



Activity
Connecting with intelligence

LPWAN App Integration Streamlined with ThingPark X

Agenda

Introduction

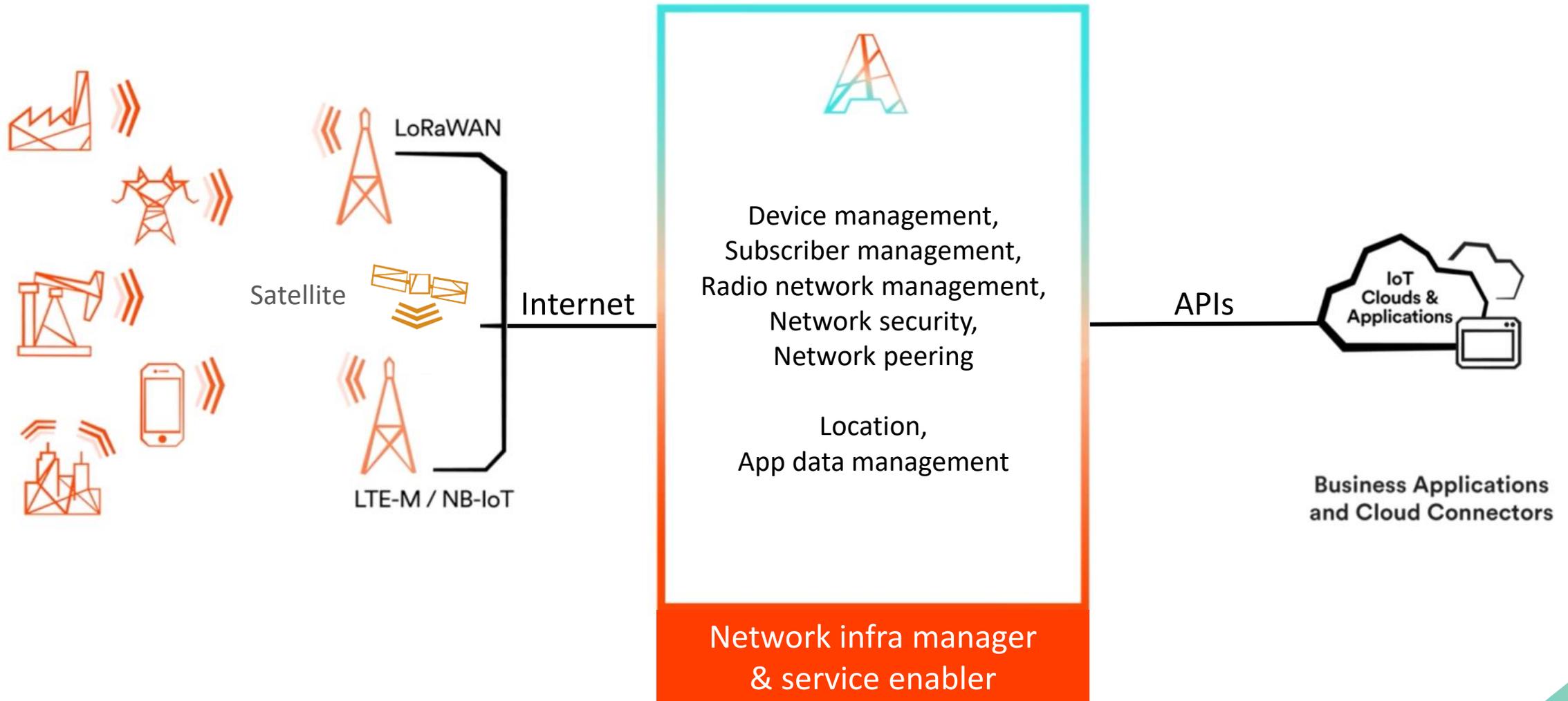
Alper Yegin (VP of Advanced Technology Development)

