Data Sheet

AOS Edge Server Router for electricity meters (ESR-M).

The AOS Edge Server Router for electricity meters is the latest in secure edge computing and open wireless communications for smart metering and grid automation.

Plug'n'play with market leading smart meters, the AOS Edge Server Router is an open standards-based, secure edge computing and wireless router card that provides the customer with *communications choice*, without having to compromise on grid modernization and operational communications network technology decisions.

Powered by AOS, the ESR-M allows utilities to choose and deploy the smart metering and grid automation application(s) that best meet their needs, without having to compromise on their grid modernization and communications network decisions. The AOS ESR-M also has integrated Wi-SUN and WiFi radios for field area and premise area networks.

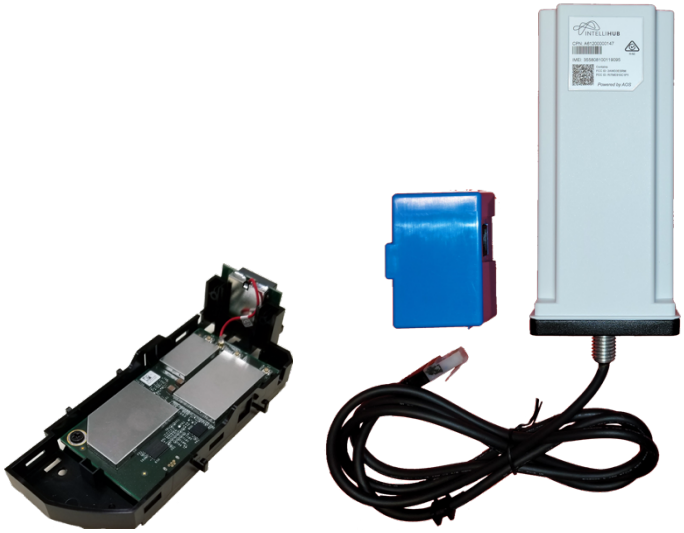
The AOS ESR-M provides hosted applications and local premise devices with secure Internet access, while allowing the ESR-M and its hosted applications to be concurrently managed and controlled over the utility's private IP network.

AOS is a distributed device operating system based on the Linux kernel and other open-source software that is specifically designed to enable secure embedded edge computing and the internetworking of things.

AOS software runs in the cloud, and AOS firmware is available on select modem chip sets. AOS is a Distributed Device Operating System for Things, which is commercially deployed today, at scale, in public and private LTE networks throughout the world; supporting both large and small advance metering and grid automation programs.

At the foundation of AOS is a oneM2M.org compliant Common Services Entity (the AOS CSE). The AOS CSE Server is based on the oneM2M common services entity model, and it provides distributed devices and applications with a common means of strong identity, secure network registration, dynamic discovery, and reliable secure communications with application specified quality-of-service priorities.

Leveraging AOS Device Management Services (based the LwM2M protocol and objects), the AOS ESR-M includes over-the-air lifecycle management support for both device and application firmware upgrades, with digitally signed firmware and application image versioning and automated rollback capabilities. AOS includes an IEEE x.509 CA/PKI Security Framework Service, with remote Registration Authority (RA) and Online Certification Status Protocol (OCSP) Services available on the AOS ESR-M. AOS provides strong identity services and key management utilizing the AOS RA and OCSP services with the Qualcomm® Trusted Execution Environment available on the QTI MDM9xxx LTE chipsets.



AOS Edge Server Router for Meters

The AOS ESR-M's application microcontroller is an ARM Cortex A7, 1.3GHz processor on die in the Qualcomm® MDM9206 modem chip, with integrated 256MB DDR Memory and 512MB Flash Storage.

Standard compliant	Implemented algorithms	NIST CAVS
AES-128/192/256 CBC, ECB, CTR, CCM, and GCM	Encryption, decryption (with message authentication code)	#5046 #5047
SHA-1/224/256/384/512	Hashing	#4114 #4115
HMAC-SHA1/224/256/384/512	Message authentication code	#3369 #3370
RSA with 1024/2048/3072 modulus	Key generation, signature generation (PKCS1.5/PSS), and signature verification (PKCS1.5/PSS)	#2732 #2733
ECDSA with P224, P256, P384, P521	Key generation, signature generation, and signature verification	#1302 #1303
Triple-DES CBC/ECB	Encryption, decryption	#2607 #2608
PBKDF2	Password Based Key Derivation Function	Vendor affirmed

Figure 1 - Qualcomm® Trusted Execution Environment Security Algorithms

Smart Meter Support

The AOS ESR-M is a Linux-based computing platform specifically designed to host embedded software applications. Application segmentation and security is provided through Linux Containers with Rule Based Access Control lists. Application firmware must be digitally signed in order to be loaded into kernel user space. The Aetheros PolicyNet Smart Metering application software is available on the AOS ESR-M in a wide range of market leading smart meter products and form factors.

