5th UCAAT User Conference on Advanced Automated Testing

ETSI

A FLEXIBLE, MULTI-PURPOSE, OPEN SOURCE TEST PLATFORM FOR IOT TESTING

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ERICSSON

MASSIVE IOT

ERICSSON VIEW

CONNECTED DEVICES IN 2022

29 BILLION

7.3 BILLION IN 2016

8,6 BILLION
MOBILE PHONES

3 BILLION IN 2016

3 BILLION
PC/TABLET/LAPTOOP/FIXED PHONES

5.6 BILLION IN 2016

18.1 BILLION
M2M/IOT DEVICES

Source: Ericsson Mobility Report November 2016

Machine to Machine

Connect autonomous **devices** to an application **server**

(device ↔ server)

Internet of Things

Connect autonomous **devices** to each other as well

(device ↔ device)

IOT/M2M COMMUNICATION
- EVOLVING WITH WIDE RANGE OF REQUIREMENTS

MASSIVE IOT

SMART BUILDING

LOGISTICS, TRACKING AND FLEET MANAGEMENT

SMART METER

SMART AGRICULTURE

CAPILLARY NETWORKS

CELLULAR M2M TODAY

- ELECTRICITY METERS
- CONNECTED CARS
- POS TERMINALS
- ETC

CRITICAL IOT

REMOTE HEALTH CARE

TRAFFIC SAFETY & CONTROL

INDUSTRIAL APPLICATION & CONTROL

REMOTE MANUFACTURING, TRAINING, SURGERY

Massive IoT Radio Access

LOW COST, LOW ENERGY
SMALL DATA VOLUMES
MASSIVE NUMBERS

- ~400 million cellular M2M connections today
- Majority over GPRS

4G Evolution & 5G

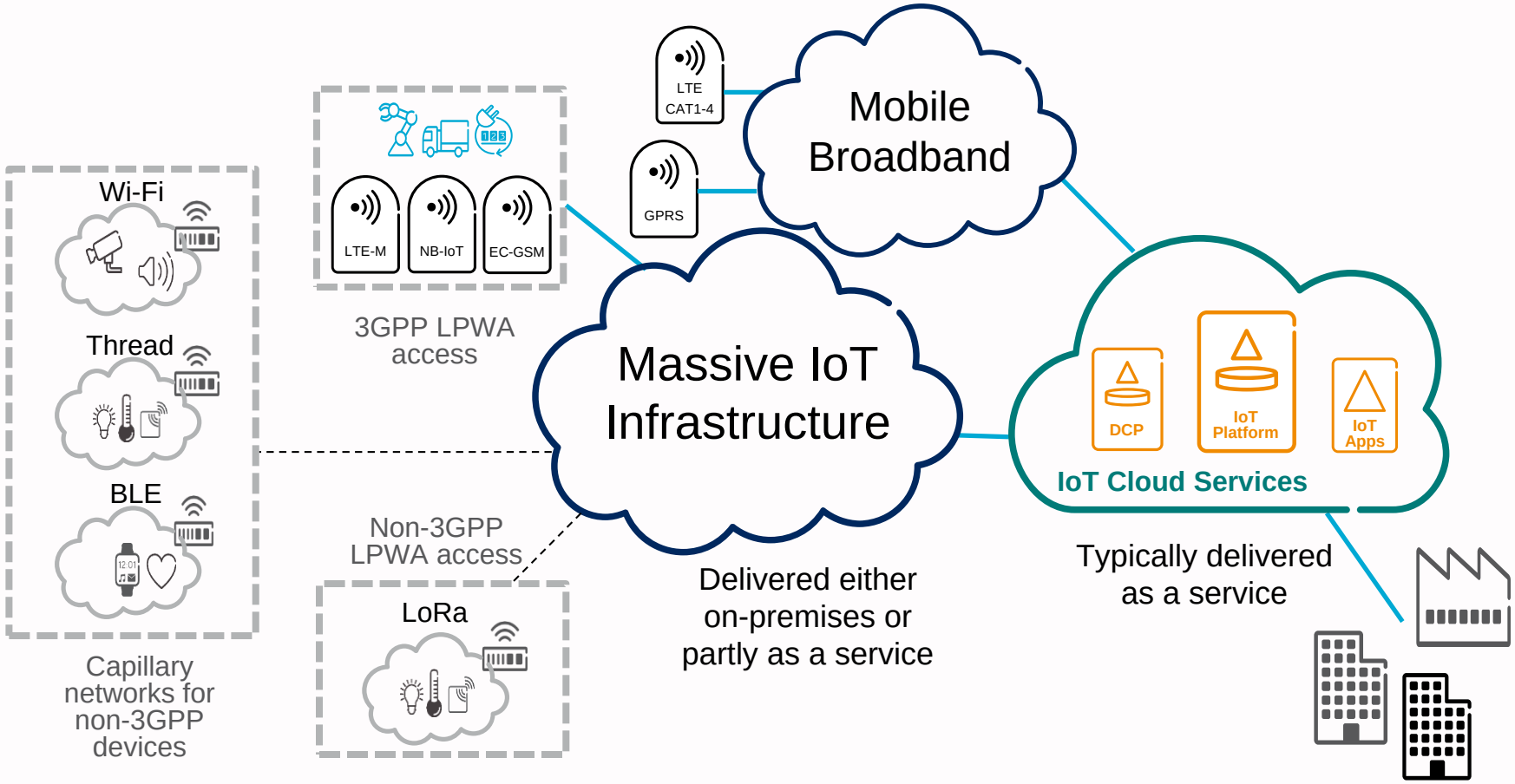
ULTRA RELIABLE
VERY LOW LATENCY
VERY HIGH AVAILABILITY

Cellular for Massive IoT

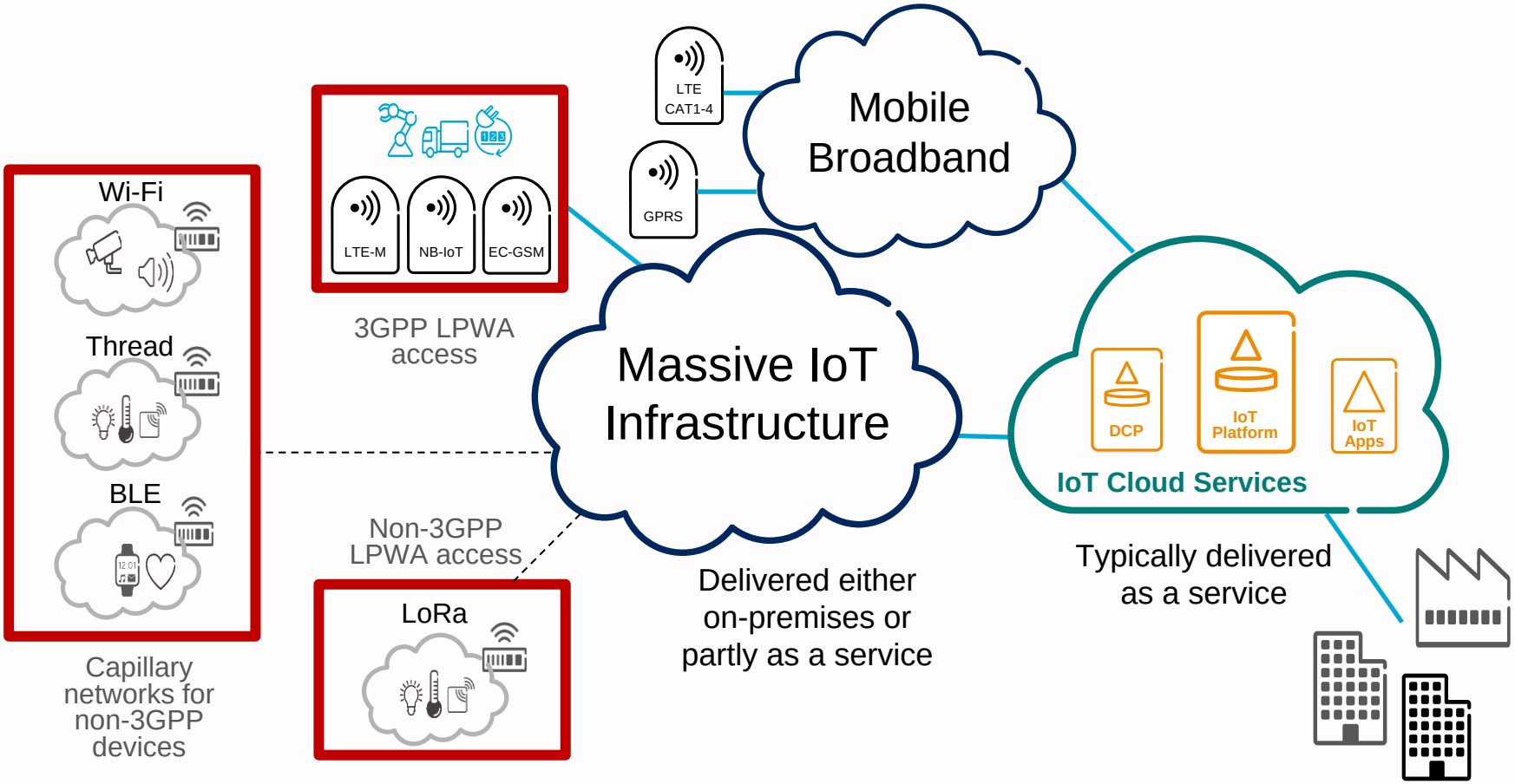
Meeting diversity of use case requirements

	Bandwidth	Coverage	Battery life	Throughput (peak)	Security	Mobility	Deployment
Cat-M1	1.4MHz	160dB (+15dB)	10+ Year	0.8/1 Mbps full duplex		Connected & idle mode mobility	SW
NB-IoT	200kHz	164dB (+20dB)	10+ Year	227/250kbps multi-tone UL		Idle mode mobility	SW
EC-GSM-IoT	600kHz	164dB (+20dB)	10+ Year	473/473k bps		Idle mode mobility	SW