Demo

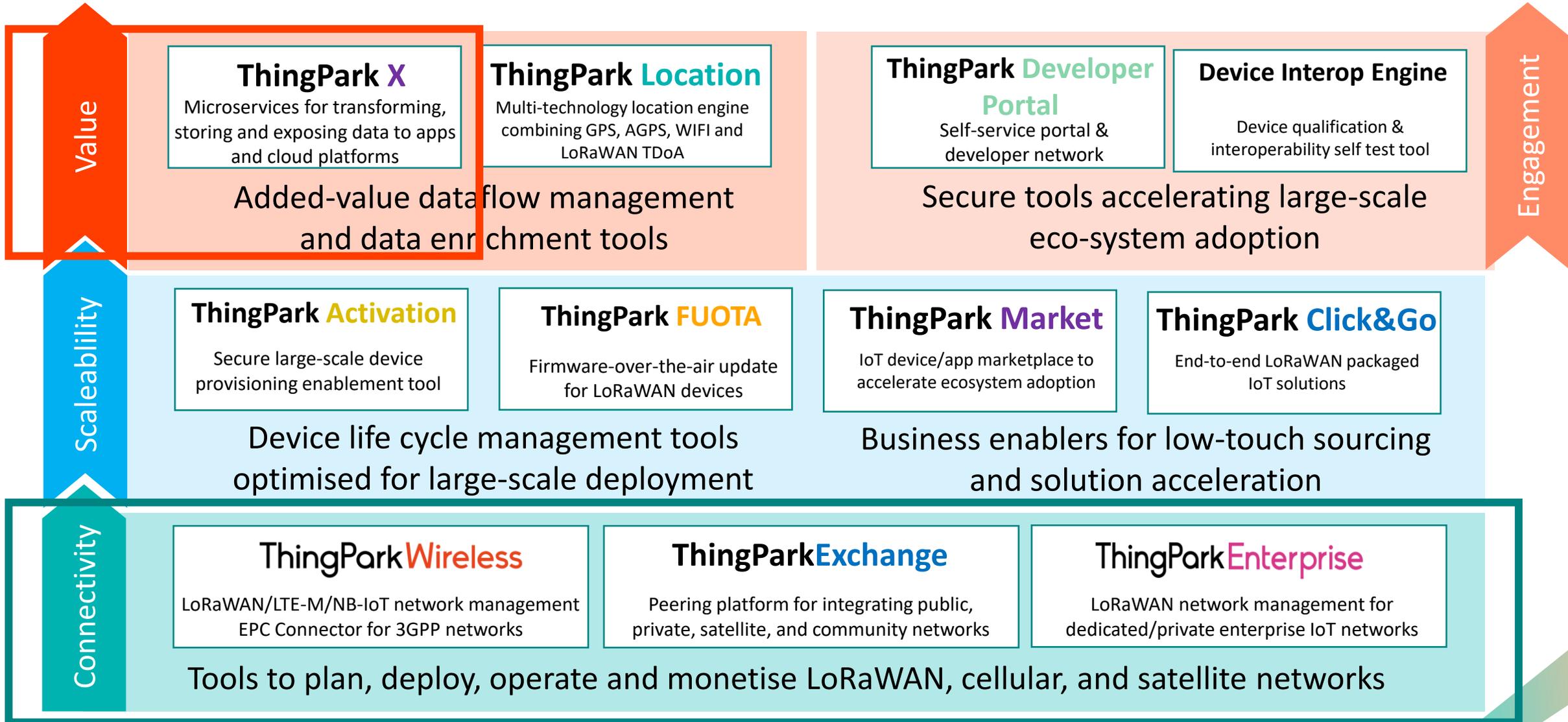
Norbert Herbert (Head of Solution Delivery & Ecosystem Integration)

