Unlocking the Future of Smart Cities with IP65+ Multi 5G Networks & AI Box

White Paper

October 2024

Majdi Abdulqader - Intel
Anthony Abuta - Intel
Firas Khayat - SuperMicro
Claude Swain - Urban AI Solutions
Lakshmi Talluru - TelcoNets

Document Number: 834962-1.0

Contents

1.0 **Executive Summary** 5

2.0 **Business Challenge** 6

2.1 Terminology 6

3.0 **Solution** 8

3.1 Key Features 9

3.1.1 One Deployment, One Server, Four 5G Networks & Edge AI Compute 9

3.2 Rapid, Scalable Deployment, and Cost Efficiency 10

4.0 **Use Cases** 11

4.1 Smart City Management 11

4.2 Advanced Transportation Systems 12

4.3 Public Safety 12

5.0 **Conclusion** 13

6.0 **Appendix A – System Configuration** 14

7.0 **About** 15

Figures

Figure 1. Supermicro IP65+ Server 5

Figure 2. Support for Multiple 5G Networks Using Urban AI Solutions' AI Networking Accelerator 9

Figure 3. AI-Driven Networking & Workloads Orchestrations & Management Tool 10

Figure 4. Cost and Deployment of Classic 5G vs. the IP65+ 10

Figure 5. IP65+ in Action in SF Union Square 11

Figure 6. Autonomous Driving with Dedicated 5G Network Bandwidth 12

Revision History

Date	Revision	Description
October 2024	1.0	Initial release.

§

1.0 Executive Summary

The IP65+ Multi 5G Networks & AI Box, developed by Supermicro, Intel, and Urban AI Solutions, is a comprehensive solution designed to meet the evolving needs of smart cities and intelligent transportation systems. Urban AI Solutions, an independent software company, provided the proprietary AI-driven networking and workload consolidation at the edge, empowering cities to manage complex networks efficiently. This white paper outlines the platform's capabilities, which include multi-tenant 5G support, AI acceleration, and workload orchestration, making it a pivotal tool in the digital transformation of urban environments.

The collaboration between Intel, Supermicro, and Urban AI Solutions allows for rapid deployment, scalability, and significant cost savings while supporting the diverse needs of municipal governments, public safety, and private enterprises. Urban AI Solutions' AI-driven platform plays a critical role in optimizing network performance and reducing operational costs.

Figure 1. Supermicro IP65+ Server

§

2.0 Business Challenge

As urban populations grow, cities face increasing challenges to enhance connectivity, optimize operations, and streamline infrastructure management. Traditional methods of deploying 5G networks are time-consuming and expensive, often failing to meet the rising demands for bandwidth and low-latency services in smart city applications.

Key challenges include:

Warning: Costly and slow deployment of 5G infrastructure.

Warning: Inefficient resource allocation across networks.

Warning: The need for secure, multi-tenant network management for multiple stakeholders.

Warning: High operational costs and sustainability concerns.

These issues are prevalent in managing smart cities, transportation systems, and public safety operations, where real-time data processing and low-latency communication are essential.

2.1 Terminology

Term	Description
IP65+ Multi 5G Networks Box	A ruggedized platform designed to support up to four independent 5G networks and AI workloads.
Edge AI Compute	AI processing done at the edge of the network to reduce latency and improve real-time performance.
AI-Driven Orchestration	The use of artificial intelligence to manage and optimize network resources and workloads.
Multi-Tenant Capability	The ability to support multiple independent 5G networks on shared infrastructure.
Workload Consolidation	Combining multiple tasks into a unified, efficient process for optimal resource usage.
Low-Latency Connectivity	High-speed data transmission with minimal delay, critical for real-time applications.
AI Accelerator	Hardware or software designed to speed up AI workloads and optimize processing efficiency.
5G Private Network	A secure, isolated 5G network set up for specific organizational needs, like businesses or cities.

Term	Description
Workload Orchestration	The process of automating, managing, and optimizing different computational tasks across networks.

§

3.0 Solution

The IP65+ Multi 5G Networks & AI Box, developed by Intel and Supermicro in conjunction with Urban AI Solutions, addresses these challenges by providing a scalable, AI-powered solution. Urban AI Solutions contributed to the proprietary AI accelerator that consolidates networking and workload orchestration at the edge, enabling more efficient resource use and faster network performance.