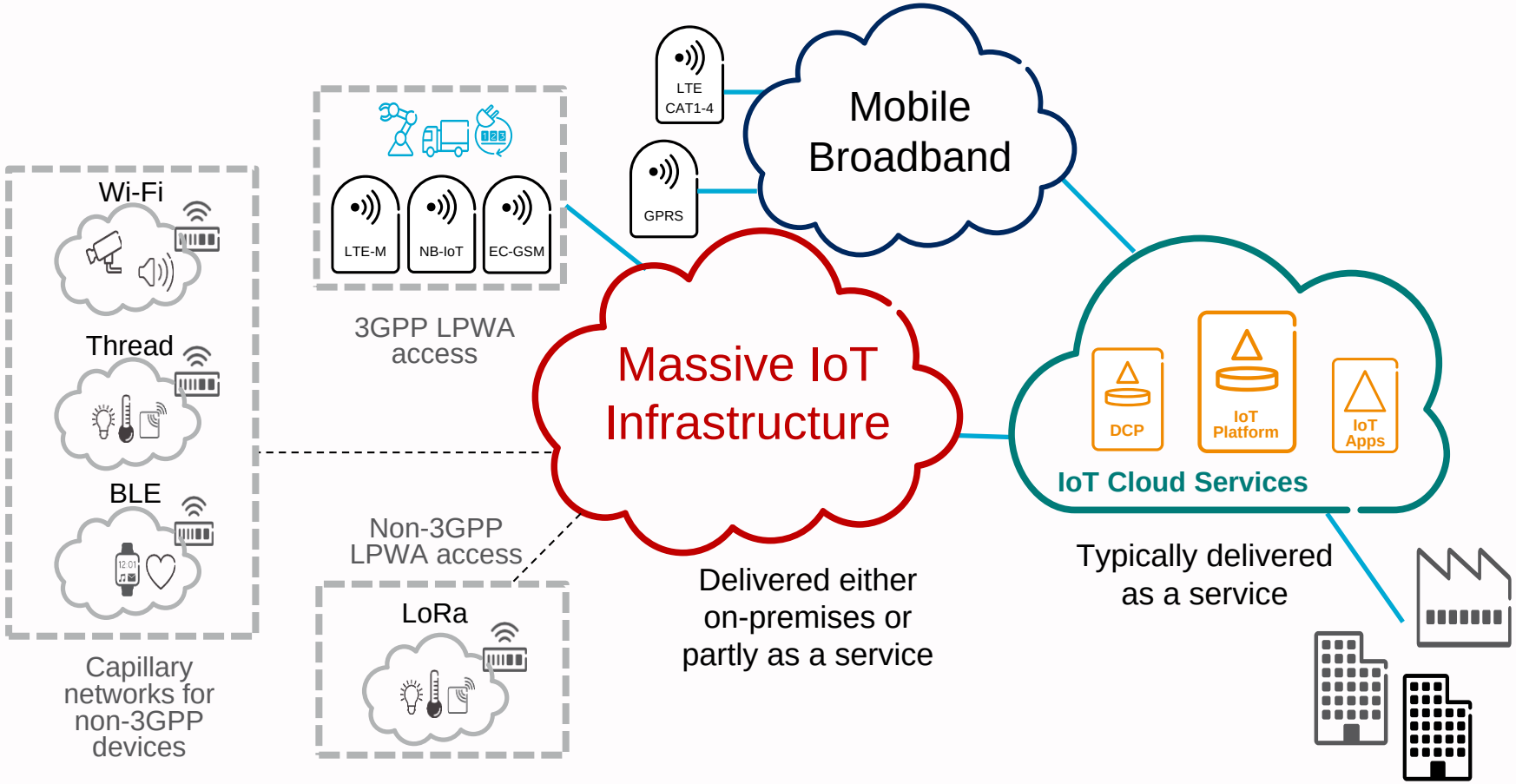
Massive IoT in Ericsson



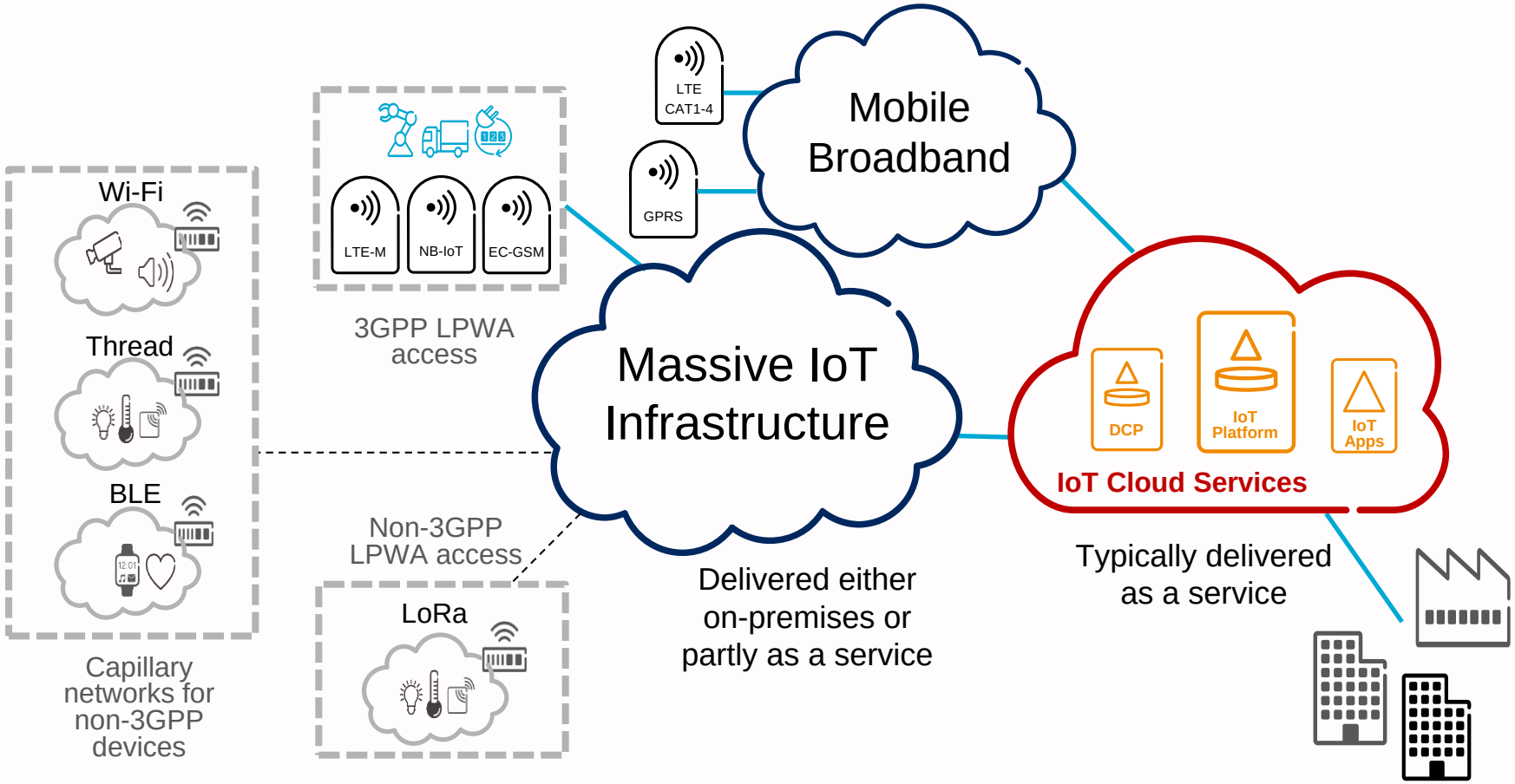
System under test: things



System under test: infrastructure



System under test: platform



Testing challenges

1. Scaling-up to millions of IoT devices with new traffic patterns — CAPACITY, SCALABILITY TESTS
2. IoT traffic may cause disturbances for other mobile subscribers — COEXISTENCE TESTS
3. Diverse set of IoT functionalities and applied technologies — FUNCTIONAL TESTS
4. New security risks — SECURITY TESTS

