Mbarx™

Secure IoT Endpoints, Tools And Gateways

Arcturus
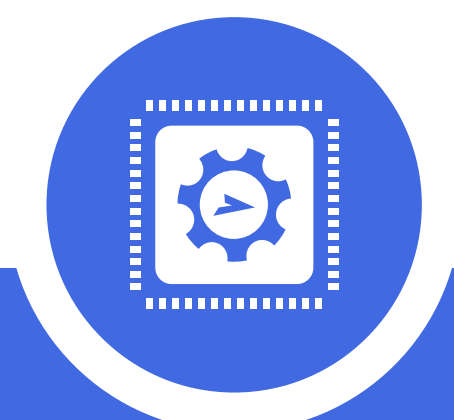We are Edge.

OVERVIEW

Mbarx is an ecosystem of solutions that simplifies the development of secure, end-to-end IoT systems. It consists of embedded software for endpoints, tools and gateways that forms a trust-chain architecture using industry standard TLS cryptography with certificate based authentication.

Mbarx endpoint software is integrated into the OS to provide security, connectivity, configuration, operation, telemetry and firmware management services. It supports a range of IoT devices from simple MCUs running an RTOS to AArch64 Linux systems.
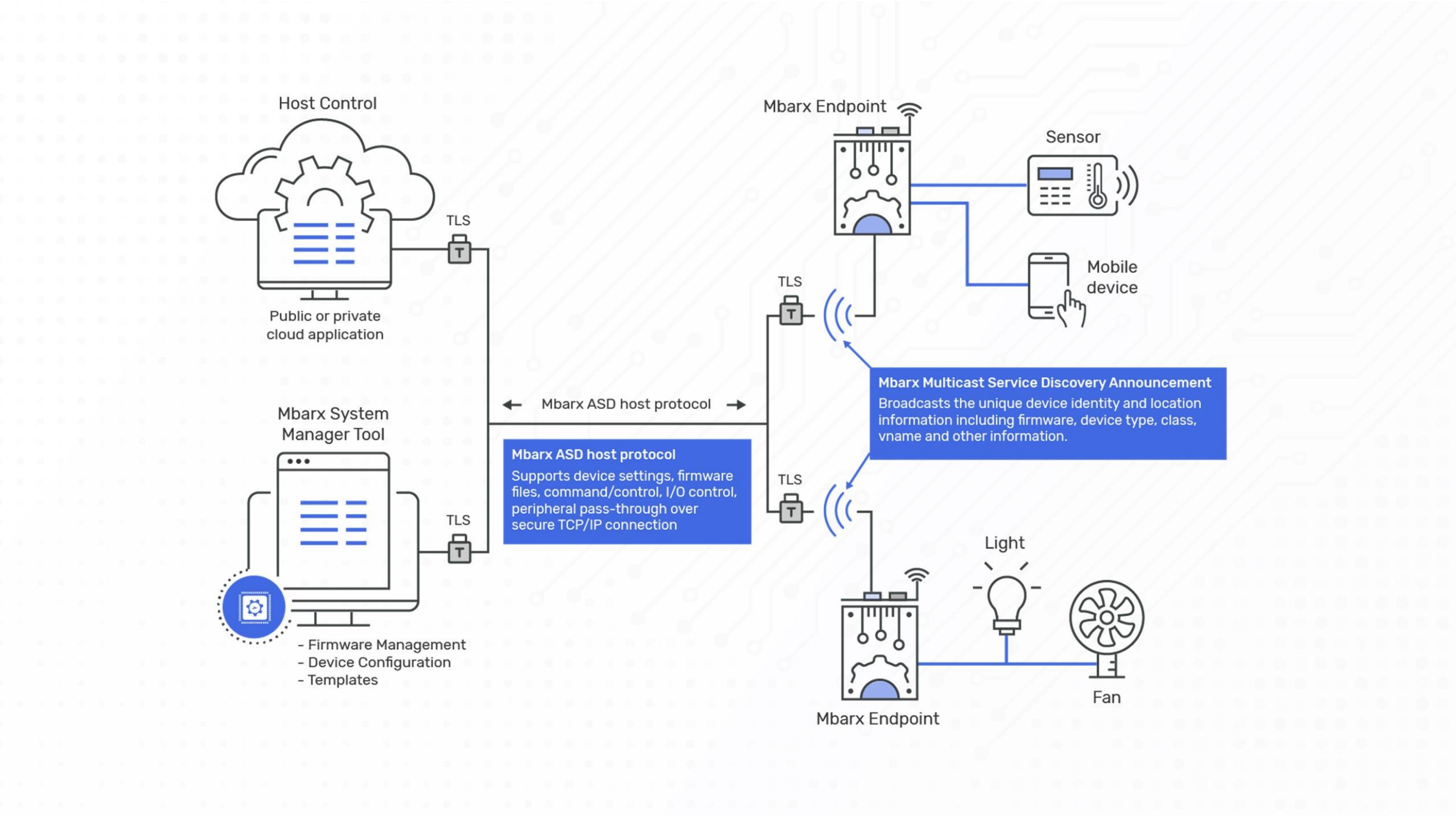
The endpoint software works by using a discovery protocol to broadcast device information and services on the network. This information is used by other endpoints, tools and gateways to securely connect. Once connected, a host protocol is used for configuration, telemetry and real-time operation.

