

Easy IoT/Robotic integration with Eclipse Zenoh

Eclipse IoT Day Grenoble - January, 19th 2023

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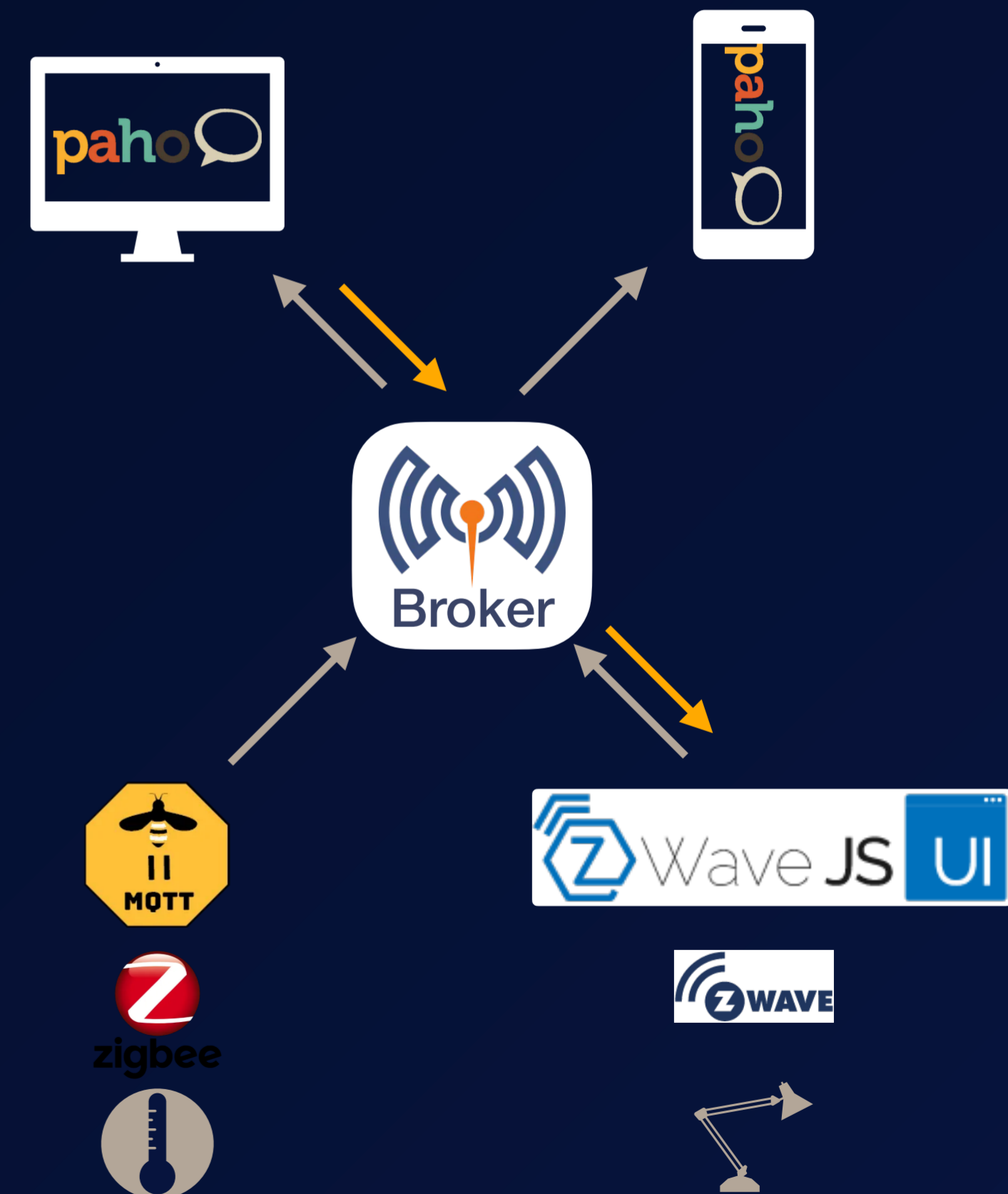
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Which middleware ?

Which middleware for IoT ?