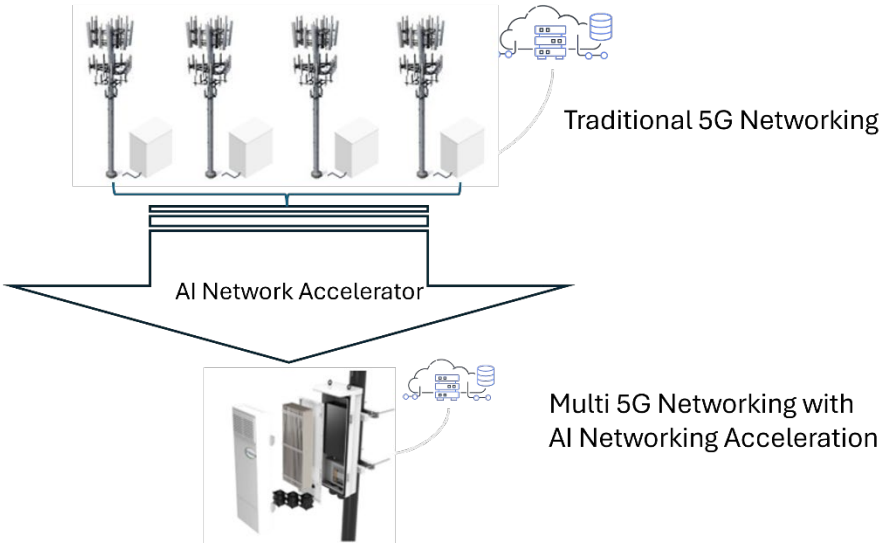
Key features include:

- Multi-Tenant 5G Support: The platform supports multiple 5G networks within a single unit, allowing various stakeholders to share infrastructure while maintaining secure, dedicated access.
- AI-Driven Workload Orchestration: Urban AI Solutions' proprietary software provides AI-driven networking and workload consolidation at the edge. This optimizes resource allocation and minimizes operational costs, reducing energy consumption by up to 75%.
- Rapid Deployment and Scalability: The system can be deployed in less than a day, making it a cost-effective and scalable solution for urban environments. Data rates of up to 3Gbps download and 1Gbps upload ensure robust support for applications requiring high-speed, low-latency connections.

3.1 Key Features

3.1.1 One Deployment, One Server, Four 5G Networks & Edge AI Compute

Figure 2. Support for Multiple 5G Networks Using Urban AI Solutions' AI Networking Accelerator

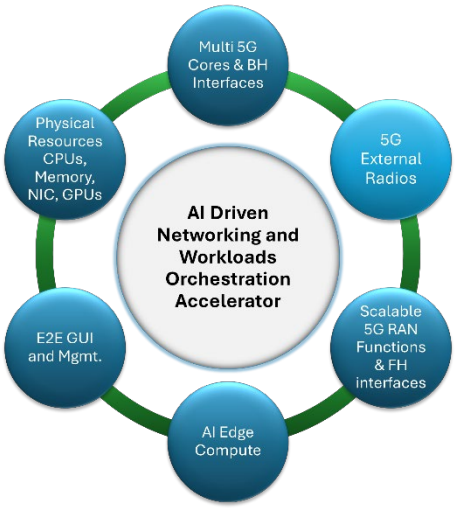


The IP65+ platform supports up to four complete 5G networks within a single unit. This unique multi-tenant capability allows different entities—such as municipal governments, enterprises, and public safety organizations—to operate their networks on shared infrastructure, optimizing resources while maintaining dedicated access. Figure 1 shows support for multiple 5G Networks in one server.

The AI networking and workload orchestration accelerator from Urban AI Solutions consolidates the operations of the four 5G networks into a single, streamlined network-to-cloud pathway. This consolidation reduces operating costs by nearly 75%, significantly cutting energy consumption and noise and supporting sustainability initiatives across urban environments.

Figure 3 shows the product components and functions flow.