Mbarx tools simplify the management of IoT endpoints. The System Manager tool provides visualization and workflow to manage many local devices concurrently. When combined with Site Controller gateways, System Manager's capability is extended to support remote IoT sites. Other gateway solutions support workflow and automation including the Operations Controller for semi-supervised or user involved operational workflow, notification and automation.

- ✔ END-TO-END IOT SOLUTION

- ✔ TLS, TRUST-CHAIN SECURITY

- ✔ MANAGEMENT, OPERATION, TELEMETRY

- ✔ OTA FIRMWARE UPDATES

- ✔ LOCAL OR REMOTE SITES
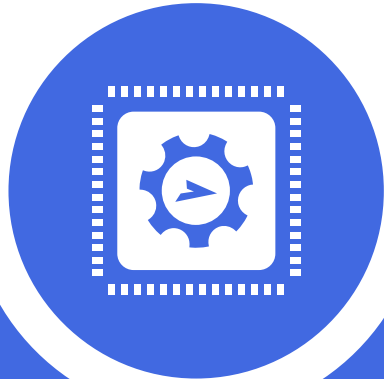
- ✔ WORKFLOW AND AUTOMATION

- ✔ RTOS OR LINUX SUPPORT

Host Control

Public or private
cloud application

TLS

Mbarx System
Manager Tool

- Firmware Management
- Device Configuration
- Templates

TLS

Mbarx ASD host protocol

Mbarx ASD host protocol
Supports device settings, firmware
files, command/control, I/O control,
peripheral pass-through over
secure TCP/IP connection

Mbarx Endpoint

Sensor

Mobile
device

TLS

Mbarx Multicast Service Discovery Announcement
Broadcasts the unique device identity and location
information including firmware, device type, class,
vname and other information.

