EMBEDDED SYSTEMS ENGINEERING powered by EECatalog

Military, Aerospace & Avionics

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Round Table: Raising Expectations for UAVs and More

By Anne Fisher, Managing Editor, EECatalog

One of the challenges our round table participants know well is that of fitting the desired functionality into a small form factor.

As you read the responses here, I believe you'll agree that a common thread running through them all is how to bridge the gap between the expected and the possible, and, more important, how innovative approaches and the application of specialized expertise continually raises expectations.

EECatalog: What are your "must-follow steps" for anyone evaluating/recommending embedded small form factor solutions?

Steve Gudknecht, Product Manager, Elma

Steve Gudknecht, Elma: The best answer is by way of example regarding a current implementation. Following up on an inquiry for a rugged PC, we offered a system that didn't meet many of the application I/O needs. Instead, we showed the customer how we could bridge to the final solution by leveraging a modular electronic design and morphed it into a system that specifically met the application requirements.
In addition to purchasing the systems for a defense program, the customer is also talking with us about follow-on variations for other applications. In this example, our "must-follow steps" are: buy modular, COTS-based solutions from a supplier that can provide the complete solution, in packaging suited to the end environment.

Doug Patterson, VP, Military & Aerospace Business Sector, Aitech Defense Systems

Doug Patterson, Aitech Defense Systems:
Rule 1: Seeing is believing, believing is seeing. Yes, Marketing PowerPoints from vendors are interesting, but I fundamentally do not trust the claims made until I see a working unit.
Rule 2: Where's the beef? If some pretty exotic performance claims are made, what's the underlying technology and proof?

Rule 3: What am I buying? What am I paying for, and why? Where is that vendor's "value-add"? Hardware, software, systems integration, what???

Rule 4: Beware obfuscation. What are the unsubstantiated promises or program usage of the products not backed up in writing? If it's good enough to claim something's true, it should be easily verifiable…and in writing.

Bottom line: Does the product represent a needed solution, or is it a solution looking for a problem to solve? It should help the process, not create new problems along the way.

George T. Hilliard, Director of Technical Sales, WinSystems

George T. Hilliard, WinSystems: The selection process can vary greatly depending on the end system requirements. Following are a few of the high-level consideration and decision factors we use to begin our consultative approach to small form factor (SFF) selection.

- Identify the limiting dimension factors.
- "Small form factor" can mean many things so it is important to define the real limitations of the system. Understanding the end dimensional needs will guide proper selection of Commercial Off-the-Shelf (COTS) products

or identify the need for development of a system solution based on a custom design.

- Determine the processing requirements and architecture.
- Designing efficient SFF computing platforms requires an understanding of the production processing requirements. A headless control and monitoring application may only require a 32-bit ARM processor, while a multi-video surveillance UAV may require significant processing bandwidth.
- The operating system can drastically impact the processor and memory requirements for the SFF selection. If you plan to run Linux on an ARM platform, make sure any peripheral devices provide drivers that you can build into the system.
- Identify the environment where the system will be operating.
- This includes typical factors such as operating temperature, ingress requirements, shock and vibration, along with reliability factors. It is important to understand how meeting the demands of the operational environment can affect cost, reliability, and risk. If you only need to deliver a proof of concept, an inexpensive maker board may be a suitable option. However, the equation can change drastically, for example, if the embedded solution is controlling a transportation system where downtime is critical or a remote unit's location will make maintenance and service expensive.
- Ask for suggestions from potential suppliers and discuss the requirements.
- SFF vendors are dealing with multiple clients across different segments of the embedded marketplace. A proven supplier will use this experience to help guide you to product selection that makes the best sense for the application. Several years ago, we had a client that spent thousands of dollars to replace damaged boards—spending that could have been avoided had they shared how they were going to mount the system.

Chris A. Ciufo, Chief Technology Officer, GMS

Chris A. Ciufo, GMS: At the risk of sounding obvious, it's essential that the customer provide a very clear Statement of Work, or in absence of that, be willing to be "interviewed" to provide a thorough understanding of the problem that needs solving. It's quite common for a customer to come to us merely wanting a certain type of form factor, a favorite processor, and some select I/O. But this approach pre-assumes that the customer already thinks they know what they want.

In the case of General Micro Systems, we offer boards, boxes, and complete systems from small form factors (SFF) all the way up to displays with everything I just listed embedded inside. With so many system-level and packaging options, it's important for us to assess the complete problem before settling on one or more possible solutions.

