IoT Communication-as-a-Service Introduction

Nov 2021

Product Center Services

We provide a comprehensive “one-stop-shop” solution

Wireless and location made easy

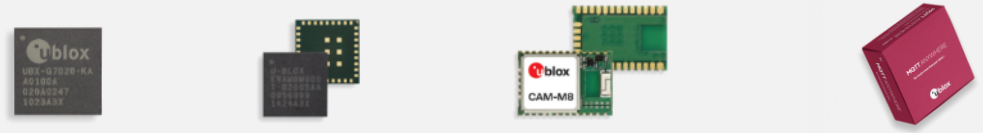
From the customer’s perspective:

- Faster time-to-market with seamlessly integrated technologies.
- Reduced execution risk when working closely with one competent provider.
- Increased ROI with extended device life cycles, reduced data overhead, and energy consumption.

A unique combination of capabilities from silicon to cloud.

- u-blox delivers essential IoT solutions with a unique combination of hardware components and services.

u-blox solutions comprised of chipsets, modules and data services



Services

To enhance and complement location, connectivity, and security

Positioning

To locate the source of information

Cellular connectivity

To connect over a wide area

Short range connectivity

To connect over short distances

Services overview

We make wireless and location easy

We deliver leading service technologies to reliably locate and connect people and devices. We are forging a path in which our services combined with products enhance functionality, improve quality of service in challenging conditions, and solve the problems of complexity, cost, and availability.

IoT Communication-as-a-Service combines true global connectivity with a fixed-price global MQTT network that works seamlessly in 190 countries.

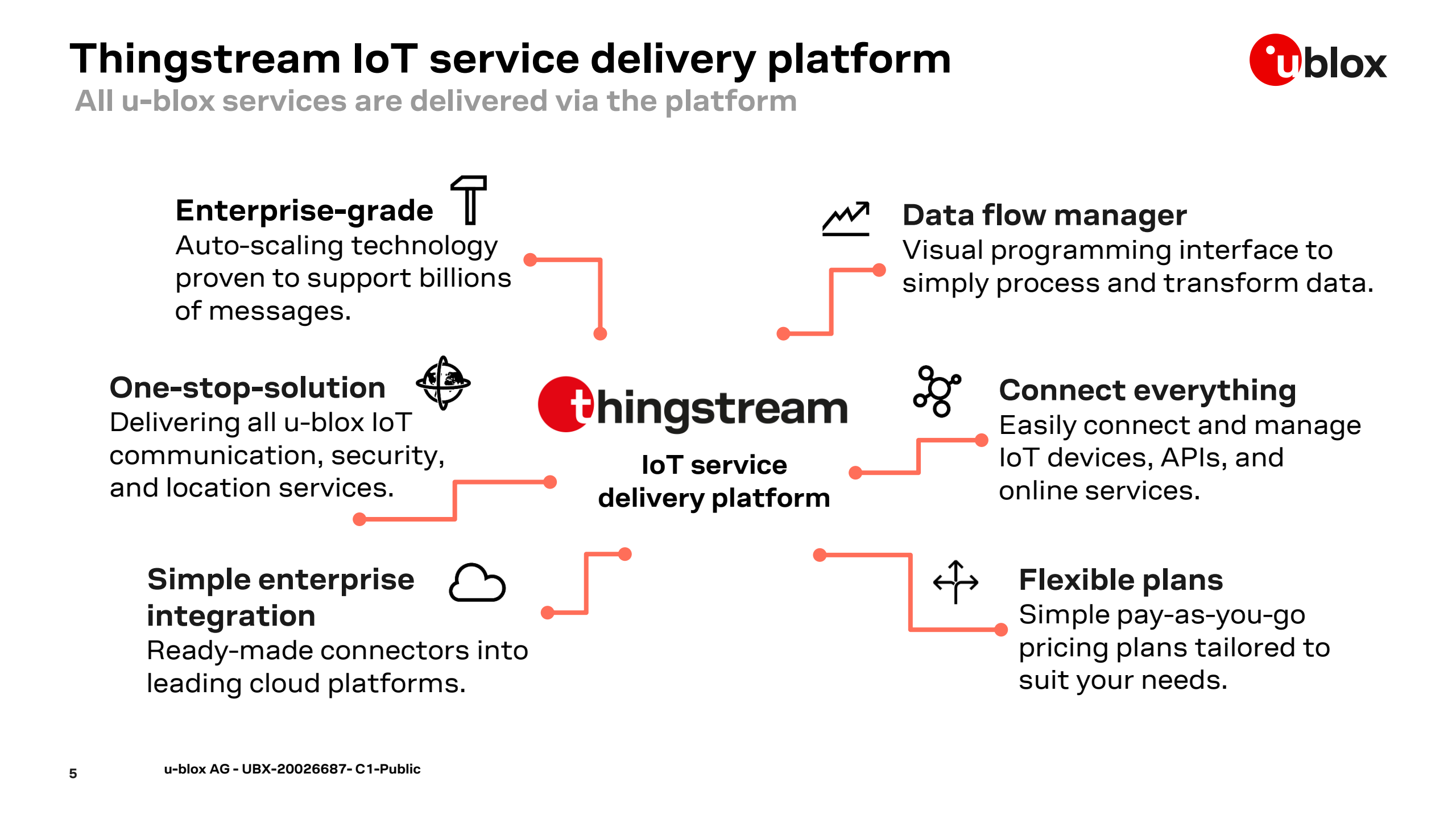
IoT Location-as-a-Service sets the standard for reliable and fast location information and for delivering accurate assistance and augmentation data.

IoT Security-as-a-Service protects your business and your data, with safety as a core value, through a world-class scalable symmetric key management system.


Thingstream
IoT service delivery platform

Thingstream IoT service delivery platform

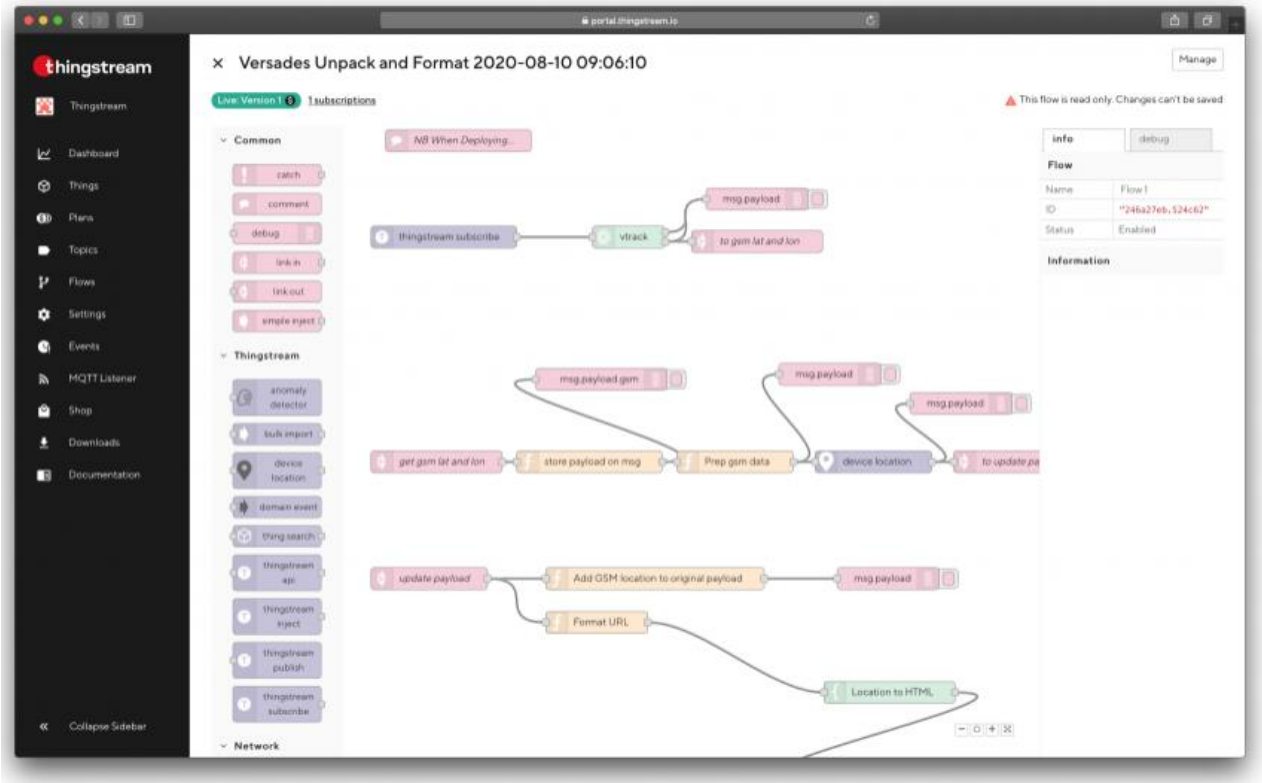
All u-blox services are delivered via the platform