TLS

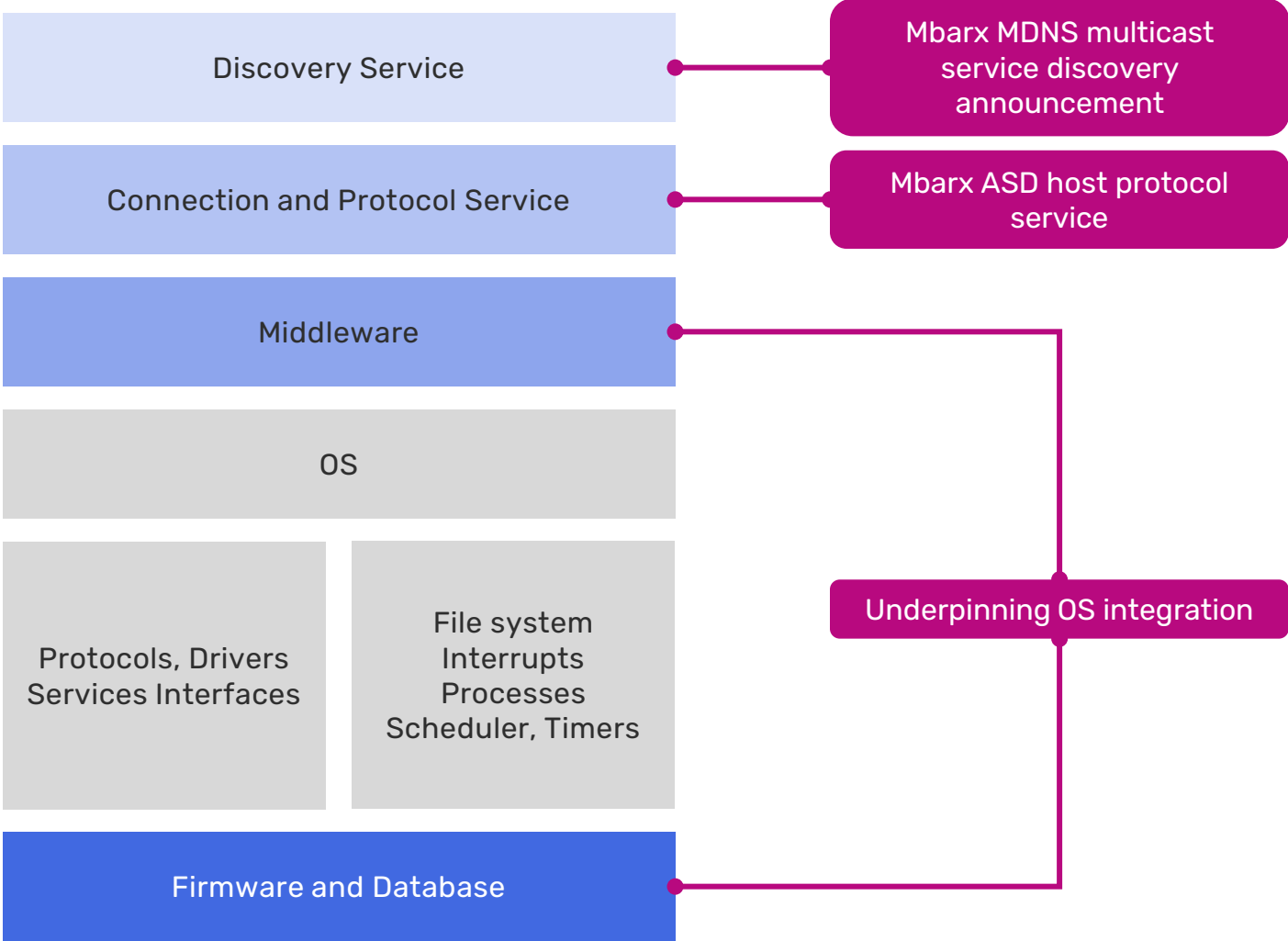Light

Fan

Mbarx Endpoint

ENDPOINTS

The Mbarx endpoint stack consists of two components, an MDNS multicast service discovery announcement and a point-to-point connection. The discovery announcement advertises basic information about the endpoint and the point-to-point connection provides a simple host protocol that can be used for both configuration and operation. The host protocol is available on a TCP/IP (TLS) socket or local UART connection.

| Discovery Service | Mbarx MDNS multicast service discovery announcement |
Connection and Protocol Service	Mbarx ASD host protocol service
Middleware	
OS	
