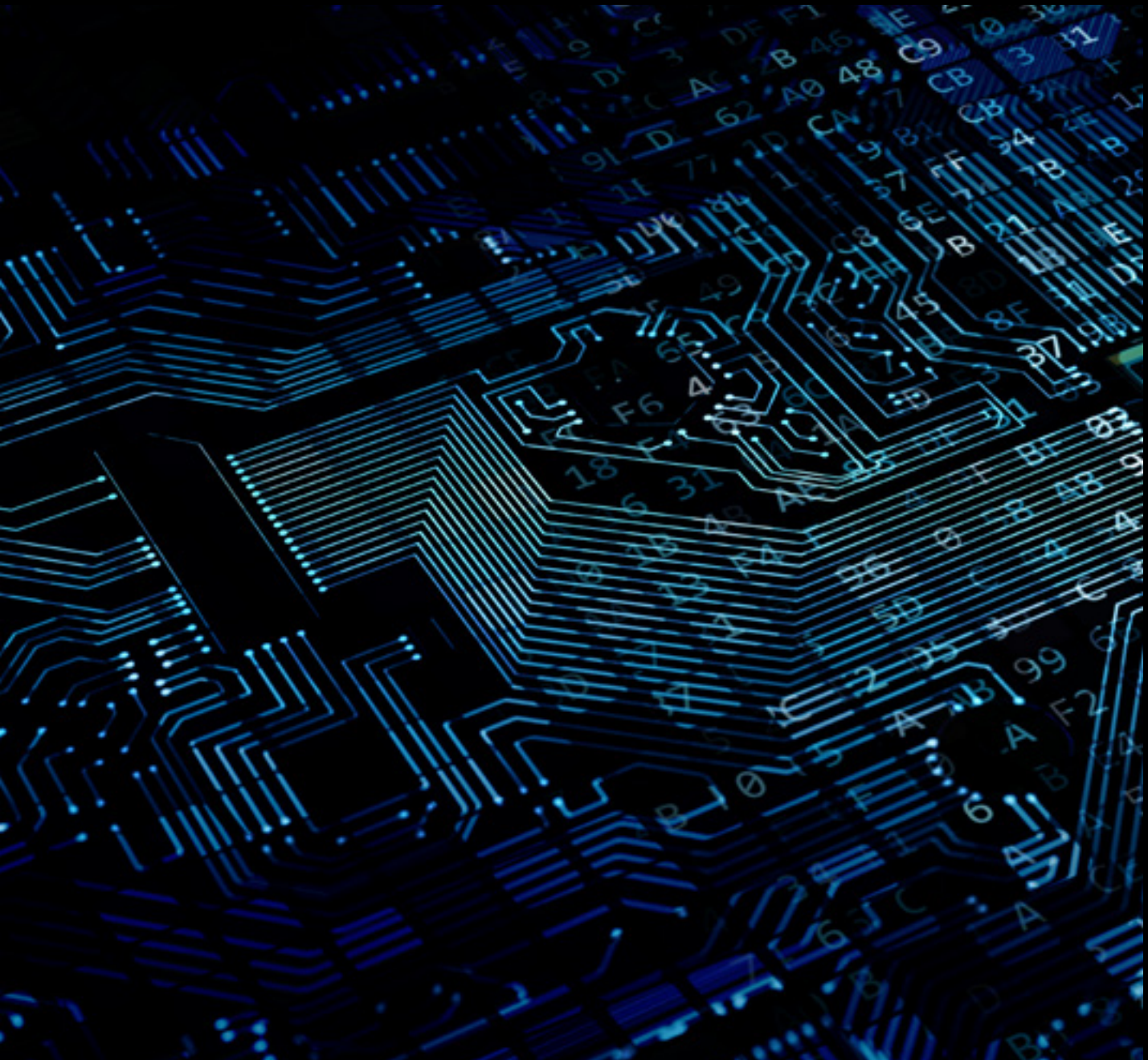# AVSYSTEM

ENABLING LIGHTWEIGHT DEVICE MANAGEMENT IN THE INTERNET OF THINGS ECOSYSTEMS

Product Overview

Anjay LwM2M SDK

Introduction

In the era of the Internet of Things, the challenge that device manufacturers truly need to face is management, configuration and overall maintenance of millions of connected devices.

To answer the industry's need for a low-cost remote management and service enablement mechanism, OMA SpecWorks created a lightweight communication protocol—Lightweight M2M (LwM2M).

As an active member of OMA SpecWorks, AVSystem decided to contribute to the protocol development by providing the most complete, fully developed LwM2M software development kit— Anjay. It is available under the AVSystem-5-clause license for free with the possibility of extending it with paid commercial features.

Lightweight M2M

OMA SpecWorks' Lightweight M2M is a device management protocol designed for sensor networks and the demands of M2M environments. OMA LwM2M addresses similar use cases as other already established M2M protocols such as MQTT or CWMP (TR-069), but it also optimizes bandwidth consumption by using space-efficient binary payloads and introduces support for multiple servers or SMS transport to improve reliability in places where network connection isn't always stable.