Q&A

Core Network Infra for LPWAN

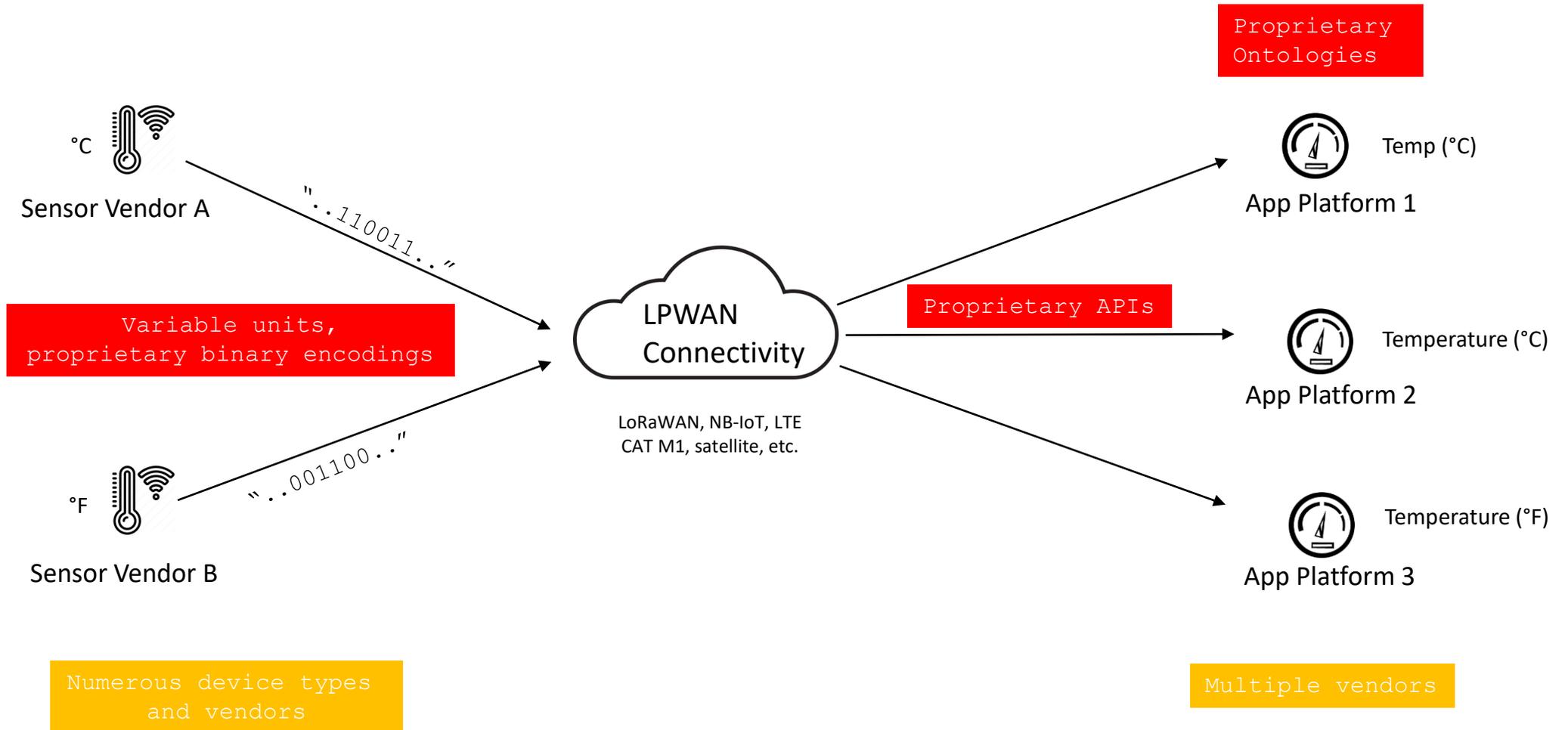


ThingPark Product Family

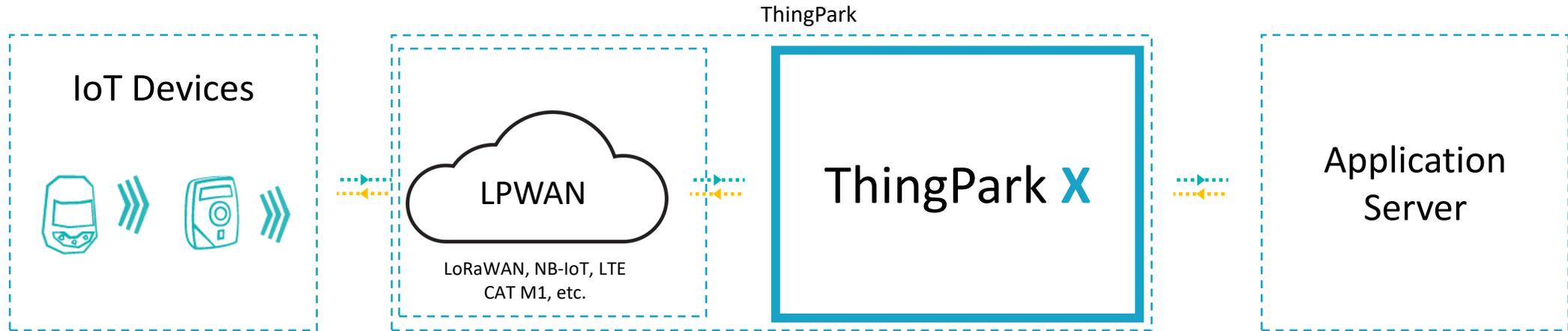


Activity

Challenge

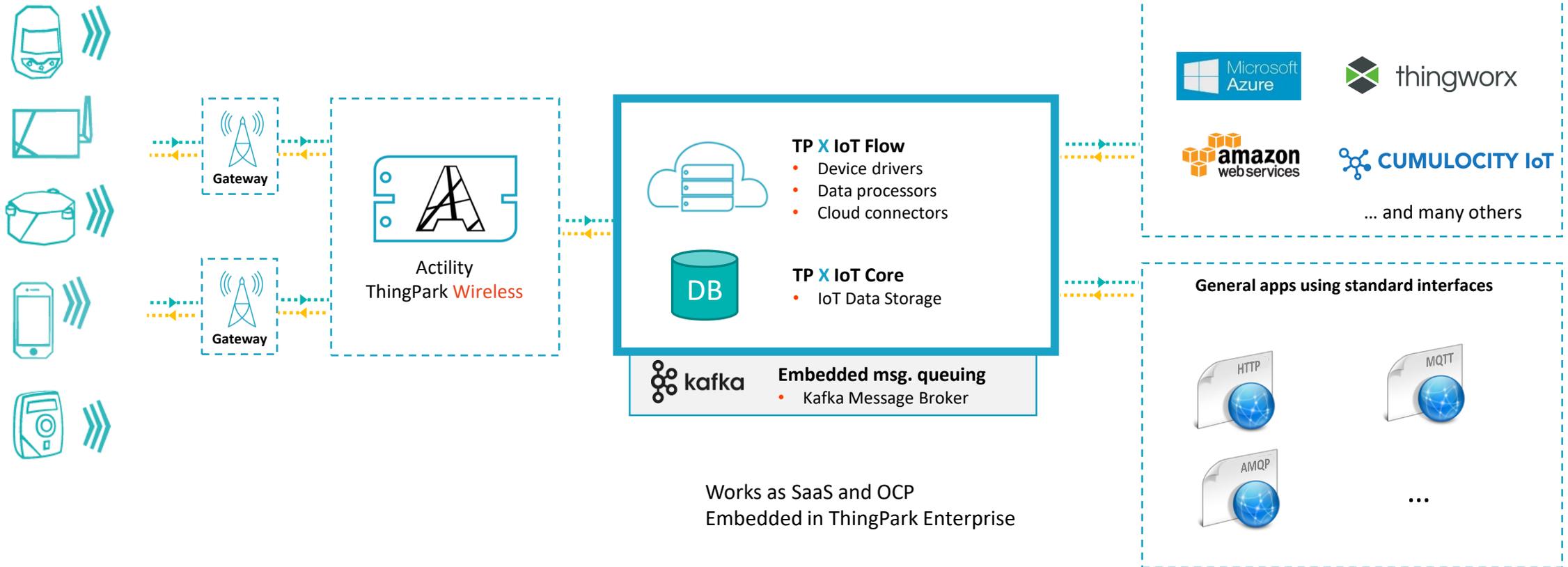


Solution: ThingPark X



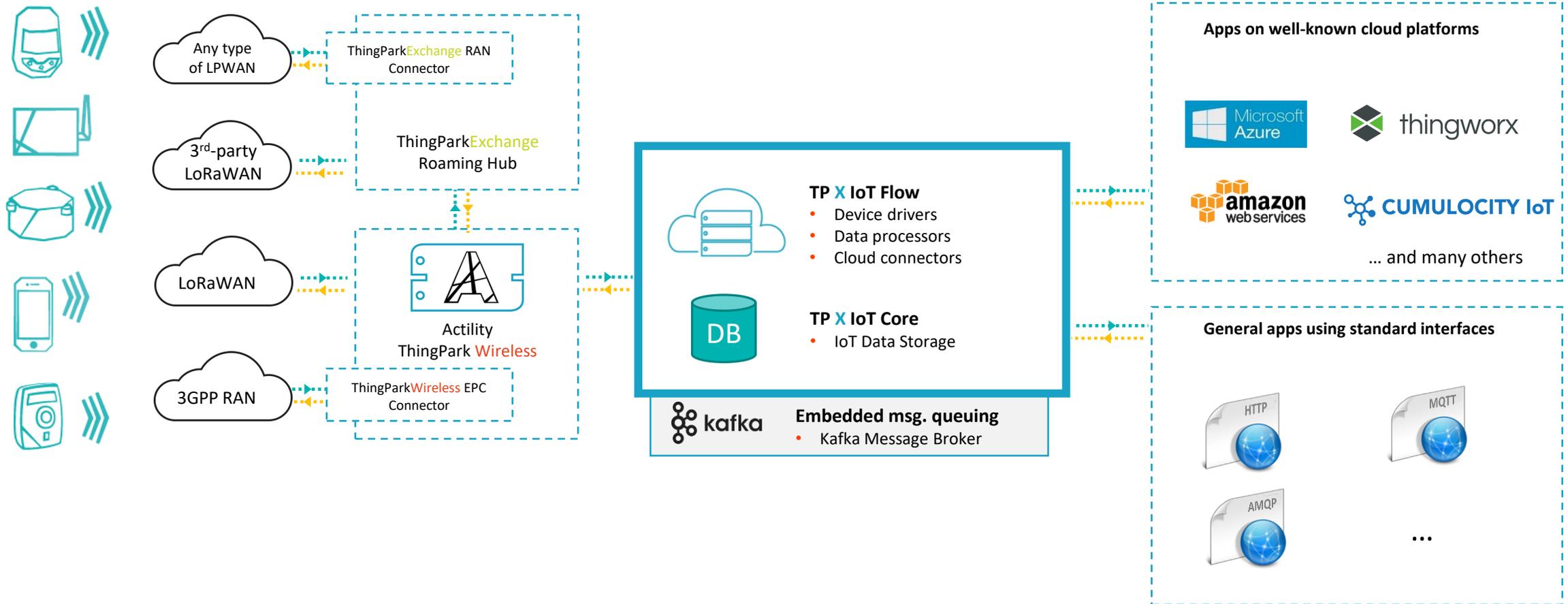
- Decode payload