MQTT:

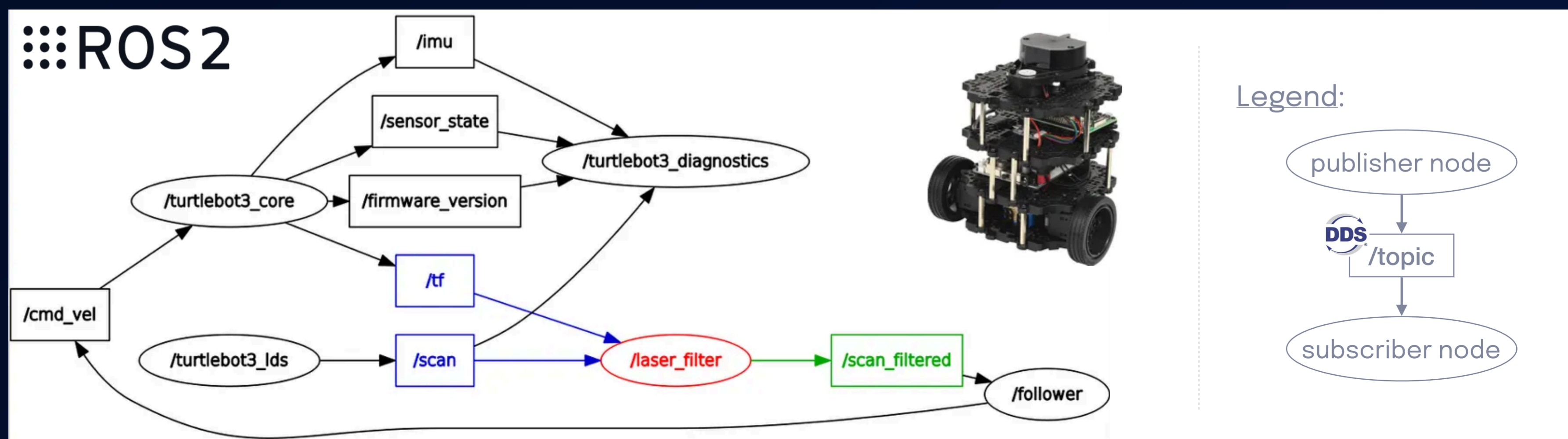
- Used for Consumer IoT and IIoT
- Publish / Subscribe
- Brokered
- Large ecosystem including bridges for IoT protocols
(zigbee2mqtt, ZWave-JS-UI...)
- Open source implementations:
 - *Eclipse Mosquitto (broker)*
 - *Eclipse Paho (client)*



Which middleware for Robotic ?

DDS (used by ROS2):

- Publish / Subscribe
- Peer-to-peer
- Low latency, high throughput
- Open source implementations:
 - *Eclipse CycloneDDS*



Eclipse Zenoh ?



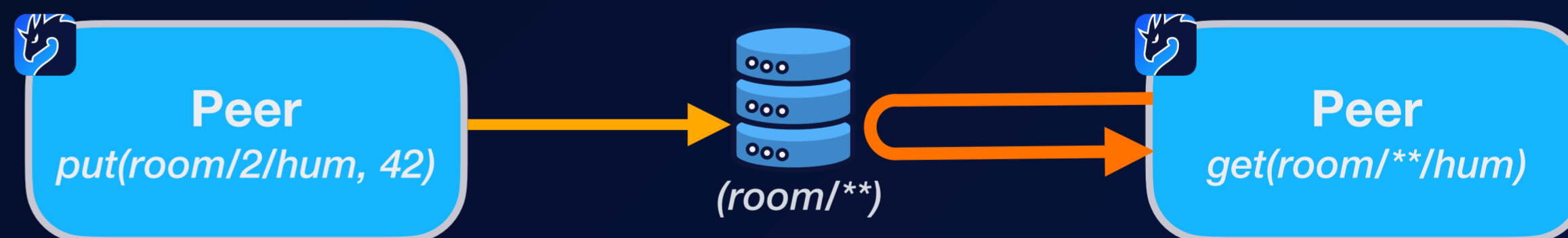
Pub / Sub... but not only!