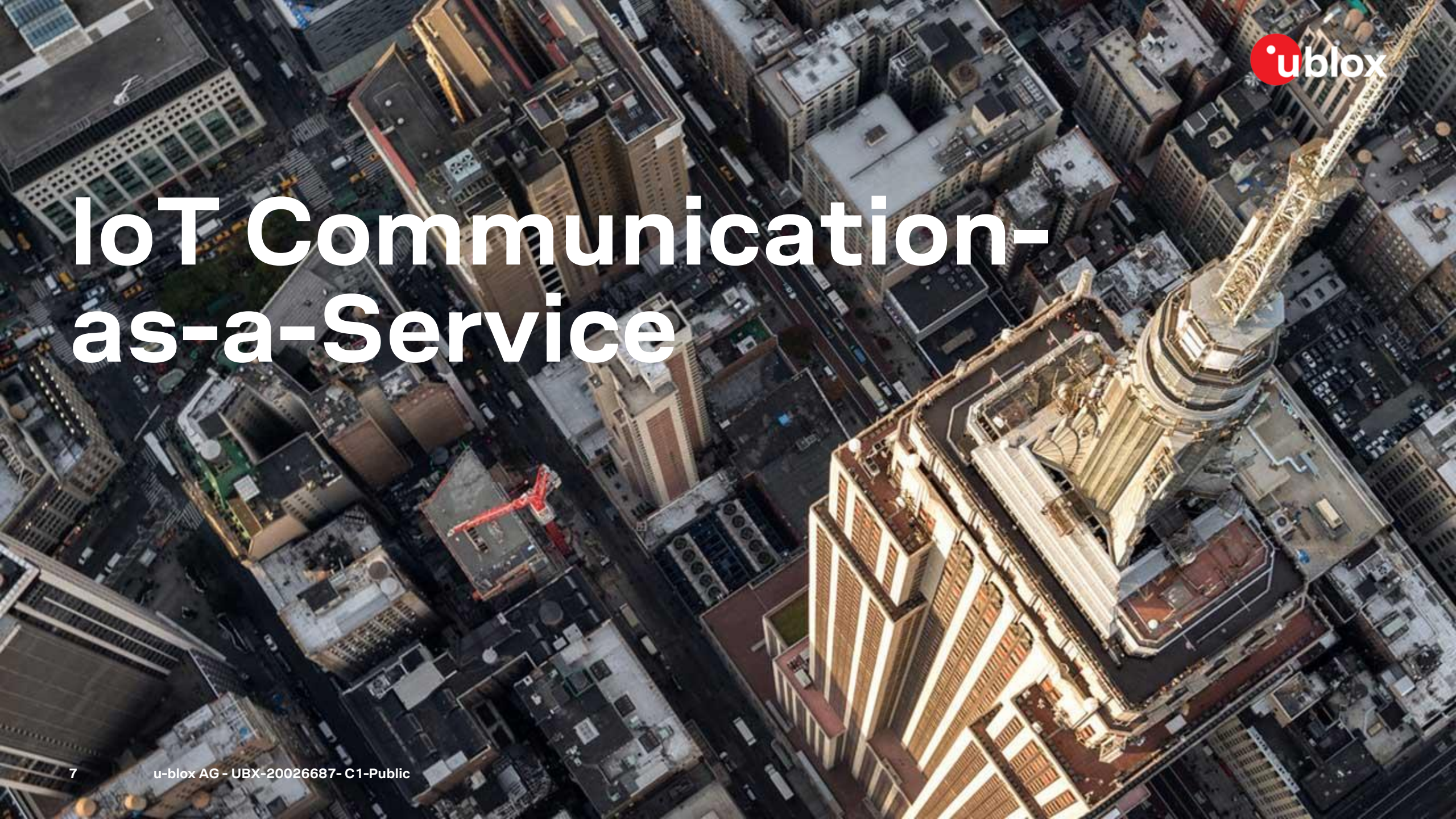
Data Flow Manager

Data processing and premium extensions

- Use visual Data Flow Manager to easily process and transform data.
- Apply logic to data as it travels between Things and IoT platforms.
- Use pre-built templates and dedicated application nodes for rapid smart integration into mainstream IoT and enterprise systems.
- One-click “Prototype to Production” gives you auto-scaling, reserved instances.

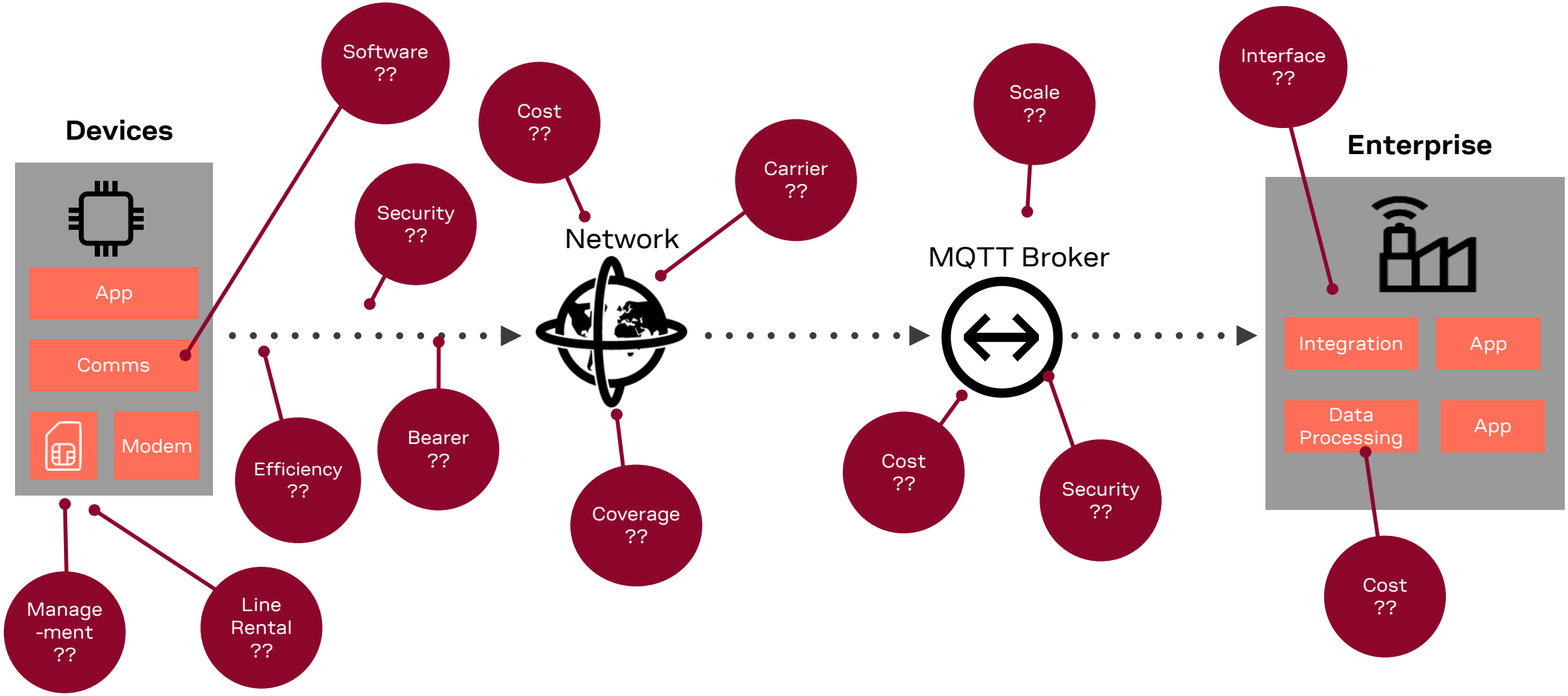


[Data Flow Manager Demo Video]