- Transform payload
- Connect to app platforms

ThingPark X

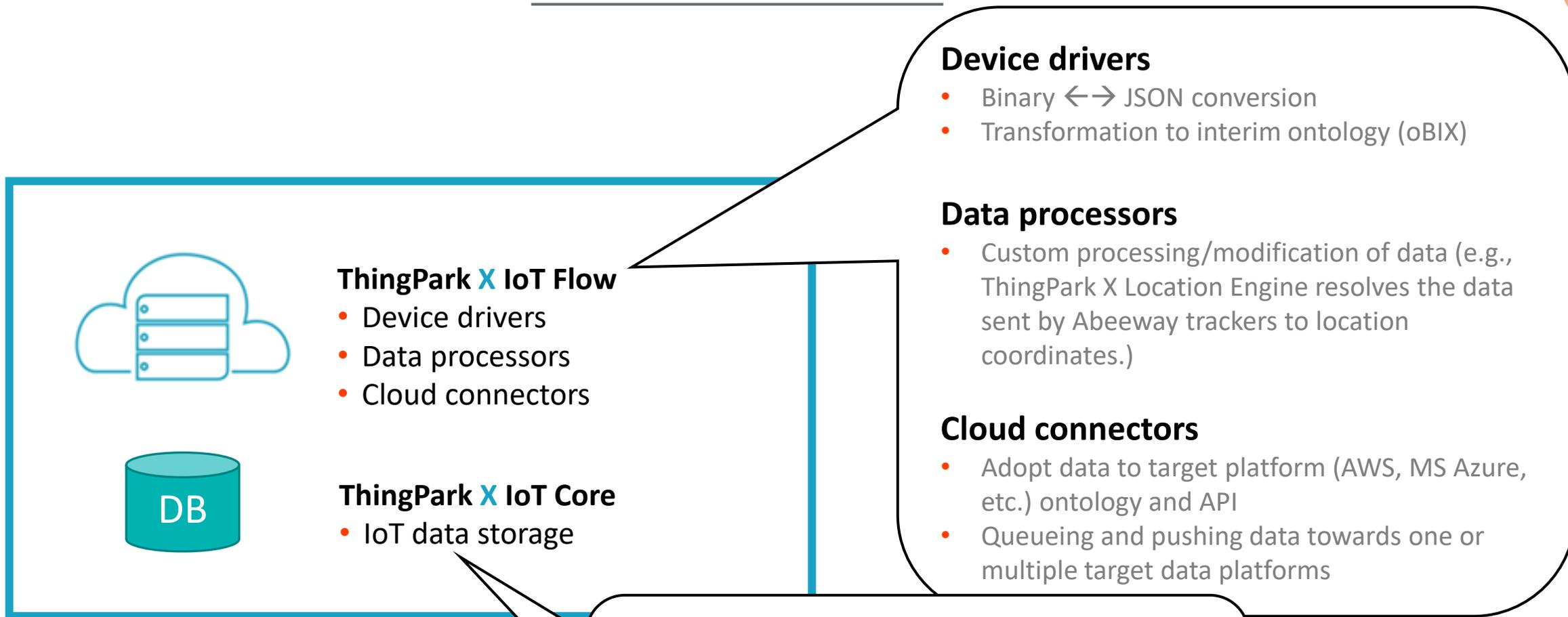


Works as SaaS and OCP
Embedded in ThingPark Enterprise

Serving Multiple LPWAN Types



ThingPark X Components



oBIX: Open Building Information Exchange (obix.org, OASIS)

