

# Blocklet

## Enterprise IoT and Blockchain Convergence at the Edge

Filament's Blocklet™ platform is the first-ever embedded blockchain solution enabling edge devices and enterprise data systems to automate business processes through provable, end-to-end trust. It is the only technology that transacts data to the blockchain starting with the origination of data: at the edge. Blocklet is deployed directly on the embedded devices and machines where information is first generated, providing complete assurance of data integrity and powering transparent value exchange.

### TURNKEY, TRUSTED TRANSACTIONS FOR CONNECTED MACHINES

- Empower IoT edge devices with verifiable credentials
- Securely integrate existing IoT ecosystems with cryptographic DLTs
- Future-proof blockchain platform investments in today's IoT and tomorrow's smart contracts

Connected devices and distributed ledger technologies (DLTs) are rapidly accelerating strategic enterprise initiatives in the race for digital transformation. Gartner estimates blockchain technology innovation will exceed \$3.1 trillion of new business value by 2030.<sup>1</sup> However, early adoption has been slowed by the lack of assurance required to scale smart contracts based on data from the physical world.

Blocklet-enabled devices generate verifiable proof of their integrity, securely creating and processing transactions to multiple enterprise blockchain networks and smart

contracts. These capabilities are unlocking new products and services built on the auditable transparency, scalable automation, and economic underpinnings of distributed ledgers. Without cryptographic proof established at the origin of data, advanced applications such as streamlining business processes with smart contracts, adding on-demand micropayments between machines, and creating intelligent machine learning models become difficult to trust at scale. To fully leverage the power of blockchain for the Internet of Things (IoT), Blocklet now provides the missing link in extending DLTs to trusted transactions at the edge.

## ENTERPRISE IoT TODAY

Today, enterprises build their own infrastructure to support IoT security and functionality, often relying on disparate third-party systems. When coupled with DLT, IoT connectivity can introduce increased complexities, making the combination of the two technologies difficult to use within production environments. Enterprises are left with excessive IT overhead, gaps in security, and loss of context about the origin their IoT data.

Blocklet eliminates the pain points of combining today's IoT and DLT ecosystems by enabling the edge as a new beginning. Blocklet is unlike any other solutions today that send data from the edge through an IoT database, and then to the distributed ledger. Blocklet natively handles all of the critical transaction components required by DLTs, thus uniting data integrity, proof, and process assurance into a single secure process embedded within the device itself.

### IoT + DLT TODAY



IoT and blockchain today leaves a variety of approaches to mitigate security, data validation, and data storage concerns, all of which bring significant costs and scalability challenges.

### IoT + HSM



Hardware Security Modules (HSMs) are used to ensure that data from the IoT device is in fact generated from the device itself. Without securing the source of data, blockchains risk data pollution. However, without native transaction handling, preventing exposure of private keys through cloud or gateway HSMs is costly and limits usability and scalability.

### IoT + BLOCKLET



Blocklet embeds key and DLT transaction management into a secure execution environment within the IoT device itself. By integrating each of the core components into a single secure package, Blocklet removes independent and disparate channels – ensuring data integrity from edge to application.

## TRANSFORMATION WITH BLOCKLET

Built with proprietary and patented capabilities, Blocklet can "production proof" any DLT project, from proof-of-concept through full deployment. Blocklet streamlines workflows, creates an immutable chain of custody and securely executes value transactions, which in turn enables secured and trusted contract systems.

- **Proof:** Attestation at the device, providing data integrity and context
- **Scalability:** Transactions generated at the edge reduce critical bottlenecks in the cloud
- **Security:** Direct signing with hardware protected keys minimizes potential attack vectors

## SAFER, COST EFFECTIVE, AND FLEXIBLE BLOCKCHAIN DEPLOYMENTS

Filament can deliver Blocklet to drive enterprise DLT deployments in any environment.