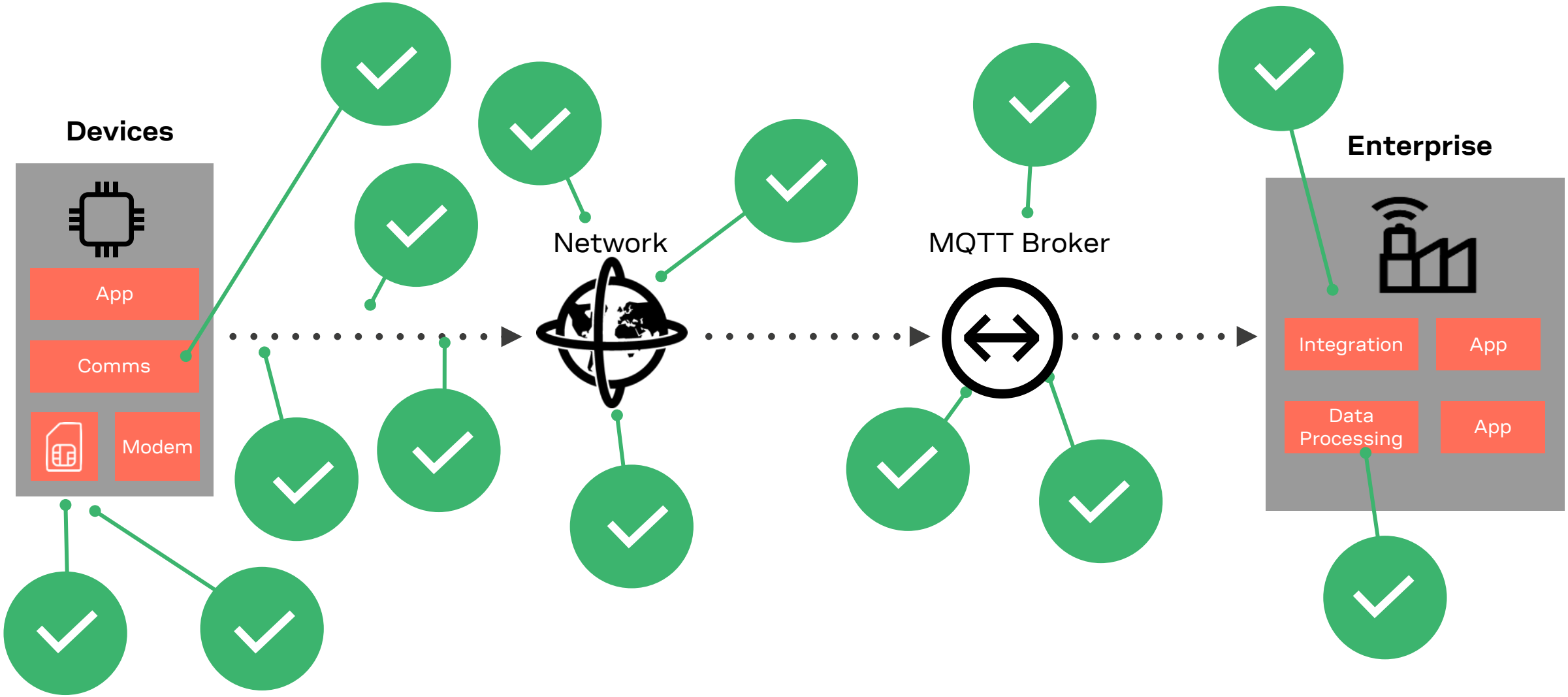


IoT Communication-as-a-Service

The device to enterprise IoT challenge

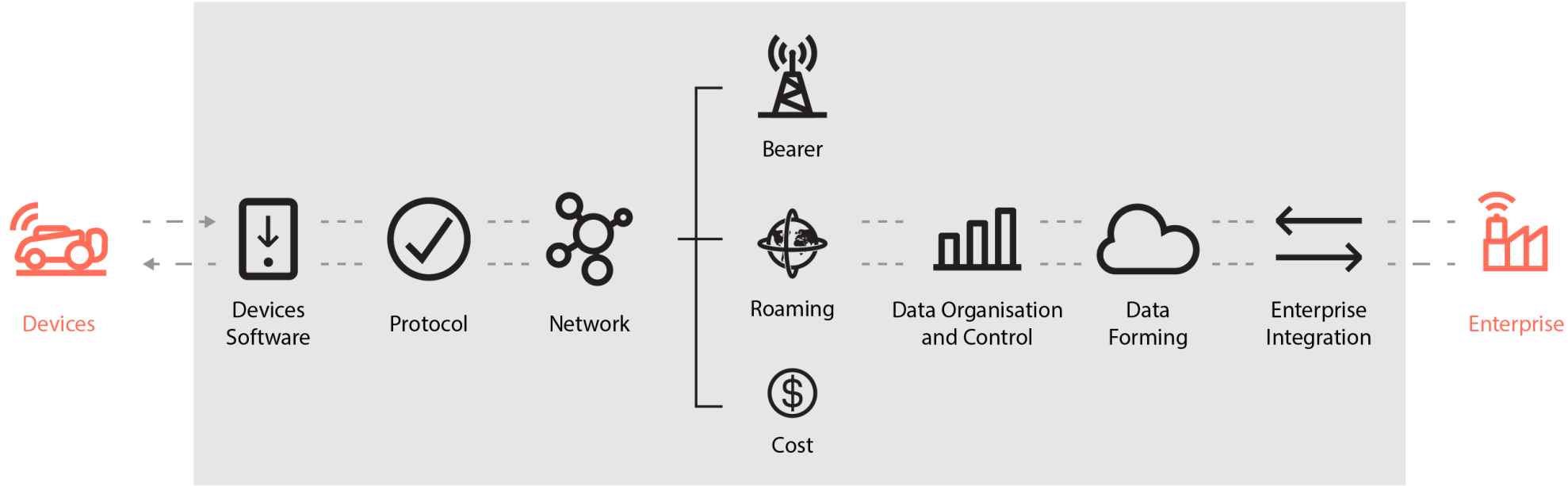


The device to enterprise IoT solution



IoT Communication-as-a-Service

Communication is so much more than connectivity. We solve the problems of complexity, cost and availability



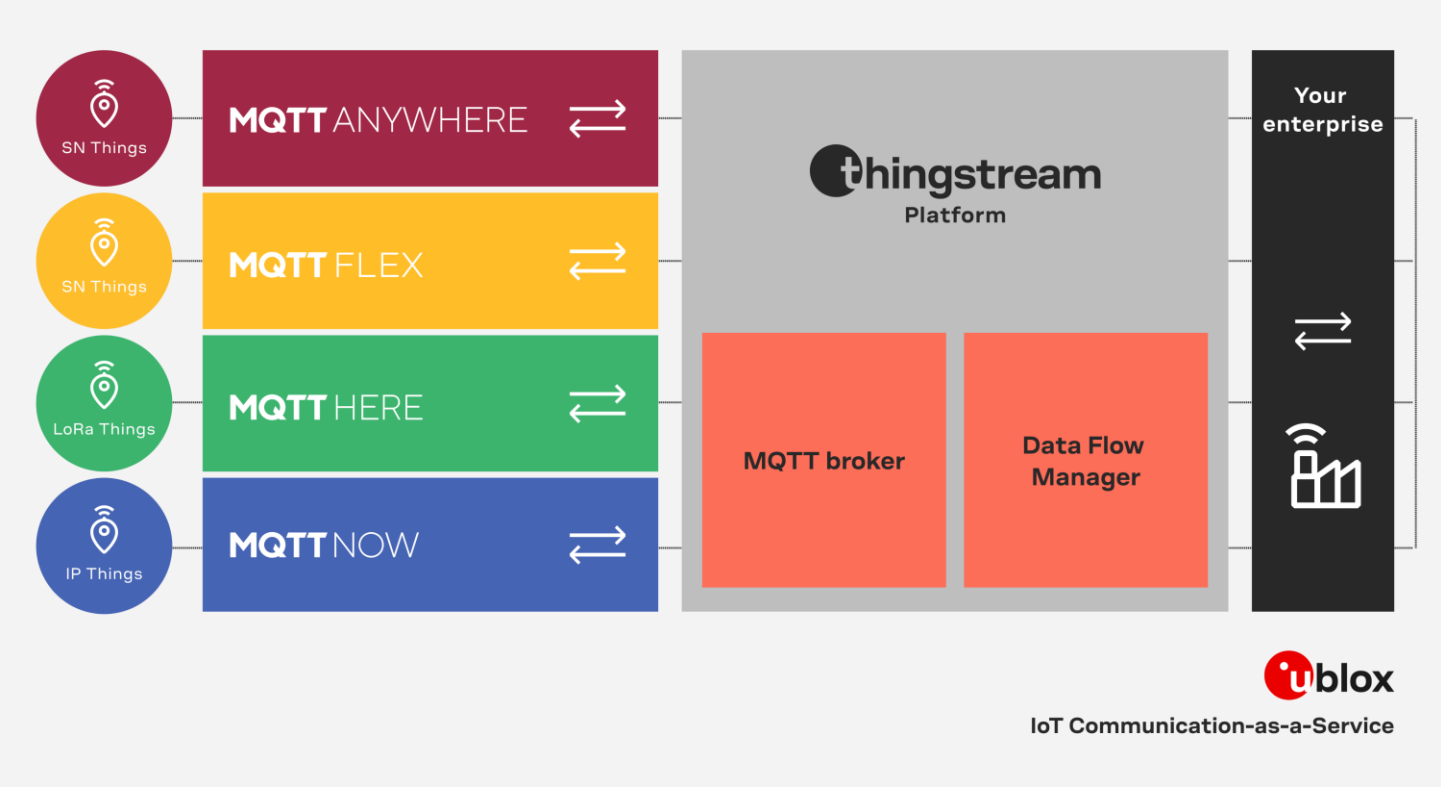
The **complexity of IoT Communication is solved** by a comprehensive end-to-end solution based on the industry standard MQTT, with our **globally available network** that works in 190 countries.

Simplifying cost of ownership by offering a product "as-a-Service" at **predictable cost with on-demand scalability**.

IoT Communication-as-a-Service

Getting data from IoT devices anywhere in the world to the enterprise is simplified through the availability of four complementary products

- Simple pay-as-you-go price plans
- No fixed-term contract tie-ins
- Single management portal for the whole fleet
- Enterprise grade MQTT broker
- Advanced Data Flow Manager for building logical data flows and enrichment of IoT data for upstream systems
- Simple integration into mainstream IoT and enterprise systems



Choosing the right protocol is key

MQTT-SN

MQTT

CoAP

HTTP

HTTPS

Why MQTT

Industry standard protocol designed for M2M communication

- MQTT (Message Queuing Telemetry Transport) has become a widely used data transfer protocol in the Internet of Things
- MQTT publishes messages from one device to one or many others via a broker. To achieve reliable machine-to-machine communication, users can set the quality of service to the specific requirements of their applications
- MQTT-SN (Sensor Network) is further tailored to the needs of sensor networks. Designed for constrained environments characterized by low power and bandwidth requirements

Why MQTT for IoT?

