

# Performance Meets Compliance for Tactical Edge Servers

## Trenton BAM servers with 3rd Gen Intel® Xeon® Scalable processors bring AI performance and flexibility to the public sector



Public sector AI-enabled IoT deployments are a growing segment of the US market, with a compound annual growth rate (CAGR) of 26.8 percent and an estimated valuation of USD 1.71B by 2025.<sup>1</sup> A multitude of new devices and sensors in the field, richer data sources, and the need to crunch increasing volumes of data are driving technology investments. For many of these deployments, the top priority is to make data accessible and usable to personnel in the field as quickly as possible, as securely as possible, and help ensure successful operations as well as personnel safety.

### Challenge: Secure supply chain IoT for rugged environments

Public sector IoT deployments face specialized challenges compared to most private sector deployments. In addition to increasing performance and efficiency requirements, many public sector deployments need to be field ready and able to withstand harsh conditions while meeting Size, Weight, Power, and Cost (SWaP-C) requirements. As personnel safety depends heavily on data security, tampering is also a major concern, and public sector clients need IoT server solutions that are manufactured, assembled, tested, and validated in the US. Even if an original equipment manufacturer (OEM) or system integrator can check all of these boxes, short end-of-life (EOL) cycles make it harder for public sector departments to get dependable technology that passes lengthy certification processes and works with existing legacy investments.

### Solution: 3rd Gen Intel Xeon Scalable processor-enabled IoT servers

The Trenton BAM Server solution, built with 3rd Gen Intel Xeon Scalable processors, delivers performance, flexibility, and actively managed supply chain security. 3rd Gen Intel Xeon Scalable processors deliver high core count,<sup>2</sup> higher performance<sup>3</sup> compared to the previous generation, and PCIe 4.0 support. With these enhancements in the BAM server solution, customers can add more PCIe cards for better customization and flexibility while supporting compute-intensive AI requirements at the edge. Michael Bowling, CEO of Trenton Systems, states, “We chose 3rd Gen Intel Xeon Scalable processors because they’re powerful, because of the plethora of security features, and because of Intel’s amazing account team and support.”

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—Michael Bowling, CEO of Trenton Systems



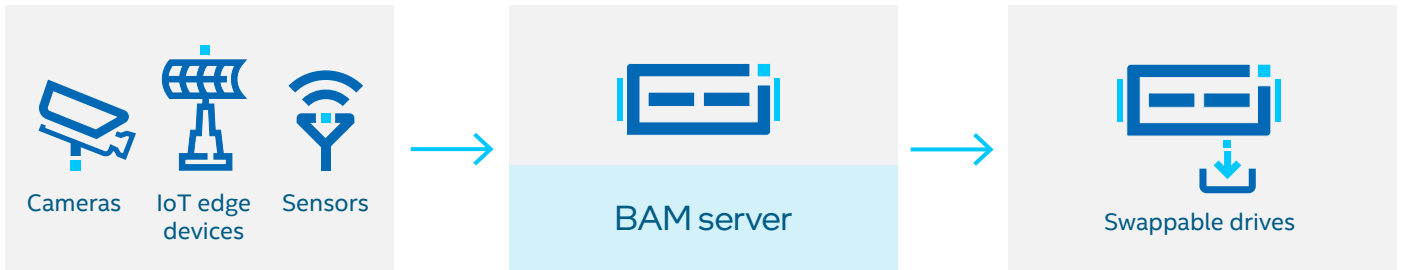
The Trenton solution adheres to the latest cybersecurity protocols including FIPS 140-2, a government security standard, and also adheres to the Trade Agreement Act (TAA) as all components, including the boards and chassis, are designed and/or manufactured in the US. BAM servers

and the 3rd Gen Intel Xeon Scalable processor come with long life availability,<sup>4</sup> which means that SKUs will be available for years to come so that public sector agencies can get more value out of lengthy certification processes.

## How it works

Field-deployable BAM servers are designed for AI and machine learning (ML) workloads at or near the source of data generation. BAM servers are built to be the endpoint, functioning as a single server at the tactical edge, but they can also be connected to other servers or connected to a mainframe as needed. Lightweight and built for easy mobility from one location to the next, BAM server enclosures are ruggedized and shock-absorbent, allowing customers to transport them in or on trucks, cars, ships,

aircraft, spacecraft, and other vehicles without risking hardware damage. In field deployments, the BAM server allows for extracting physical drives and returning them to command and control for further processing. "Our goal with the BAM is to process data in near-real time and make it available as fast as possible to personnel in the field," says Yazz Krdzalic, director of marketing and business development at Trenton Systems.



