



Matrikon Flex[™] and Matrikon eFlex[™] OPC UA SDKs

Trusted OPC UA Foundations for Embedded and Enterprise Systems

Overview

The **Matrikon Flex™ SDK** family provides developers and OEMs with complete, production-ready OPC UA connectivity software for everything from embedded devices to full-scale enterprise platforms.



Both SDKs are built on a **shared C++ architecture**, following Matrikon’s “**Server-in-a-Box**” design: the SDKs implement all the heavy OPC UA logic — secure channels, sessions, subscriptions, Pub/Sub, and certificate handling — so developers can focus on application behavior rather than on constructing the underlying OPC UA stack.

Matrikon Flex™ SDK

Used inside **Honeywell Experion DCS, PHD, and Matrikon Data Broker (MDB)** and proven in demanding, continuously running systems.

Matrikon eFlex™ SDK

Applies the same design philosophy to **embedded, RTOS, and bare-metal environments**, providing industrial-grade OPC UA implementation for resource-constrained hardware.

Design Philosophy: “Server-in-a-Box”

Matrikon Flex™ and Matrikon eFlex™

Both SDKs deliver a fully functional OPC UA server framework that can be used as-is or customized as needed.

- Handle communication, secure channels, and message encoding internally
- Manage session and subscription lifecycles
- Integrate certificate-based authentication and encryption
- Provide address-space creation, browsing, and node management APIs
- Implement Pub/Sub (UDP (Matrikon eFlex) or MQTT (Matrikon Flex)) with customer reader and writer groups
- Offer developer APIs for fine-tuning and callbacks

This approach lets teams build **with** OPC UA, not around it, cutting integration time and ensuring consistent, standards-compliant performance from device to enterprise.

Why Matrikon Flex™ and eFlex™?

Production-proven, security-hardened OPC UA SDKs

- **Proven pedigree:** The same core used in **Honeywell Experion, PHD, Matrikon Data Broker**, and others.
- **Secure by design:** Full certificate handling, encryption, and ECC/RSA support.
- **Production-ready:** Validated through OPC Foundation conformance testing; deployed worldwide in shipping products.
- **Long-term stability:** Designed for products that remain in service for years.
- **Consistent codebase:** One architecture from microcontrollers to multi-core servers.
- **Supported lifecycle:** Backed by Matrikon engineering and update roadmap alignment with OPC UA standards.

These SDKs are **built for OEMs shipping industrial products**, not just developers building prototypes.

Feature Breakdown

Matrikon Flex SDK

(Enterprise-class OPC UA SDK)

| Category | Description |
|---------------------|--|
| Primary Use | OEM, gateway, and enterprise software needing full OPC UA stack |
| Architecture | C++ modular design supporting multi-threaded, multi-session environments |
| Protocols | UA-TCP, HTTPS, MQTT, Pub/Sub |
| Security | Full enterprise PKI suite, AES/RSA encryption, out of the box support for OpenSSL, webTLS, and WolfSSL |
| Operating Systems | Windows, Linux, RTOS |
| OPC UA Profiles | Data Access (DA), History Access (HA), Alarms & Conditions (AC) |
| Performance Profile | High scalability, multi-node and multi-client capable |
| Pub/Sub Mode | MQTT and TCP for scalable cloud/enterprise messaging |
| Integration Level | OEM integration into control systems, gateways, data platforms |
| Example Use | Honeywell Experion DCS, PHD, Matrikon Data Broker, other OEM systems |
| Footprint | Moderate (designed for systems with ample RAM/CPU) |

Matrikon eFlex SDK

(Embedded OPC UA SDK)

| Category | Description |
|---------------------------|--|
| Primary Use | Embedded devices, sensors, controllers, and small gateways |
| Architecture | C++ engine with ANSI C API interface for easy C integration |
| Device Profiles Supported | Nano and Micro Embedded Device Server Profiles |
| Protocols | UA-TCP (binary), UADP-UDP (Pub/Sub) |
| OPC UA Profiles | Data Access (DA) – Server only |
| Security | RSA and ECC (Basic256Sha256, ECC P-256) with OpenSSL or WolfSSL. Able to integrate your crypto provider of choice. |
| Operating Systems | Embedded Linux, FreeRTOS, ThreadX, VXworkx, Green Hills, bare-metal |
| Threading | Single-threaded event loop with optional async mode |
| Performance Profile | Deterministic, low latency, optimized callbacks |
| Pub/Sub Mode | UADP over UDP for lightweight, real-time communication |
| Testing & Certification | Passes OPC UA CTT 1.04.11 for Micro Embedded and Data Access Facets |
| Example Use | Smart sensors, edge controllers, compact gateways |
| Typical Footprint | < 250KB RAM (Micro Server Profile, 45 items, ECC security) |