- Easy
- Reliable
- Light-weight
- Bi-directional
- Messaging at scale

Advantages of MQTT

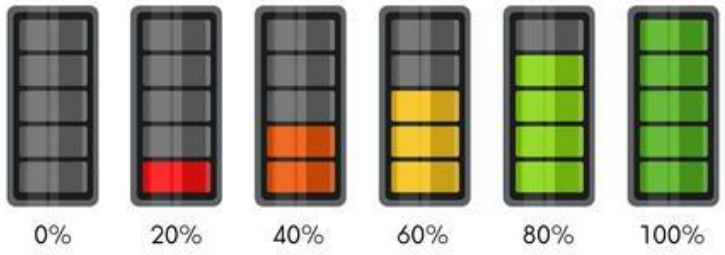
- Simplified communication
- Eliminates polling
- Dynamic targeting
- Decouple and scale

MQTT-SN

Lower overhead. Less time on air. Longer battery life.

HTTPS

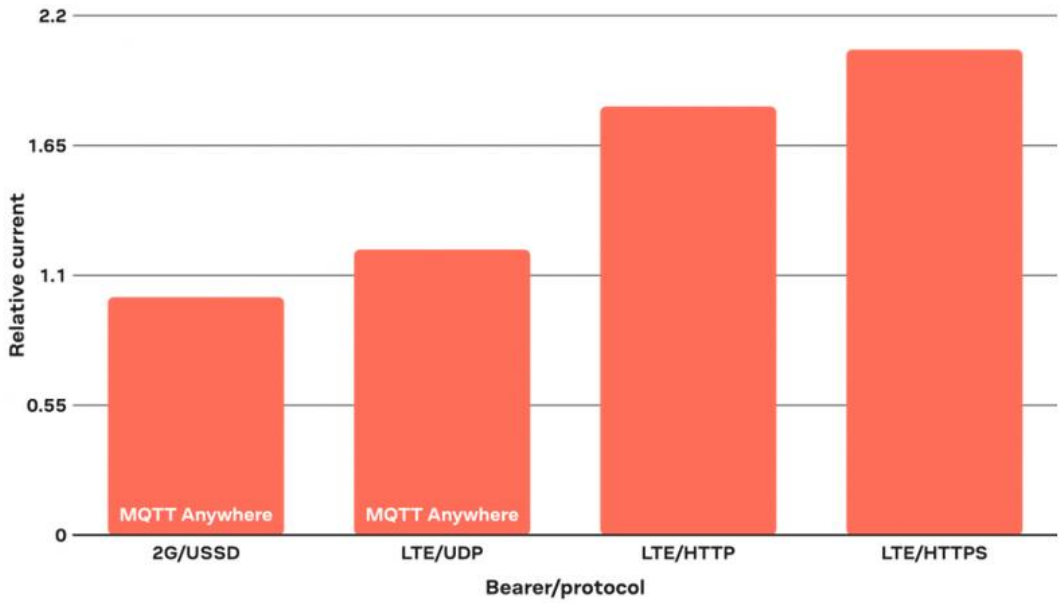
Battery longevity



Message overhead

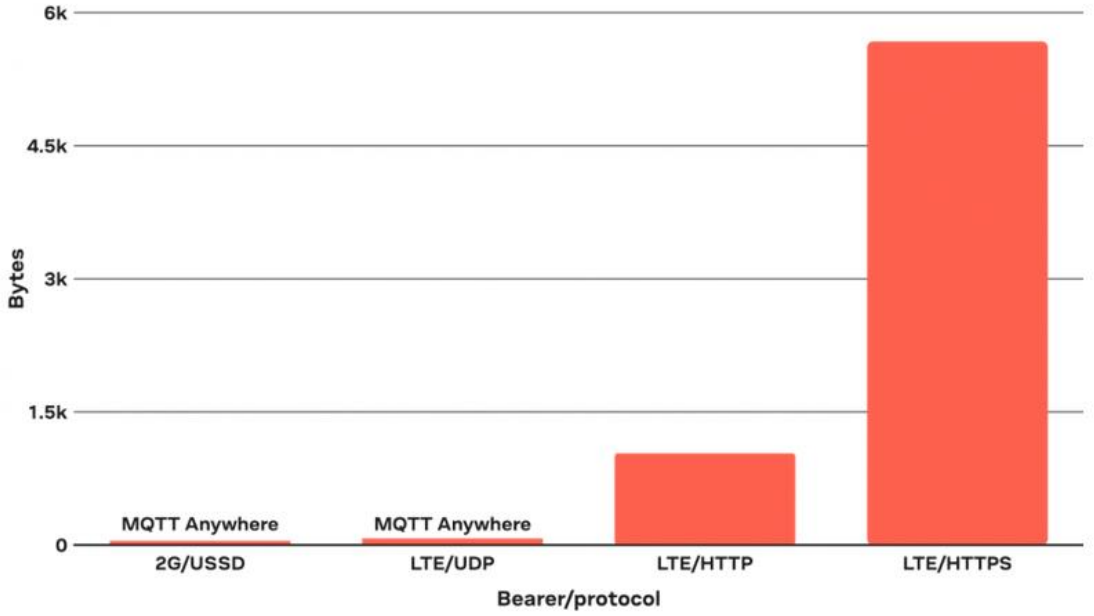
MQTT-SN

Ultra-low power



These same data are shown numerically in the table below:

Bearer/protocol	Relative power consumption
MQTT Anywhere 2G/USSD	1.0
MQTT Anywhere LTE Cat-1/UDP	1.21
HTTP/LTE Cat-1	1.81
HTTPS/LTE Cat-1	2.05



These same data are shown numerically in the table below:

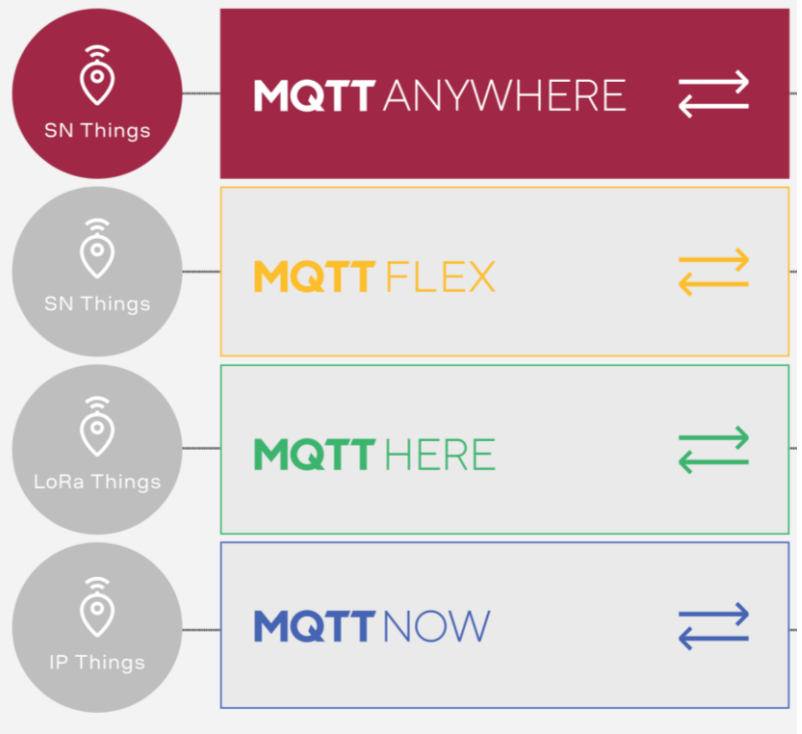
Bearer/protocol	Payload (bytes)	Total transferred (bytes)	Inflation factor
MQTT Anywhere 2G/USSD	12	26	2.17
MQTT Anywhere LTE Cat-1/UDP	12	34	2.83
HTTP/LTE Cat-1	12	1034	86.17
HTTPS/LTE Cat-1	12	5676	473

MQTT Anywhere

IoT Communication-as-a-Service SIM-based LPWA

Secure IoT communication service operating across multiple cellular carriers in 190 countries around the world.