IOT FUNCTION TESTING

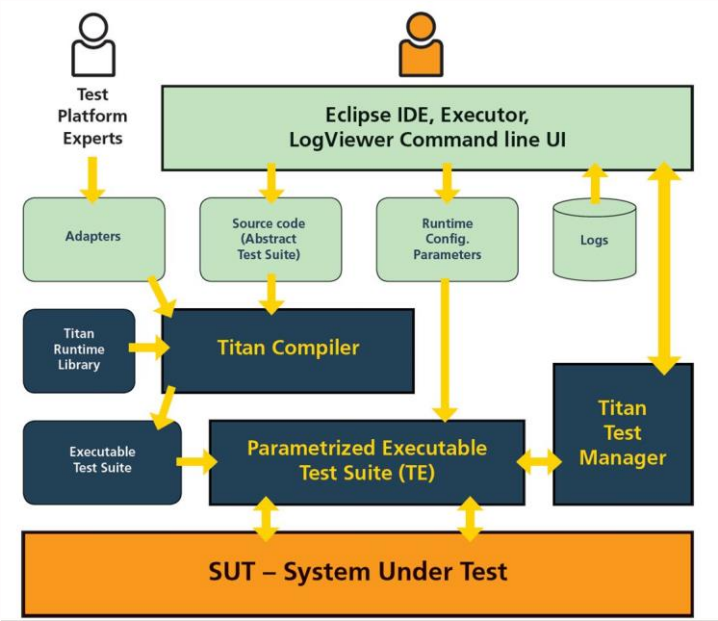
WITH

IoT testing with TITAN

Titan: open-source TTCN-3 test automation framework

- Developed at Ericsson Hungary

https://projects.eclipse.org/projects/tools.titan



Titan supports **IoT protocols**

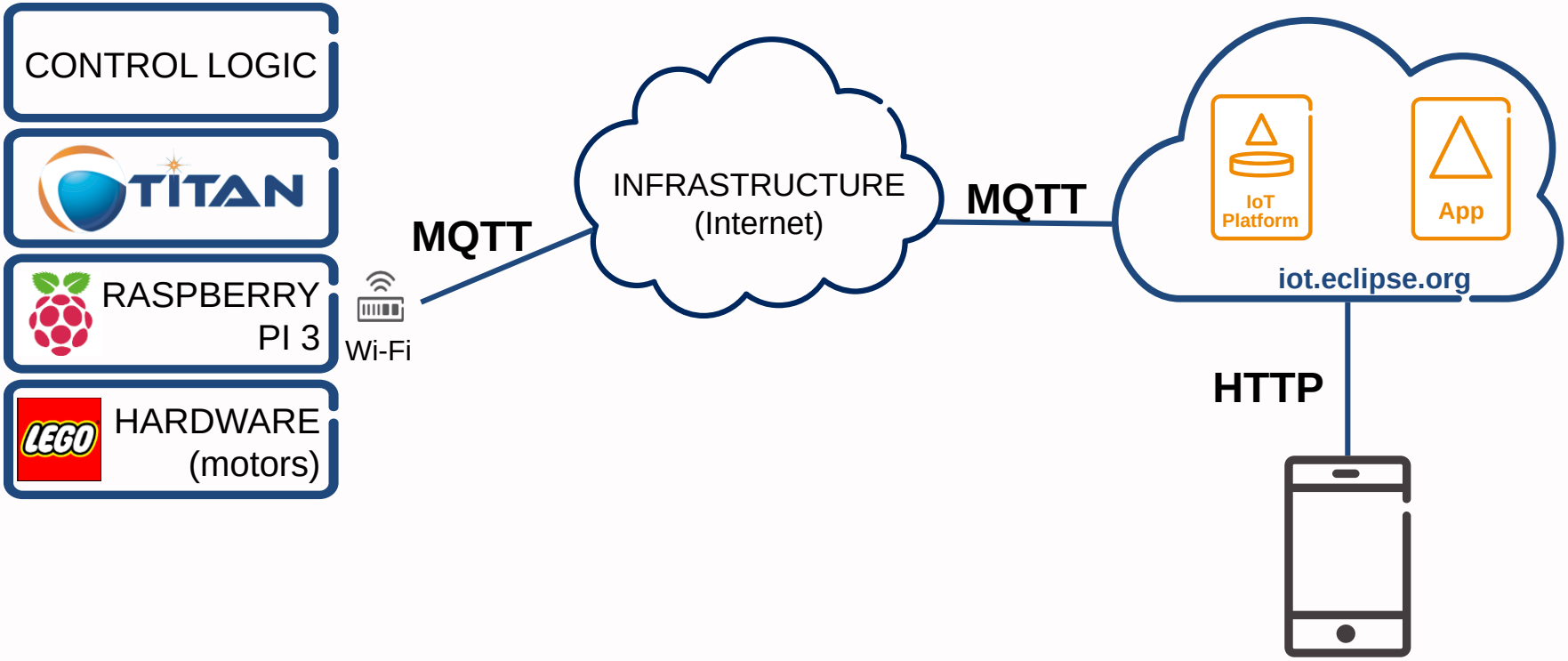
- TCP/HTTP, TCP/MQTT, UDP/DTLS/CoAP, SMS/CoAP …

oneM2M

- global consortium for standardizing IoT common services
- **chosen Titan** as the basis for oneM2M Tester

“Internet of Lego”

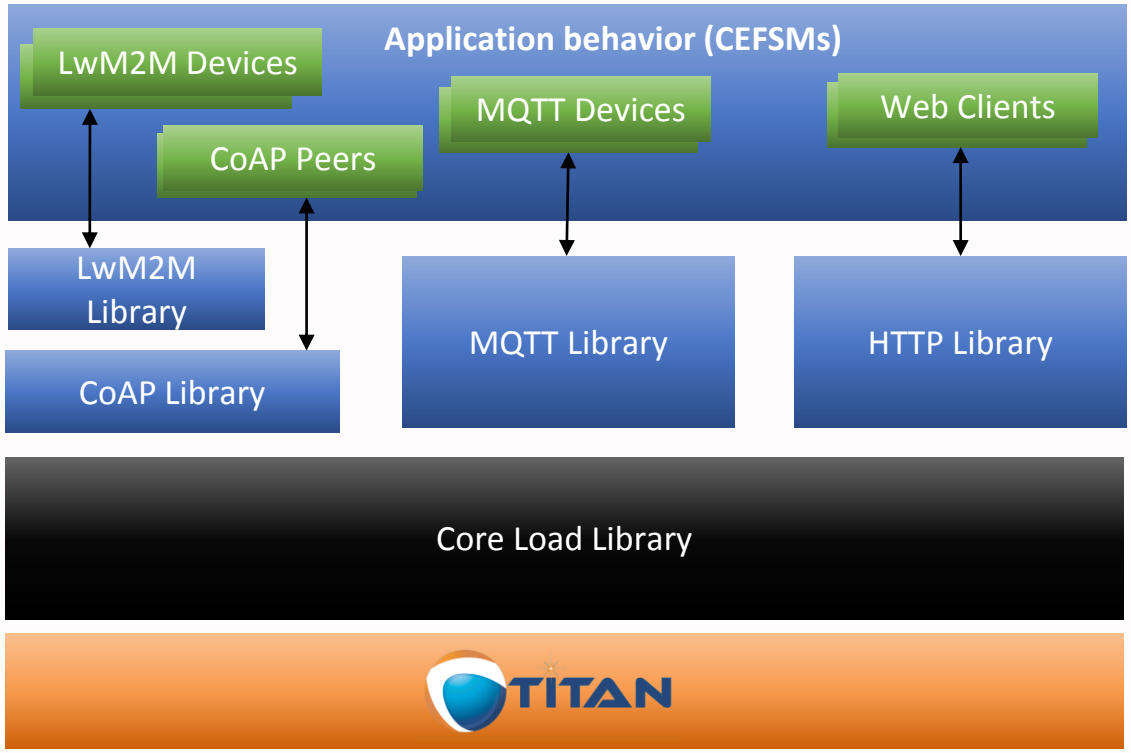
Architecture of Lego truck



IOT TRAFFIC SIMULATION

WITH RIOT

IoT traffic with RIOT (TTCN-3)