Let's be more specific. When it comes to UAVs or autonomous vehicles, emphasis is usually placed on the payload processing. That is: a COTS computer that interfaces to the platform's sensor suite. But often we find that the horsepower, weight and/or available power often exceeds what's available on the airframe—that's usually the reason they came to us in the first place. They had no idea how to solve the simultaneous equations for these three vectors.

Instead, we expand the discussion beyond what they asked—the payload processing—to include their on-platform communications backbone, the mission processor, the avionics suite, or any other electronics that we can subsume into our system to meet those vectors of horsepower, weight or power.

In summary: it's important to look at the whole system, not just what the customer is asking about immediately. This approach is our standard step-by-step process, and it works well for our customers because we often give them more than they expected.

Rodger H. Hosking, Vice-President, Co-founder, Pentek, Inc.

Rodger H. Hosking, Pentek, Inc. Although it's often difficult, the most important initial task is defining the dimensional, functional, environmental, and performance level specifications of any embedded system. Small form factor systems often require non-standard packaging, with unique constraints that can impact internal structures. This often rules out power supplies, boards, backplanes, and interconnects based on open standards, and discovery of these facts late in the design cycle can be devastating to program costs and schedules. Using design tools for 3D modeling of both mechanical and thermal management structures during the proposal stage will help avoid these serious surprises. This approach helps the customer recognize the consequences of his imposed constraints before the deal is struck. Then, it may be possible to relax some of them with further analysis.

Jim Shaw, Executive Vice President of Engineering, Crystal Group

Jim Shaw, Crystal Group: Understand the environment in which the system will be deployed and operating. What are the operating temperature and thermal management needs? Will it be stationary or mobile? Will it be exposed to the elements and, if so, what type? What are the size, weight, and power (SWaP) requirements?
Given that there is often a mismatch between what is expected and what is possible, it's crucial to understand the expectations the customer has for the compute capability. Are they anticipating, to quote Genie from "Aladdin," "phenomenal cosmic power in an itty-itty living space"? All these factors contribute to clearly comprehending the application and environment, which is critical to the product evaluation process. Expressing all the requirements leads to better informed decisions and helps technology providers such as Crystal Group recommend the optimal embedded solution to meet program, application, and end user needs.

Understanding any constraints can help us make tradeoffs when necessary. The most important requirements (MIR) drive what parameters can be sacrificed for features. Is it weight, cost, space, power, or performance? They are all important, but optimizing the solution requires fully understanding the problems. Finally, knowing the deadline is important because it is a factor in decisions such as selecting development over catalog items and with regard to performance, space, and weight tradeoffs.

EECatalog: What I/O and processing trends are you tracking?

Rob Persons, Senior Presales Technical Architect, Artesyn Embedded Technologies

Rob Persons, Artesyn Embedded Technologies: A number of Navy tactical systems have been using our Advanced Telecom Computing

Architecture (ATCA) based systems over the past few years. For the Marines, Artesyn ATCA-based systems form the foundation for some forward deployed sensor analysis equipment in UAVs. In both cases, the programs chose ATCA because its architecture makes a large amount of processing power directly accessible to the war fighter—where it is most needed—and does so efficiently. Deploying ATCA in these programs represents the future of FOG tactical computing.

James Schada, Technical Marketing Manager, Virtium Solid State Storage and Memory

Artesyn is tracking the extended Intel Xeon road map and plans on supplying more advanced, refreshed processors for these same systems for many years. The robustness of the standard allows these systems to start operating with 10G fabric connections between the processor payload boards and migrate to 40G if necessary—without replacing the chassis or switches— and to increase the total number of cores available per slot as the Intel Xeon processor advances through each generation.

Hosking, Pentek, Inc. One of the most consistent trends we see in I/O is the adoption of digital optical links to gain significant advantages for embedded systems. Compared to copper wires and cables, optical interconnects can deliver wideband data at baud rates up to 10 times higher over distances of hundreds of meters or more. Optical cables are smaller in diameter and lighter in weight, particularly important for aircraft and UAVs. Their immunity to EMI radiation means optical cables can be run close to powerful transmit antennas and noisy power generators. Unlike copper cables, optical cables radiate no energy, making them highly immune to eavesdropping on secure or sensitive signals. Evolving open standards for embedded systems, like VITA-66, which defines optical VPX backplane interconnects, help us deliver systems compatible with products from other vendors, and allow our customers to insert new technology as it emerges.

