ADLINK

Leading EDGE COMPUTING

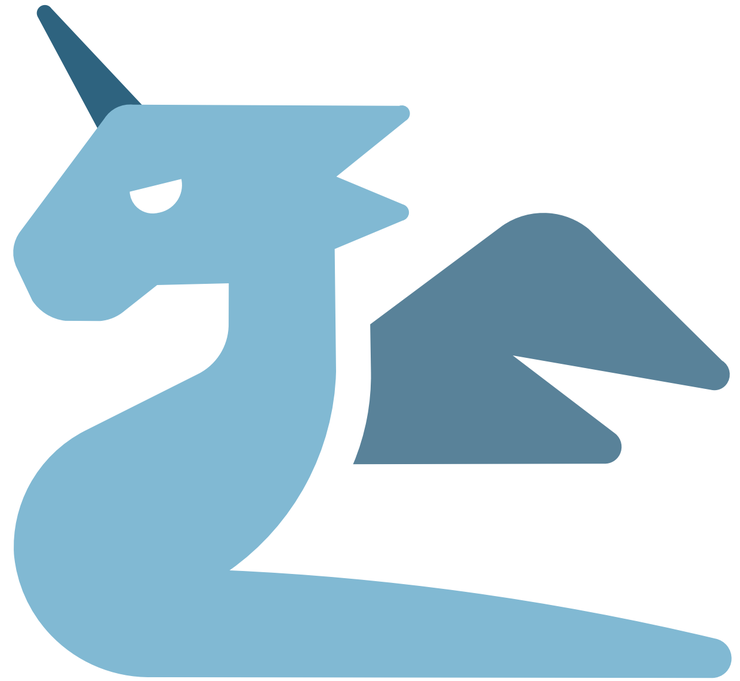
Advanced Technology Office

Olivier Hécart

ADLINK Tech. Inc.
olivier.hecart@adlinktech.com

ATO

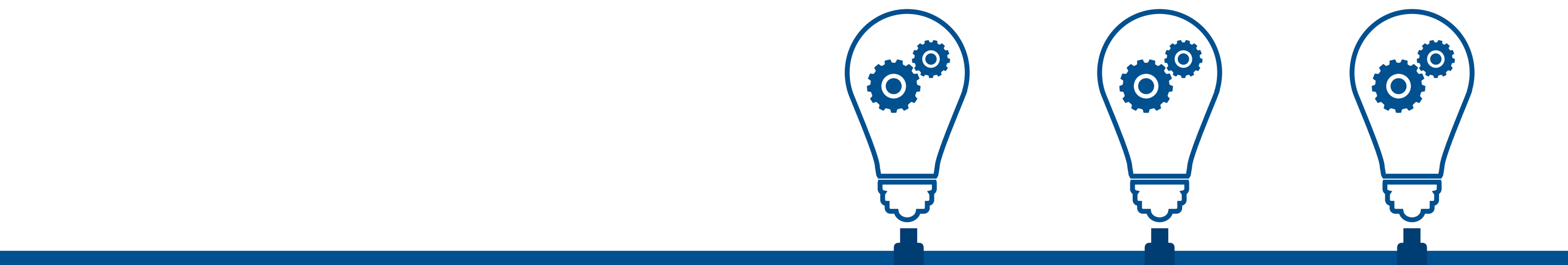
Innovating Together



zenoh

ATO

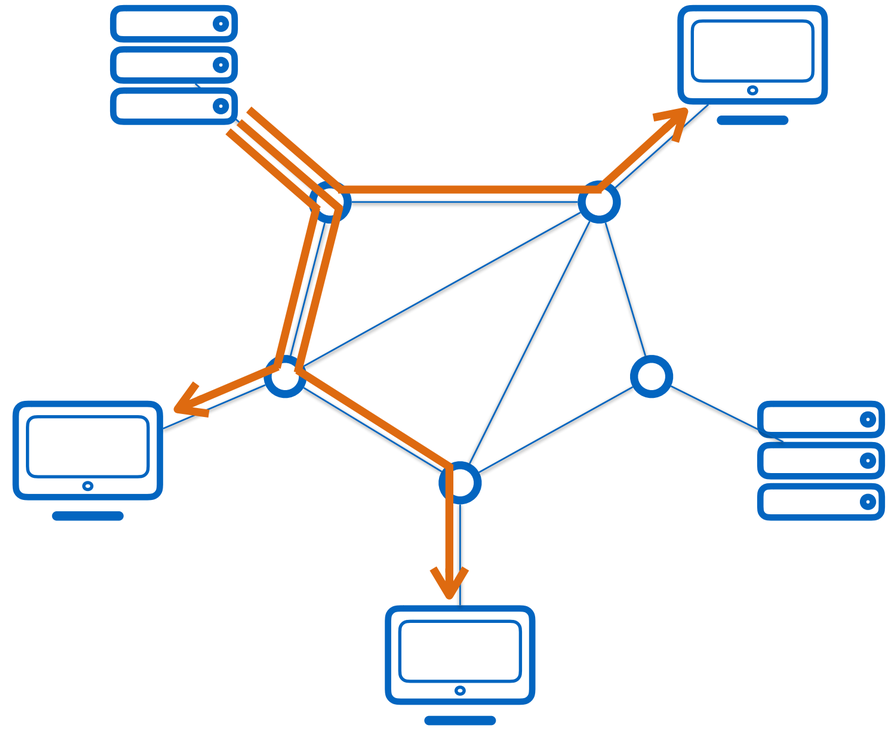
Conceptual model



Host-centric vs Data-centric

For historical reasons, internet has been built on a **host-centric** communication model.
(**machine-to-machine**)