- Pub / Sub (push)



- Pub / Sub (pull)

- Pub / Store / Get



- Get / Reply



Any topology

Peer-to-peer

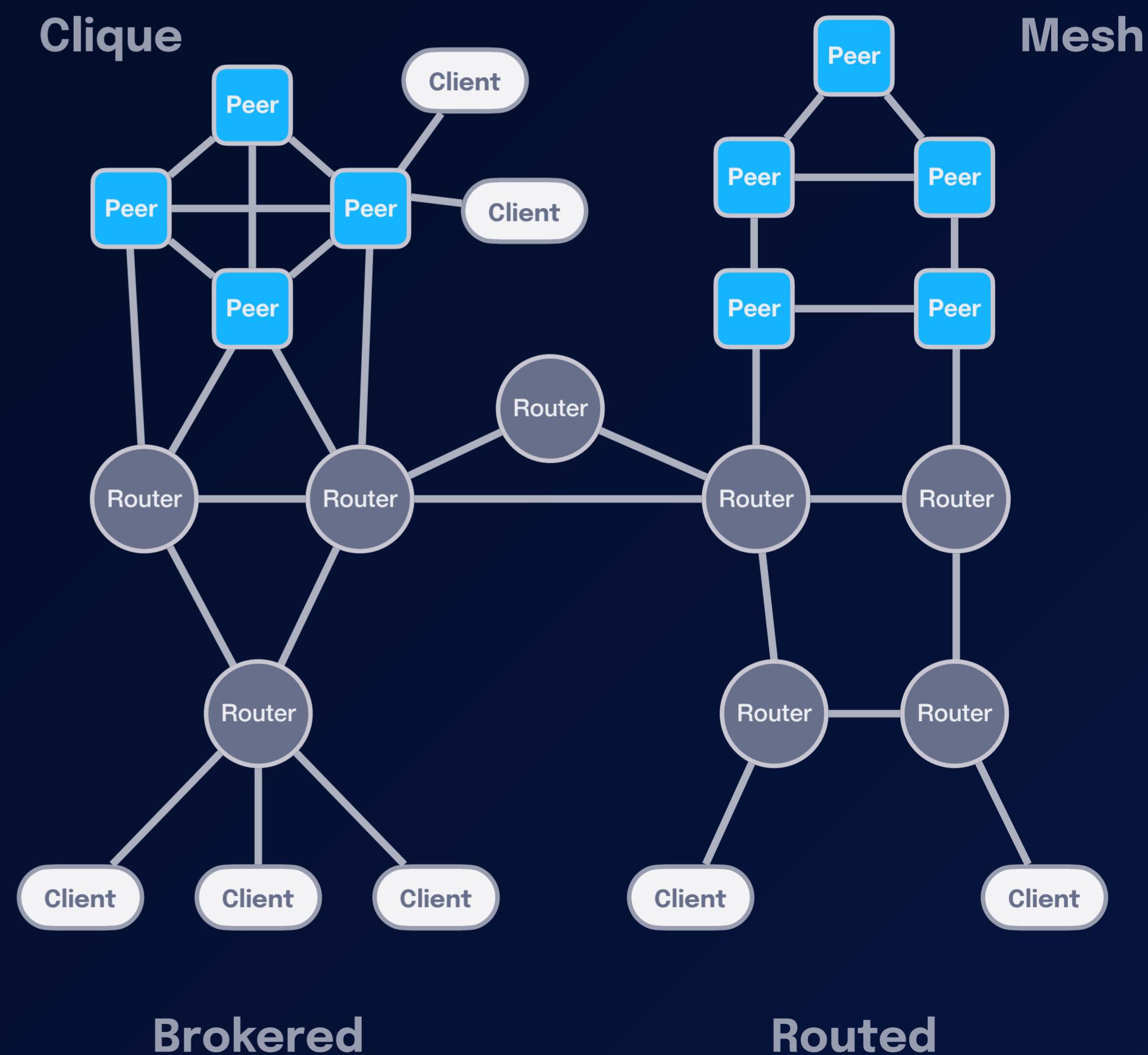
Clique and mesh topologies

Brokered

Clients communicate through a router or a peer

Routed

Routers forward data to and from peers and clients



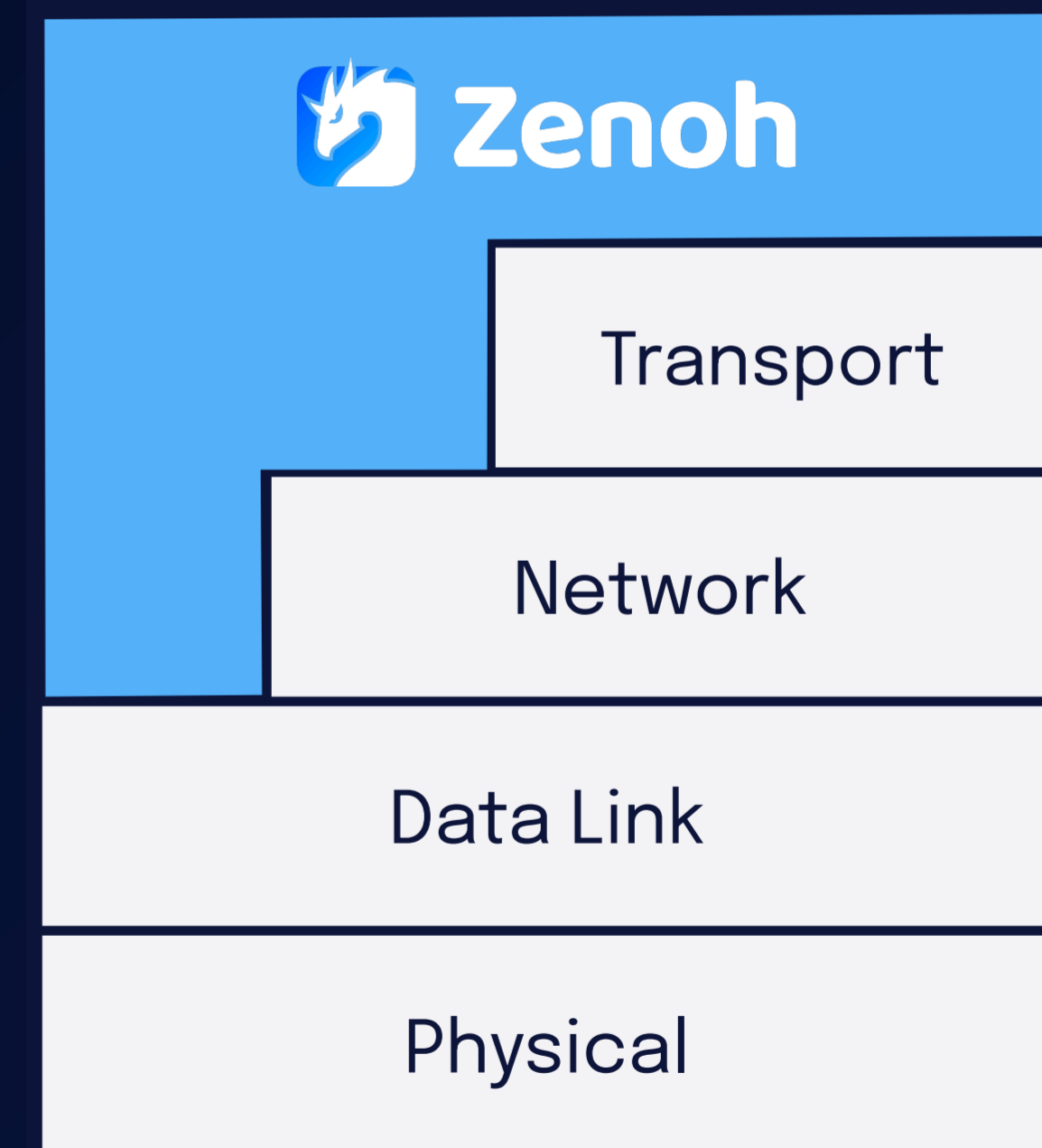
Runs Everywhere

Written in Rust for security, safety and performance

Native libraries and **API bindings** for many **programming languages**, e.g., Rust, C/C++, Python, REST, C# Kotlin

Supports **network technologies** from **transport layer down-to the data link**

Available on **embedded** and **extremely constrained devices** and **networks** – 5 bytes minimal overhead



Zenoh vs. MQTT & Kafka

Zenoh can deliver ~60Gbps which is 15x higher throughput than Kafka and up to 32x than MQTT for 8Kbyte payloads