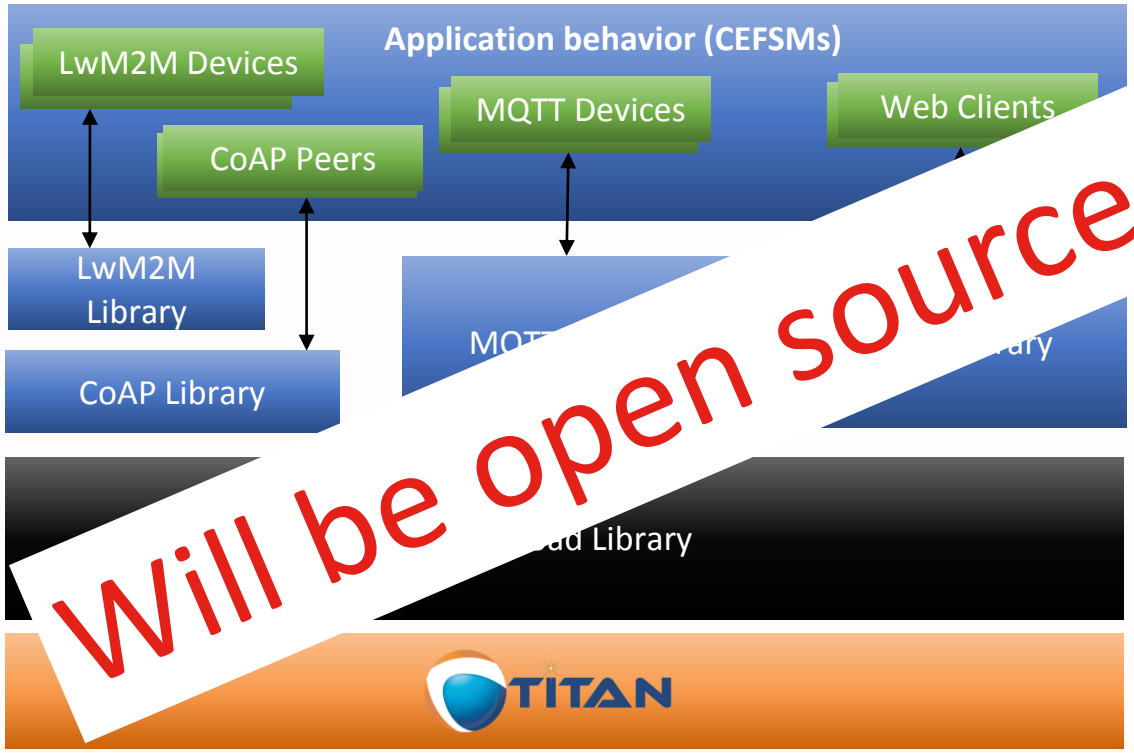


Protocol Stacks
- Finite State Machine based
- Simulating huge number of instances

Protocol Stacks
- Non-blocking functions
- Handling large number of sessions

Core Load Library
- Load generator components
- Resource mgmt.
- Scheduling
- REST API for presentation

IoT traffic with RIOT (TTCN-3)



Will be open sourced soon!

Pro

based
ge number
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Protocol Stacks

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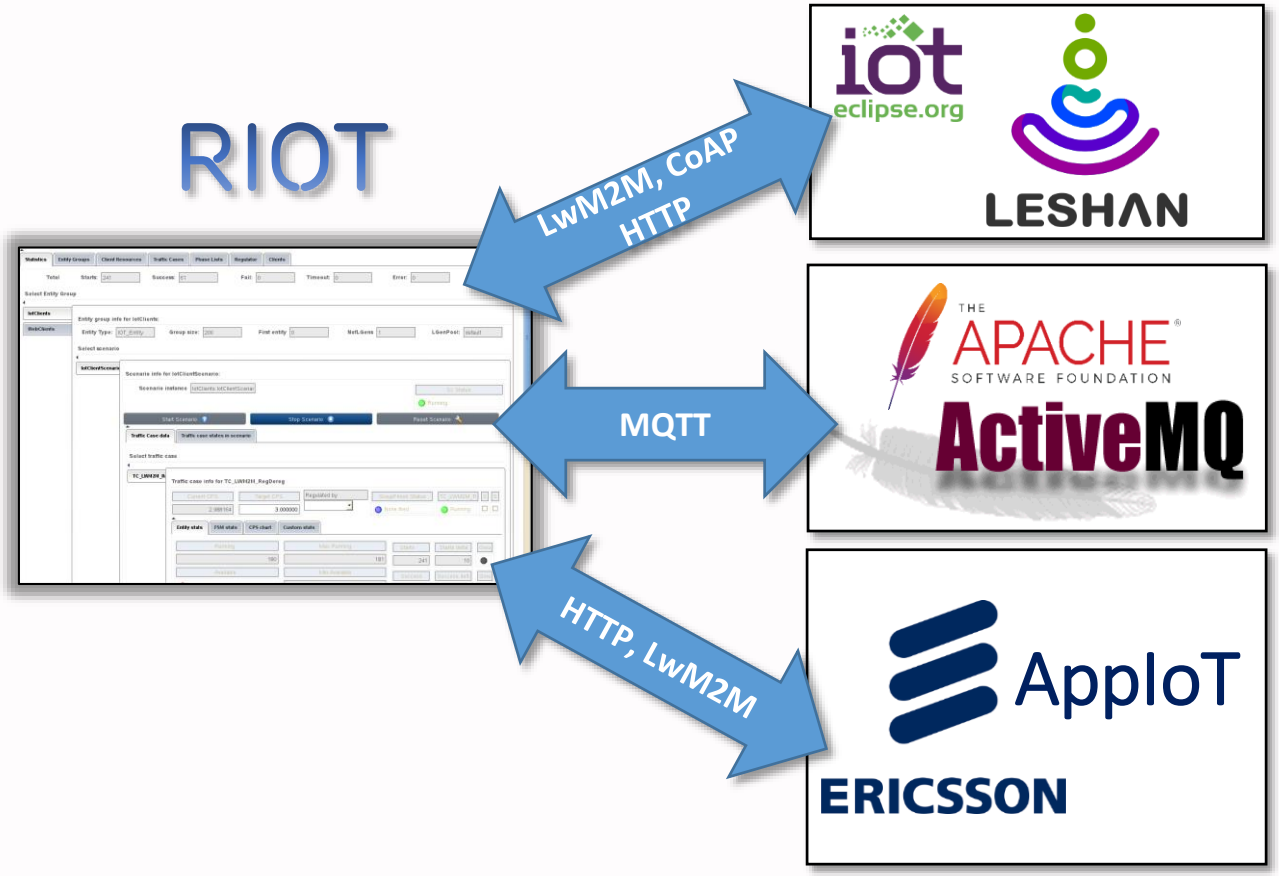
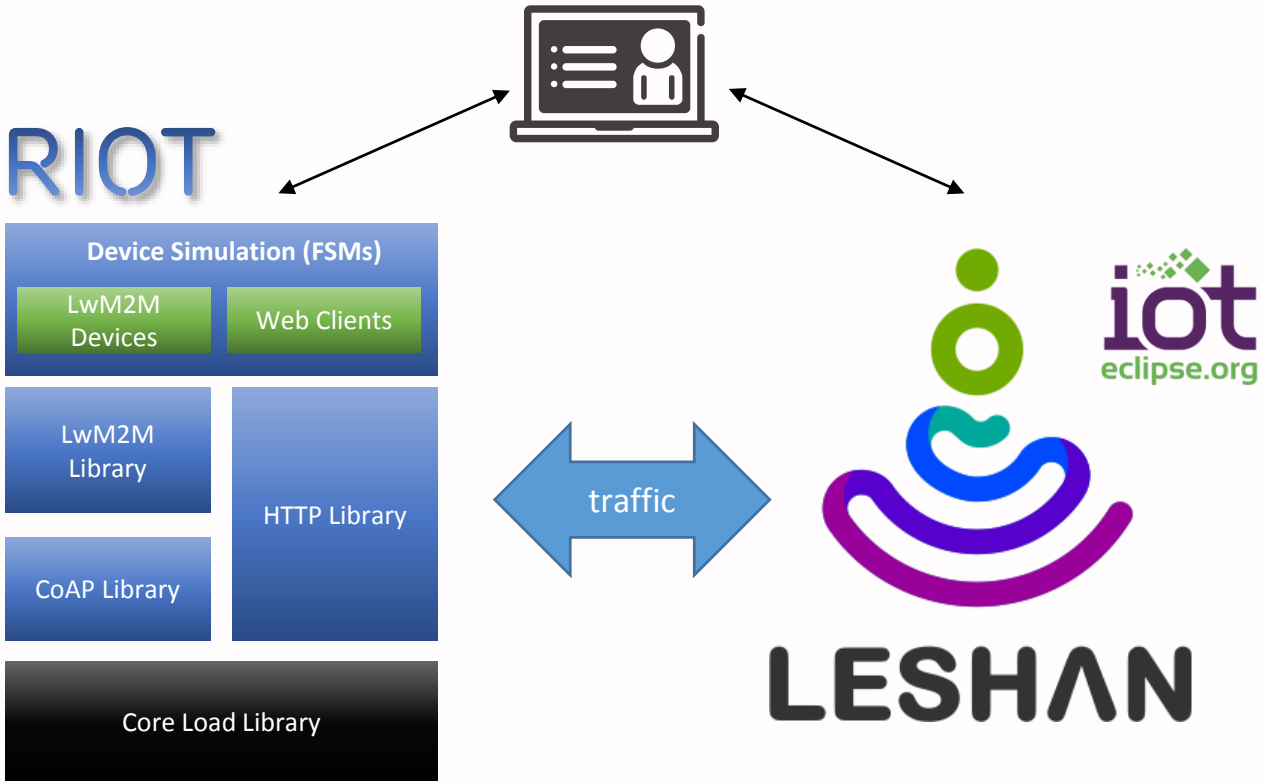
IoT traffic with RIOT