- Enables long-life, ultra low-power devices
- Fixed price, low-cost, global connectivity
- Globally ubiquitous, seamless roaming



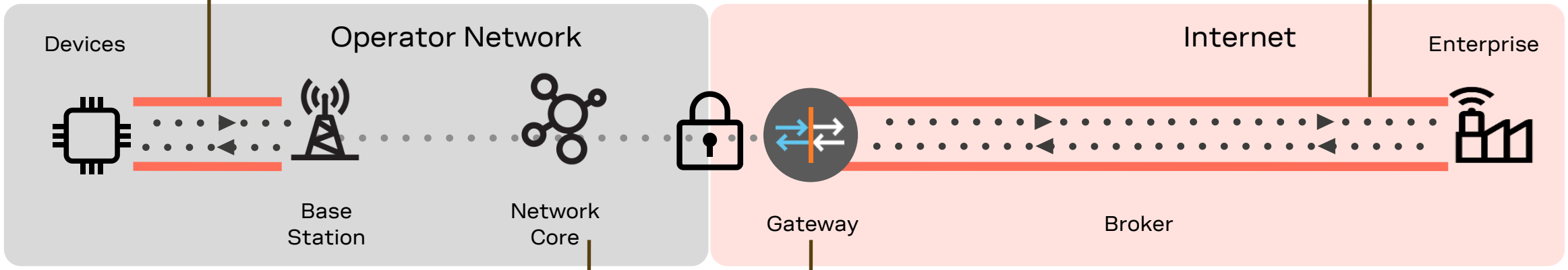
Deep global coverage

- Operating in 190 countries across all cellular technologies (2G, 3G, LTE, LPWAN, and 5G)
- Multiple operators in most countries

Secure IoT communications

Security between a device and network base station guaranteed by hardware SIM card

Enterprises connect to Thingstream via secure protocols (SSL/TLS)

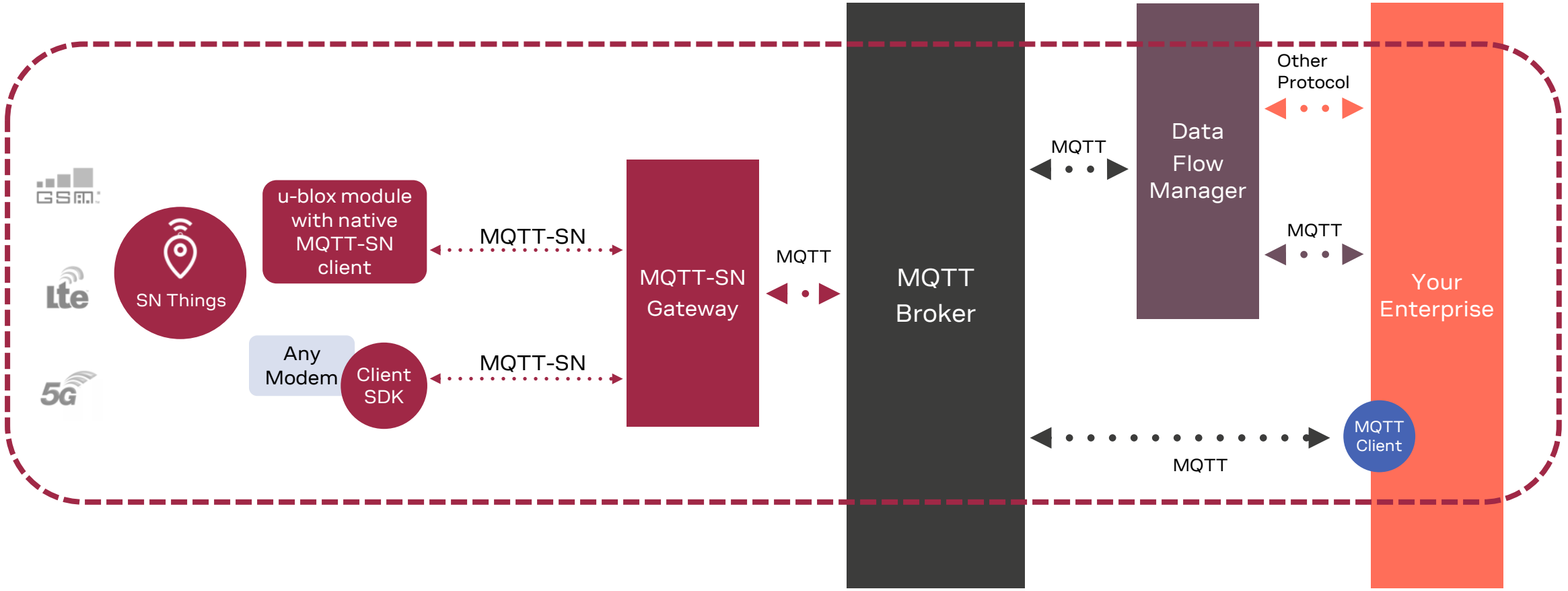


Traffic is private and secure inside the operator network

Thingstream MQTT-SN gateway is connected securely to the operator network core via VPN

MQTT Anywhere

Thingstream architecture



MQTT Anywhere

Detailed pricing plan

- Contract less: PAYG
- Pay per MQTT message consumed
- Fixed price no matter where you are in the world

Name	Price ($)	Unit	Description
MQTT Anywhere 12K	$2.00	Block of MQTT message(s)	12 K MQTT-SN messages – $2 per device per month
MQTT Anywhere 5K	$1.00	Block of MQTT message(s)	5 K MQTT-SN messages – $1 per device per month
MQTT Anywhere 2K	$0.50	Block of MQTT message(s)	2 K MQTT-SN messages – $0.50 per device per month
MQTT Anywhere 500	$0.25	Block of MQTT message(s)	500 MQTT-SN messages – $0.25 per device per month

Comparing overall costs vs cellular data from MNO

The MQTT Anywhere vs. cellular data cost comparison below doesn't include the human overhead of managing multiple vendor relationships for each constituent part of the overall communication solution. That also needs to be factored into the total cost of ownership, in addition to the time required to organize each one.

	Bytes	Activation / line rental	Roaming fees	SIM management	Security	Data / protocol management	Application logic	User application
	Payload size without security	Carrier fees	If device is roaming, fees will usually apply	Carrier or IoT System fee for managing devices	Cost for certificate management	Web server fees for ingesting data	Vendor specific (usually $X per device per month)	Variable
LTE	**e.g., $0.02 per MB**	**e.g., $1.00 PM**	**e.g., $ variable**	**e.g., variable PM (Vodafone GDSP, etc.)**	**e.g., $0.20+ per month**	**e.g., 3rd party vendor $ variable**	**IoT platform vendor or custom dev $ variable**	IoT platform vendor $ variable
MQTT Anywhere	**Price from previous slide (e.g., $0.25 per month)**						**Premium extension** **$ variable**	IoT platform vendor $ variable

MQTT Anywhere – use cases

Use Case 1

30 Minute Refrigeration Monitoring

Thing wakes up every 30 min, connects to the broker, publishes payload to a topic using QoS 2.

11,520 MQTT messages per month

12 k plan = $2.00
per Thing per Month

Use Case 2

Hourly Container Tracking

Thing wakes once per hour and publishes a MQTT-SN message using QoS -1.

720 MQTT messages per month

2 k plan = $0.50
per Thing per Month

Use Case 3

Daily Battery Monitoring

Thing wakes up daily, connects to the broker, publishes payload to a topic using QoS 1.

150 MQTT messages per month

500 plan = $0.25
per Thing per Month

MQTT Anywhere – premium extensions

Container tracking

Thing wakes once per hour and publishes a MQTT-SN message using QoS -1

720 MQTT messages per month

2 k plan = $0.50
per Thing per Month

Device Location extension is used to calculate the location of the tracker (latitude, longitude) based on cell tower data and/or Wi-Fi access points

720 device location executions x $0.0001

$0.072
per Thing per Month

Each message is converted and sent as an event message to the Azure IoT Hub.

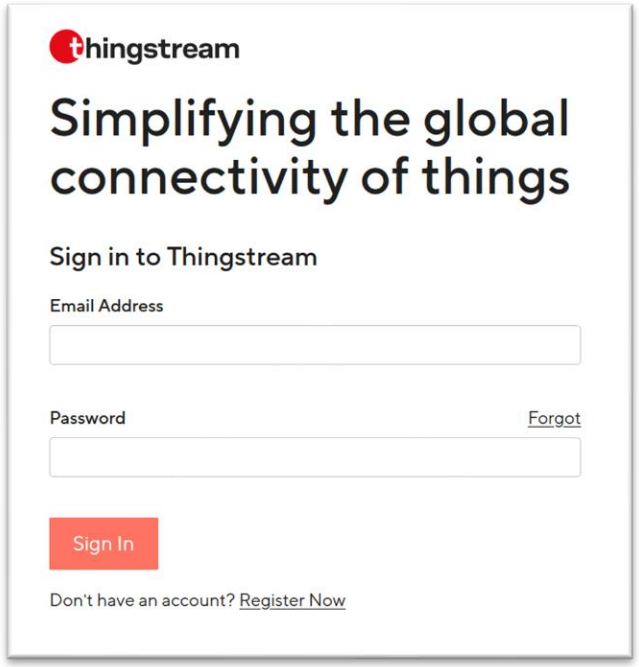
720 Azure IoT executions x $0.0001

$0.072
per Thing per Month

Total = $0.64
per Thing per Month

Proof of concept

A range of Thingstream-ready devices are available for testing and prototyping. These are suitable for a range of use cases, including alert & alarm, asset tracking, industrial monitoring, and environmental monitoring.