Shaw, Crystal Group: Crystal Group's engineering team is tracking the following trends, to better assist customers:

- I/O that's OUT: 15-pin VGA, RS232, USB 2.0
- I/O that's IN: DVI-D, HDMI, USB 3.0, 10G Ethernet
- CPU that's IN: Purley Platform with Skylake

We're evaluating the first Supermicro X11 boards using the new Intel Skylake CPU architecture. Crystal Group performs extensive testing on the configurations prior to rolling them out as solutions to our customer base and expect the testing to be completed mid-summer. The next variant of Crystal Group's Rugged Server (RS) series is being architected to provide maximum modularity, making it exceptionally easy to reconfigure for various applications.

Gudknecht, Elma: High-speed vision processing is a big growth area, with countless applications that include anything unmanned in the defense and security spaces as well as driverless in the industrial space. Autonomous vehicles, heavy equipment on land, sea and air, surveillance, manufacturing optimization and inspection are just a fraction of other applications as well.
At Elma, we're focusing on modular, configurable systems that enable our customers to realize an initial system, yet are designed to allow fast, inexpensive reconfiguration to handle evolving and future requirements.

Patterson, Aitech Defense Systems: Many in the embedded computing industry are watching the ARM processors closely. It seems several of the traditional PowerPC end-users are becoming a bit "circumspect and nervous" about the pending Qualcomm acquisition of NXP and what that means for the PowerPC architecture. Will Qualcomm consume all NXP's output? Will Qualcomm dump the PowerPC architecture altogether? No one knows for sure, not yet. On the I/O side, SpaceWire seems to be making big inroads into the embedded space market.

Ciufo, GMS: SWaP-C still reigns supreme. Despite the promise of bigger DoD budgets, all branches are forced to trade off new COTS programs with O&M requirements ("boots, beans, bullets"—plus health care). It remains essential to balance all these with lowest cost.

Yet we are seeing more willingness to take purely leading-edge commercial technologies and field them if they meet the requirements. We've had a customer inquire about embedding a standard smartphone within one of our small form factor boxes, simply because the perception was that the phone met the requirements for LTE cellular, image processing, storage, and low cost. We couldn't do that, of course, but the message was clear: processing high-res images from megapixel cameras and other IR sensors; civilian connectivity via Wi-Fi and cellular; and "cheap" storage.

As well, there's an equal need for better image resolution from the sensor, plus in-airframe image processing. This means increased emphasis on intermediate processing and the ability to move data to on-platform storage. Where once 1GbE was used, we're shipping a lot more 10GbE interconnects. To meet the storage requirements, smaller SSDs are needed in M.2 format instead of the "traditional" U.2 (2.5-inch) sizes.

We've standardized on the PCIe Gen 3 interconnect for inter-board communications and all the way out to the drives, which are now more commonly NVMe instead of SATA. This also has the advantage of reducing latency as Intel CPUs (like Xeon D) and PCHs offer myriad PCIe Gen 3 I/O, which can talk directly to the NVMe drives.

EECatalog: What issues are not getting the attention they deserve?
Hilliard, WinSystems: Security is certainly getting a lot of attention and the potential consequences are well publicized. However, we are still surprised that application designers are making little use of the hardware security features built into modern ARM application and Intel processing platforms.

James Schada, Virtium: Encryption in small form factor storage devices is sometimes overlooked —at the risk of diminished data security. Not taking necessary security measures such as encryption will increase the likelihood of data loss or worse, theft. Self-encrypting drives, or SEDs, help satisfy data protection requirements through dedicated AES encryption engines built into the SSDs. This hardware-based encryption eliminates the need for encryption key management software and prevents vulnerabilities to corruption and other attacks brought by software running under an OS. With a single command via SW or HW trigger, the SED can scramble the encryption key, instantly rendering the data useless. This provides system developers—particularly in the military sector—with peace of mind that their data is protected from unauthorized access in the event of any physical loss of the equipment.

Ciufo, GMS: The issue that doesn't get the right attention is how the customer asks for a specific solution. This is a function of how a whole program flows down from the government's requirements, and a prime- or sub-contractor goes out to ask the industry for bids. They usually specify what they want, and it's typically an "evolutionary" improvement over what they already have or already believe is possible.