**Figure 1.** BAM servers connect directly to edge devices, while swappable drives can be extracted and sent back to base for processing.

## 3rd Gen Intel Xeon Scalable processors

As an Intel partner, Trenton Systems was able to gain early access to the 3rd Gen Intel Xeon Scalable processors when designing their BAM server solution. They chose Intel because of reliable performance, security, and product availability, all of which are essential considerations for customers in this space. Krdzalic adds, "Next-generation CPU and next-generation memory means you're not lagging behind. Intel Xeon Scalable processors enable BAM servers to help deliver mission success repeatedly in harsh environments." High core count<sup>2</sup> and higher overall performance compared to the previous generation processor<sup>3</sup> and key technologies such as Intel® Deep Learning Boost (Intel® DL Boost) all contribute to enhanced AI and machine learning capabilities in the field.

PCIe 4.0 support is another key feature, as BAM servers offer up to 11 PCIe 4.0 add-in card slots, with the ability to plug in double-wide GPU cards that have a direct connection to the CPU. Expanded memory capacity also means faster data transmission to and from the CPU, and the BAM server offers up to 24x DDR4 3200 DIMM slots. The BAM server is also a switchless system, contributing to greater cost efficiency and reducing complexity in the overall build. To help manage costs and help optimize total cost of ownership even further, Intel® Speed Select Technology is a powerful new collection of features in the 3rd Gen Intel® Xeon® Scalable platform that provides more-granular control over CPU performance.

# 3rd Gen Intel® Xeon® Scalable processors

More cores

Up to 28

cores/socket in IoT SKUs<sup>2</sup>

Better performance

1.46x

average performance gains  
over prior generation<sup>3</sup>



**Figure 2.** The BAM server delivers high memory capacity and 11 PCIe 4.0 slots for extended customization.

### Integrated AI acceleration for field operations

BAM servers are intended to be used to ingest and process IoT sensor data, video data, or even incoming radar applications. Bowling states, “If you’re in AI and machine learning for cybersecurity, you’re taking in a lot of data, and you need to crunch it at lightning-fast speeds while keeping everything secure. That’s the primary challenge we help solve with a trusted, high-performance solution like our BAM server.” In addition to the increased performance<sup>3</sup> and memory capacity found in 3rd Gen Intel Xeon Scalable processors, the Trenton BAM offering also uses Intel optimizations to enable AI workload processing in their edge server solution.

Intel® Advanced Vector Extensions 512 (Intel® AVX-512) in Intel Xeon Scalable processors helps accelerate AI workloads for image analysis, audio/video processing, and cryptography. Intel DL Boost further extends Intel AVX-512 with a new instruction set that increases inference performance on lower-precision data types, such as those used in workloads for image classification, speech recognition, and object detection. The [Intel® Distribution of OpenVINO™](#) toolkit helps optimize AI applications on Intel® hardware, helping drive even more value from Intel DL Boost.

### Hardware-enabled security helps protect against tampering and malware

3rd Gen Intel Xeon Scalable processors deliver hardware-enabled security that helps protect data and system integrity all the way down to the chip level. Hardware-enabled security combined with Trenton Systems’ secure supply chain manufacturing process helps ensure that BAM server solutions are free of tampering from design to delivery and helps data stay secure in the field. Bowling says, “Our previous systems have also been based on Intel Xeon Scalable processors, so we were already familiar with many of the hardware-based Intel® solutions and security features. New capabilities in the latest generation help make the environment even more secure.”

### Security features in 3rd Gen Intel Xeon Scalable processors:

- **Intel® Software Guard Extensions (Intel® SGX)** helps protect workloads at runtime by creating isolated memory enclaves. This helps make systems more resistant to malware and privileged software attacks. S-SKU offerings<sup>5</sup> in the 3rd Gen Intel Xeon Scalable platform offer the maximum enclave size of 512 MB, designed to meet the needs of confidential computing in healthcare.
- **Intel® Total Memory Encryption (Intel® TME)** enables full physical memory encryption. This helps defend against hardware-level attacks such as cold boot, freeze spray, and DIMM removal.
- **Secure Boot with Converged Boot Guard and Trusted Execution (CBnT)** is a fusion of two powerful boot sequences: Intel® Boot Guard and Intel® Trusted Execution Technology. These technologies help establish a secure boot and provide the foundation for safe computing.
- **Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI)** provides accelerated data encryption that doesn’t impact system performance.