ThingPark X IoT Core offers a flexible IoT data storage that can be accessed by external application servers through its REST API

Drivers

```
{
  bytes: 1231AB823C349DA1
  fPort: 1
}
```



```
/**
 * Decode uplink
 * @param {Object} input - An object provided by the IoT Flow framework
 * @param {number[]} input.bytes - Array of numbers as it will be sent to the device
 * @param {number} [input.fPort] - The fPort on which the downlink must be sent
 * @returns {Object} The decoded object
 */
function decodeUplink(input) {}

/**
 * @typedef {Object} EncodedDownlink
 * @property {number[]} bytes - Array of numbers as it will be sent to the device
 * @property {number} fPort - The fPort on which the downlink must be sent
 */
/**
 * Downlink encode
 * @param {Object} input - An object provided by the IoT Flow framework
 * @param {Object} input.message - The higher-level object representing your downlink
 * @returns {EncodedDownlink} The encoded object
 */
function encodeDownlink(input) {}

/**
 * Downlink decode
 * @param {Object} input - An object provided by the IoT Flow framework
 * @param {number[]} input.bytes - Array of numbers as it will be sent to the device
 * @param {number} [input.fPort] - The fPort on which the downlink must be sent
 * @returns {Object} The decoded object
 */
function decodeDownlink(input) {}
```

Driver (JavaScript)



JSON (free form)

```
{
  "temp": 39,
  "humSens": 60,
  "battery": 20,
  "latitude": 10.32,
  "longitude": 40.33
}
```

```
{
  "temperature": {
    "unitId": "Cel",
    "type": "double",
    "record": 39.3
  },
  "humidity": {
    "unitId": "%RH",
    "type": "double",
    "record": 60.1
  },
  "batteryLevel": {
    "unitId": "%",
    "type": "double",
    "record": 20.2
  },
  "location": {
    "unitId": "Gps",
    "type": "object",
    "record": [10.32, 40.33]
  }
}
```

JSON (using oBIX schema)

Drivers in Action

The screenshot displays the Activity dashboard interface. At the top, there is a navigation bar with the Activity logo, a 'Devices' dropdown menu, a search bar, and links for Marketplace, Notifications, Help, Contact Us, and My Account. Below the navigation bar, a sidebar on the left contains a menu with items: Dashboard, Base Stations, Devices, List, Adeunis, Create, Import, Drivers, Connections, and Manage. The main content area shows a table with columns: Information, Status, Connections, Location, Radio Traffic History, Radio Statistics, Last 10 Packets, and No uplink activity alarm settings. A tooltip is visible over the 'No uplink activity alarm settings' column, containing the text 'Go to No uplink activity alarm settings'. The table row shows a device with a status of 'PR', 147 connections, location 'Today - 13:24:01', a 'DATA' button, 1 packet, -115 dBm signal strength, -7.2 dB, and SF12. Below the table, the 'Decoded Payload' section shows a JSON object with various fields including temperature, GPS coordinates, quality, and frame counters. There are 'RAW' and 'PREVIEW' buttons next to the payload.

Information	Status	Connections	Location	Radio Traffic History	Radio Statistics	Last 10 Packets	No uplink activity alarm settings
Dashboard	PR	167	Today - 13:24:03			1	Foreign BS
Base Stations	PR	147	Today - 13:24:01	DATA		1	Foreign BS

```

Decoded Payload:
{
  "triggeredByAccelerometer": false,
  "triggeredByPushbutton": false,
  "temperature": 26,
  "gps": {
    "latitude": {
      "hemisphere": "NORTH",
      "degrees": 41,
      "minutes": 7.348
    },
    "longitude": {
      "hemisphere": "EAST",
      "degrees": 29,
      "minutes": 3.04
    },
    "quality": "POOR",
    "satellites": 7
  },
  "uplinkFrameCounter": 176,
  "downlinkFrameCounter": 146,
  "batteryLevel": 3.765,
  "rssi": -8,
  "snr": 6
}
    
```

Driver Library

System drivers

Developed by device makers, Activity

More than 180 models from market-leading device manufacturers



Custom drivers



Import from 3rd-party libraries (TTN, Chirpstack)

Drivers (to-be) developed according to (upcoming) LoRa Alliance standard API

Build Your Own Driver!