Protocols, Drivers Services Interfaces / File system Interrupts Processes Scheduler, Timers	Underpinning OS integration
Firmware and Database	

Security Architecture and OTA Firmware

Mbarx is built on a foundation of industry standard TLS encryption and certificate based authentication. For firmware rollouts additional enhancements support payload integrity, authenticity and compatibility. This additional layer of protection minimizes threat vectors and improves system resilience. Device specific implementations can further enhance this performance with redundant firmware storage, image failover, flash read lockout, tamper detection and secure boot.
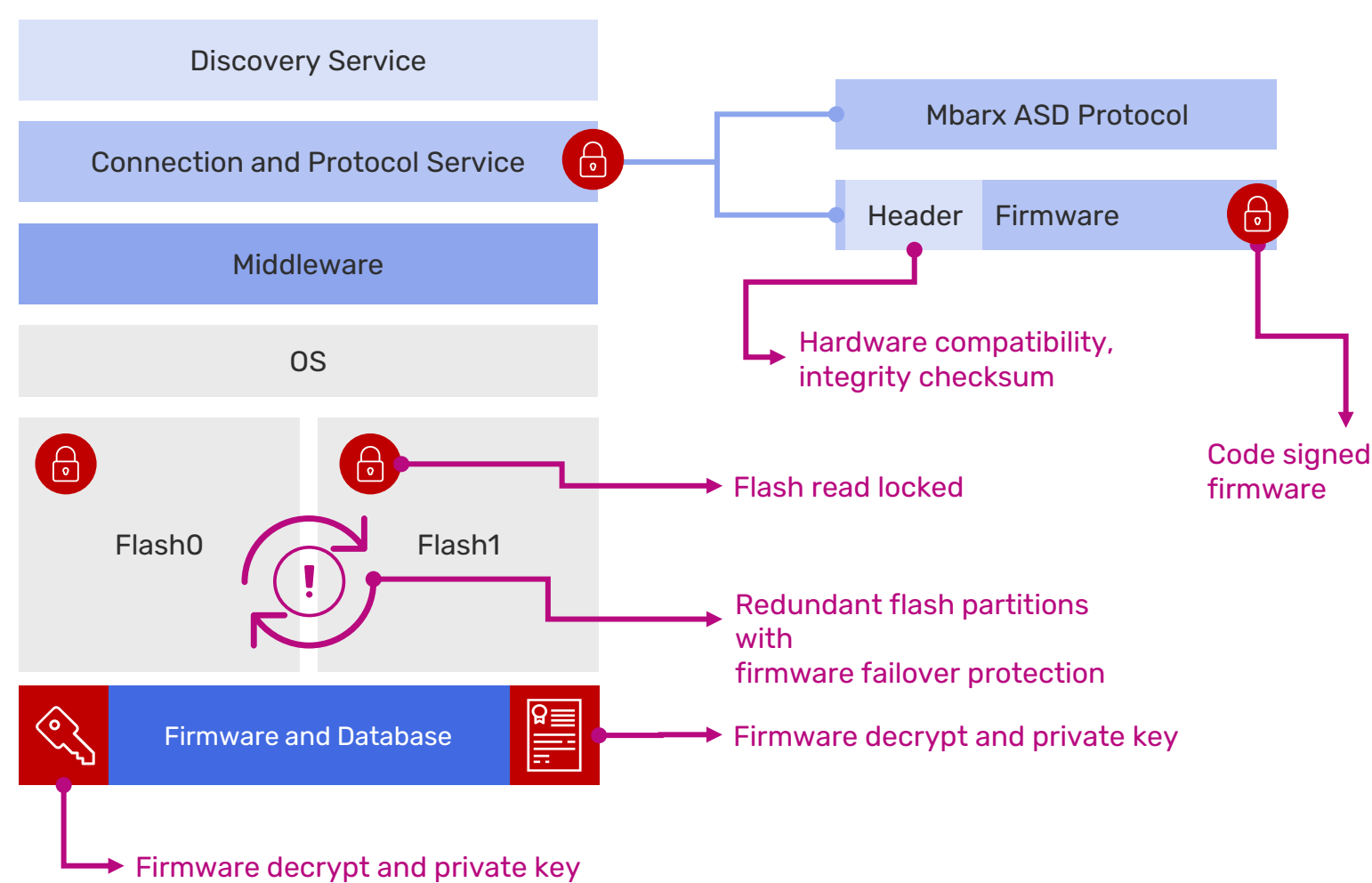