## Compliant and secure supply chain helps prevent tampering

Trenton Systems has a deep understanding of tactical edge IoT challenges as well as an extensive history of delivering to public sector clients. This history enables Trenton Systems to both meet compliance requirements and give supply chain assurances that other solutions providers can't. "I'd say it's a competitive advantage," Bowling notes. "Not many manufacturers or system builders can say that everything they make was made in the USA, and that's a top consideration for clients in this space."

### Deep customization with close support and collaboration

With all these considerations for performance, flexibility, and security, Trenton Systems is aware that customers are facing a challenge in merely selecting the best-fit solution to address all their pain points. That's why they offer close collaboration as a service, from design to deployment, and also pay special attention to making sure that BAM servers integrate and work with legacy investments. "We help customers whiteboard from start to finish and try to get as close to a plug-and-play solution as possible," Bowling says. "We ask what the requirements are and advise on what we can do to make it so BAM servers work with your existing ecosystem." The Trenton Systems support team is available to customers throughout the entire life of the product.

## A stellar partnership leads to a higher-quality product

Trenton Systems is an Intel® Partner Alliance member, an active member of the Intel® IoT Solutions Community, and also a participant in the Early Access Program. The Early Access Program allowed Trenton Systems to start designing their BAM server solution around the 3rd Gen Intel Xeon Scalable processor before the official launch. The Intel team has been a key part in Trenton Systems' success by providing guidance and leadership on IoT solutions along with customer research and market analysis that helped Trenton Systems understand the target audience's needs. The result is that Trenton Systems delivers cutting-edge products with the latest technologies that are relevant to the customer's interests and challenges now. Krdzalic states, "We're an Intel house at Trenton Systems. We only support Intel® architecture. Nobody else can touch what Intel does in this space."



Trenton BAM server compliance, availability, and certification:

- **Meets government requirements:** The Trenton Systems BAM server meets FIPS 140-2, a US government security standard, and is compliant with the TAA by being manufactured in the US. Cybersecurity maturity model certification (CMMC) is pending.
- **US-made, five-year warranty:** Trenton Systems manufactures all server boards, chassis, system solutions, and enclosures themselves and backs up all solution offerings with a five-year warranty.
- **Counterfeit parts protection program:** Trenton Systems can provide assurance that all components in the BAM server solution are sourced from trusted vendors and suppliers.
- **Strict revision control:** Trenton Systems doesn't modify the hardware of existing SKUs, so customers can purchase the same system for years to come. Trenton regularly issues last-time buyer notices for each product nearing EOL.
- **BIOS control and customization:** As the principal OEM for the BAM server solution, Trenton Systems can control or enable/disable any BIOS feature by client request, including key 3rd Gen Intel® Xeon® Scalable processor technologies.

## Learn more

### Trenton BAM Servers

Built with 3rd Gen Intel Xeon Scalable processors, BAM servers deliver performance for AI applications, ruggedness for field deployments, and flexibility for customization.

[Learn more >](#)

### 3rd Gen Intel Xeon Scalable processors

Get greater performance, more memory bandwidth, and hardware-enabled security features to enable and enhance your AI and IoT deployments.

[Learn more >](#)

## About Trenton Systems

With 30+ years' experience in embedded computing systems, Trenton Systems delivers US-made solutions, deep customization for each deployment, extended product life cycles, and world-class support.

[trentonsystems.com](https://trentonsystems.com)



1. "AI in the United States Public Sector Industry to 2025: A \$1.71 Billion Opportunity," businesswire.com, March 2019.
2. The 3rd Gen Intel® Xeon® Scalable platform offers a maximum of 40 cores/socket; a maximum of 28 cores/socket are offered on the IOTG road map.
3. See [125] at [www.intel.com/3gen-xeon-config](http://www.intel.com/3gen-xeon-config). Results may vary.
4. Intel does not commit or guarantee product availability or software support by way of road map guidance. Intel reserves the right to change road maps or discontinue products, software, and software support services through standard EOL/PDN processes. Contact your Intel account rep for additional information.
5. S-SKU offerings not available on the IOTG road map.

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