Develop

By following guidelines

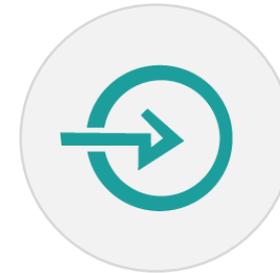
github.com/activity/thingpark-iot-flow-js-driver



Test

On ThingPark Community Platform

community.thingpark.io



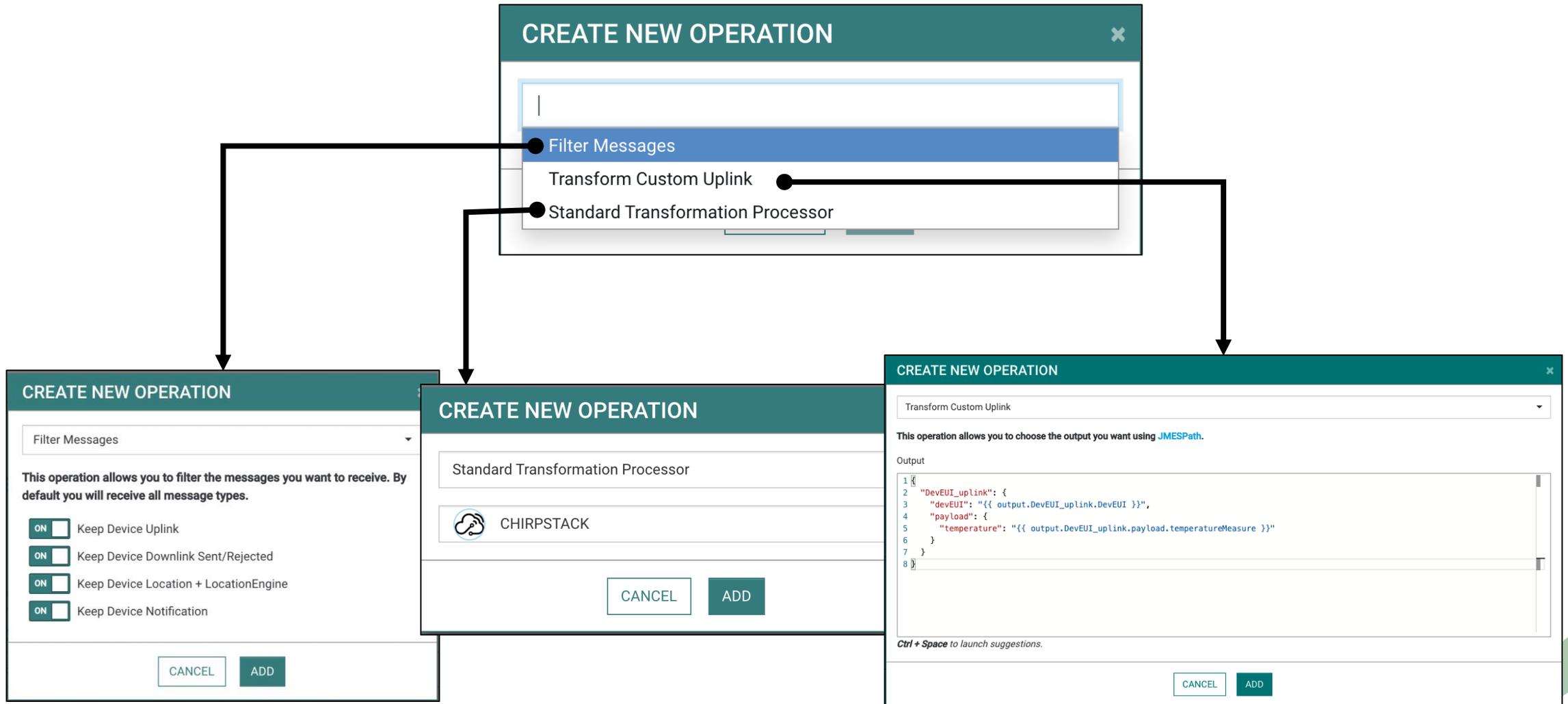
Submit

Via ThingPark Community Portal, publish to reach 100s of networks around the world

community.thingpark.org/index.php/device-maker/

The image shows a collage of three screenshots related to the driver development process. On the left is a README.md file titled "IoT Flow JavaScript driver developer guide" with a table of contents including Concepts (Driver, Thing, Point, Application, Uplink, Downlink), API (Driver definition, Driver functions), and Examples (Simple driver, Advanced driver). In the center is a screenshot of the "Activity" web interface showing a "CREATE A NEW DRIVER" form with a code editor containing JavaScript code for decoding and encoding uplinks and downlinks. On the right is a screenshot of the "Submit your ThingPark X IoT Flow Driver" form on the ThingPark Community portal, which includes fields for driver name, version, protocol version, developer information, and a file upload section for the driver package.

Processor (Operation)