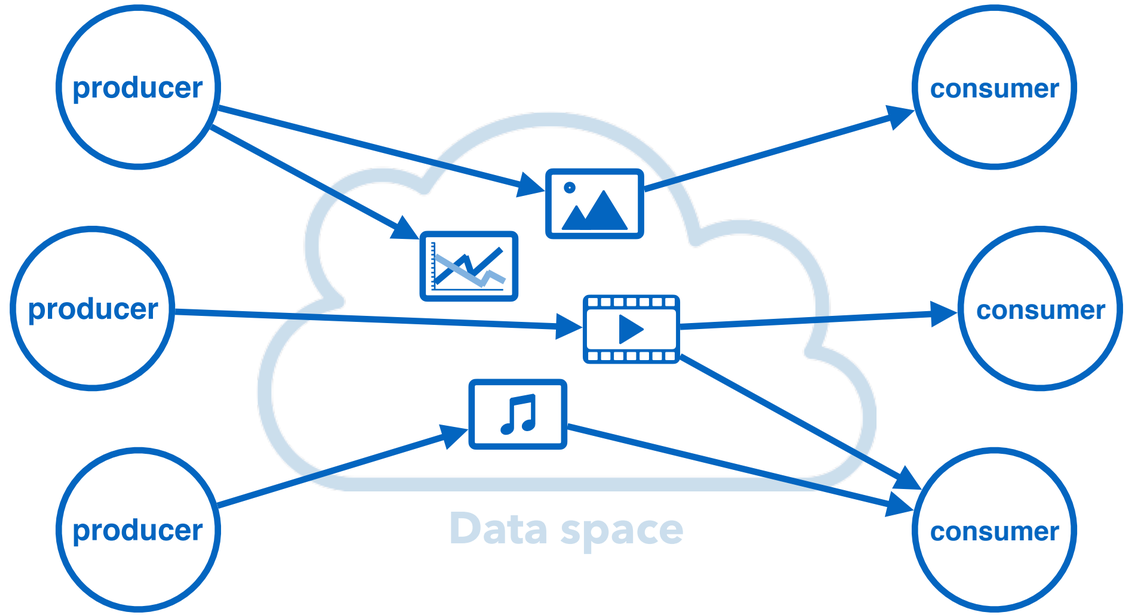
But what matters to the user is the **data** not as much who has it…



The **diffusion** of the same data to multiple consumers is very **inefficient**.

Conceptual Model

zenoh provides a **data-centric** abstraction in which **applications** can **produce** and **consume data autonomously** and **asynchronously**.



URI based data organisation

- Data is organised as a **Key/Value space**.

- Keys follow an **URI scheme**.

```
/myhouse/floor01/musicroom/LightStatus
/myhouse/floor02/musicroom/LightStatus
/myhouse/floor02/bedroom/erik/LightStatus
```

- **Data sets** can be identified using **wildcards**.

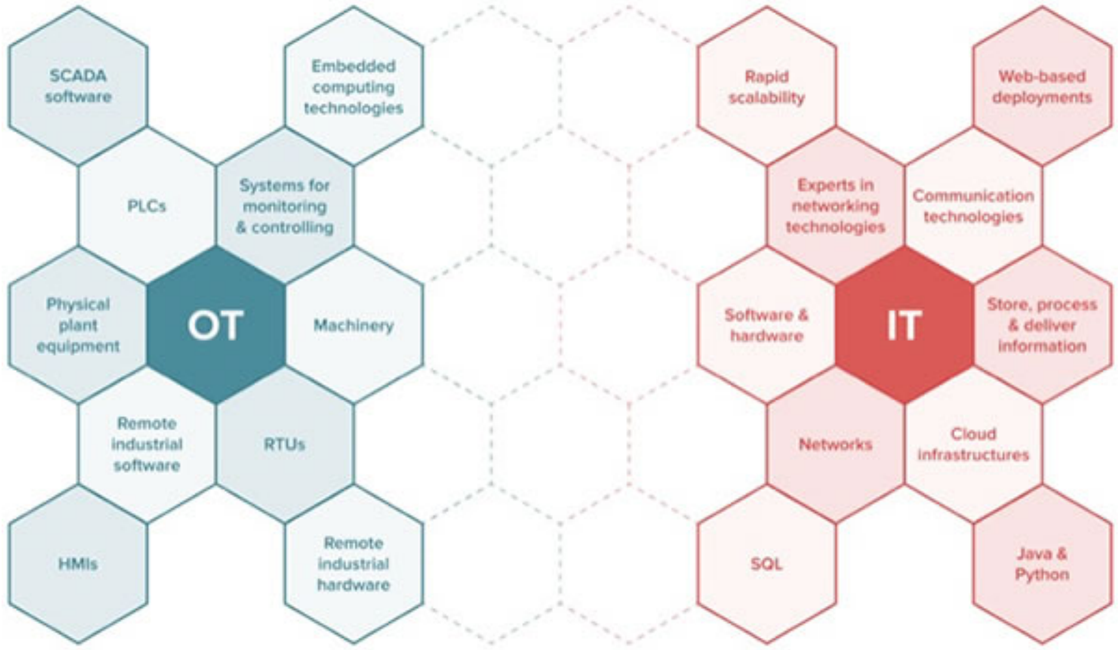
```
/myhouse/floor02/bedroom/*/LightStatus
/myhouse/floor*/bedroom/*/LightStatus

/myhouse/**
/myhouse/**/LightStatus
```