Yet as Steve Jobs of Apple famously requoted from someone wise: Your customers are asking for something, but they don't even know what they want. Stop listening to them. By asking for evolutionary system technologies and improvements, the UAV is constrained to missing out on the revolutionary advances the suppliers—like GMS—can offer. Don't ask us for a faster sensor processor; instead, ask us for a way to recognize image changes or for a way to predict the probability that the burned-out truck by the side of the road might have been moved since the last time it was imaged. This could signal the existence of an IED.

If this linear thinking—which is just fine, but inefficient—isn't solved, our systems will not keep pace with the enemy's capitalizing on civilian technology and adapting it to fight against us. Their modified smartphone

is way more powerful than most systems we can bring online today—that's because we will use that same civilian technology, but it'll take us several years to adapt it to a defense environment. By then, several civilian generations have come and gone, always leaving us a generation or two out-of-synch.

Instead, we need non-linear, or what Admiral Harris (USPACOM) calls "revolutionary thinking." Take us into your confidence, tell us the complete problem and let select industry partners like GMS come up with the best way to solve the problem. Don't just ask us to bid on your definition of what you think is the best way to solve the problem.

If we fail to keep up-tempo with the enemy's technology, we'll have to fight with overwhelming force to stay even. We can't afford to do that on so many fronts.

Hosking, Pentek, Inc.: Now that software radio technology is taking over an increasing portion of communications, radar, and signals intelligence systems, the industry faces myriad proprietary methods of representing digital signals flowing across the many different links between components, boards, and sub-systems. Often, digitized signals are mixed with metadata for time stamping, location marking, and other parameters, adding to the complexity and variety of formats and protocols. This situation runs counter to the COTS philosophy of open standards and interoperability among vendors. Concerned customers, especially government and military entities, have joined with key industry and university representatives to develop the VITA 49 Radio Transport Protocol (VRT). It defines standardized formats for signal payload and information data streams so that compliant system elements from different equipment suppliers can be successfully connected. Enhancements to VITA 49 are now underway to add standard protocols for controlling the radio equipment and support for transmit signals.

Shaw, Crystal Group: Embedded computers are still as power hungry as ever, forcing embedded systems engineers and integrators to make tradeoffs between performance, cooling techniques, and power consumption. The multicore processor was a tremendous technological breakthrough with far-reaching benefits, and a couple of challenges: power consumption and heat dissipation. Virtually all embedded computing engineers now struggle with power and heat, endeavoring to achieve the greatest performance per watt.

Some modern high-performance multicore processors have a thermal design power (TDP) rating of approximately 95 watts, which presents considerable cooling challenges and requires an innovative thermal management approach. If power and thermal requirements are not addressed, systems can overheat and fail. Or deployed warfighters must make the difficult decision of which systems to use and which to shut off—

which can put lives and missions on the line. At the same time, processor technology might stagnate, unable to advance past current power and thermal limits. Advances in heat pipes and liquid cooling have alleviated some of these challenges; and, given that most of the heat is generated by friction of electrons within the processor, optical computing holds great promise for the future of embedded computing.

Patterson, Aitech Defense Systems: Although many are watchful, it seems that no actions are being taken by NXP to define a clear, future path for the PowerPC in the wake of Qualcomm's announced acquisition of NXP. Where are the next gen, PowerPC roadmaps?

Gudknecht, Elma: For rugged, sealed systems, thermal management should be a top concern. Ongoing demand drives more functionality—and hotter payloads—in smaller, lighter equipment. Lack of proper heat mitigation will inhibit system density and growth in terms of functionality per square inch. Better thermal management techniques will enable continued SWaP improvements.

Security is another critical area of concern. Security considerations usually occur at a level above where Elma operates, however we do offer highly secure solutions that form the basis of a wider scale, secure network solution. The consequences and benefits on the security issue are self-evident.

EECatalog: How well are the commercial aviation and the mil aero sector doing in addressing the need for high-performance graphics?

Shaw, Crystal Group: Significant growth in intelligence, surveillance, and reconnaissance (ISR) missions is driving the demand for high-performance graphics capabilities, including real-time graphics processing, high-capacity data storage, high-bandwidth data transfer, and high-resolution displays. Sufficient bandwidth to transmit terabytes of detailed imagery and full-motion video is a challenge. The focus continues to be on handling image processing on the platform, a challenge which requires high-performance computing, networking, and storage systems. At some point, we may see 5G in the battle space, but due to technology maturity and security reasons, we are not there yet.