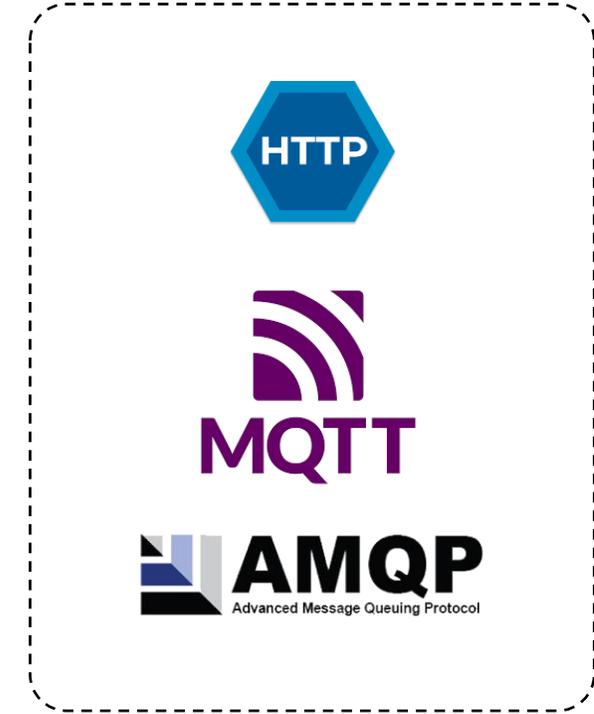


Connectors

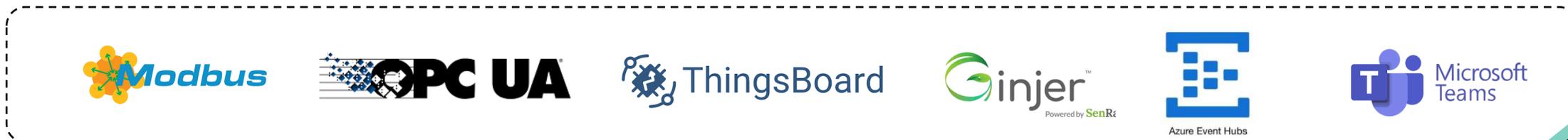
App Platform Connectors



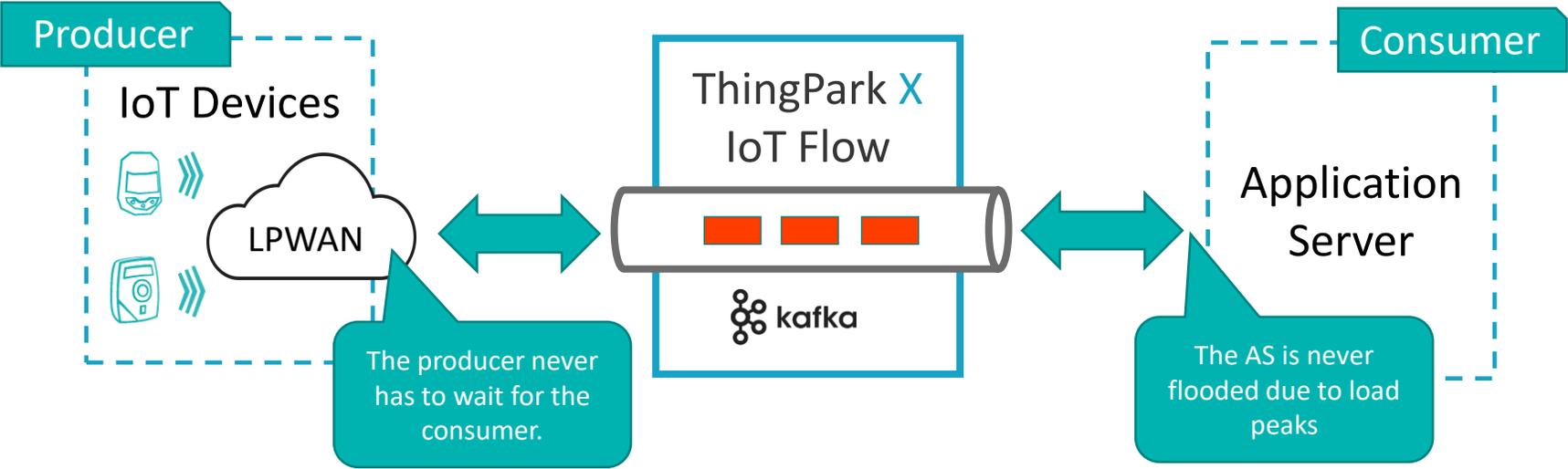
Basic Connectors



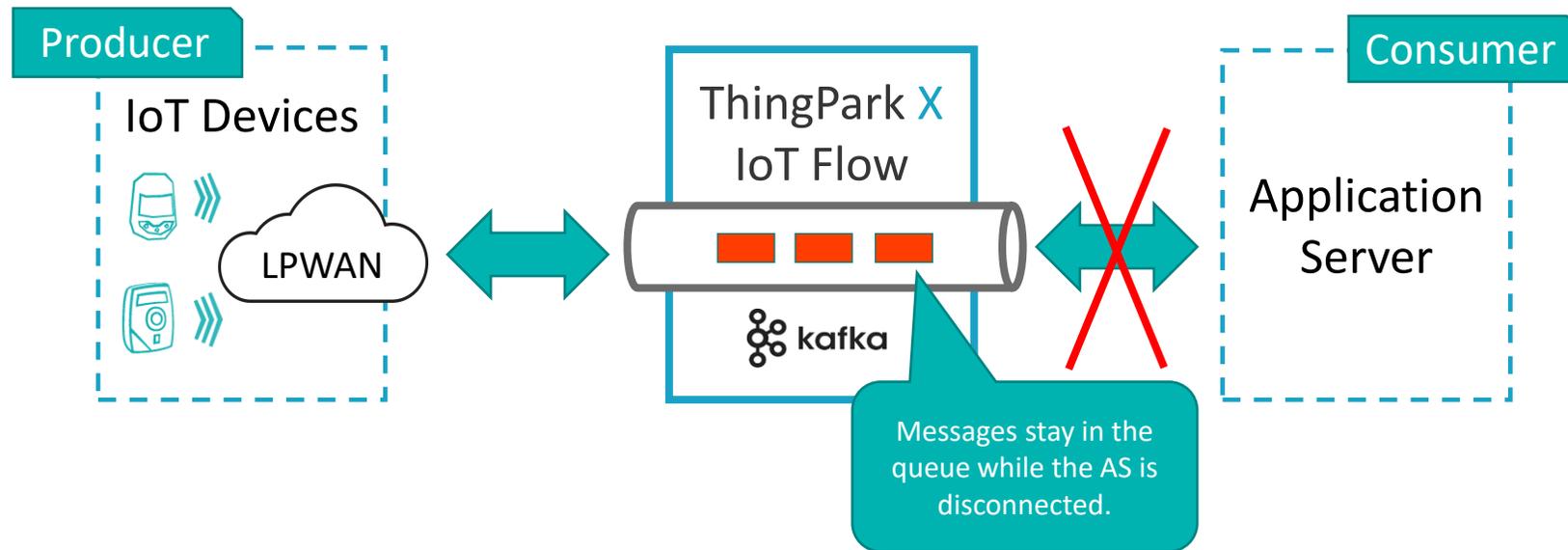
Coming soon...



