AI Transportable Market

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Cut Time-to-Market for AI Applications at the Edge

Program managers are struggling to quickly deploy AI capabilities for real-time applications in the field – outside of data centers. These leaders can speed time to market by utilizing scalable commercial compute solutions from vendors with expertise in real-time, AI-ready platforms built for rugged environments.

The Demand for AI Capability in the Field

The requirements for AI in the field form a specific and distinct segment [see Figure 1] in the big, fast-growing edge computing market, separate from the familiar segments of edge data centers and the Internet of Things. One way to describe this emerging segment is "AI Transportables."

Figure 1: The Business Opportunity for "AI Transportables"

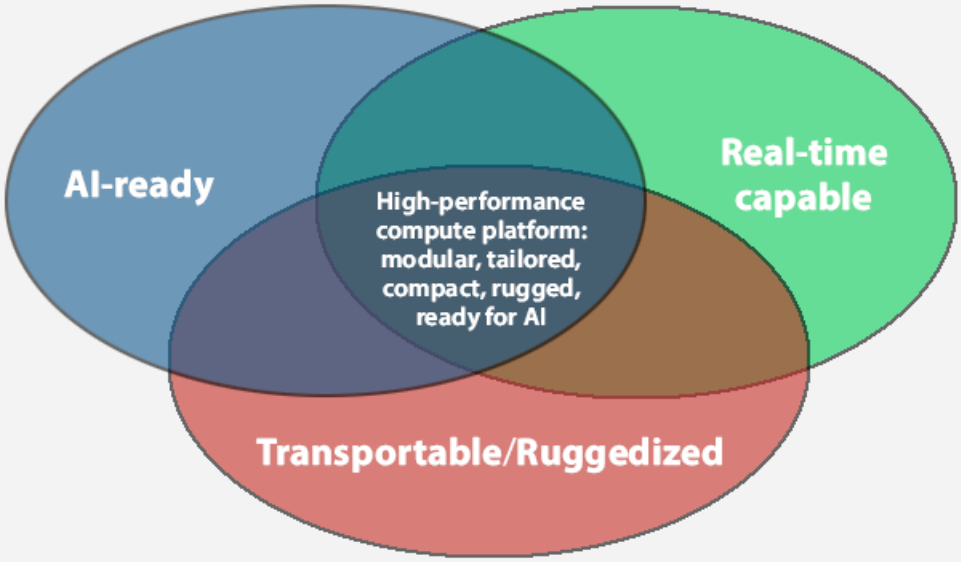


Figure 1 identifies the critical customer requirements for AI application in the field – for AI transportables:

- Very high-performance and scalable compute, storage and networking via commercially available GPUs, FPGAs, CPUs, memory and I/O.
- Enabling AI-readiness via direct support for AI development libraries, tools, models, model training and deployment.
- Rugged design features to ensure these platforms can survive demanding, even harsh, deployment in vehicles, ships, planes, heavy equipment, oil drilling platforms, mobile command centers and much more.

These requirements mean that field-deployed AI applications run outside the typical edge solutions: smaller but still conventional edge data centers and Internet of Things (IoT) edge devices.

By contrast, high-performance, transportable AI platforms must be able to endure heat, dust, moisture, vibration and the lack of HVAC. These and other constraints such as space, performance, power and cooling can only be surmounted by system design expertise and disciplines, including rugged design. In the past, program managers faced hard choices about trade-offs and compromises in trying to deploy AI at the edge. With today's technology, those compromises are no longer needed.

Satisfying these key requirements opens up new business opportunities in an array of industrial and aerospace segments, in addition to the military, especially for real-time applications.

The underlying technology foundation for AI transportables is ongoing breakthroughs in high-performance computing - scalable, state-of-the-art advanced GPUs and FPGAs, flash storage and high-speed I/O. This foundation enables both real-time applications and an array of artificial intelligence capabilities. When these systems are packaged in compact, rugged containers, they can run real-time applications far removed from air-conditioned data centers, and without network latency.

