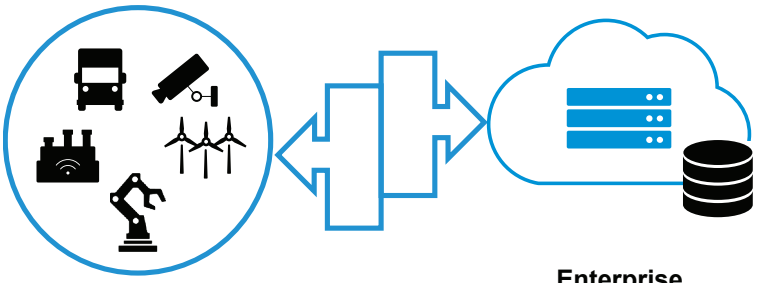
Winning the Race to the IoT Edge

The IoT Edge—Enabling the Connected Enterprise

With billions of industrial IoT devices expected to be connected to the cloud, the IoT edge will bridge enterprise and industrial systems in markets such as factory automation, oil and gas, smart cities, surveillance, health care, and many others*.

IoT edge solutions will bring compute and AI closer to the source of the data, incorporating new software paradigms and introducing new business models that will inspire traditional OEMs and IoT platform providers to develop strategies to win the race to the IoT edge.



Real-Time Sensing
- Data ingestion
- Position/condition
- Metadata

IoT Edge
- Data aggregator
- Protocol converter
- Data normalizing
- ML inference
- Local storage

Enterprise Data Center
- Big data
- Training/AI
- Cloud storage
- Expert insights

Evolving Architectures

IoT edge solutions will continue to evolve as compute and storage demands are expected to increase, leading to a need for:

- Data aggregation and connectivity in real-time
- Multicore processor systems that support deep learning inference and higher compute requirements
- Embedded local storage for on-premise data management
- New software middleware and APIs to support containers for microservices

As a result, memory size for code and data will increase to support new software cloud agents, middleware, and edge management. Processors will require higher DRAM performance with wider bus width for more efficient machine learning execution. And embedded storage size will increase as more endpoints are managed by a single edge device.

Micron Intelligence Accelerated at the IoT Edge

As the leader in industrial and automotive applications, Micron offers the industry's broadest memory and storage solutions to support the essential demands of the IoT edge:

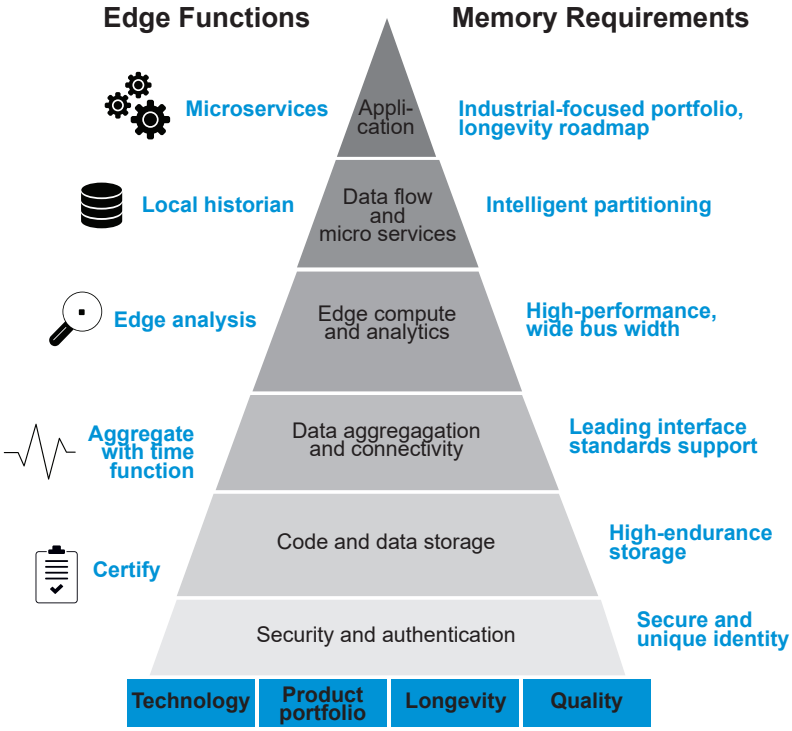
- **High-performance DRAM/LPDRAM and modules for compute and deep learning at the edge**
- **Broad NOR/NAND portfolio for code and data storage versatility**
- **Multichip package (MCP) solutions for space-constrained applications and cellular IoT modules**
- **Industrial-grade e.MMC, PCIe NVMe flash storage SSD and SD/microSD solutions for on-premise storage**

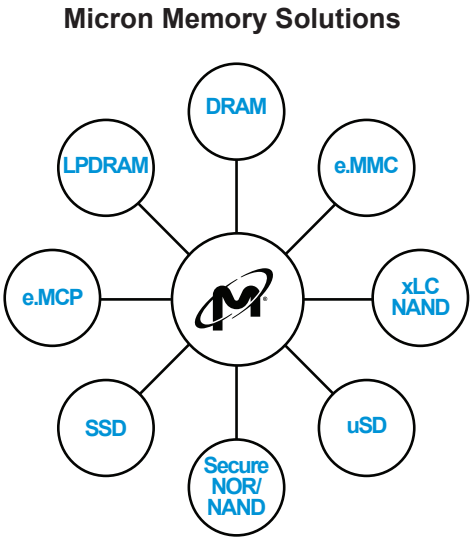
*Projections of the edge compute market estimated at $28B by 2025 (source: Edge Computing Market, Grand View Research, 2019)

Micron

Memory and Storage Requirements for the IoT Edge

The new breed of edge devices will require high-performance DRAM to support deep learning inference acceleration, managed NAND solutions with features and densities to support code size and complex OS functions, and high endurance storage for on-premise data logging and historian systems.





Complete Edge Essentials

DRAM Solutions

- DDR3/DDR4 and LPDDR4: market-proven, best system cost/performance tradeoff and long-term support
- LPDDR5x: data rates up to 8.5 Gb/s; improved power efficiency; up to x64 bus width-packaged solutions enable high bandwidth interface for AI/ML workloads
- Variety of DRAM modules from high-performance SODIMMs to high-density LRDIMMs

NOR/NAND Portfolio

- SLC NAND with adaptive FTL: on-die ECC, industrial temperature range, OTP data protection
- **Xccela**© Flash: x8 (Octal SPI) SDR/DDR JEDEC xSPI standard compliant; up to 2Gb full featured flash, supports direct code execution and parametric data storage with up to 400 MB/s reads, reducing pin count 5X compared with parallel NOR devices
- e.MMC with internal NAND management for simplifying development
- 1TB uSD removable storage

Multichip Packages (MCPs)

- Broad range of NAND MCP, e.MCP density combinations
- Low 1.8V power; small package size/ball count solutions
- Vertical stacking at die level; minimize BOM for simplified manufacturing and cost savings

Industrial- and Automotive-Grade Storage

- Micron 2100AI, 2100AT 3D TLC SSDs
- SLC partitioning; Trusted Computing Group (TCG) Opal self-encrypting drives (SED)-compliant
- 64GB-1TB densities, BGA and M.2 form factors:
  2100AI: Tcase -40°C to 95°C operating temperature
  2100AT: Tcase -40°C to 105°C operating temperature

Security and Trust

- Authenta™ technology adds secure element functions for integrity checking and memory protection
- Authenta key management services (KMS) enables simple activation and management of DICE-based identities for support of OTA updates, device management