher priced than others on the market as these companies ascribe value to a known history and good physical and mechanical condition and tend to offer a longer warranty, typically one year. There are approximately five companies of this type in the US and about four international suppliers. In many cases these companies do not inventory older equipment (although some may claim to be able to source the equipment from elsewhere).

The second group of suppliers contains large GPETE dealers that regularly purchase used test equipment from end users at auction. Some of these dealers may also be rental and lease companies. The equipment types this group acquires overlaps the categories of the first group and tends to be newer equipment; however, older equipment (3-7 years) in good condition is also acquired. These suppliers also tend to have their own repair and calibration facilities and usually pass equipment through a refurbishment cycle where it is inspected, cleaned, painted (as necessary), accessorized[2] and calibrated. Equipment from these suppliers is generally of good quality and moderately priced with a shorter warranty of 3 to 6 months. There are approximately ten suppliers of this class in the US and about six international players.

The third group is made up of smaller dealers that purchase used test equipment similarly to the larger dealers. However, they tend to specialize in older equipment (5-20 years). Not all of these suppliers have their own repair and calibration facilities; in many cases they contract out the work to an outside supplier of repair and calibration services. Equipment is generally passed through a functional and cosmetic inspection that includes cleaning and calibration. Equipment from these suppliers is generally of moderate quality and price with a shorter warranty of 3 months. Suppliers in this category tend not to deal in higher priced equipment due to their limited access to capital. There are approximately twenty of this class of supplier in the US and about fifteen international suppliers.

The fourth group is a broad set of test equipment brokers that use personal knowledge and relationships to match sellers with buyers on a case-by-case basis. Many times equipment changes hands "As-is" as this class of supplier generally has no facilities to inspect, test or calibrate equipment. Unfortunately, although there are many reputable suppliers in this class, many brokers get a reputation for offering equipment in poor or unverified condition subject to the most minimal checkout (glow 'n go). They also tend to represent they have an item available when, in fact, they do not carry inventory. This makes it difficult to distinguish this group from the third group described above. There are about seven hundred members of this group worldwide, some of whom operate from their personal residences.

The Best Solution--New Procurement Tools Tailored for Exact Replacement Asset Acquisition using Pre-Approved Procurement Methods

A new process for government acquisition of secondary market GPETE has now been introduced with standardized processes for government acquisitions. These standardized procedures will yield significant benefits to all prospective buyers.

- Lowers acquisition costs
- Establishes and maintains a consistent standard of quality
- Establishes a chain of support for maintenance and repair
- Conforms to pre-established and widely accepted government and military procurement practices

These new tools take advantage of the Internet where the power of connectivity across a broad supplier network is leveraged to return maximum value to the government user.

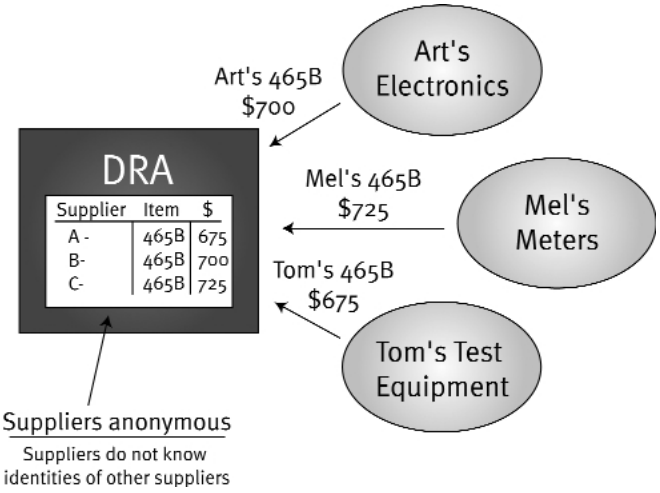

Figure 1 - Best Value Ranking

Specifically, by establishing a particular type of reverse auction that requires sellers to competitively bid (in real time) and "in the blind" on any asset-based secondary market GPETE item, many of the current and common pitfalls associated with the procurement of "exact replacement" GPETE may be avoided. This type of online auction is called a Dynamic Reverse Auction (DRA) and it has its roots in the now commonly used traditional reverse auction.

Basis for a Dynamic Reverse Auction-The Traditional Reverse Auction

A reverse auction is simply the opposite of a regular auction. In a regular auction the seller offers an item for sale and

2 Accessorized in this context means being equipped with all accessories supplied by the original manufacturer when shipped as new.