AI in the Field

Growth global edge computing market:

2019: $3.5 Billion

2027: $43.4 Billion

Source: Grand View Research

"AI Transportables" market (estimated):

2019: $200-400 Million

2027: $3-5 Billion

Source: One Stop Systems

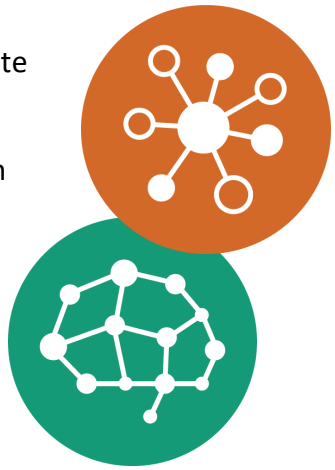
Defense/aerospace companies have led the way in deploying artificial intelligence capabilities in tactical and field systems. But now, a growing array of civilian customers in many industries are adapting this defense industry experience and technology. They are actively exploring how to apply AI for real-time analysis, inference, monitoring and decision-making for demanding field applications.

Use Cases for AI Transportables

AI transportables make it possible for companies to use commercial off-the-shelf hardware and AI capabilities in the field to solve an array of critical problems in real-time. Capabilities such as machine learning, deep learning and deep neural networks already are being used in widely different market segments, both civilian and military, including:

- A truck manufacturer deploys an onboard AI-based autonomous driving system enabling its trucks to respond to real-time highway conditions, including road construction, that are overlooked by GPS mapping systems.
- Portable military command centers that use AI "in theater" – close to combat – to quickly process a flood of tactical information into a comprehensive and intelligible picture of the battle area.
- A ride-share company deploys AI and high-performance hardware in a prototype vehicle fleet.
- Development of autonomous civilian vehicles apart from automobiles: commercial long-haul trucks, construction, mining and agricultural heavy equipment, buses, subway cars, freight and passenger trains.
- Enabling cooperative behavior among airborne or land drones (military or civilian).

- Offshore oil and gas industry rigs leverage AI to monitor complex topside and subsea operations and analyze sensor data to uncover suboptimal operations and impending problems, including equipment failures, before they occur.
- AI-based maritime monitoring and analysis systems onboard ships to automate detection of faulty systems for maintenance.
- An aerospace prime contractor develops an AI-based threat detection system aboard U.S. Navy jets.
- AI cybersecurity applications monitor in real-time access to industrial equipment at manufacturers and utilities, tracking authorized access and identifying patterns that are indicative of cyber-attacks.
- Civilian "connected aircraft" using onboard AI and SATCOM or 5G radio links to collect and send aircraft operational performance data to cloud systems.



- Medical imaging and diagnostic equipment hosting AI applications to process and analyze scans for faster, more accurate and more granular diagnoses.
- Entertainment/Media applications using rugged transportable AI systems in venues to process very high-resolution video and manage complex event video and light shows.
- Automated targeting systems that use advanced sensors, machine learning algorithms and touchscreen displays to enable Army tank crews to detect and respond to incoming threats far faster than ever before.

Three Steps to Achieve First-to-Market Advantage in AI Transportables

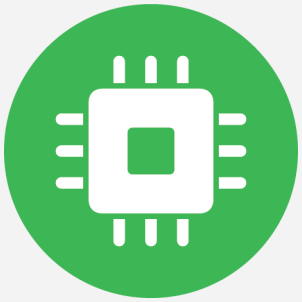
Program managers should collaborate with business development and portfolio leaders to assess the "AI transportables" opportunity and select a technology partner that can deliver the commercial off-the-shelf systems necessary for a first-to-market advantage. These leaders should evaluate AI transportables technology suppliers from the standpoint of three critical program concerns: time to market, constraints and trade-offs, and execution.

Speed Your Time to Market by Using a Modular, Scalable Platform

The transportable AI market is marked by two key characteristics that program managers can exploit for competitive advantage:

- AI development is – and will be for some time – still in very early stages.
- It is a fragmented market, with numerous systems vendors, from small to gigantic, racing to respond.

In such a business environment, organizations that achieve first-mover status for transportable AI products create an especially favorable competitive position. The benefits include:



1. Advanced, integrated compute, storage and networking features to address customer performance requirements now and in future.
2. Integrated AI tools, models and software platform to support the customer's algorithm and model development, testing and training.
3. System containers readily adaptable to deployment-specific environmental requirements, including temperature, vibration, shock and weather.

All three of these benefits depend on very specific experience and expertise, which typically are under-developed or non-existent in an organization's program hierarchy. Hence, a commercial off-the-shelf platform that is modular and scalable is critical to speeding time to market for high performance, real-time, AI-enabled applications in the field.