System Manager

Mbarx System Manager is a PC tool that supports the management of many endpoints across a site. System Manager supports bulk templates, firmware upgrade, reset, restore and configuration capabilities. It also features an auto-upgrade service that allows endpoints to "call home" to check for new firmware. System Manager stores firmware in a local repository and connects to a secure cloud store to acquire new firmware from a trusted source. System Manager works with Mbarx gateways, extending capability beyond a local network to manage many IoT sites, from one central location. System Manager is available for Windows® or Mac ®.
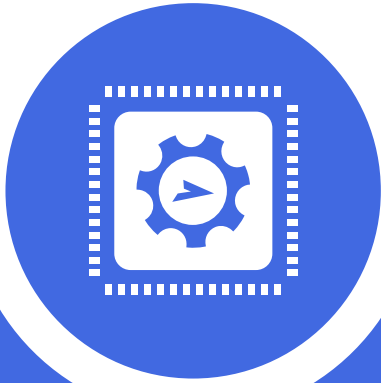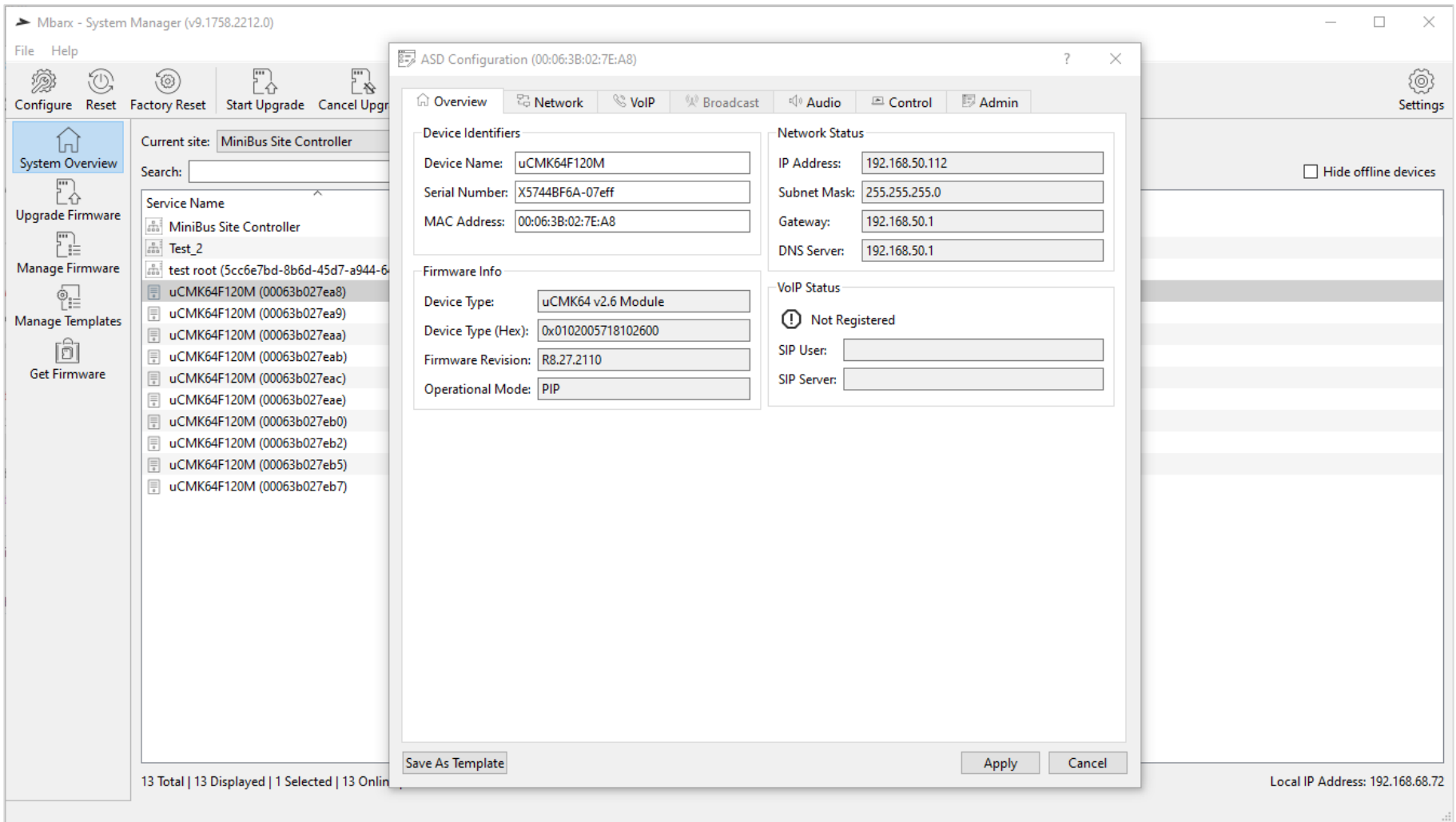
Virtual Control Panel