The AOS Metering Services APIs provide application developers with a simple common interface to advanced electricity metering services, including support for instantaneous and summation reads for power, voltage, current, frequency, kW delivered, kW delivered/received, and quality of supply. Leveraging the OpenFMB Meter Reading Profile protobuf adapter and AOS MQTT client firmware, the AOS ESR-M enables secure low-cost four quadrant metering for near real-time field area communications for advanced distribution use cases like line down, demand response circuit segmentation, to name a few.

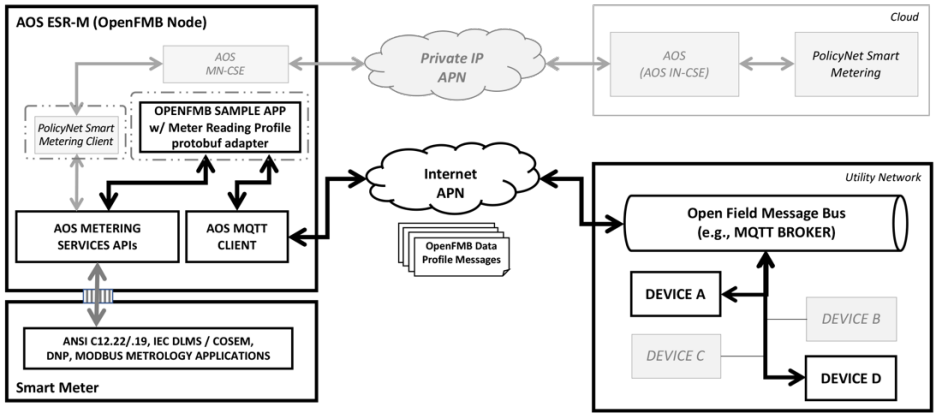
Application processor	Advanced Features and Functions
ARM Cortex A7 @ 1.3GHz	256 MB DDR2 / 512MB NAND
	Linux Containers and Control Groups provide hosted application segregation, and configurable access control to AOS services
	oneM2M CSE RESTful APIs over HDLC, DTLS/CoAP, TLS/MQTT
	ESR-M and Application FOTA Services (LWM2M / oneM2M)
	MQTT Client and Broker Services
	OpenFMB Node Services
	Qualcomm® TEE for Key Generation and Secure File Storage
	Wi-SUN v1.x FAN Border Router (Wi-SUN FAN / LTE WAN)
	Metering Services APIs (ANSI C12, IEC CIM, DNP3, Modbus)
	MU-MIMO WiFi and WiFi Direct (with WPA2 / WPA3 Security)
	IP Traffic Shaping and Quality of Service (IP DiffServ / CMDH)
	IPv6 / IPv4 Access Control Lists, TLS, DTLS and IPSec VPNs
	Split Data Routing (Dual APN – Private IP Network and Internet)

Radio Interfaces	Supported Radio Frequencies	TX Power	Data Rate
LTE Cat M/NB-IoT	LTE Bands: 2, 3, 4, 5, 8, 12, 13, 18, 19, 20, 26, and 28	23 dBm	375 Kbps
Wi-SUN v1.x	902-928 MHz; 915-928MHz	30 dBm	128 Kbps
WiFi 802.11n	2400 MHz	20 dBm	330 Mbps
GPS / GNSS	1575-1610 MHz	-	-

Environmental Conditions	
-20 °C to +60°C	Specified operating range
-30 °C to +70°C	Limit range of operation
-45 °C to +80°C	Storage
up to 95% non-condensing	Humidity

Meter Interfaces	Standard Usage	Data Rates
1 USB Host (2.0)	Meter communications and power supply (external), developer interface	480 Mbps
1 2X Wire UART	ANSI C12.18/.19, ANSI C12.22, and DLMS/COSEM metrology applications	9600-115200 bps
1 2X Wire UART	Waveform Streaming interface (1P, 3P)	1.333K MHz
Multiple GPIO	Meter Event Alarm and Zero Crossing Outage Detection trigger	3.3V Logic

Power	Voltage Ranges Supported	Power Outage Signaling
DC Power	4V to 20V input power	Last Gasp <90 msec



Regulatory, Standard, and Industry Certifications
FCC, GCF, RCM, Verizon, Telstra