IT/OT Convergence

Push/Pull

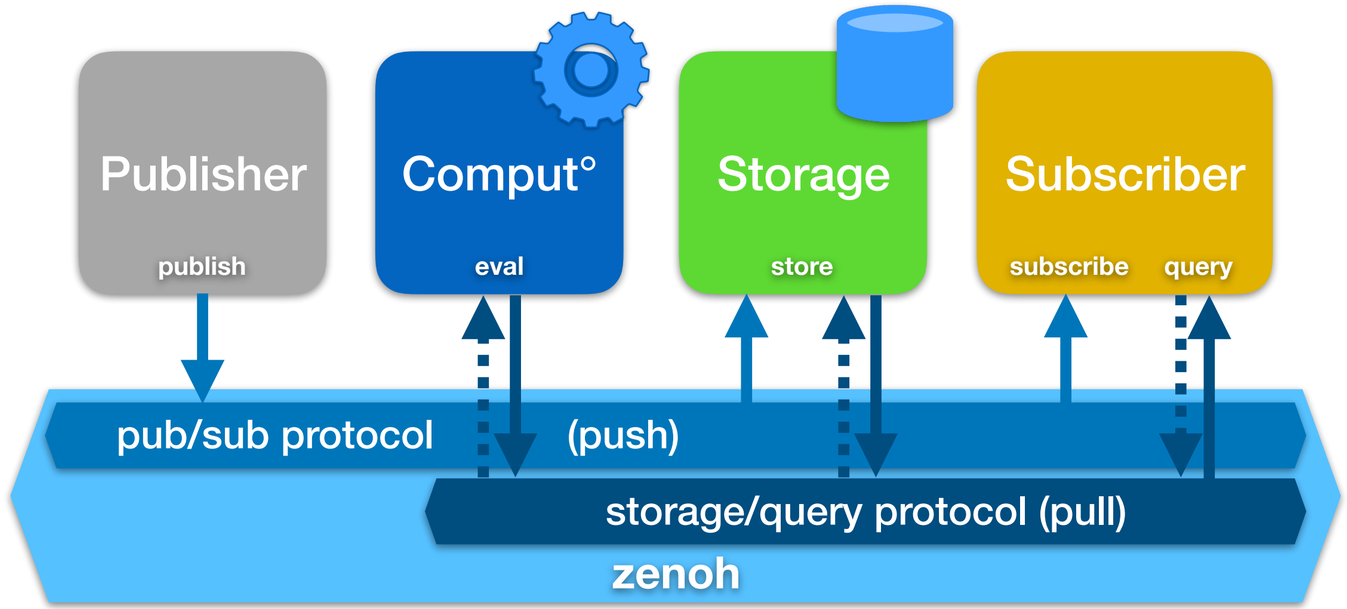
The convergence between **IT** and **OT** is creating an increasing need to properly integrate the traditional data-at-rest **query-based** IT world with the Data in Motion, **pub/sub oriented** OT world



Conceptual Model

Data can be

- **pushed** to **subscribers** and **storages**
- **computed** on demand
- **queried** from **storages** and **evals**



Data at rest

Cloud-Based Solution

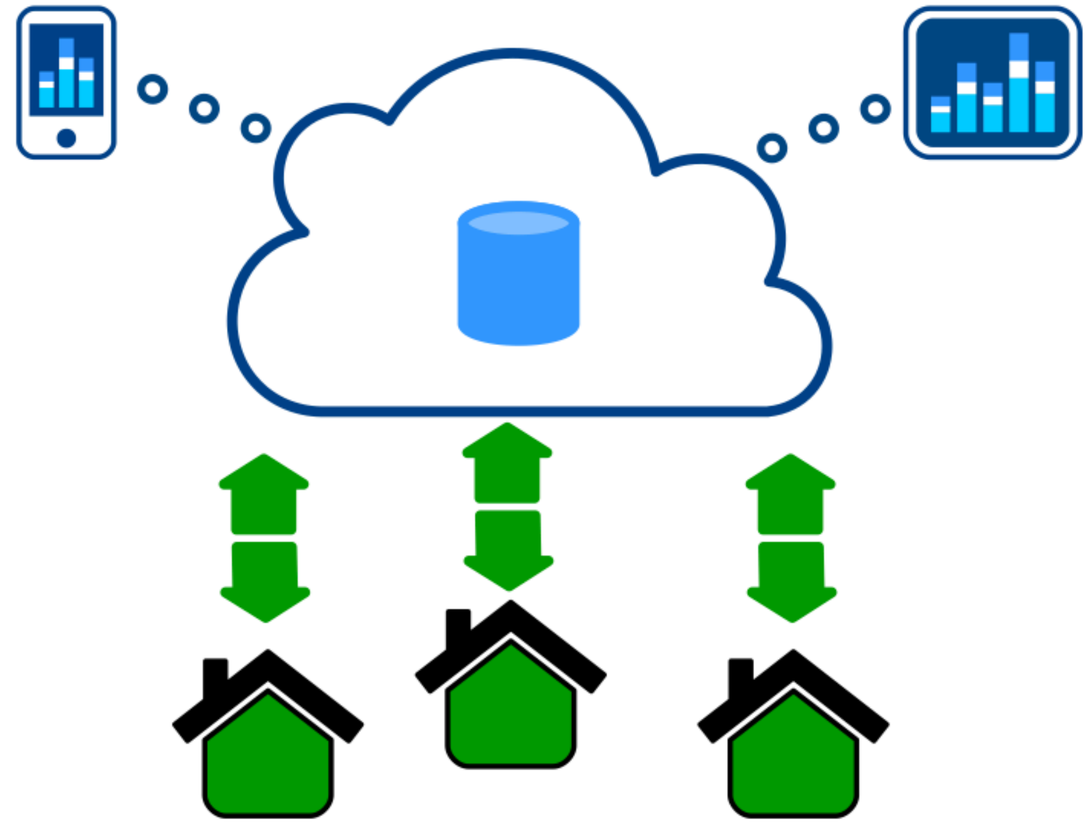
One common approach is to use the cloud as the place to store and retrieve information.