OMA LwM2M also establishes robust security requirements—messages exchanged between servers and clients are reliably encrypted using industry-standard DTLS protocol. In case of communicating with multiple servers, access control lists precisely govern which parts of the data model exposed by the device can be managed by which server. All this makes OMA LwM2M a perfect choice for M2M communication in the Internet of Things ecosystem.

Lightweight M2M 1.1.1

LwM2M 1.1.1 introduces new features that improve the LwM2M standard even further. Since some environments benefit from more reliable transports than UDP or SMS, the CoAP over TCP functionality has been implemented in the new version of the standard. TCP as a transport binding is particularly useful for networks with restrictive firewalls.

LwM2M 1.1.1 also incorporates Non-IP Data Delivery in order to expand its reach and empower even more devices. However, new transport bindings are just one of a few new features that, along with other extensions and performance optimizations, make LwM2M 1.1.1 ready to support even more IoT use cases.

Anjay

Anjay is a free and open-source LwM2M SDK that helps vendors of the Internet of Things equipment to quickly and reliably implement support for OMA Lightweight M2M. It can be easily incorporated into the firmware of a device to enable remote management over LwM2M protocol. Anjay is used to create individual LwM2M clients, to enable the communication between M2M devices and M2M servers.

	LwM2M 1.0.2	LwM2M 1.1.1	MQTT
Transport	UDP, SMS	UDP, SMS, TCP, NIDD, LoRaWAN	TCP
Application layer	CoAP	CoAP	
Payload	TLV, JSON, Opaque	TLV, JSON, CBOR, Opaque	Undefined
Data model	Defined	Defined	Undefined
IPv6	YES	YES	YES
Security	DTLS 1.2	TLS, DTLS 1.2+	TLS
Standardization body	OMA, IETF	OMA, IETF	OASIS, ISO
Bandwidth usage	Low	Low	Depends on payload encoding

*The full comparison can be found on www.avsystem.com/products/anjay

Benefits

Make your IoT devices market ready

Use Anjay to implement OMA LwM2M and make your devices ready for the newest challenges in the field of management and monitoring.
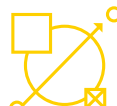
Zero initial cost

Anjay's core technology is available as a free and open-source project—you can start using it with no commitment.

Save your time and effort

Focus on the essentials and instead of implementing the complicated internal logic of the management protocol let Anjay do the job.

Avoid incompatibility

Take advantage of the open nature of the protocol to market your products among different customers.

Anjay architecture

Features

- **Conformance to the latest LwM2M 1.1.1 specification**
  Anjay can be set to support LwM2M 1.1.1 features on top of all core interfaces specified in LwM2M 1.0.2 which allows effortless interoperability with most LwM2M servers on the market.

- **Latest web standards built-in**
  Anjay uses its own internal implementation of CoAP, LwM2M's underlying protocol, including Observe and Block extensions. Anjay implements the core LwM2M protocol and some essential parts of the data model. However, in general, implementation of the concrete data model has to be done by the customer.

- **Runs on any platform**
  Anjay can be compiled for any platform with a standard ISO C compiler. Operating system abstraction layer allows to easily port it, while it works on POSIX-compliant systems out of the box.

- **Robust security**
  Anjay is compliant with all the security requirements of LwM2M, which means strong encryption of network communication and access control lists for multiple server environments.

- **Support for any data model**
  The library is data model agnostic and can be used with any of the standard LwM2M Objects and Resources published by OMA, as well as with any custom data model extensions.

- **Extendable**
  The default version of Anjay can be extended with a variety of options in the form of commercial features:
  - Core Persistence
  - Enrollment over secure transport
  - File System Data Model
  - Hardware Security Module
  - IoT Safe
  - Non-IP data recovery
  - SMS Binding
  - Bootstrapper (smart card bootstrap)

Technical specification of Anjay

Language standards	C99
TLS libraries supported	OpenSSL, mbed TLS
LwM2M interfaces implemented	Bootstrap, Register, Management and Information Reporting
Support for multiple LwM2M Server connections	Yes
Pre-implemented LwM2M objects	Security, Server, Access Control
Underlying protocols implemented	CoAP (RFC 7252) Observing Resources in CoAP (RFC 7641) CoAP Block transfers (RFC 7959) CoAP over TCP, TLS, and WebSockets (RFC 8323)
User guide, full API documentation	Sphinx, Doxygen, code documentation

Commercial options

Anjay is available under the AVSystem-5-clause license for free with the possibility of extending it with paid commercial features.

If you're interested in the server-side solutions for LwM2M, you should check out our Coiote IoT Device Management platform.

About AVSystem

No IoT deployment is successful without proper device management—this is what AVSystem stands for.

As a 16-year-old company, AVSystem is an expert in its field. We help companies around the world deliver better quality of service thanks to our top-class device management solutions. We also focus on WiFi VAS & indoor location as well as other systems for SDN and NFV. Apart from creating software, we actively participate in the standardization process of the LwM2M standard to enable secure device management and service orchestration in the IoT ecosystem. 100+ large companies worldwide prove the superiority of AVSystem's technology.