Aerospace and defense organizations across the globe are actively focused on infusing avionics on commercial or military aircraft, unmanned aerial vehicles (UAVs), and satellites as well as electronics on ships, combat ground vehicles, and soldiers with robust graphics capabilities. Crystal Group rugged solutions are helping transform aerospace and defense platforms into vital graphics powerhouses capable of capturing, processing, sharing, and storing critical data to help facilitate real-time

informed decision-making across various markets, including homeland security, public safety, firefighting, and meteorology.

Schada, Virtium: We expect significantly more data to be generated by high-performance graphics, creating a need for a broader range of storage capacity. Given visual systems' complexity and mission-critical role, processing performance cannot be compromised. Thus, system designers would need higher-capacity embedded SSDs and faster interfaces to push the throughput required for tasks such as enhanced 3D mapping and object recognition.

Patterson, Aitech Defense Systems: On the one hand, GPUs designed for the PC gaming market are perfect for next gen, high end mil and aero applications. High-performance GPGPUs, including our A176 Cyclone Rugged HPEC, are making inroads into the once stable GPU markets now.

However, GPUs continue to have a component obsolescence problem. Many of these parts are obsolete long before these new GPUs can make it to a mil and aero program's production cycle. Some companies are buying up the near-obsolete component stock, then doubling the price, or more. Something's gotta give…

Ciufo, GMS: Commercial aviation "glass" cockpits are among the best I've seen. To the extent that they must be exceptionally rugged and certified, unlike the LCD on your desk, multi-function displays (MFDs) are nearly leading edge with the best civilian technologies.

In defense, we work with the same LCD suppliers that build your living room TV and we have high-res, high-contrast, and high-brightness (up to 1000 nits for sunlight readability). Our SmartView displays—really rugged "panel PCs"—use Intel's latest Core i7 Seventh Generation CPUs, which are what you'd buy at Costco, BestBuy or your favorite online supplier. My point: high res displays with the industry's best graphics are available to commercial aviation and the mil sector.

Ruggedizing them for ultra-high shock and vibration, or to prevent water/moisture ingress is where the magic is required.

EECatalog: Where do you see virtualization being most helpful in solving aviation challenges?

Persons, Artesyn Embedded Technologies: A common ground control station, where virtualization is an integral part of the program, is using Artesyn Embedded Technologies ATCA products. Virtualization assists in a variety of ways, including fully utilizing over 24 hyperthreaded cores per ATCA slot. And virtualization also makes it possible to support a variety of operating systems for legacy pieces of code along with new operating

systems and software, and to improve resource allocation without being concerned about the underlying hardware. In a standard 14-slot chassis, that means a total of 288 hyperthreaded cores with a potential of 3 TB of DDR4 can be managed and distributed to the tasks dynamically.

Shaw, Crystal Group: Virtualization is solving challenges in many market verticals, including aviation, through the consolidation of multiple systems on a single piece of hardware or making the hardware supporting these systems interchangeable. Several specialized hardware systems—that make up a full avionics suite, for example—are being replaced with a common robust, space-saving solution.

Virtualization can cut down on clutter in the cockpit and reduce the size, weight, and power consumption of avionics, which in turn can increase fuel efficiency and uptime, reduce maintenance and support time and cost, and reduce pilot workload while increasing situational awareness. Rather than several discrete avionics systems each with its own display, cockpits on legacy and new aircraft will benefit from a single or redundant rugged server running a virtualization platform in which each piece of avionics is a virtual machine sharing a piece of the underlying hardware with other systems and feeding data to multifunction displays. Virtualization technologies such as separation kernels, together with hardware- and software-based encryption, help solve the growing challenge of keeping sensitive information and critical systems secure.

Crystal Group's hyperconverged infrastructure (HCI) solutions tightly integrate compute, storage, and networking hardware with virtualization, software-defined, and Internet of Things (IoT) technologies in a single streamlined, space- and cost-saving system while load balancing the demand on any one node.

EECatalog: What can help or is helping companies in the mil-aero sector get to a stronger position than they were in last year?