But what about :

- Latency ?

- Privacy ?

- Connectivity ?

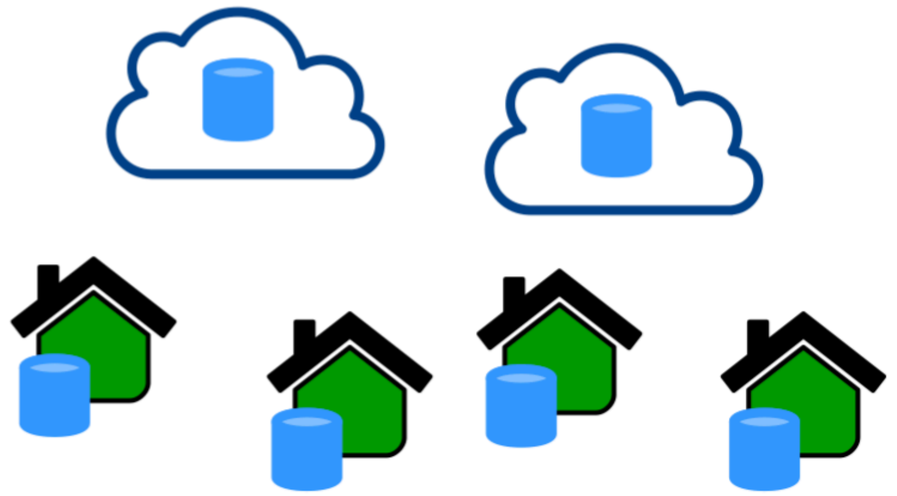


Decentralisation

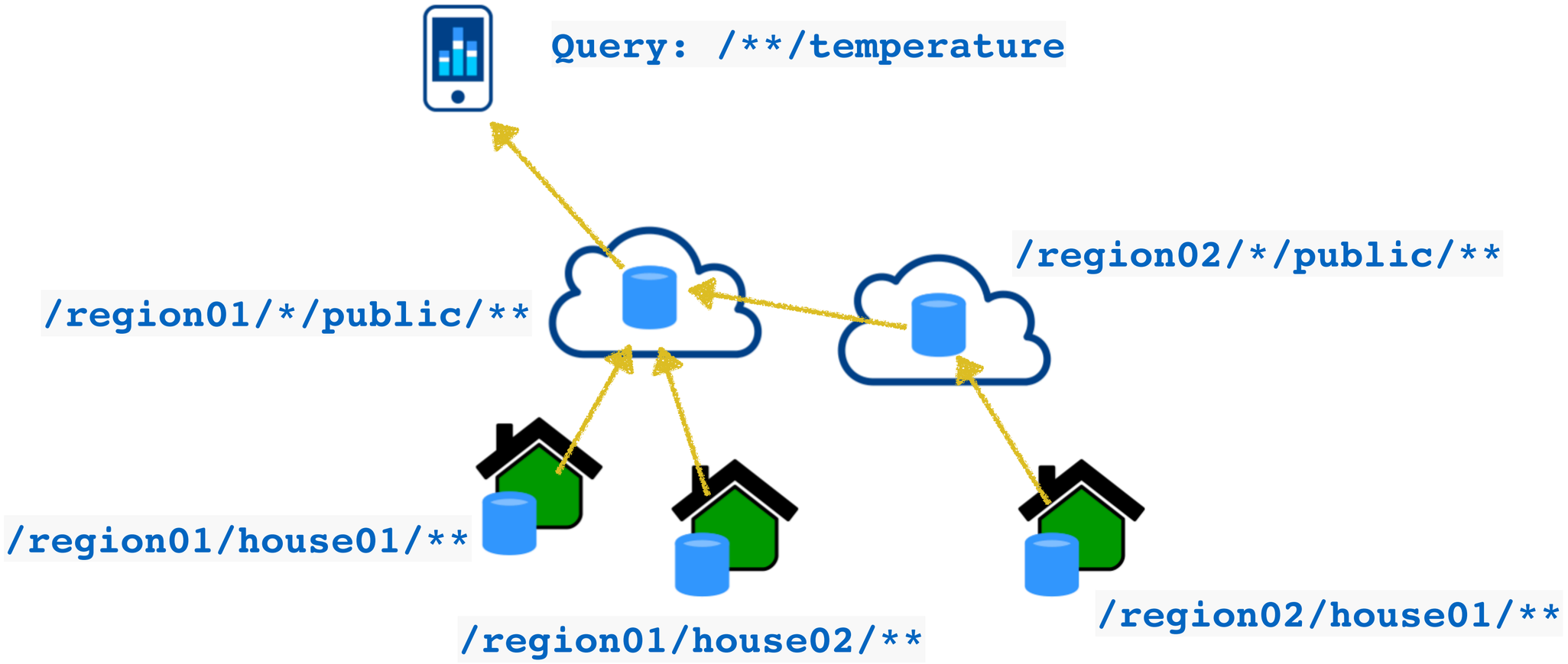
What if we want to keep some of the data locally?