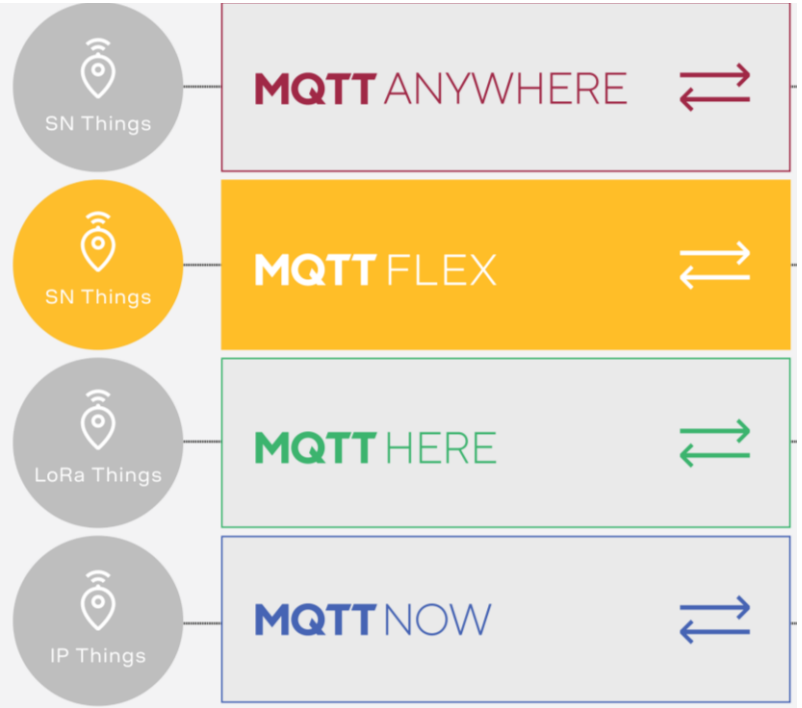


MQTT Flex

MQTT communication with flexible connectivity

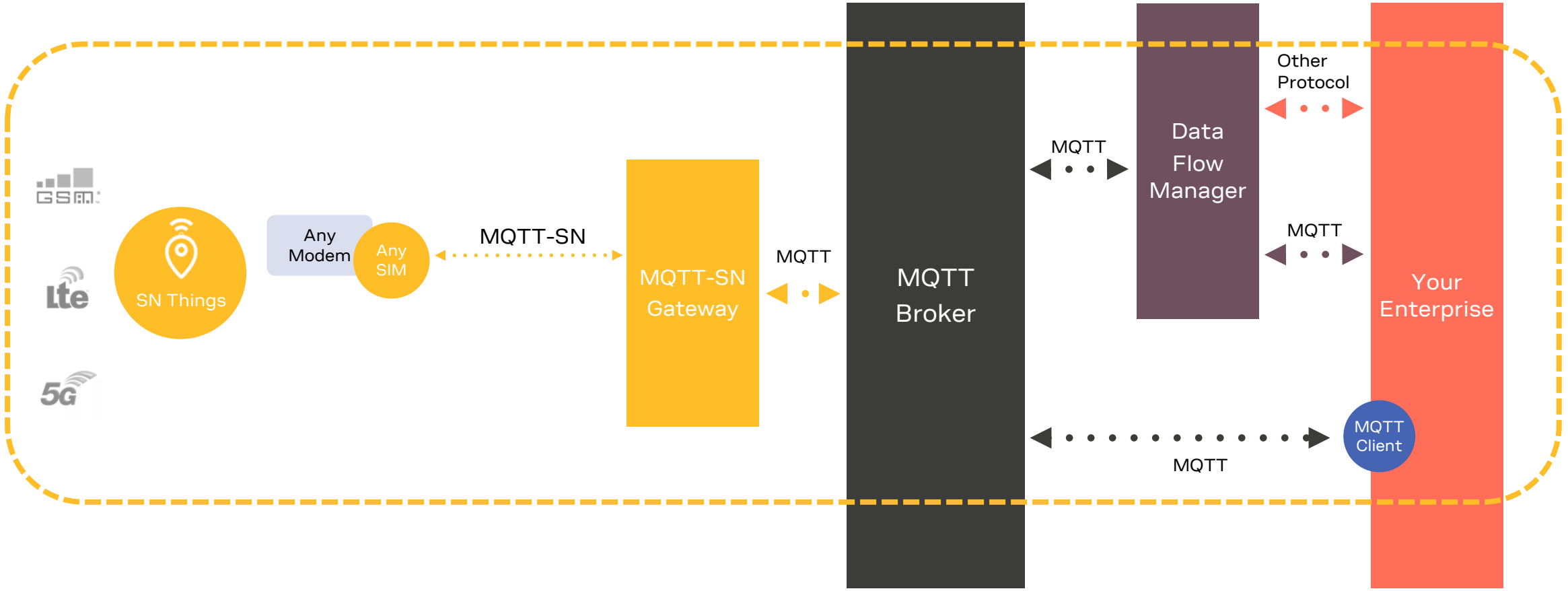
MQTT Flex provides the flexibility to choose your own cellular connectivity, combined with the advantages of IoT Communication-as-a-Service.

- Keep the relationship with your preferred network operator
- Operate in countries that do not allow permanent roaming
- Leverage NB-IoT networks for specific IoT use cases
- Enable long-life, low-power IoT devices via MQTT-SN protocol
- Provides predictable cost and on-demand scalability for your solution
- Allows simple processing, transformation, and integration of messages into the enterprise



MQTT Flex

Thingstream architecture



MQTT Flex

Detailed pricing plan

- Contract-less: PAYG
- Pay per MQTT message consumed

Name	Price ($)	Unit	Description
MQTT Flex12K	$0.80	Block of MQTT message(s)	12 K MQTT-SN messages – $0.80 per device per month
MQTT Flex 5K	$0.40	Block of MQTT message(s)	5 K MQTT-SN messages – $0.40 per device per month
MQTT Flex 2K	$0.20	Block of MQTT message(s)	2 K MQTT-SN messages – $0.20 per device per month
MQTT Flex 500	$0.10	Block of MQTT message(s)	500 MQTT-SN messages – $0.10 per device per month

MQTT Flex – use case

Water metering

Water metering

3 readings per day using QoS 1

450 MQTT messages per month

500 plan = $0.10
per Thing per Month

Each message is converted and sent as an event message to the Azure IoT Hub.