The Mbarx Virtual Control Panel is a tool to help developers become familiar with the Mbarx ASD protocol. It contains a console interface and various controls to help with workflow experimentation and debug. The Virtual Control Panel is built using Python and QT and is available as a source package for developers that may want to use it as a starting point. The Virtual Control Panel is available for Windows or Mac.
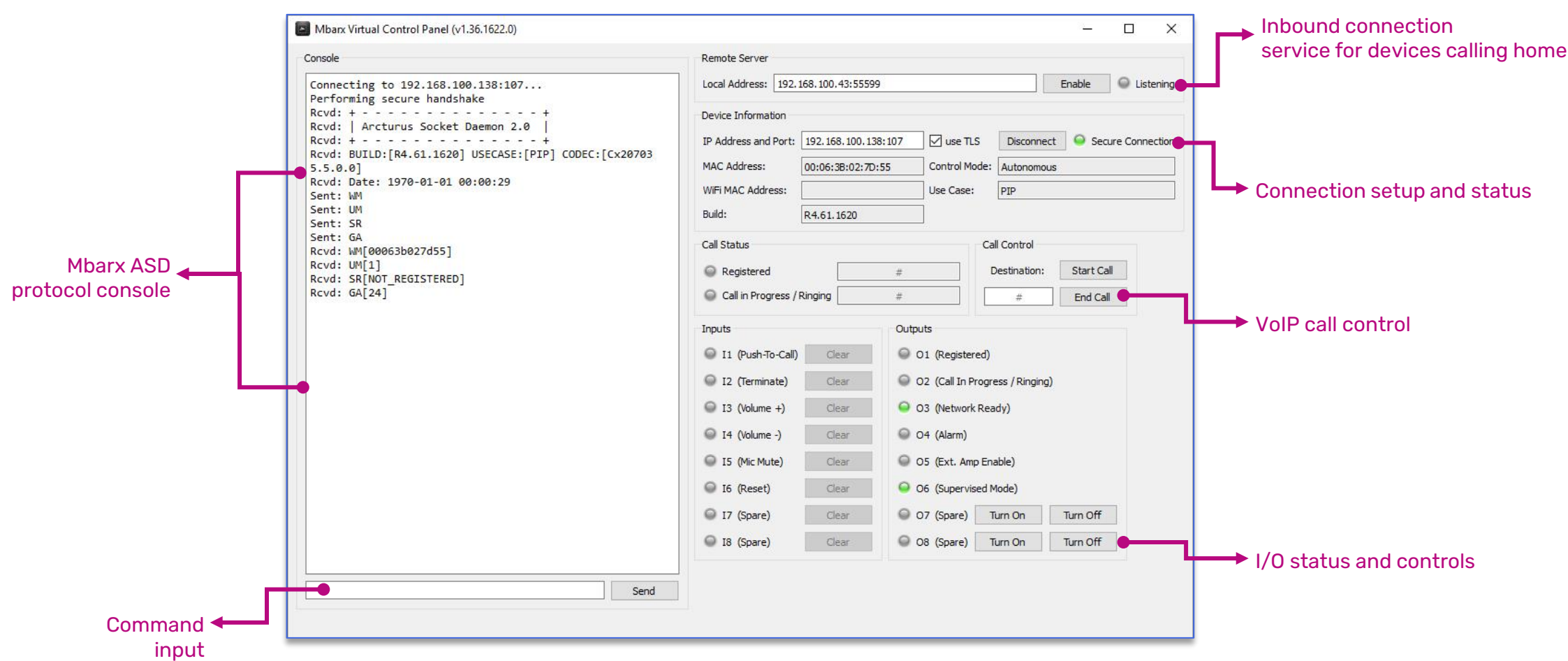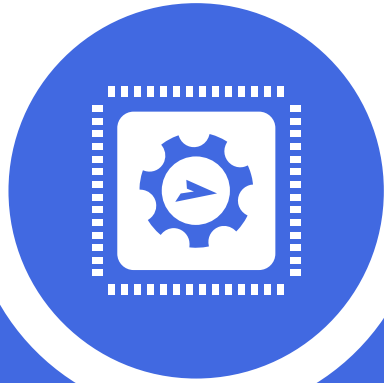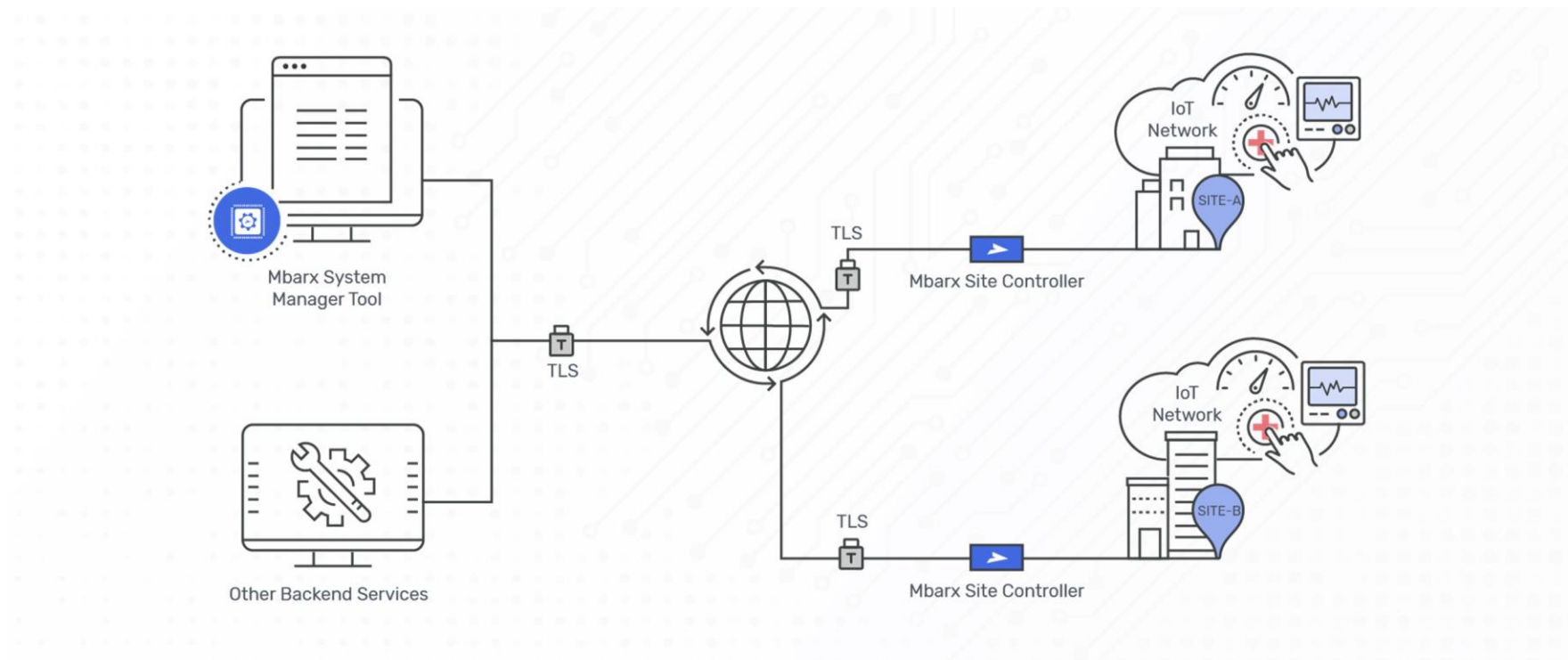