IoT traffic example



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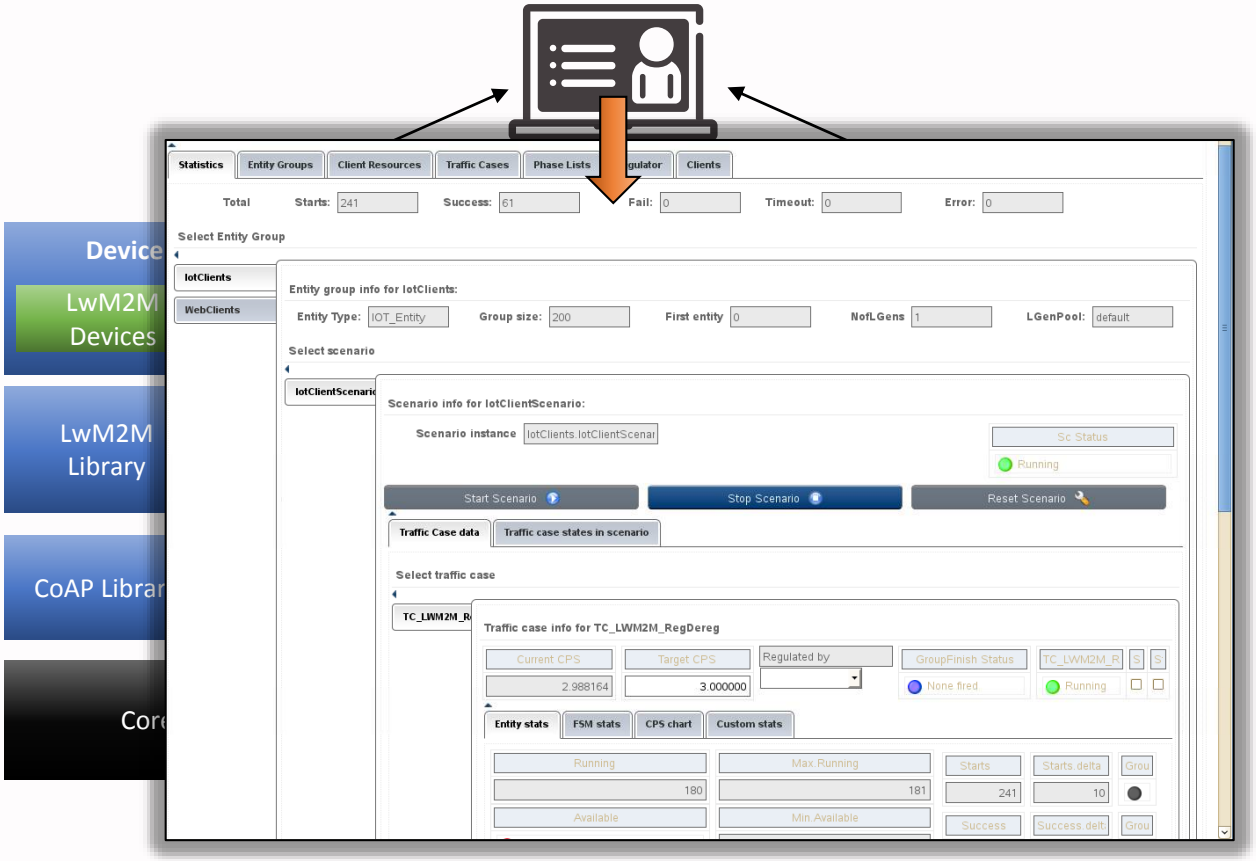