That would make sense from energy, processing ands privacy perspectives

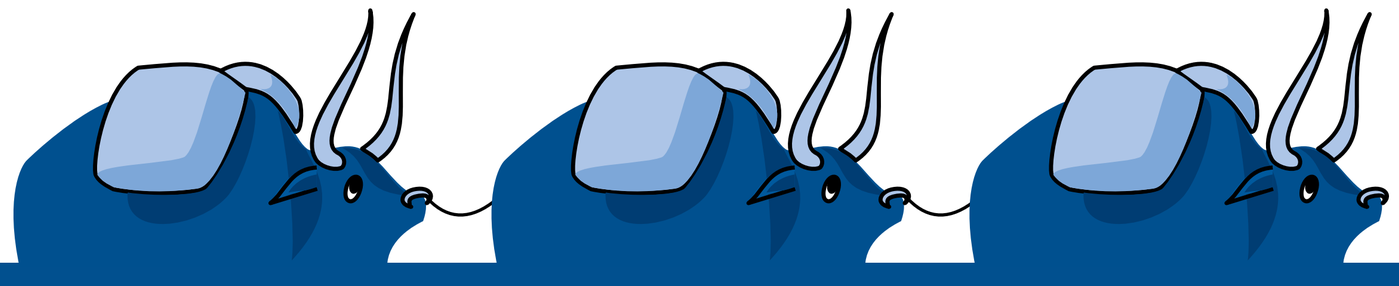
But if we keep data locally, how can we still provide global access to it?



Decentralisation



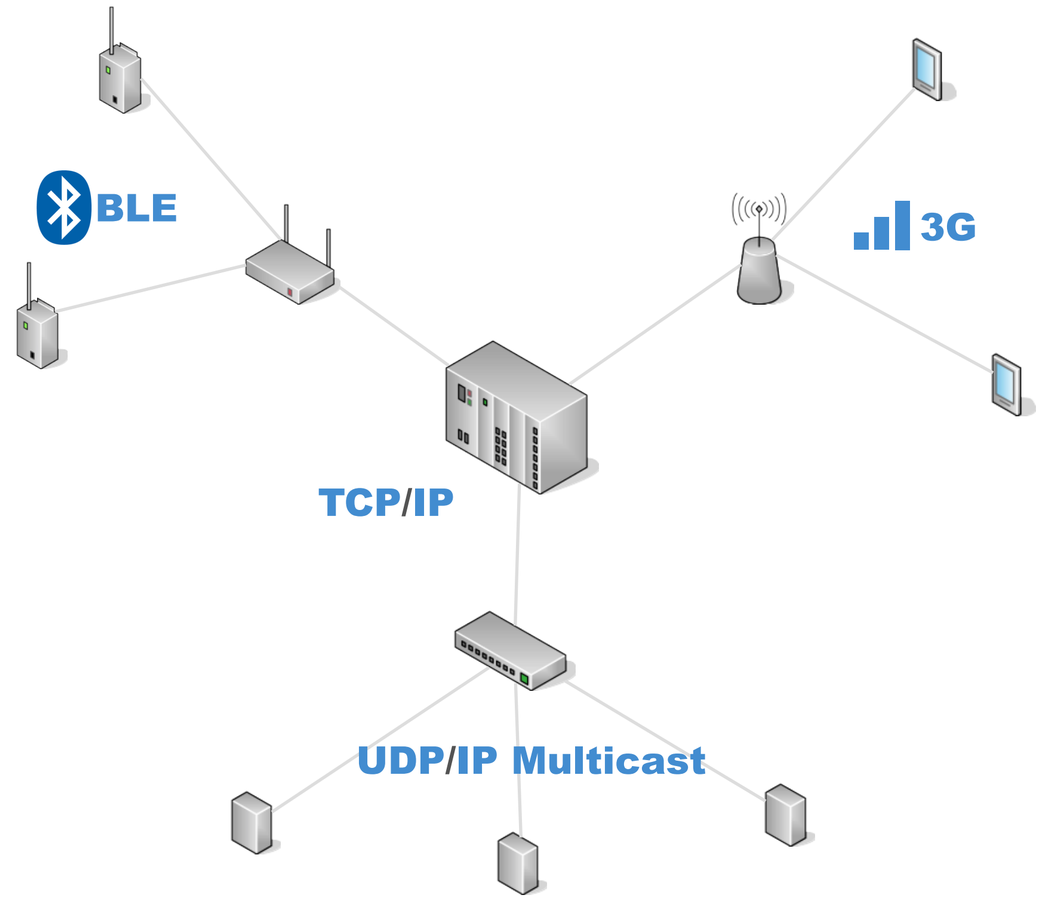
Data in motion



Heterogeneous environment

The different devices connected to the system use very **heterogeneous networking** technologies (TCP/IP, BLE, 3G, 6LowPan, …).

Some endpoints are **extremely constrained** w.r.t computational, communication resources as well as energy.