Site Controller

The Site Controller is an Mbarx gateway solution for IoT sites. It resides at the edge or inside a remote IoT network and provides secure access to the site and its endpoints. Site Controllers can be deployed in networks where multiple subnets, NATs or security policy make connectivity difficult. They are compatible with System Manager, making it possible to manage many sites from one central location. Site Controllers can be added or removed easily as needs change.

In addition to connectivity, Site Controllers provide various IoT site services, including the ability to host automated firmware deployments. This approach eliminates the need for devices to egress their home network, reducing bandwidth, attack surface and improving update reliability. The Site Controller firmware upgrade service is qualified to handle 300 concurrent update sessions, using Arcturus IoT Gateway hardware. Site Controllers also provide network services, such as DHCP, NTP and rsyslog server or specialized services, such as voice/PBX, network bridging/bonding, failover or 3G/LTE redundancy.

Access to an online lab provides the opportunity to evaluate the capabilities of Mbarx Site Controller remotely. The demo lab is built into System Manager, allowing users to evaluate the capabilities of Mbarx gateways in a real-world environment.
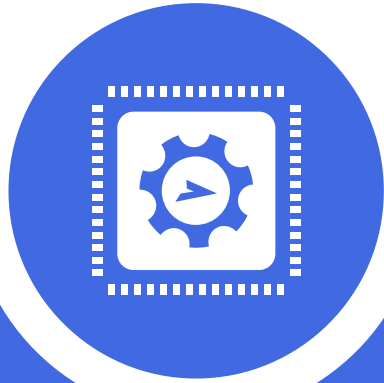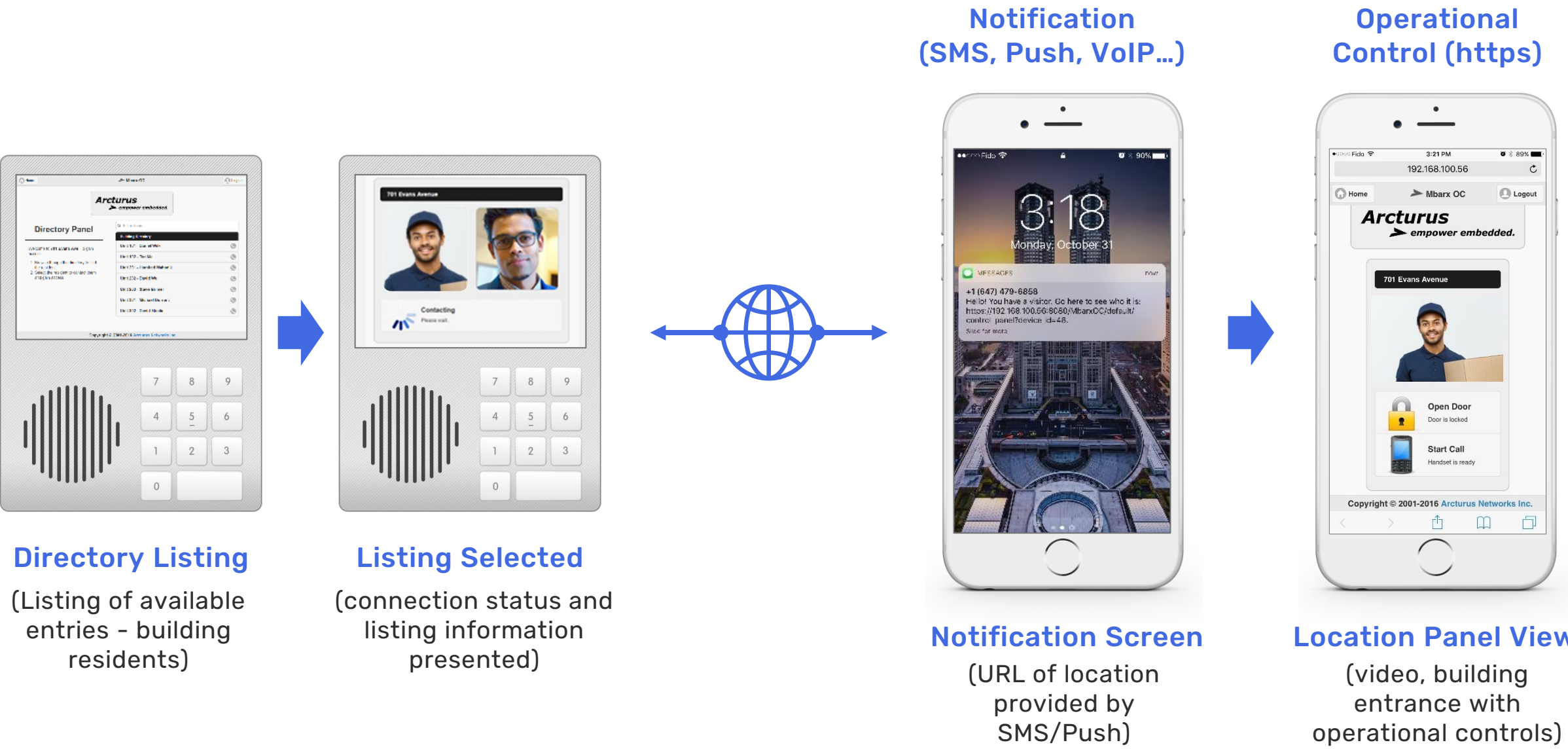
Operations Controller

The Operations Controller is an Mbarx gateway solution for operational workflow and automation. It is suitable for various types of applications where semi-supervised or user-driven workflow is required, including security and access control, nurse call, patient care or intelligent transportation applications. The software implements a location hierarchy, where devices are associated with a location; locations are then grouped form a continuum, such as rooms, floors, buildings etc. A notification system distributes events from locations to subscribed users via Push, SMS, VoIP, or other methods. The event notification provides access to web-based telemetry and controls for the IoT devices at the location. Controls can include voice, video, actuators, along with other html data objects that can be presented along side. The front-end of the operations controller is web based, making it highly compatible across platforms.

User workflow	Supervisory workflow
Devices → Locations	Groups → Groups Combined
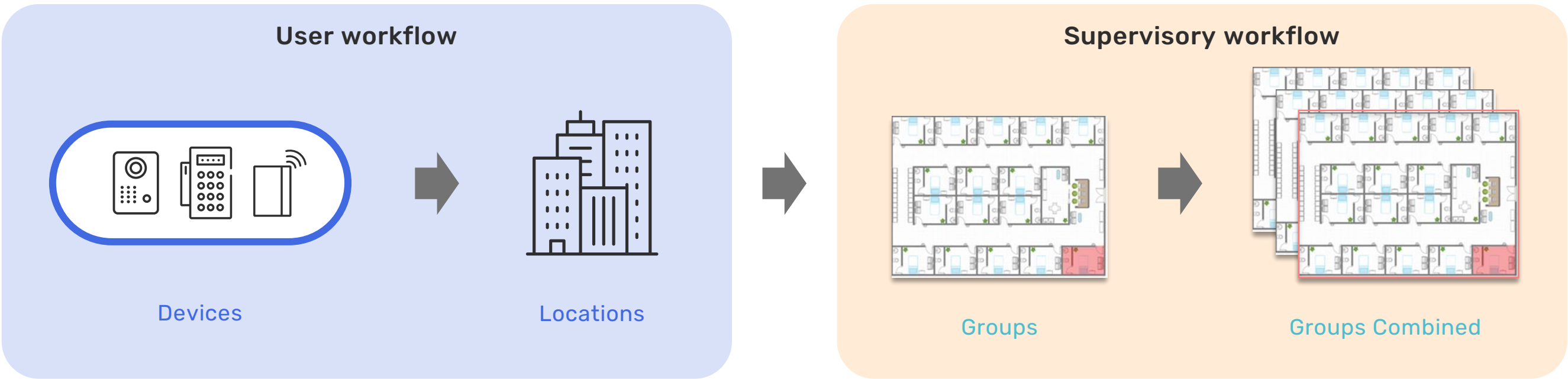
The Operations Controller is suitable for applications such as a multi-tenant building voice/video access control and intercom systems. This provides notifications by voice, SMS or Push making it compatible with smart phones, legacy phones or PCs, without the need to install an app. Tenants use their tablet, phone or PC for two way voice, video or to unlock the door lock actuator.

