Intelligent Edge Speeds Data Analysis for Mission Success

In July 2024, a flawed software patch triggered technology outages worldwide, with airlines grounding flights, government agencies slowing, and retailers closing for business. The cascading effects reinforced the importance of a growing technological trend: secure artificial intelligence (AI) at the edge, or intelligent edge. If AI at the edge – on individual devices – had inspected the software patch, the new code would have been rejected before it was deployed, preventing weeks of disruption to normal operations.

Essential for Managing Data Flow

Intelligent edge is the deployment of AI-enabled processing analytics and decision-making capabilities at the periphery of a network, instead of sending data back to on-premises data centers or the cloud for processing. Data is processed on edge devices, which include sensors, drones, and cameras, for real-time intelligence.

The explosive growth of sensors and Internet of Things (IoT) devices is making AI at the edge a mission-critical necessity. By 2025, an estimated 55.7 billion connected devices will generate an overwhelming stream of continuous data that must be processed in real time, according to Unisys. This data deluge, particularly in military operations where sensors are embedded in everything from vehicles and aircraft to soldiers' helmets, requires the power of AI at the edge. As sensors proliferate, the ability to analyze data locally at the edge will be indispensable for maintaining operational superiority and responding swiftly to dynamic threats.

Sending data from the edge to the cloud or on-premises data center for processing uses limited bandwidth and introduces significant latency, delaying critical decision-making, and raises security concerns. Front-line personnel need to know that their data is secure, and they can't afford to wait for critical intelligence.

Use Cases Benefit Military, Civilian Agencies

With the growth of intelligent edge, more agencies are gaining vital real-time insights. In a military context, soldiers can instantly assess threats through data collected from edge sensors. In civilian agencies, intelligent edge can help save lives and defend critical infrastructure.

The Department of Veterans Affairs, for example, can leverage intelligent edge to enhance remote medical diagnostics for veterans in rural areas, analyzing data from IoT medical devices in real time. Experts say intelligent edge computing can also help improve health care equity and enhance the privacy of digital health data. Similarly, the Department of Homeland Security could use intelligent edge in border security to assess real-time data from drones and sensors monitoring vast geographical areas.

Public sector use cases for intelligent edge include:

- **Anomaly detection.** Intelligent edge devices can analyze data from drones, sensors, and other surveillance equipment to detect anomalies. That can enable warfighters to detect movement of enemy forces and prepare for changing weather patterns.

- **Contextual semantic analysis for situational awareness.** Military personnel collect masses of data such as mission reports and field notes. Context-aware semantic search of these data streams, enabled by edge applications, identifies meaningful patterns in real time. This gives commanders critical intelligence on enemy movements and logistical challenges.

- **Disaster response.** First responders use IoT devices to monitor conditions such as air quality and structural stability. Intelligent edge systems can analyze that sensor data on site, enabling instant decision-making to protect people from the aftermath of hurricanes, earthquakes, and other catastrophes.

- **Critical infrastructure protection.** The grids covering air traffic control, water treatment, nuclear plants, and other critical systems also utilize millions of IoT sensors. On-site data analysis can predict system failures and potentially prevent cyberattacks and network outages.

GAI and HPE Help Agencies Deploy Intelligent Edge

To help government agencies effectively and securely implement intelligent edge, Government Acquisitions, Inc. (GAI) and Hewlett Packard Enterprise (HPE) offer a range of cross-domain solutions and services. They include cross-layer AI integration to smoothly connect edge analytics systems back to data centers, allowing organizations to realize the benefits of both environments.

GAI supports full-stack development of the intelligent edge with durable components that accelerate AI, including:

- The HPE Edgeline EL8000 Converged Edge System, which is purpose-built for high-performance edge computing and data storage in DDIL (disconnected, intermittent, and limited) and air-gapped military environments. Its modular, scalable architecture adapts to evolving mission needs, while the compact form factor fits space-constrained infrastructures unsuitable for traditional x86 systems. Weighing 50-55 pounds and operating on standard power outlets, the EL8000 offers the power of a full-scale data center, delivering real-time data processing at the tactical edge. Designed for distributed, disconnected environments, it ensures mission-critical computing and decision-making without relying on consistent network connectivity, making it ideal for field deployment in demanding operational theaters.

- HPE Machine Learning Development Environment (MLDE), a comprehensive platform for building and deploying AI models with advanced functionality. Running on the HPE Edgeline EL8000, MLDE supports no-code and low-code AI development, enabling users to create and train models without deep technical expertise. It is optimized for anomaly detection, deep search, and contextual semantic analysis with enhanced integration capabilities for mission-critical edge deployments. MLDE's AI capabilities include advanced network intelligence, automated model training, and continuous learning at the edge, making it suitable for dynamic environments where data constantly evolves.

Intelligent Edge Requires a Full-Stack System Designed for Constrained Environments

AI at the edge requires a robust blend of infrastructure, hardware, and software – a full-stack system tailored to the unique requirements of a distributed remote environment. That infrastructure must be ruggedized and scalable, with tools that allow for training and optimization of AI models.

A full stack for the intelligent edge includes:

Edge devices. These include sensors, drones, smart cameras, and connected vehicles equipped with AI chips that can perform computer vision, image recognition, anomaly detection, sensor fusion, and natural language processing.

Network connectivity. To support real-time AI processing and decision-making at the edge, IT leaders need high-speed, low-latency networks – ideally 5G. The more sensors and smart devices at the edge, the more important a reliable communication network becomes.

Edge computing infrastructure. A robust infrastructure that includes high-throughput storage, robust memory, and graphics processing units is essential to support AI operations in the disconnected, low-bandwidth environment characteristic of the edge.

AI model management and optimization. These tools and techniques help agencies deploy, monitor, and manage AI models. Critical capabilities include model compression through pruning and quantization to adapt models for edge devices without sacrificing performance.

Federated learning. This machine learning technique facilitates AI model training across edge devices holding local data samples, without exchanging them. Because raw data isn't shared across devices, data privacy and sovereignty are protected.

Security. AI at the edge requires end-to-end data protection and encryption, along with multi-factor authentication.

Compliance. The intelligent edge solution should comply with Federal security requirements, including the Federal Information Security Management Act, zero trust, FedRAMP, and DoD Impact Levels.

Explore the Possibilities

For agencies throughout the government, adopting intelligent edge is not just a technological move but a strategic one that impacts mission success.

In today's rapidly evolving threat landscape, public sector agencies must adopt intelligent edge solutions as a strategic imperative to safeguard national security, enhance operational efficiency, and drive mission success. Reach out to GAI today to explore how AI at the edge can positively impact your agency's mission. To set up an intelligent edge workshop for your agency, contact GAI at **sales@gov-acq.com.**

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