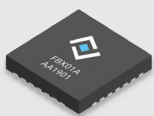
- **Blocklet Chip™:** A patented, 5x5 mm IoT-optimized trusted execution environment (TEE) that can be installed directly onto the board in future IoT designs
- **Blocklet Enclaves:** USB, UART, and vehicle on-board diagnostic (OBD) interfaces enable legacy devices and proof of concept environments to securely execute transactions on a blockchain
- **Blocklet Kit:** A comprehensive set of Blocklet-enabled hardware, software, and resources to build a blockchain-enabled IoT ecosystem
- **Blocklet License:** Blocklet is available for deployment directly into an edge device's existing TEE and Hardware Security Module (HSM)
- **Blocklet for Trusted Vehicle Applications (TVA):** Blocklet-enabled secure and flexible solution designed exclusively for connected vehicles
- **Ledger Support:** Blocklet is blockchain agnostic and able to support any private or public ledger; native DLT support currently includes Ethereum and Hyperledger Fabric

## INDUSTRIES REIMAGINED

Blocklet brings the benefits of blockchain to IoT – pushing intelligence to smart devices, to allow autonomy and new streamlined transaction models. It also eliminates enterprise and industrial IoT attack vectors that would otherwise need to be secured and managed. It is the only solution that provides authenticated and provable data without the extra overhead. With Blocklet, Filament is driving change in the economics of mobility, freight, supply chains, renewable energy, and more.

- **Mobility:** New models for flexible leasing, vehicle tracking, parts provenance, and usage-based insurance
- **Freight:** Streamlined and transparent remanufacturing and fleet management with built-in compliance audits
- **Renewable Energy:** Decentralized, clean energy marketplaces and secure, trusted transactions for renewable energy credits that can be easily automated and distributed between producers and consumers

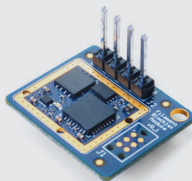
## BLOCKLET-ENABLED DEVICES



CHIP



USB



UART



VEHICLE OBD  
ADAPTOR

Blocklet Feature Comparison	License	Chip	USB	UART	TVA	Third Party HSM and Generic Curve Support	Third Party HSM Only
Non-Retrieveable Private Key	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Secure Memory Operations	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trusted Execution Environment	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Generic DLT Signing	Yes	Yes	Yes	Yes	Yes	Yes	No
Client Configurable Device Permissions and Roles	Yes	Yes	Yes	Yes	Yes	No	No
Native DLT Wallet Management	Yes	Yes	Yes	Yes	Yes	No	No
Native DLT Transaction Forming	Yes	Yes	Yes	Yes	Yes	No	No
Native DLT Signing	Yes	Yes	Yes	Yes	Yes	No	No
Transaction Verification	Yes	Yes	Yes	Yes	Yes	No	No

Blocklet Curve and DLT Support	License	Chip	USB	UART	TVA
Native SECP256 K Curve Support	Yes	Yes	Yes	Yes	Yes
Native SECP256 R1 Curve Support	Yes	Yes	Yes	Yes	Yes
Native SHA 256 Support	Yes	Yes	Yes	Yes	Yes
Native ED25519 Curve Support	Yes	Yes	Yes	Yes	Yes
Native Ethereum Support	Yes	Yes	Yes	Yes	Yes
Fabric Compatibility	Yes	Yes	Yes	Yes	Yes

Accessing Blocklet	License	Chip	USB	UART	TVA
Future IoT Device Designs	Yes	Yes	-	-	-
Today's IoT Solutions	Yes	-	Yes	Yes	Yes
Legacy IoT Device Integration	-	-	Yes	Yes	Yes

From PoC to Production	License	Chip	USB	UART	TVA
Proof of Concept Deployments	-	-	Yes	Yes	Yes
Pilot Deployments	Yes	-	Yes	-	Yes
Production Deployments	Yes	Yes	-	-	-

Blocklet Chip, USB, and UART Specifications	
Core	ARM Cortex-M23, 64 MHz
Trusted Execution Environment	TrustZone® for ARMv8-M
Memory	96 kB RAM, 512 kB ROM
Clock Speed	64 MHz
I/O & Package	32-QFN
Nominal Power	97 µA/MHz (LDO)
Idle Power	36 µA/MHz (LDO)
Standby Power	3.0 µA
Voltage Power	Chip: 1.7V to 3.6V, USB & UART: 5V
Operating Temperature Range	-40°C to +105°C

<sup>1</sup> Forecast: Blockchain Business Value, Worldwide, 2017-2030. Gartner.  
<https://www.gartner.com/guest/purchase/registration?resId=3627117&srcId=1-3478922230>