**Notification
(SMS, Push, VoIP...)**

**Operational
Control (https)**

Directory Listing
(Listing of available entries - building residents)

Listing Selected
(connection status and listing information presented)

Notification Screen
(URL of location provided by SMS/Push)

Location Panel View
(video, building entrance with operational controls)

SYSTEM SOLUTIONS

System Solutions are engineering-level engagements that combine Arcturus hardware, software and expertise to form turn-key project collaborations. Arcturus provides access to our in-house experts, application architects and hardware designers to help reduce project risk and decrease time-to-market, translating into a lower total cost of ownership. Projects are tailored to specific needs and simple engagement packages help get development moving quickly.

ARCTURUS HARDWARE

Whether you are designing your own chip-down solution or leveraging our boards and modules to accelerate time-to-market, Arcturus offers hardware, services and support to help. We have 100,000's of devices in service and we leverage this expertise to help you.

- Quality - Field failure rates as low as 0.1% / 10,000 units

- Longevity - Product life-cycles in excess of 20+ years

- Time-to-Market - Boards and modules ready to integrate

- Reduced Risk - Hardware and software expertise, support

- Lower Cost of Ownership - Software ready for deployment, reduces development cost

UCMK64-IOT

uCMK64-IoT hardware module is a real-time platform that uses a 32-bit K64 microcontroller from NXP. It comes preloaded with Mbarx Secure IoT software making it ready for deployment out of the box. uCMK64-IoT uses a host protocol for integration and management, it is simple to use with no BSP or code development required. The development kit includes everything you need to get started.
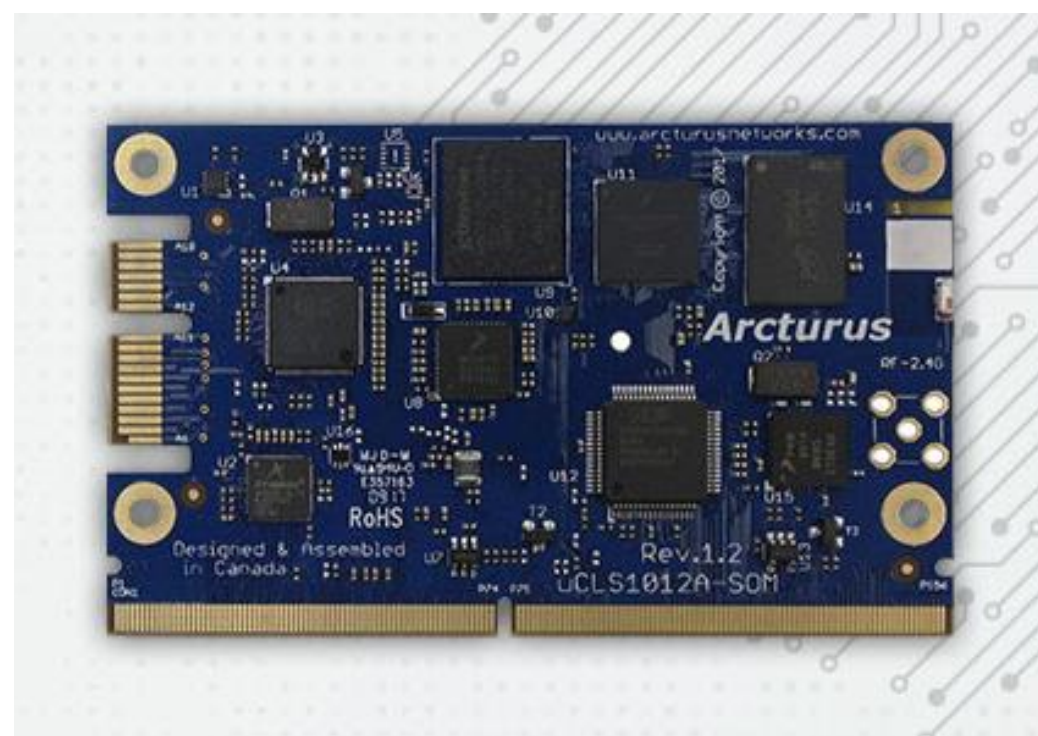
UCLS1012A-IOT

uCLS1012A-IoT hardware module is a Linux based platform that uses a low-power 64-bit Arm v8 LS1012A digital networking processor from NXP. It is ideal for data communications and edge connectivity applications with cloud native Docker runtime. The development kit includes everything you need to get started including a Linux BSP, preloaded Mbarx Secure IoT software with web UI and host protocol.
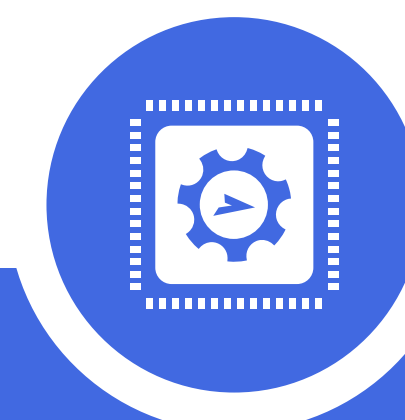
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Arcturus
We are Edge.