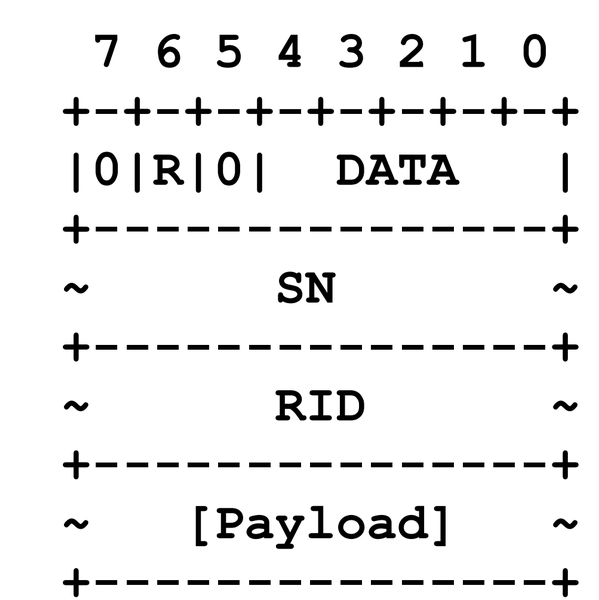
Protocol details

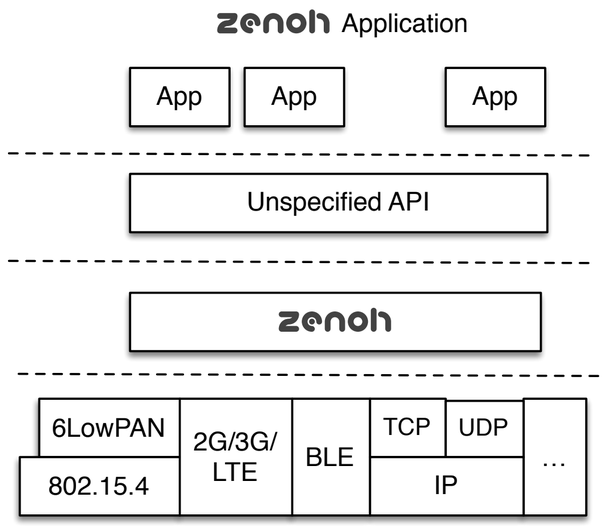
Use of **Variable Length Encoding**.

Minimal **overhead** of **3 bytes** in data messages.

Protocol implementation for a **8-bit micro-controllers** takes **300 Bytes of RAM**.

Independent of underlying **transport**.