Hosking, Pentek, Inc.: Each new generation of processors, GPUs, and FPGAs takes advantage of shrinking silicon geometries to increase performance, density and resources. This increasing complexity presents a serious challenge to software and IP designers who are developing more sophisticated programs and algorithms, and larger signal processing structures to take best advantage of the new devices. Fortunately, new design tools are emerging that allow design entry at a higher, more abstracted level, often using graphical representation of common building blocks to help shorten the development time. One tradeoff in using these high-level generic blocks can be some reduction in efficiency of resource utilization, but this can be offset by the falling cost per resource. A major trend in FPGA design is the widespread adoption of AXI4-compliant IP blocks, which use standardized I/O ports for data, clock, and control

signals to simplify interconnections. Graphical design entry tools including the Xilinx Vivado IP Integrator, supported by Pentek's Navigator Suite and AXI4 IP blocks for software radio, both with major new releases during the last year, boost design productivity and ease future upgrades.

Patterson, Aitech Defense Systems: A much better handle on funding for defense programs. US Congress and the previous administration had forced funding sequestration, which has directly and indirectly hurt program developments and their funding streams, meaning funds are not coming in when they were expected to the larger primes. Forced and uninformed change always has unintended consequences. This means a slow-down in funding to sub-tier contractors, which in turn, impacts and forces reductions in investment dollars for R&D.

I hear U.S. Congresspersons continually grumbling that defense program costs are "out-of-sight, "horrible," horrendous," etc. The facts are that new, leading-edge technologies are never ready for full-scale deployment when people's lives depend on it. Developments are made, testing is performed, improvements are incorporated, then tested again. Repeat and rinse over and over…. This all takes time, energy, effort, and no less than a full commitment of people and monetary resources to make it happen.

Then Congress cuts LRIP or production quantities to "save the taxpayers money," and to everyone's complete surprise and consternation, program costs rise. The Congress's typical knee-jerk reaction is to blame the prime for either "blatant price gouging," or "it's the military industrial complex screwing the taxpayer again," or worse yet, "pure incompetence," where in reality it's the level of expected ROI that went down significantly with the program cuts. In the end, we all have stockholders, boards of directors, or constituents we report to.

This can be made better by cutting this 20/20 hindsight and back-seat driver propensity out of the process and letting the defense industry perform to its full capacity to gain the cost efficiencies that are demanded and desired.

Gudknecht, Elma: The rapid development of SFF (non-slot card) based products is helping pave the way for better solutions. Board manufacturers, especially COMe manufacturers, have stepped up with rugged board versions and embedded integrators like Elma have quickly adopted those products for inclusion in modular, configurable and cost-effective sub-systems

Shaw, Crystal Group: Consumers and enterprises have benefited from IoT innovations for years; meanwhile, aerospace and defense professionals have been waiting to harness the same enterprise-level capabilities and IoT functionalities in the field.

The main obstacles to adoption have been data transfer security and access to the private cloud. Crystal Group is marrying highly reliable, rugged hardware with software-centric approaches to bring IoT, virtualization, and other key enterprise-level features, functionality, and capabilities to the edge—even in the most extreme and inhospitable environments. Data collection, processing, networking, and storage are of paramount importance in bringing IoT to fruition and reaping all its benefits. Crystal Group's rugged, robust, and reliable hardware sits at the heart of it all—tightly integrating compute, storage, and networking in a single hyperconverged infrastructure (HCI) system—helping to bring IoT visions to life virtually anywhere and everywhere.

Ciufo, GMS: The promise—not yet realized, I might add—of bigger budgets under President Trump has released IRAD funding and put some programs back onto the front burner. In this case, the "achievement" was a new president.

The relentless push towards faster networking such as 40GbE (Ethernet) is raising the possibility for faster sensors, distributed databases, and even faster backplanes in open standards like VPX (VITA 46/VITA 65). The biggest COTS companies in our industry are talking openly about applying these technologies to defense systems and creating new architectures previously thought not possible. For example, if one can create a symmetric multiprocessing architecture across a 40Gbps VPX backplane that was previously constrained to 10Gbps, that's a notional 4x improvement in computational capability. This is the difference between doing target recognition in real time as opposed to. saving the data, landing the UAV, and downloading the data for an analyst to review and advise—thus requiring a strike mission the next day instead of at the time of sensor data capture. This is a huge advantage in how a war is fought or in how targets are neutralized.

http://eecatalog.com/military/2017/04/27/round-table-raising-expectations-for-uavs-and-more/