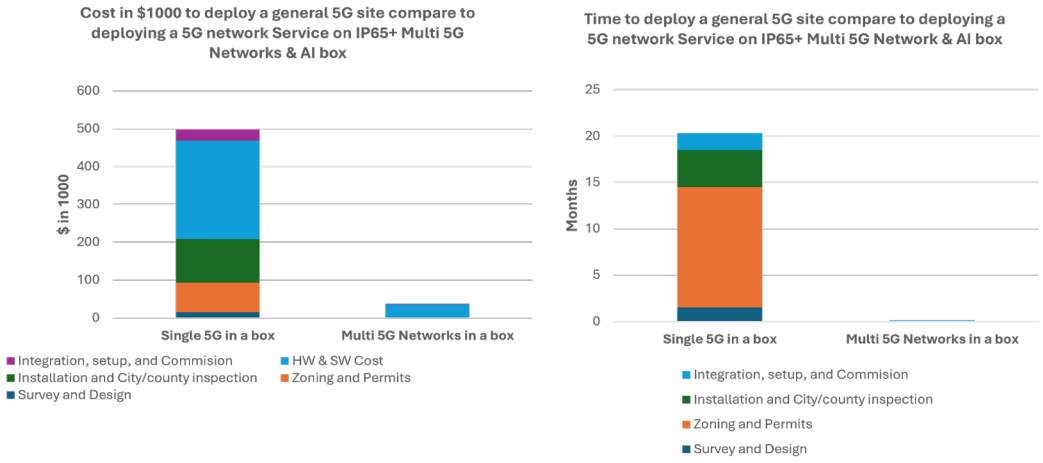
Figure 3. AI-Driven Networking & Workloads Orchestrations & Management Tool



3.2 Rapid, Scalable Deployment, and Cost Efficiency

This solution can be deployed in less than a day, offering a highly cost-effective solution for urban centers. It supports scalable data rates of up to 3Gbps download and 1Gbps upload, making it ideal for applications requiring high-speed, low-latency connections. Figure 4 below compares the cost and deployment time of traditional 5G deployment vs IP65+.

Figure 4. Cost and Deployment of Classic 5G vs. the IP65+



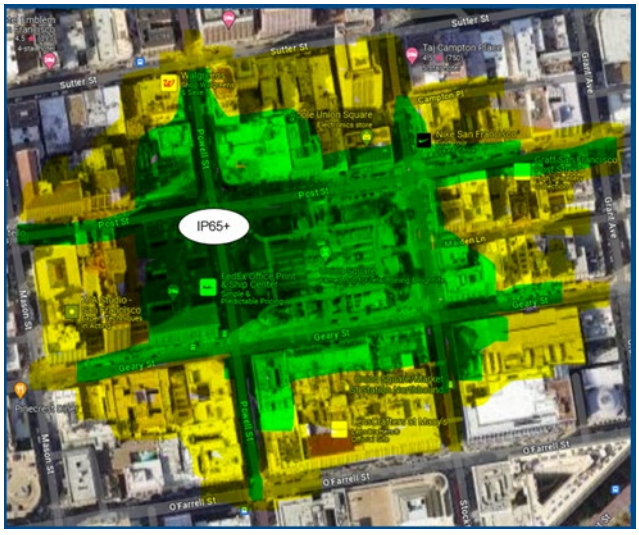
4.0 Use Cases

4.1 Smart City Management

The IP65+ offers a platform for new data, voice, texting, and PTT service providers using public and mm Wave spectrum. It offers multi-backup networks in case of emergency and disasters and E911 service for all. In addition, it supports a combination of Private/Public 5G to enhance pop-up events such as concerts and parades.

Entity	Services Provided	Latency	Bandwidth	AI Integration
City of San Francisco	Smart city & transportation	40ms	200Mbps DL	AI in Cloud
SFPD	Security & body cameras	10ms	100Mbps UL	AI on Prem
Google	Autonomous driving services	10ms	400Mbps DL	AI in Cloud
Amazon	Shipping tracking & PTT	10ms	300Mbps DL	AI on Prem