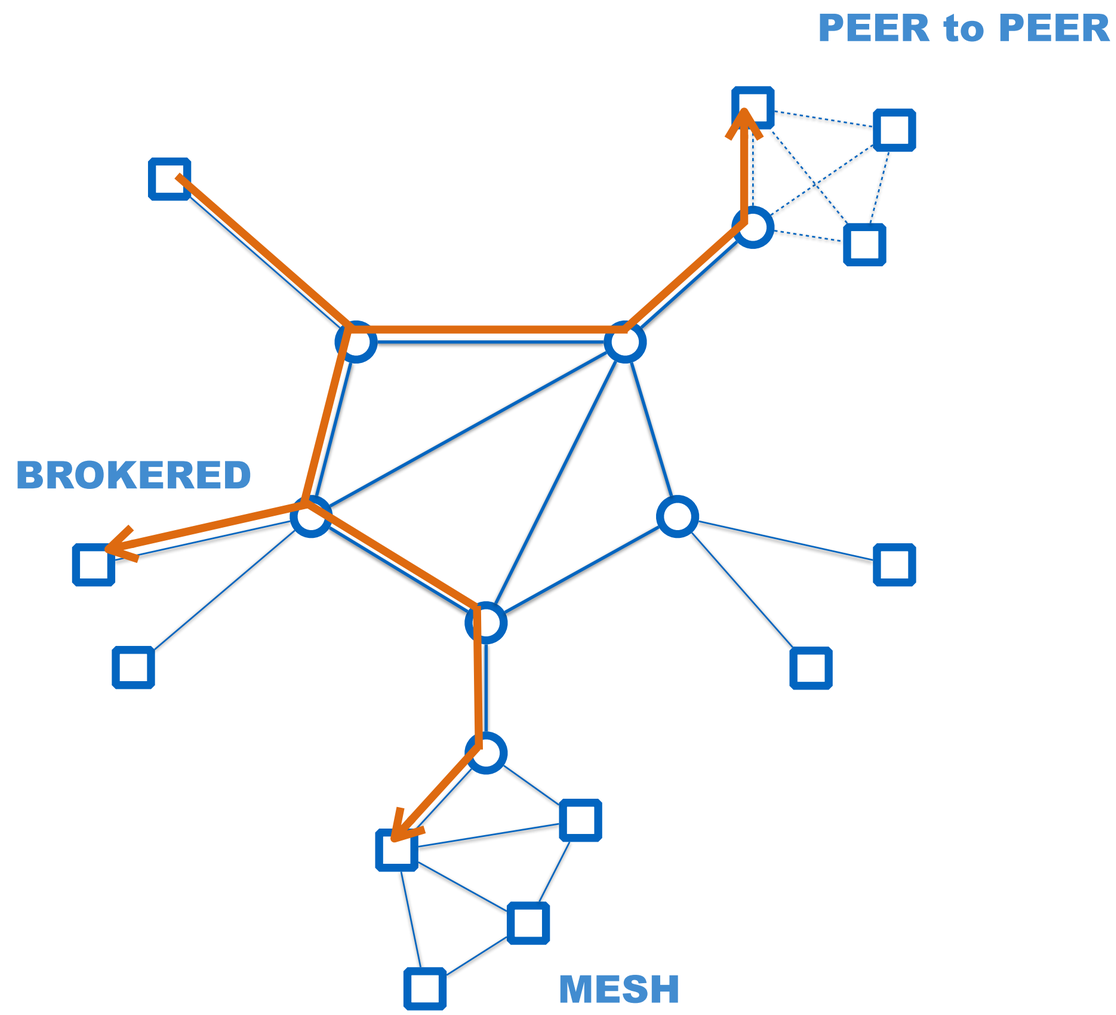


zenoh routers

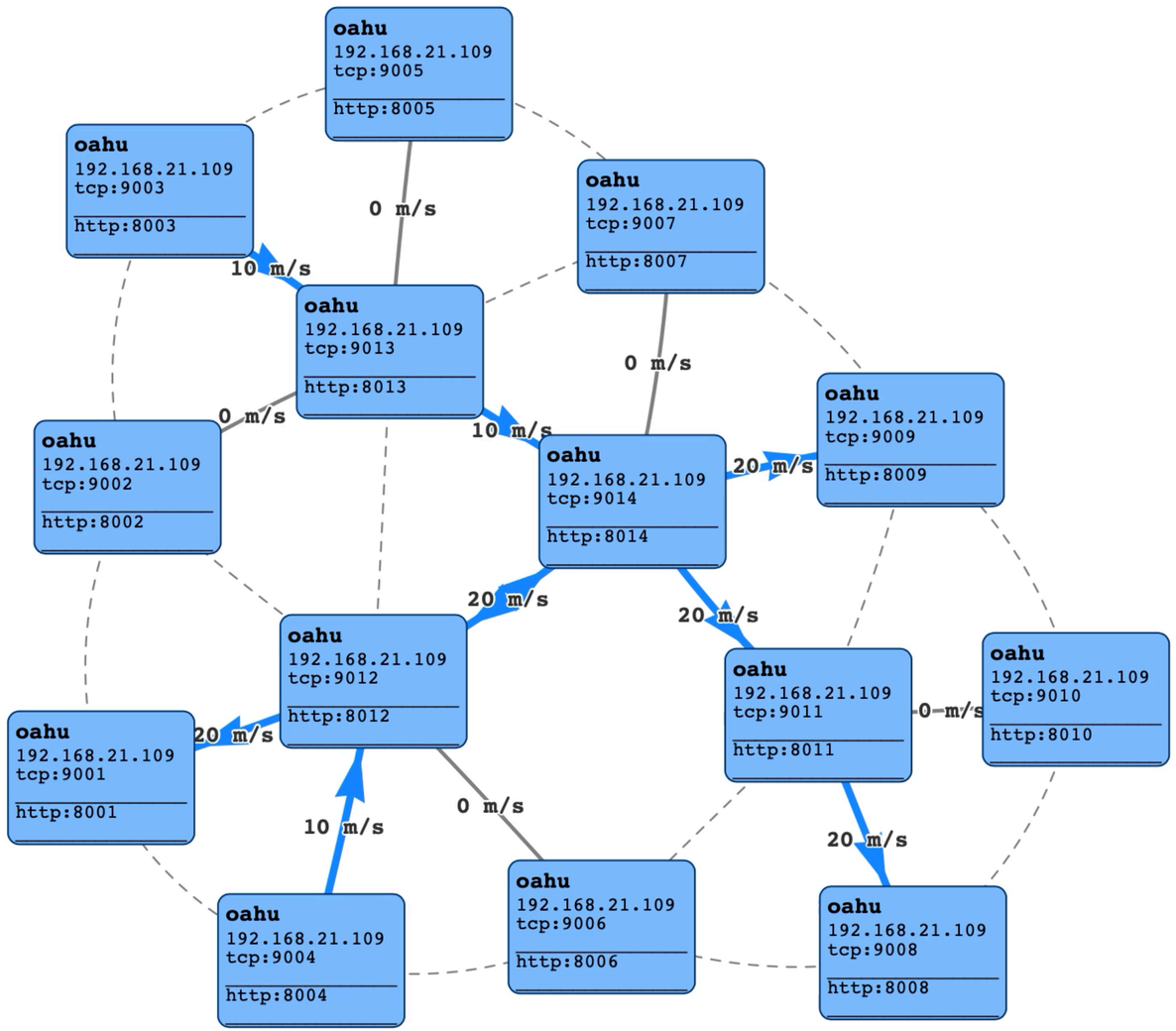
Bring **connectivity** between devices

- in different **subnetworks**
- using different **transports**

Allow **efficient diffusion** of the same data to different devices.