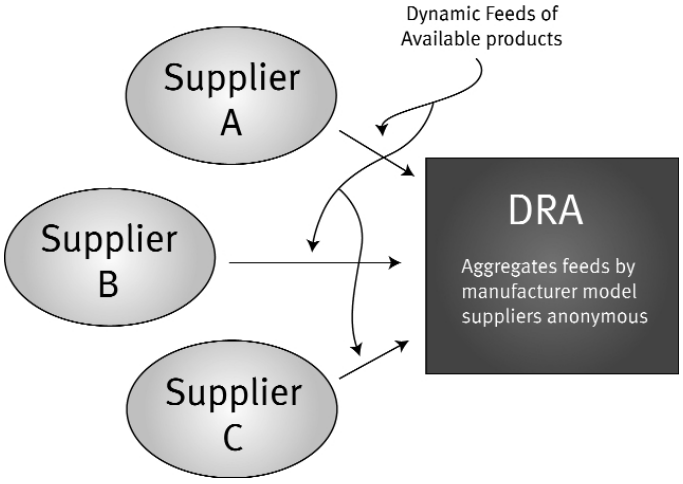

Figure 2 - Dynamic Product Availablity

multiple potential buyers submit sequentially higher bids for the item. Conversely, in a reverse auction there are multiple sellers of items that compete for the business of a single buyer. During this competition the sellers drive the price of the item down.

On-line reverse auctions are conducted using a variety of procedures and automated tools. An agency may contract with an on-line auction service to conduct the reverse auction or it may conduct the reverse auction itself using commercially available software. In either case, the reverse auction must be conducted on a secure Web site and the ground rules for the auctions, particularly when the bidding will start and stop, must be clearly stated in the RFP (Request for Proposal).

Acquisition of goods and services by this technique was authorized by recent revisions to the Federal Acquisition Regulation "Contracting by Negotiation." The use of this manner of acquisition is permissible provided the government not reveal a seller's proffered price without their consent and that only the seller's price - not their name - be disclosed during the auction. "Prohibitions on Auctioning" provisions were deleted from the FAR 15 (Contracting by Negotiation) rewrite because there is no statutory basis for prohibiting "commercial-type" auctioning. As far back as 1803, Congress expected the Government to buy supplies and services using the same techniques as in the open market (commercial). Per the report of the Second Hoover Commission in the late 1950's, the term auctioning applied to a situation where the Government went out under an IFB (Invitation For Bid), determined the low bidder, and then converted the acquisition to a negotiated process for the sole reason of getting the price down further. So the prohibition was deleted, and should have no real impact on Part 15 acquisitions.

The Internet Age Welcomes the Dynamic Reverse Auction

A Dynamic Reverse Auction (DRA) is one where all suppliers are pre-qualified in the supply of the particular manufactured goods. They have previously signed an acceptance of the DRA's terms and conditions and have agreed to supply dynamic product availability and pricing updates to the DRA host against a pre-established list of regularly requested items. In the universe of GPETE this list may include up to 2,000 products. Agreement has been previously reached with each supplier that the price they offer through a DRA for an item is the lowest price for a like item (with like warranty and condition) that they offer to any other customer.

A DRA is different than a traditional reverse auction in that the auction is continually "opening" and "closing" dynamically without the constraints of a conventional reverse auction. Since each potential supplier is required to continually post offerings of the proper class and condition with updated pricing, the customer knows a selection can be made as a requirement occurs with the knowledge that no supplier knows the identity of the other and what bid items are those of a particular supplier. This makes the process "Dynamically Competitive".

In any federal government procurement CICA (Competition in Contracting Act) rules must be followed. The DRA marketplace satisfies this requirement through the aggregation of enough qualified suppliers that none can take unfair advantage of the process. At any moment there may be 5-10 items offered to users for any particular make/model from up to 10 qualified suppliers.

Supplier Qualification

- Broad Product Availability
- Captive Repair and Calibration Capabilities
- Agreement to STD Terms and Conditions
  - Condition
  - Warranty
  - Support
  - Delivery
  - Documentation
  - Packaging

Supplier participation in a DRA is limited to the sources previously qualified to be capable of submitting competitive-range proposals. Specifically, certain vendors can be excluded from a solicited participation as long as compliance with the requirements of FAR Part 6 (Competition Requirements) for full and open competition after exclusion of sources is assured. FAR 6.202 (Alternative Sources) was not changed by the FAR 15 rewrite, so agencies may still exclude