To realize the transportable AI value proposition, program managers should enlist a strategic partner that can deliver and sustain the technical infrastructure for these field applications. This means evaluating the vendor's:

- Specific experience in this emerging AI edge segment.
- Rugged design expertise to ensure survivable, reliable systems.
- Technology collaboration with leading GPU, storage and interconnect suppliers.
- AI support, especially for early-stage AI-model development and training.
- Effectiveness of the vendor's "customer success" business model.

In effect, program managers outsource these critical capabilities to a qualified technology partner. By doing so, they free up their program and engineering teams to concentrate on adding application-specific value and to collaborate with the partner on integrating that value into the platform.

Program leaders should assess potential technology suppliers with existing commercial off-the-shelf systems that can satisfy these specific technical and market requirements.

Optimize Customer Trade-offs by Leveraging Vendor Expertise and Experience

Transportable AI applications for rugged environments pose, for customers, a daunting array of constraints and trade-offs. How does one maximize performance and enable AI in the face of electrical, space and operational limitations?

A strategic technology partner provides capabilities that enable program managers to overcome the constraints and optimize the trade-offs for their customers.

Trade-offs for AI transportables fall into three areas:

- **Computing power:** maximum performance (compute, storage, networking) in a highly compact package
- **AI capacity:** apart from the need for maximum compute power, AI application developers who are writing, testing and training AI models need all the help they can get in terms of AI software platform, tools and technical support.
- **Survivability:** portable or transportable systems at the edge face unprecedented environmental constraints: temperature, dust, water, vibration, pressure, shock and much more.

The elements of high-performance computing are well-known and widely used in modern data centers: advanced, scalable GPUs, NVM Express/PCIe Gen 4 storage, high-speed I/O and more. The critical issue for field applications that are mobile or transportable is condensing these elements into compact packages designed for rugged environments.

Rugged design is not something that can be gleaned from a Google search. It is a practical discipline that combines in-depth technical knowledge – materials science, power management, and much more – with hard-won field experience through trial-and-error-and-refinement. This expertise is essential to creating reliable and survivable AI field systems.

Portfolio leaders should assess potential technology suppliers for their demonstrated expertise in breaking through these constraints to enable reliable, powerful AI processing in rugged, edge solutions.

Key AI Transportable Applications

Top application requirements:

- Real-time
- Rugged
- AI-Ready

Civilian Industrial Markets:

- Autonomous vehicles and equipment
- Drones
- Robotics
- Security/Surveillance
- Oil and Gas exploration/production
- Mining
- Marine
- Transportation
- Medical equipment
- Media/entertainment
- Agriculture
- Factory automation

Establish a Multi-level Technical Partnership to Execute Projects On-time and On-budget

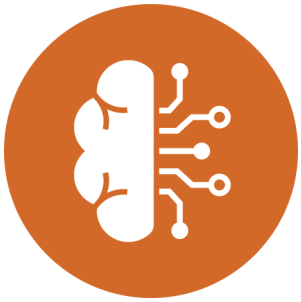
Success in this edge AI segment hinges on systems suppliers who have the capacity – and the will – to be effective business collaborators with program managers and their project and engineering managers.

AI deployments, whether civilian or military, are often part of a larger project. There are complex deadlines and demanding integration requirements. Rugged designs call for effective communication skills, technical support and customer service with the flexibility to handle iterative development, testing, feedback and changes. Accurate project cost forecasting and the ability to stay on-budget and on-time are critical in meeting business objectives.

> Program managers should evaluate systems suppliers that adopt a customer success business model. Such a model, at the outset, establishes a mutual relationship that has a shared focus: the specific business objectives and deliverables for a given program.

Vendors that adopt a customer success model should be able to demonstrate a development relationship that includes:

- Collaborating with program managers and project engineers to define customer requirements.
- Committing to realistic, specific milestones to verify design compliance with product specifications.
- Holding regular status reviews to monitor progress and attack roadblocks.
- Establishing close, ongoing customer support to ensure a clean hand-off to the sustainment/operations team.



AI is Ready for Field Deployment, Free from Data Center Confines

The general edge computing market not only continues to grow quickly, but also to segment quickly, creating new opportunities for forward-looking organizations. “AI transportables” is one such emerging edge segment, combining advanced high-performance computing, in-depth AI support and rugged packaging. This combination creates a flexible, versatile and proven platform. It gives proactive program managers first-mover advantage in deploying AI applications outside of conventional data centers in wide range of vertical markets.