Both SDKs

| Capability | Description |
|--------------------------|---|
| Language Base | C++ |
| Server-in-a-Box Core | Ready-to-run OPC UA server logic for immediate integration |
| Address Space Management | Create folders, variables, methods, and files programmatically |
| Security Framework | Integrated certificate handling and encryption mechanisms |
| Networking | Works with socket-based and block-based TCP/IP stacks (including LwIP) |
| Memory Control | Internal allocator or application-supplied heap with static/dynamic configuration |
| Customization | Developers can modify callbacks and application logic without re-implementing the stack |
| Compliance | Aligned with OPC UA specification 1.04 and embedded profiles |
| Support & Lifecycle | Matrikon engineering support and version alignment with future OPC UA updates |

Deployment Scenarios

Matrikon Flex™ and eFlex™

| Scenario | Recommended SDK | Key Benefit |
|---|-----------------|--|
| Smart sensors, small PLCs, I/O modules, drives, devices | eFlex | OPC UA DA connectivity on tight hardware. (Nano & Micro profiles) |
| Base for OPC UA FX implementations | eFlex | Secure OPC UA PubSub UDP over TSN (via BE. eTSN stack) |
| PLC or embedded controller | eFlex | Real-time performance and secure UA (ECC). UA Server and PubSub UDP) |
| Edge gateway with moderate resources | Flex or eFlex | Select based on available RAM and OS |
| Cloud-connected gateway | Flex | MQTT integration and multi-session support |
| SCADA / MES / enterprise software | Flex | Full OPC UA feature set and scalability |
| UA Client/Server applications | Flex | Supports scalable OPC UA DA, HA, AC profiles |

Go Further:

1. Matrikon Data Broker Integration

Matrikon Flex and eFlex (OEM editions)

Vendors can extend their OPC UA-enabled products into enterprise data architectures using **Matrikon Data Broker (MDB)**.

MDB OEM options allow data routing, contextualization, and management while keeping Flex/eFlex as the trusted OPC UA foundation.

2. OPC UA over TSN Development with BE. eTSN Stack

For developers exploring **OPC UA over Time-Sensitive Networking (TSN)**, Matrikon's **eFlex SDK** provides the foundation for a turnkey integration with the **BE. eTSN stack**.

This combined offering simplifies how OPC UA and TSN are tied together, enabling developers to:

- Build deterministic communication applications based on OPC UA over TSN
- Leverage Matrikon **eFlex Pub/Sub over UDP** for TSN-compliant data exchange
- Start developing high-speed, time-sensitive industrial communication solutions faster

The **Matrikon eFlex + BE. eTSN** integration serves as a practical starting point for organizations exploring **deterministic Ethernet**, **real-time data**, and **future OPC UA Field Exchange (UA FX)** systems.

The Bottom Line

Proven OPC UA Foundations From Edge to Enterprise

| Attribute | Flex™ SDK | eFlex™ SDK |
|-----------------|------------------------------------|--|
| Environment Fit | Enterprise / OEM / Gateways | Embedded / RTOS / Bare metal |
| Footprint | Moderate | Very small (< 250KB RAM) |
| Protocols | TCP, HTTPS, MQTT | TCP, UDP (UADP Pub/Sub) |
| Security | Comprehensive Enterprise PKI Suite | ECC/RSA Embedded Security |
| Use Cases | Servers, gateways, OEM software | Sensors, controllers, edge devices |
| Field Proven | Experion, PHD, MDB | Complements Flex in device tier products |

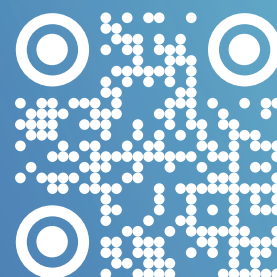
Start Building with Matrikon Flex™ and eFlex™

The reliable OPC UA
foundation for OEMs building
industrial products that last.



Jane.Zhang@HorizonDataTech.com

Suite 1800, 10405-Jasper Avenue
Edmonton, AB, T5J 3N4 Canada



www.matrikonflex.com