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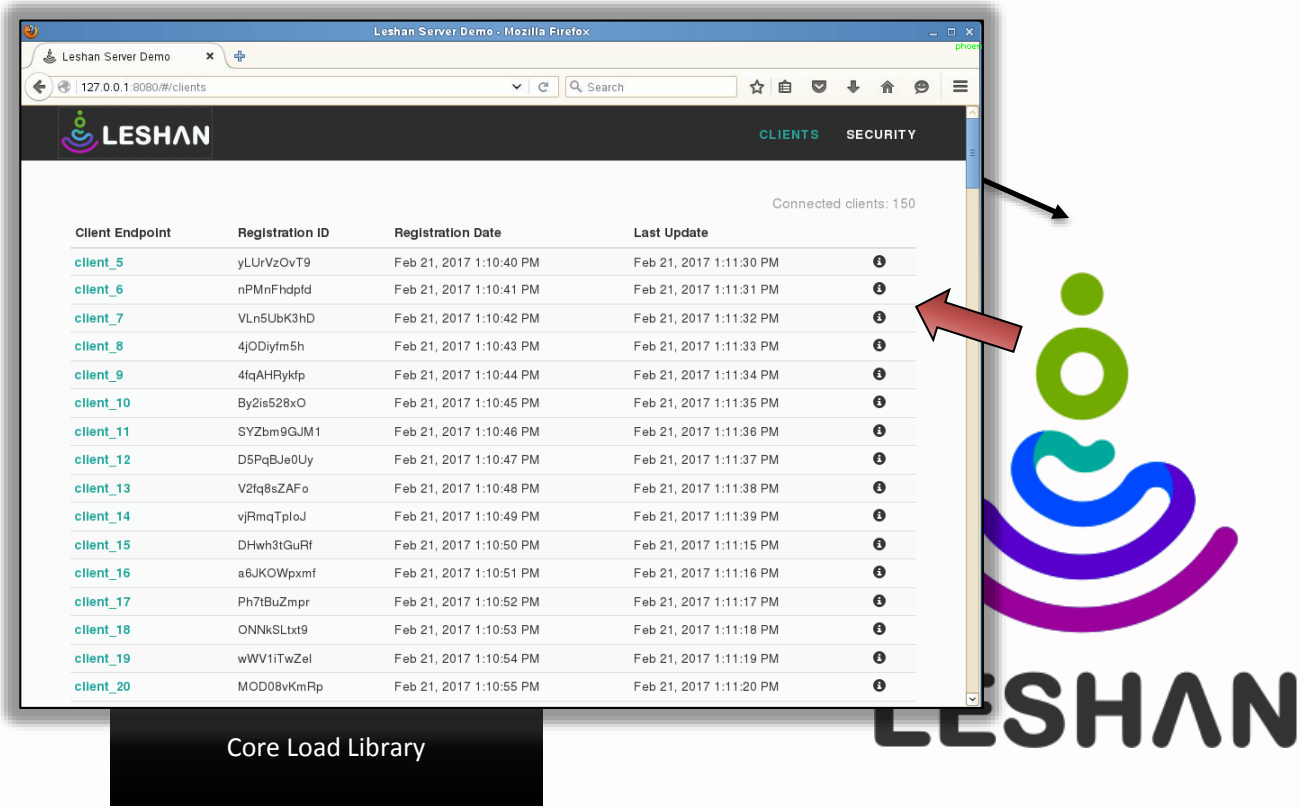
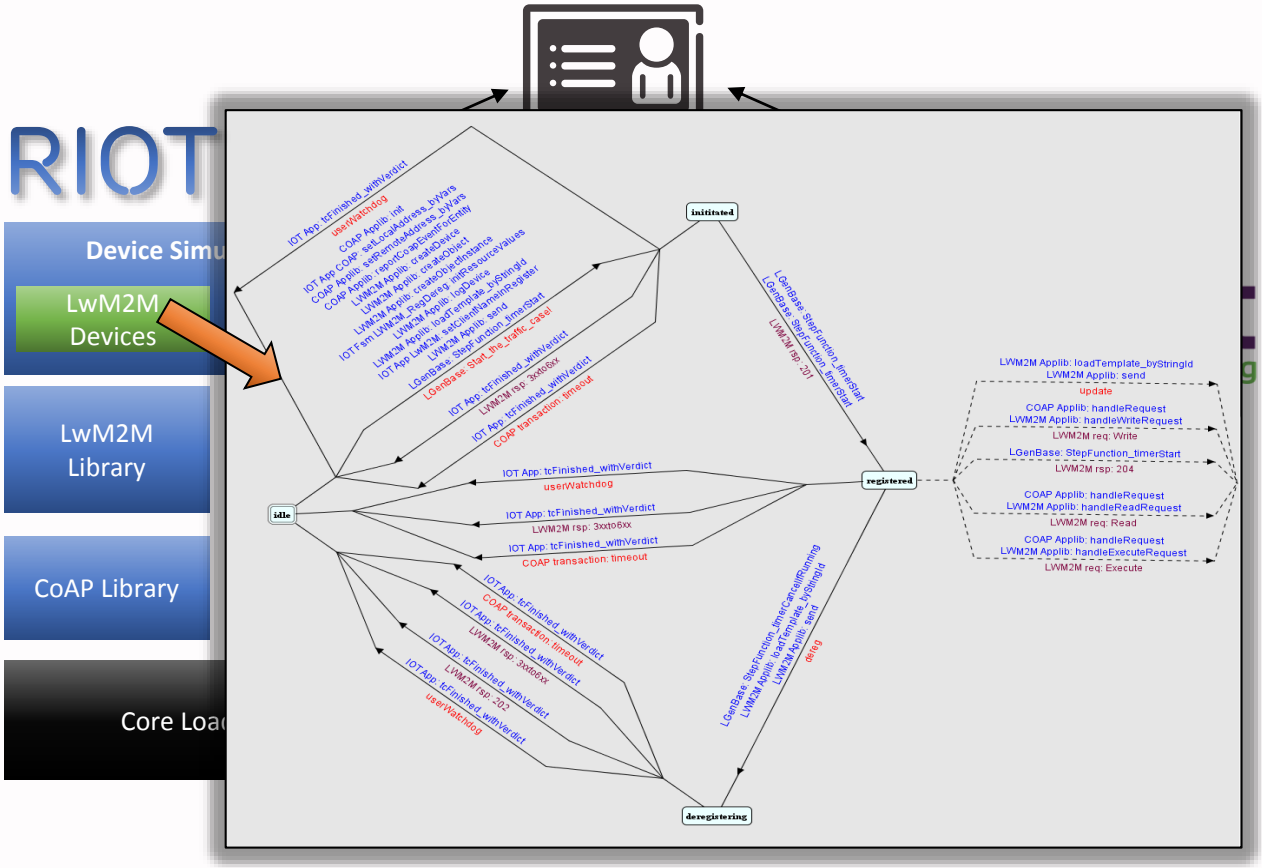