Adaptative & Fault-tolerant Routing



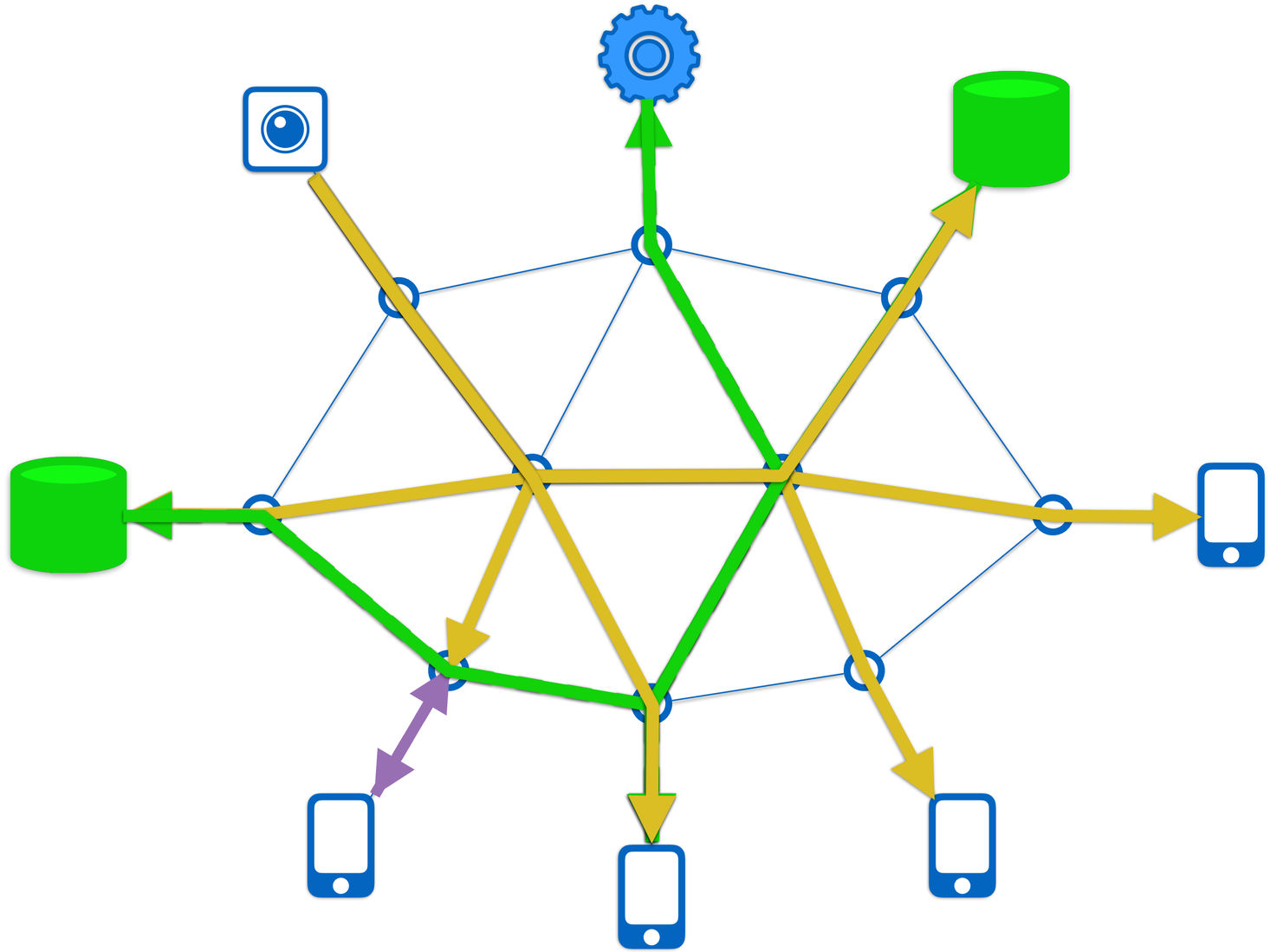
zenoh unifies data in **motion**, data **in-use,**
data at **rest** and **computations**.

It carefully **blends** traditional **pub/sub** with **geo-distributed storages, queries** and **computations**,
while retaining a level of **time and space efficiency**
that is well beyond any of the mainstream stacks.

zenoh

Conceptual Model

Data can be **pushed-to**, **pulled** periodically or asynchronously or **queried-from** storages and evals.



Router plugins

http plugin

Provides access to the zenoh data space through a **REST API**

Offers a web based **adminitration tool**

storages plugin

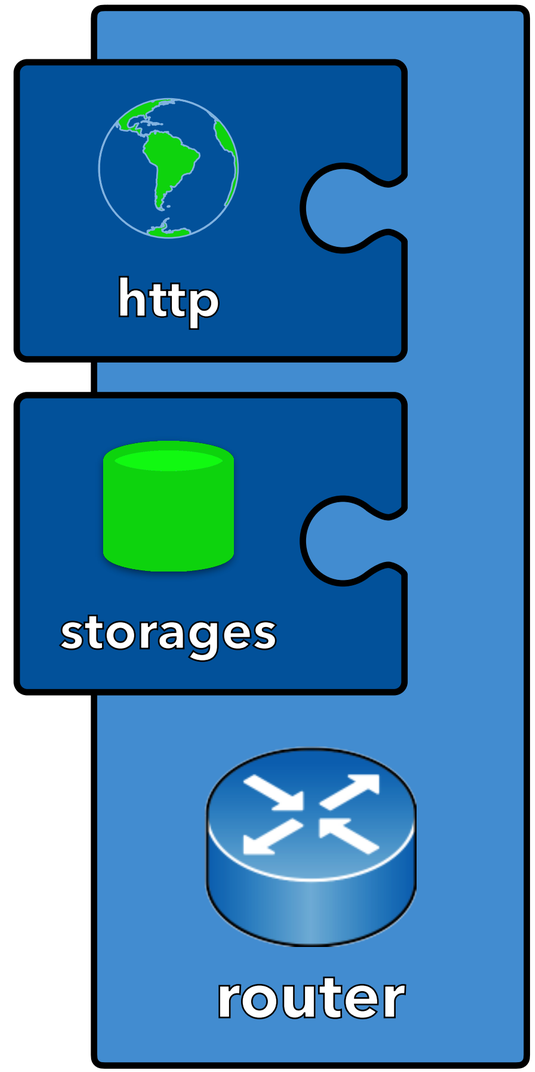
- **Memory**
- **SQL** databases

  SQLite

  MariaDB

  PostgreSQL
- **Time series** databases

  influxdb



Zenoh clients

- **zenoh-c**

- **zenoh-java**

- **zenoh-ocaml**

- **zenoh-go**

- **zenoh-python**

- **zenoh-cat**

A piece of code

Publish :

```
ws = Zenoh.login().workspace()
ws.put('/demo/hello', Value('Hello world'))
```

Subscribe :

```
ws = Zenoh.login().workspace()
ws.subscribe('/demo/**', lambda data: print('received {}'.format(data)))
```

Query :

```
ws = Zenoh.login().workspace()
result = ws.get('/demo/hello?(name=World)')
```

ADLINK

Leading EDGE COMPUTING

Innovating Together

Olivier Hécart

ADLINK Tech. Inc.
olivier.hecart@adlinktech.com