Flow Management



Fault Tolerance



Example Case:

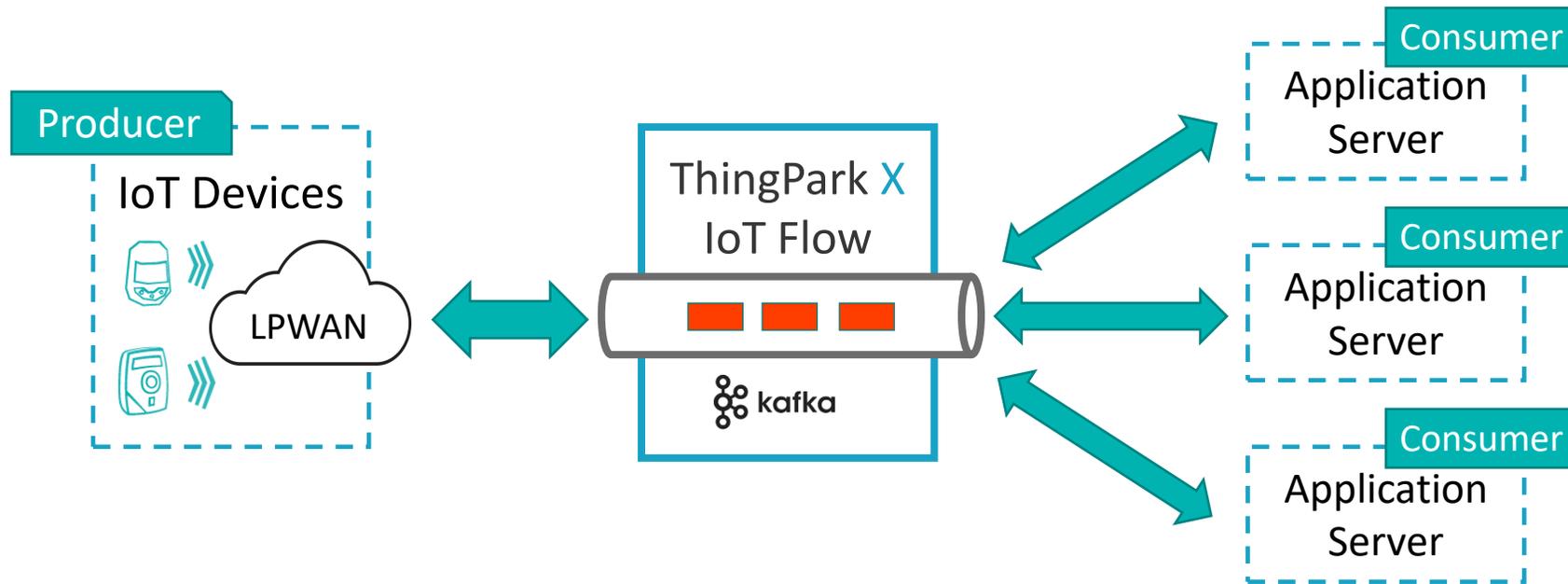
- An AS is receiving messages from 10k devices
- Devices are sending messages in every 5 min

N. of lost messages in case of 2 hours outage w/o message queuing:

- $10k * 2 * 60 / 5 = \mathbf{240\ k}$

Upon recovery of service, the system will apply **Flow Control** to prevent the AS being flooded.

Replication and Load Balancing



Try with ThingPark Community Platform!

The image displays two overlapping browser windows. The background window shows the main homepage of the ThingPark Community platform at community.thingpark.org. The page features a green header with navigation links: 'Get Started', 'Journeys', 'Solution Catalog', 'Get Support', and a 'Sign Up' button. The main content area has a large green banner with the text 'ThingPark Community Connecting the LoRaWAN™ ecosystem' and a 'Join ThingPark Community' button. The foreground window shows the 'Activity' dashboard at community.thingpark.io/tpc/#/connections/create. This dashboard includes a sidebar menu with options like 'Dashboard', 'Base Stations', 'Devices', 'Connections', 'List', 'Create', and 'Manage'. The main content area is titled 'CREATING A CONNECTION' and prompts the user to 'Select a Connection Type*'. Two options are visible: 'ThingPark X IoT Flow' (highlighted with a blue border) and 'Basic HTTPS'. The 'ThingPark X IoT Flow' option includes a 'TPX' logo and a detailed description of its asynchronous dataflow capabilities. The 'Basic HTTPS' option includes a 'https://' logo and a description of its support for HTTPS-based connections.

community.thingpark.org

Resources

Documentation: docs.thingpark.com

Cookbooks: community.thingpark.org/iot-solutions-catalog/blog

Gateways & devices: market.thingpark.com

ThingPark Community Platform: community.thingpark.org

Q&A: iot.stackexchange.com/questions/tagged/thingpark-x



Q & A

Question and Answers



Activity