Core Load Library

IoT traffic example



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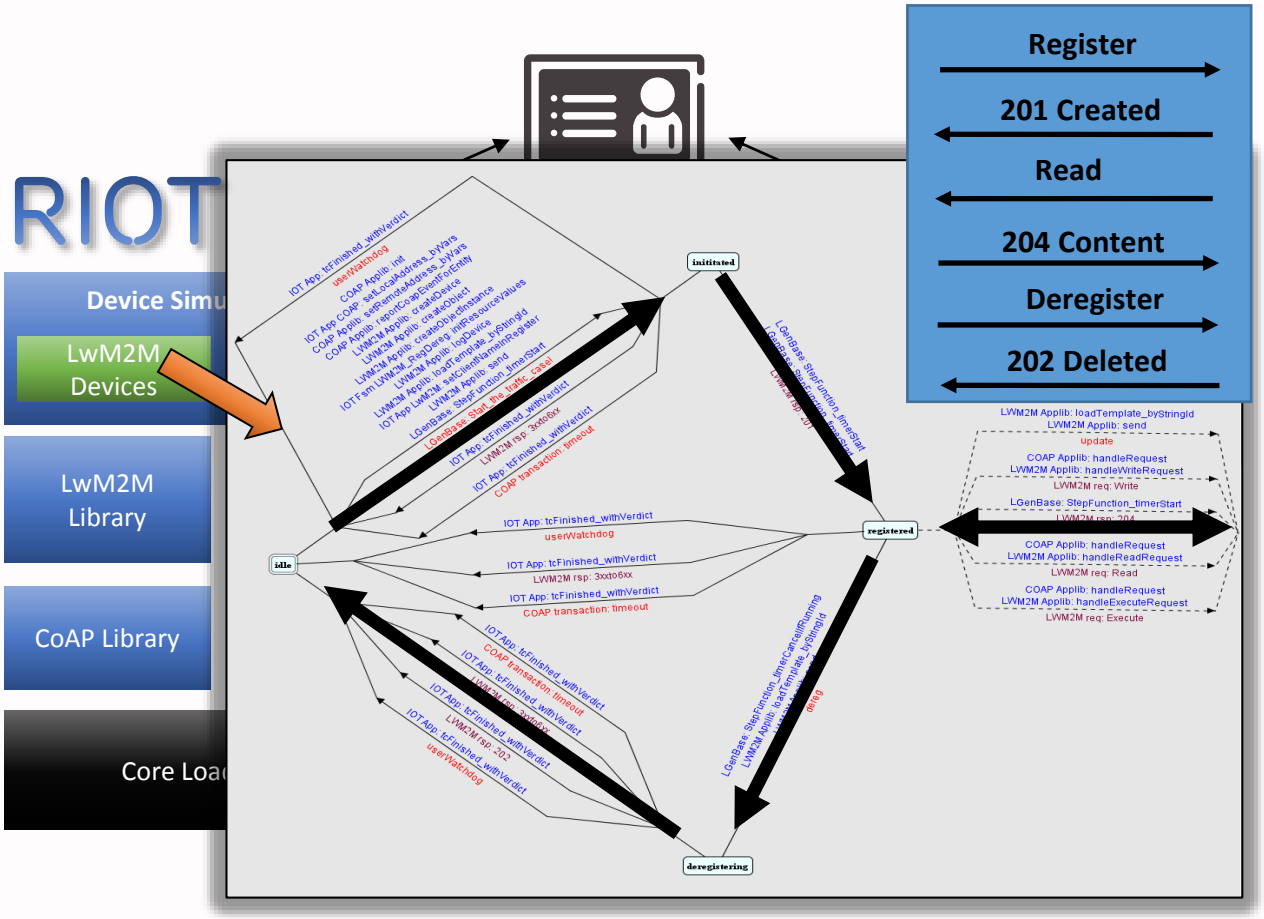

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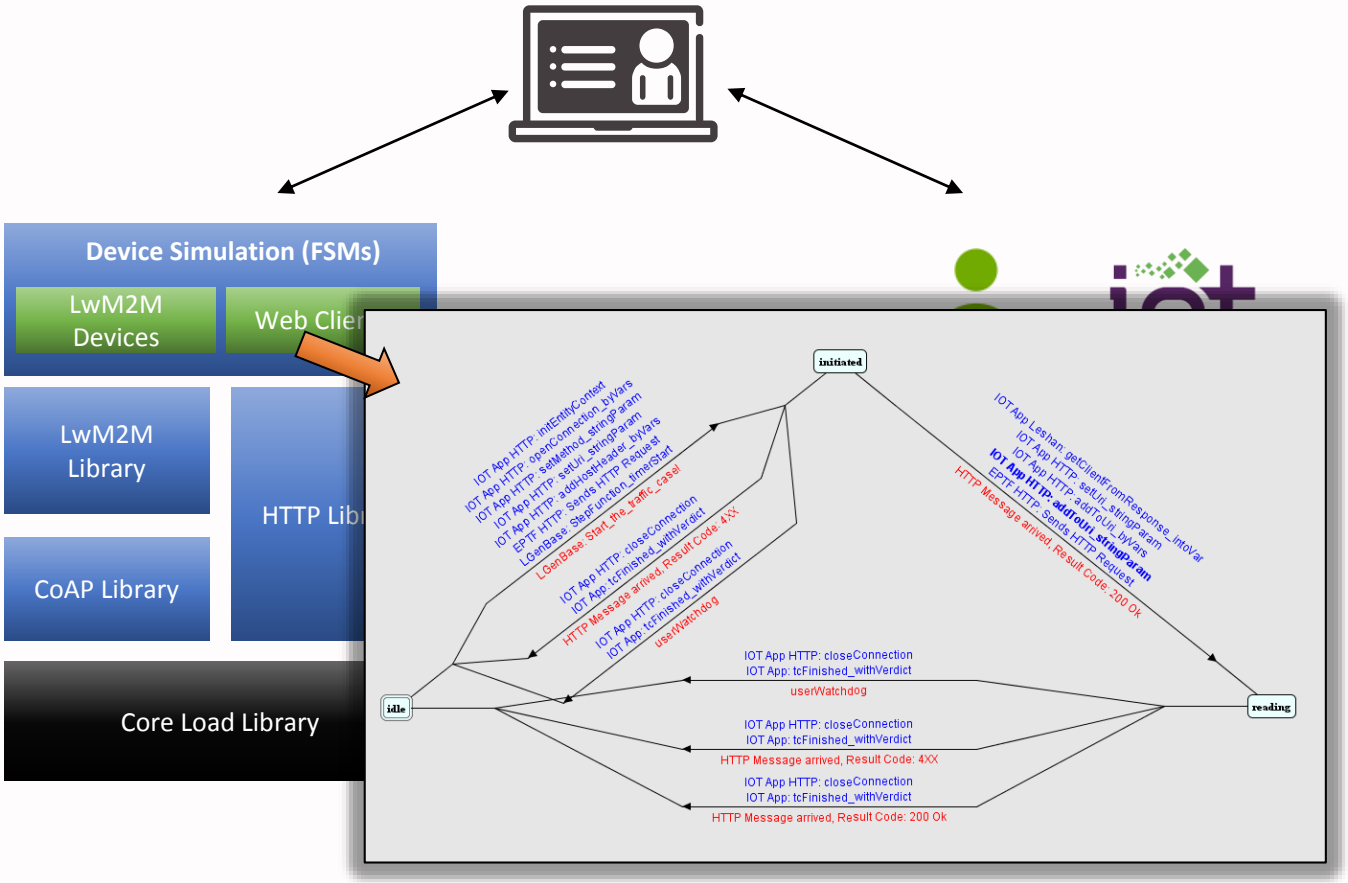

IoT traffic example