Figure 5. IP65+ in Action in SF Union Square

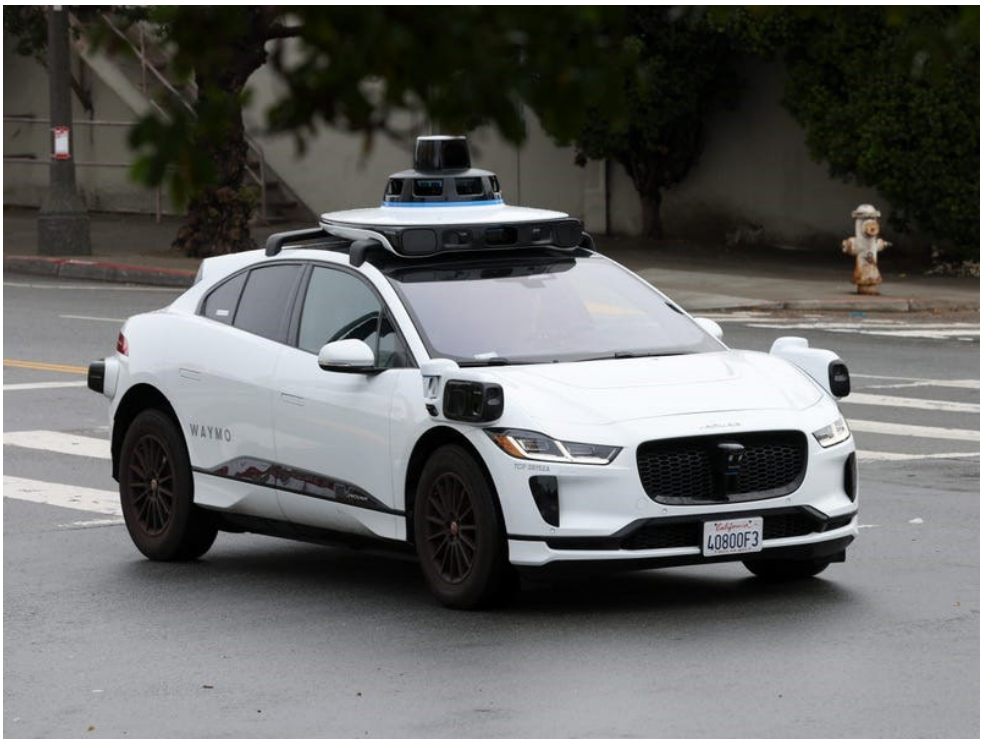


The figure to the left shows the RF coverage (RSSI) prediction of a single IP65+ deployment on the Union Square of the City of San Francisco, and radios transmit 10 watts each using omni antennas at 16 ft high.

4.2 Advanced Transportation Systems

The platform provides the reliable, low-latency connectivity necessary for autonomous vehicles and fleet management, promoting safety and reducing congestion.

Figure 6. Autonomous Driving with Dedicated 5G Network Bandwidth



4.3 Public Safety

Seamlessly integrates with public safety technologies such as police body cameras, allowing for real-time video streaming and secure data management, improving transparency and response times.

§

5.0 Conclusion

The IP65+ is a technological and sustainable innovation and a significant revenue-generating opportunity for cities and operators. Its "one deployment, one server, four 5G networks" model, combined with edge AI compute capabilities, ensures that urban environments can meet the demands of tomorrow with unmatched efficiency, reduced operational costs, and a commitment to sustainability, all while creating new streams of income. The collaboration between Urban AI Solutions, Intel, and Supermicro has resulted in a powerful tool that offers unmatched scalability, cost savings, and sustainability for urban environments.

§

6.0 Appendix A – System Configuration

Component	Specification
CPU	Intel Xeon 6433N, 32 Cores
Memory	32GB DDR5-4800
Storage	SSD 2.5" SATA 960GB
Network	Intel Ethernet Network Adapter E810
GPU	Intel Data Center GPU Flex 170
AI Software	Urban AI Solutions' AI Accelerator

§

7.0 About

SUPERMICRO

As a global leader in high performance, high efficiency server technology and innovation, we develop and provide end-to-end green computing solutions to the data center, cloud computing, enterprise IT, big data, HPC, and embedded markets. Our Building Block Solutions® approach allows us to provide a broad range of SKUs, and enables us to build and deliver application-optimized solutions based upon your requirements.

For more information: www.supermicro.com

INTEL

Intel (Nasdaq: INTC) is an industry leader, creating world-changing technology that enables global progress and enriches lives. Inspired by Moore's Law, we continuously work to advance the design and manufacturing of semiconductors to help address our customers' greatest challenges. By embedding intelligence in the cloud, network, edge and every kind of computing device, we unleash the potential of data to

URBAN AI SOLUTIONS

Urban AI Solutions is a forward-thinking technology company focused on harnessing the power of artificial intelligence to accelerate digital transformation across multiple industries. Specializing in AI acceleration tools and workload orchestration for edge, data centers, and PCs, the company provides advanced solutions that optimize GPU, CPU, and network efficiency.

To learn more, visit www.urbanaisolutions.com

TELCONETS

TelcoNets, innovative company designs and develops next gen 5G networking and AI edge computing products to empower businesses expand connectivity and AI applications in all verticals with high reliability, security, and close to real time latency.

To learn more, visit www.telconets.com