90 Azure IoT executions x $0.0001

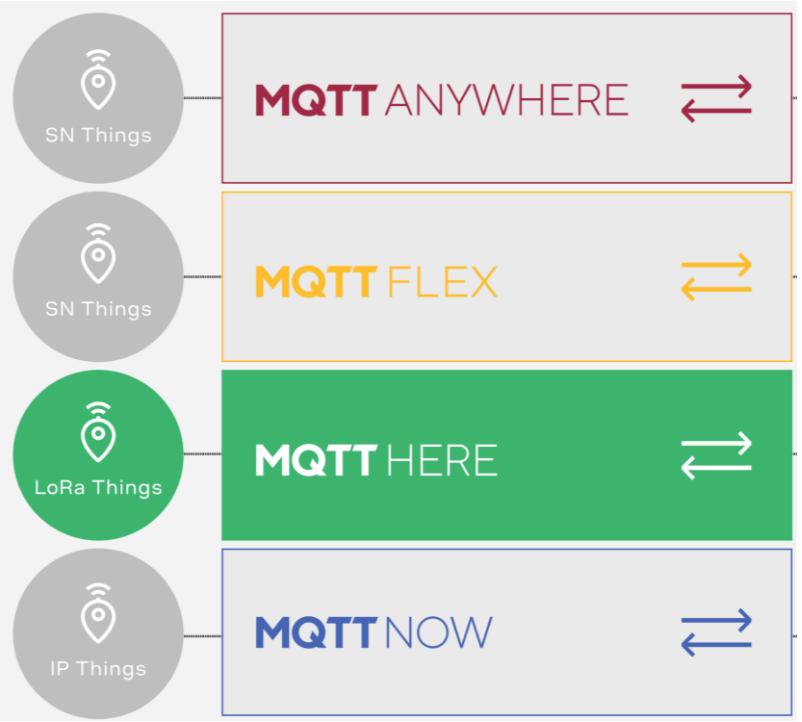
$0.01
per Thing per Month

Total = $0.11

MQTT Here

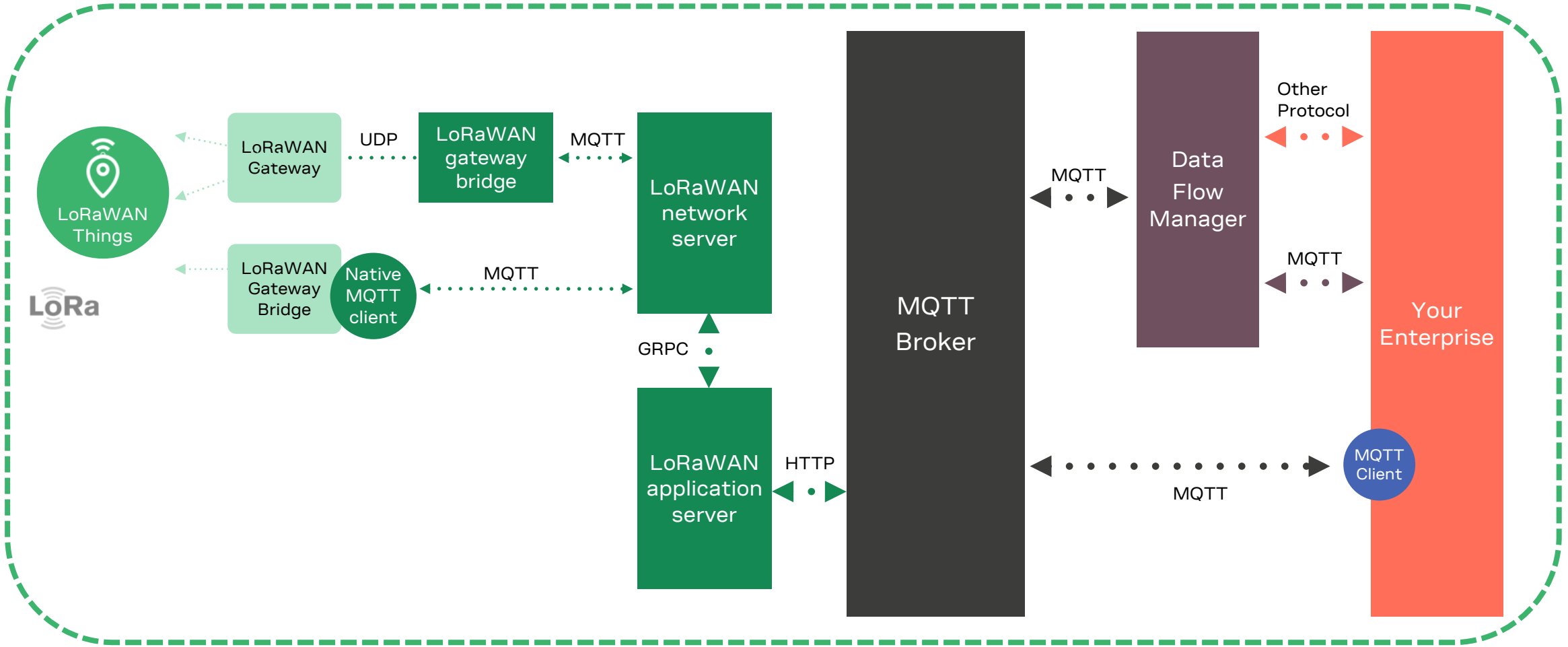
LoRaWAN IoT communication solution

- A LoRaWAN cloud infrastructure providing control over device traffic
- Simplified LoRaWAN rollout
- Scalable LoRaWAN Network Server components
- Enterprise grade MQTT broker
- Advanced Data Flow Manager for building logical data flows and enrichment of IoT data for upstream systems
- Prebuilt parsers for popular device types
- Simple integration into mainstream IoT and enterprise systems



MQTT Here

Thingstream architecture



MQTT Here

Detailed pricing plan

- Contract-less: PAYG
- A LoRaWAN cloud infrastructure providing control over device traffic by converting messages to MQTT
- Pay per MQTT message consumed

Name	Price ($)	Unit	Description
MQTT Here Business	$20.00	Block of MQTT message(s)	$20.00 for the original 50,000 message block included with the plan, overage charged at $0.0008 per message

MQTT Here – use case

Nitrate Water Monitoring

Monitoring of nitrates in rivers

100 nodes report every hour

72,000 MQTT messages per month

Business plan = $20.00
per fleet per Month

Overage = 22,000 x $0.0008

$17.60
per fleet per Month

Each message is converted and sent as an event message to the Azure IoT Hub.

72k Azure IoT executions x $0.0001

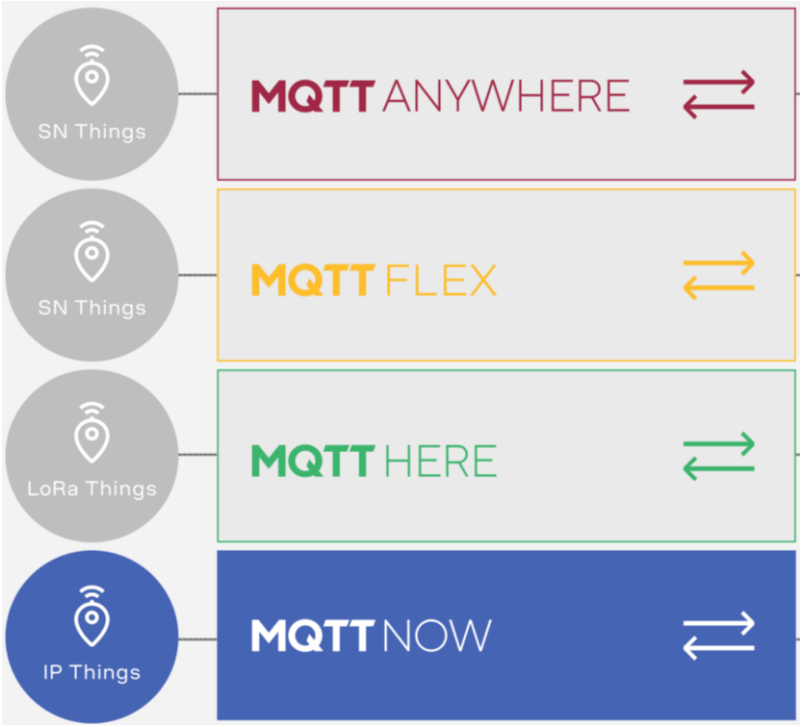
$7.20
Per fleet per per Month

Total = $44.80

MQTT Now

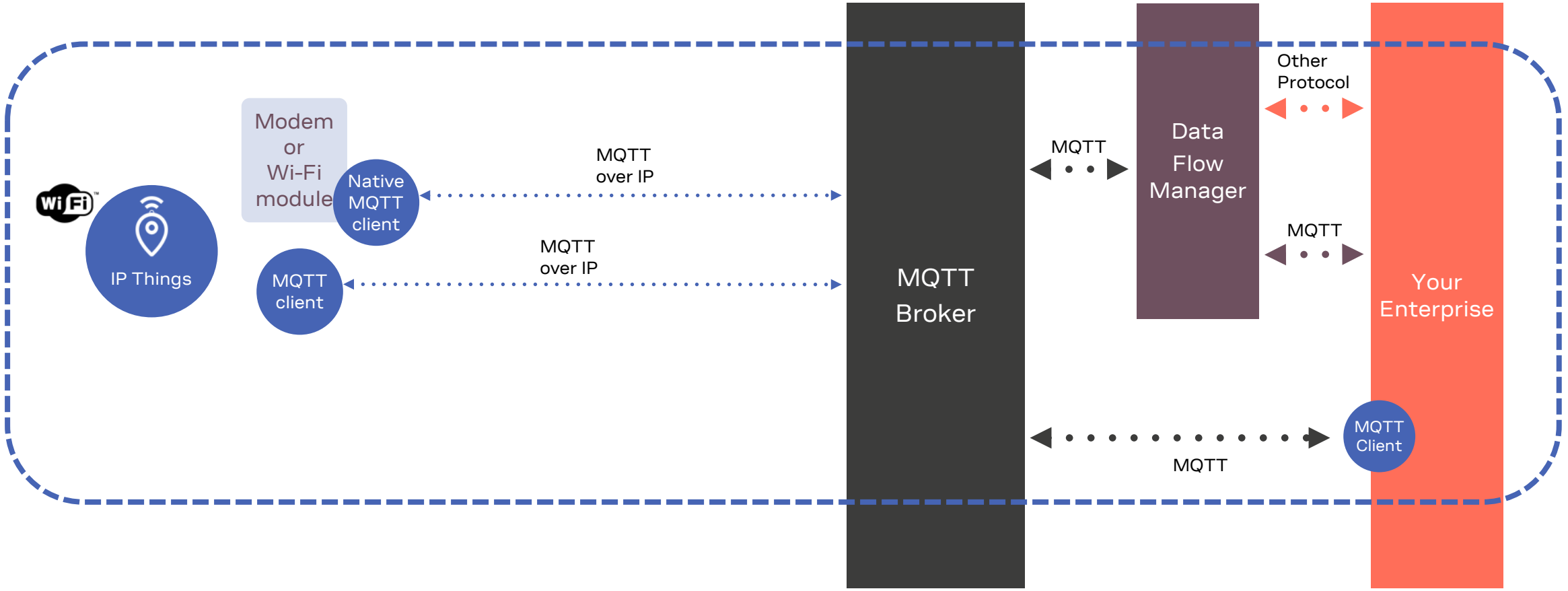
Cloud-based MQTT integration for IP devices

- Comprehensive publish/subscribe data management for enterprise
- Enterprise grade MQTT broker
- Simple pricing based only on the consumption of MQTT messages
- Advanced Data Flow Manager for building logical data flows and enrichment of IoT data for upstream systems
- Simple integration into mainstream IoT and enterprise systems



MQTT Now

Thingstream architecture



MQTT Now

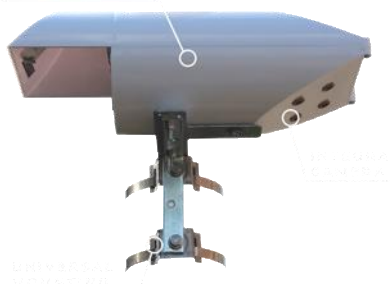
Detailed pricing plan

- Contract less PAYG
- MQTT over TCP-IP (Wi-Fi or with regular data SIM (from local MNO))

Name	Price ($)	Unit	Description
MQTT Now Developer	$0.00	Block of MQTT message(s)	1K free MQTT messages per month, capped
MQTT Now Business	$1.00	Block of MQTT message(s)	$1 per 20K MQTT messages per month
MQTT Now Enterprise	$3.00	Block of MQTT message(s)	$3 per 100K MQTT messages per month

MQTT Now – use case

Road temperature monitoring



Local MNO SIM - 15 minute reporting

Thing wakes 4 x per hour and uses QoS 0 to send messages

8640 MQTT messages per month
(QoS 0 consuming 3 MQTT messages)

Business plan = $1
per Thing per Month

Each message is converted and sent as an event message to the Azure IoT Hub.