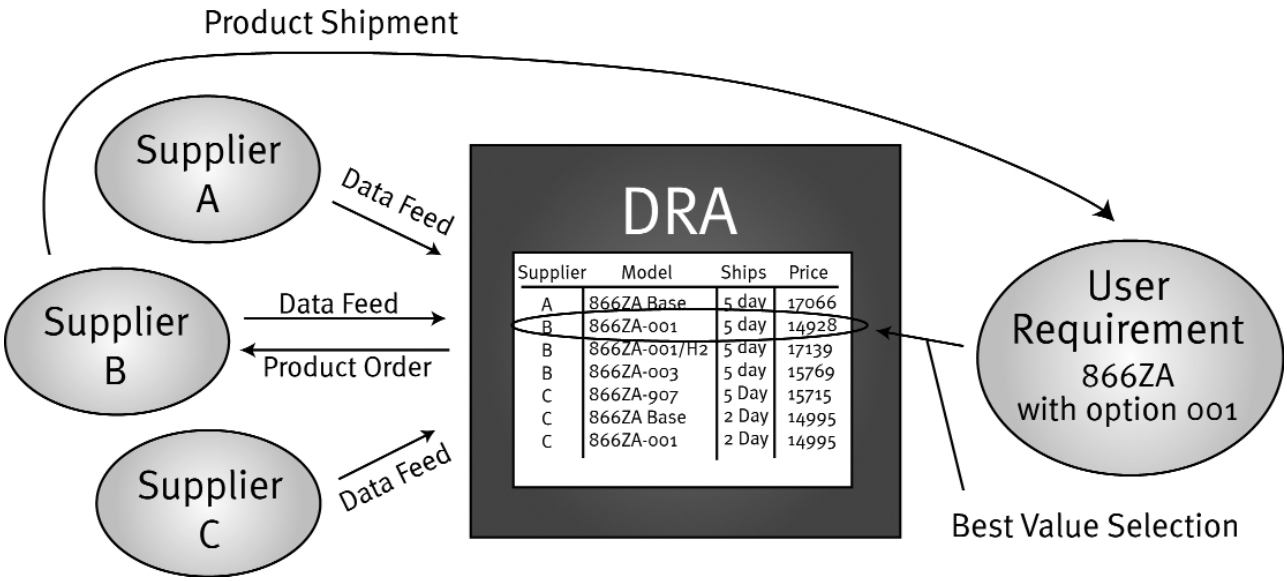

Figure 3 - Product Transaction

a particular source from a contract action in order to establish or maintain an alternative source or sources if the specific requirements of this subpart are followed.

However, the Advisory Multi-Step Process delineated in FAR 15.202 does not permit the Government to limit participation, but only to advise respondents whether the Government considers them to be viable competitors in the forthcoming acquisition based on their information submitted. Moreover, provided a vendor can ascertain "fitness' for participation in a DRA, they may also be added dynamically as appropriate.

Potential Advantages

- More bang for the buck due to intense competition
- Reduced acquisition time under existing federal acquisition guidelines
- Process is inclusive, transparent and immediate (industry likes these features)
- Quality and warranty assurances

Summary

Maintaining the readiness of our government and weapons systems is a critical component of domestic security and our ability to respond to global threats. Today, in order to maintain this readiness we rely on a combination of older systems that are still in operation well past their expected obsolescence date and newer systems that have been created to replicate older equipment and procedures. Maintaining these systems is a national priority and the GPETE component is absolutely critical. However, today there exists no clear procurement policy around the replacement of this older equipment, which is resulting in higher costs and more importantly, longer down time. Common practices include trying to replace with new equipment that is not an exact replacement and trying to replace with substandard used equipment.

The implementation of a new Web-based procurement technique and a Dynamic Reverse Auction addresses a critical need of the military to provide continuing support for its legacy systems that keep our country's major systems operational. This program not only supports readiness but also significantly lowers the life cycle costs for these systems releasing procurement money to support increased staffing and new systems procurement. A Dynamic Reverse Auction leverages the power of the Internet across a wide base of suppliers to solve a critical acquisition problem while maintaining the integrity of the government's procurement system. ■

References and Sources of Assistance

- NAVDAC Pub 15, "*Economic Analysis Procedures for ADP*," December 1980.
- OASD (PA&E) *Draft Guidance on Automated Information Systems Cost Benefit Analysis.*
- U.S. Marine Corps IRM 5236-03, "*Economic Analysis*," March 1987.
- OMB Circular No. A-11 "*Preparation and Submission of Annual Budget Estimates,*" June 1988.
- OMB Circular A-104, "*Evaluating Leases of Capital Assets,*" June 1986.
- DCA Circular 600-60-1, "*Cost and Planning Factors Manual.*"
- Defense Acquisition Handbook "*NISMC Life Cycle Management (LCM) Review Handbook*" http://web1.deskbook.osd.mil/htmlfiles/rlframe/REFLIB_Frame.asp?TOC=/htmlfiles/TOC/002octoc.asp?sNode=L3-34&Exp=N&Doc=