2880 Azure IoT executions x $0.0001

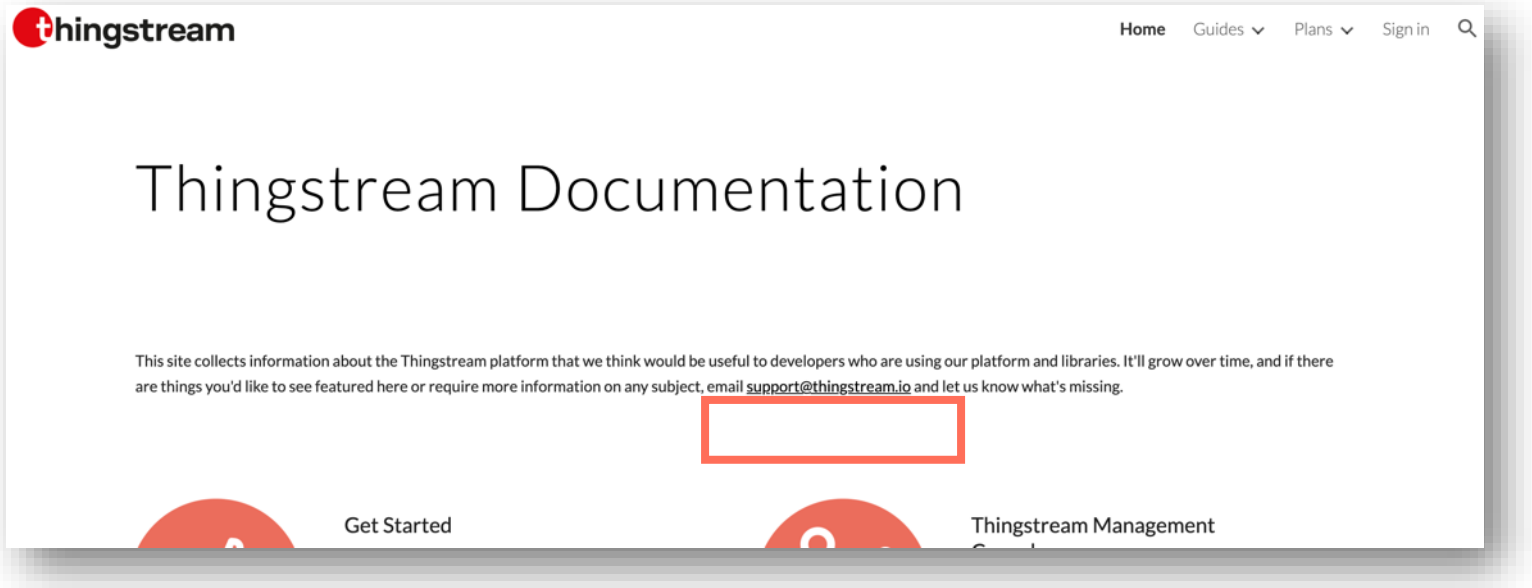
$0.28
per Thing per Month

Total = $1.28
per Thing per Month

Thank you
for your attention

Standard support

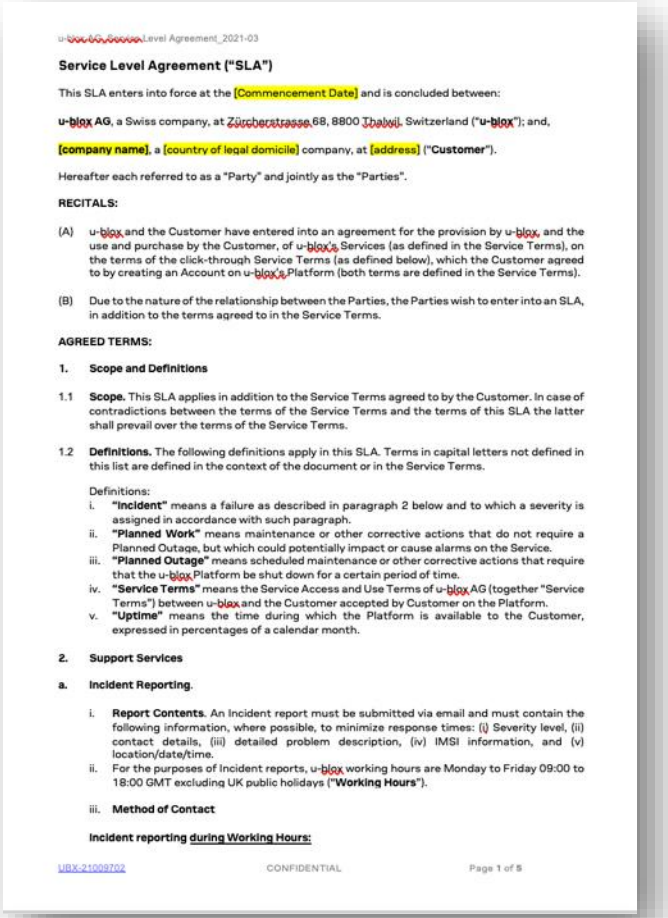
- Standard Support is available via the Thingstream IoT service delivery platform
- Documentation is maintained to assist self serving customers; however, if they have issues, they can email support@thingstream.io
- They will be sent a confirmation of email with support ticket number
- The ticket will be queued for the support team's attention within UK business hours



Enterprise Support

Over and above Standard Support

- Thingstream Enterprise Support provides you with a concierge-like service where the main focus is helping you achieve your outcomes and find success in IoT.
- With Enterprise Support, you get 24x7 access to high-quality engineers for technical and operational support.
- **Pricing starts at $500.- per month**
  - (or 10% of your monthly subscription revenue, if greater than $500.-)



u-blox Level Agreement_2021-03

Service Level Agreement ("SLA")

This SLA enters into force at the [Commencement Date] and is concluded between:

u-blox AG, a Swiss company, at Zürcherstrasse 68, 8800 Thalwil, Switzerland ("**u-blox**"); and,

[company name], a [country of legal domicile] company, at [address] ("**Customer**").

Hereafter each referred to as a "Party" and jointly as the "Parties".

RECITALS:

(A) u-blox and the Customer have entered into an agreement for the provision by u-blox, and the use and purchase by the Customer, of u-blox's Services (as defined in the Service Terms), on the terms of the click-through Service Terms (as defined below), which the Customer agreed to by creating an Account on u-blox's Platform (both terms are defined in the Service Terms).

(B) Due to the nature of the relationship between the Parties, the Parties wish to enter into an SLA, in addition to the terms agreed to in the Service Terms.

AGREED TERMS:

1. **Scope and Definitions**

1.1 **Scope.** This SLA applies in addition to the Service Terms agreed to by the Customer. In case of contradictions between the terms of the Service Terms and the terms of this SLA the latter shall prevail over the terms of the Service Terms.

1.2 **Definitions.** The following definitions apply in this SLA. Terms in capital letters not defined in this list are defined in the context of the document or in the Service Terms.

Definitions:

i. **"Incident"** means a failure as described in paragraph 2 below and to which a severity is assigned in accordance with such paragraph.
ii. **"Planned Work"** means maintenance or other corrective actions that do not require a Planned Outage, but which could potentially impact or cause alarms on the Service.
iii. **"Planned Outage"** means scheduled maintenance or other corrective actions that require that the u-blox Platform be shut down for a certain period of time.
iv. **"Service Terms"** means the Service Access and Use Terms of u-blox AG (together "Service Terms") between u-blox and the Customer accepted by Customer on the Platform.
v. **"Uptime"** means the time during which the Platform is available to the Customer, expressed in percentages of a calendar month.

2. **Support Services**

a. **Incident Reporting.**

i. **Report Contents.** An Incident report must be submitted via email and must contain the following information, where possible, to minimize response times: (i) Severity level, (ii) contact details, (iii) detailed problem description, (iv) IMSI information, and (v) location/date/time.
ii. For the purposes of Incident reports, u-blox working hours are Monday to Friday 09:00 to 18:00 GMT excluding UK public holidays ("**Working Hours**").

iii. **Method of Contact**

Incident reporting during Working Hours:

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Enterprise support

Response times

Severity	Definition	Target Response Time	
		Normal Working Hours	Outside Normal Hours
1 - Critical	A catastrophic problem that severely impacts all End Users and the ability to conduct business on the Platform.	Within 2 hours	Within 4 hours
2 - Serious	A serious issue that involves partial functionality loss, which impairs some or part of Customer's operations affecting multiple End Users. This may include a roaming issue affecting devices roaming in a specific region.	Within 4 hours	Within 6 hours
3 – Normal	A medium to low impact problem that affects an individual or small number of End Users or involves partial functionality loss which impairs some operations but otherwise allows Customer to continue to function normally.	Within 8 hours	Not available
4- Low	General usage questions or comments. There is no impact on the quality, performance or functionality of the Platform.	Within 8 hours	Not available