Zenoh delivers over 60x or higher throughput than MQTT for payload larger than 32Kbytes

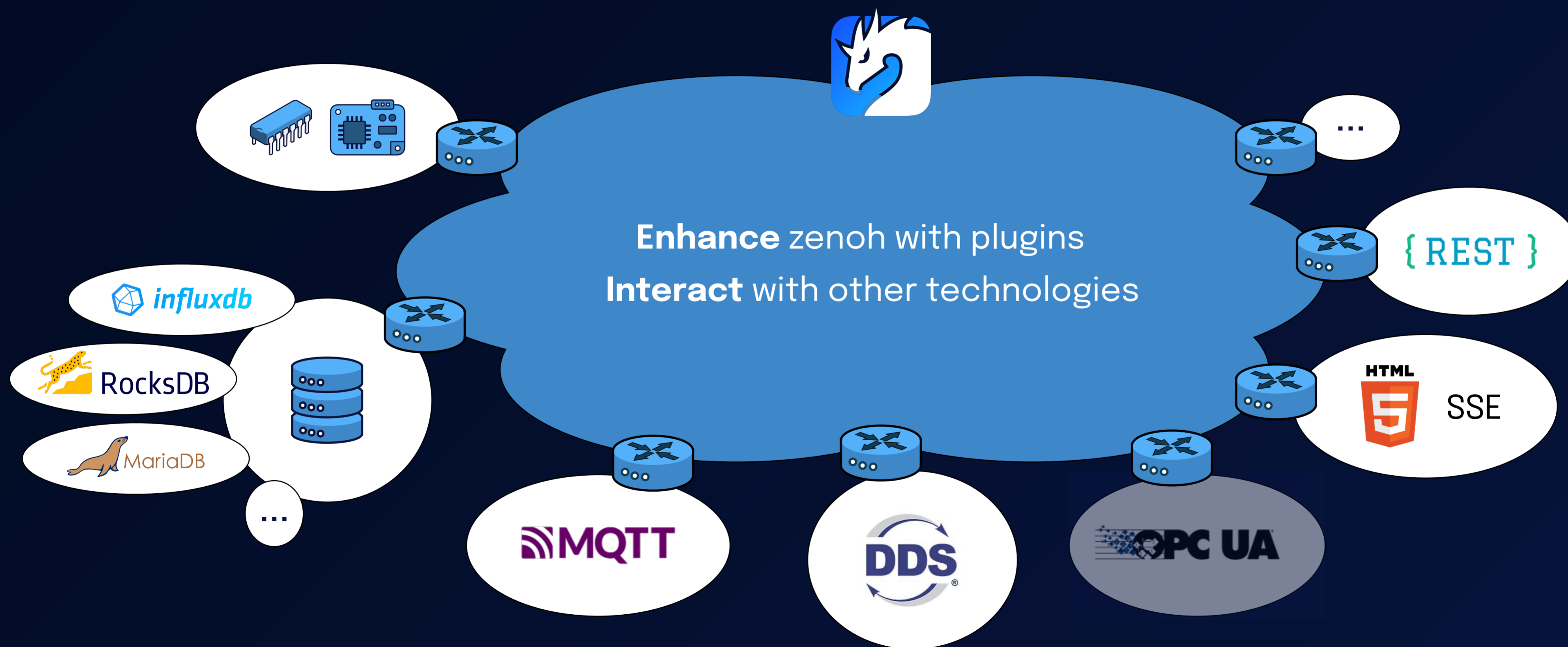
Zenoh's latency 10usec compared to 25usec for MQTT and 75usec for Kafka



Feature Matrix

	DDS	MQTT	Zenoh
Pub/Sub (Push)	✓	✓	✓
Pub/Sub (Pull)	✗	✗	✓
Distributed Query	✗	✗	✓
High Performance	✓	✗	✓
Constrained HW	✗	✓	✓
Constrained Networks	✗	✗	✓
Internet Scale Deployment	✗	✓	✓
Standard Based	✓	✓	✗
QoS	✓	✓	✓
Peer2Peer	✓	✗	✓
Brokered	✗	✓	✓
Routed	✗	✗	✓

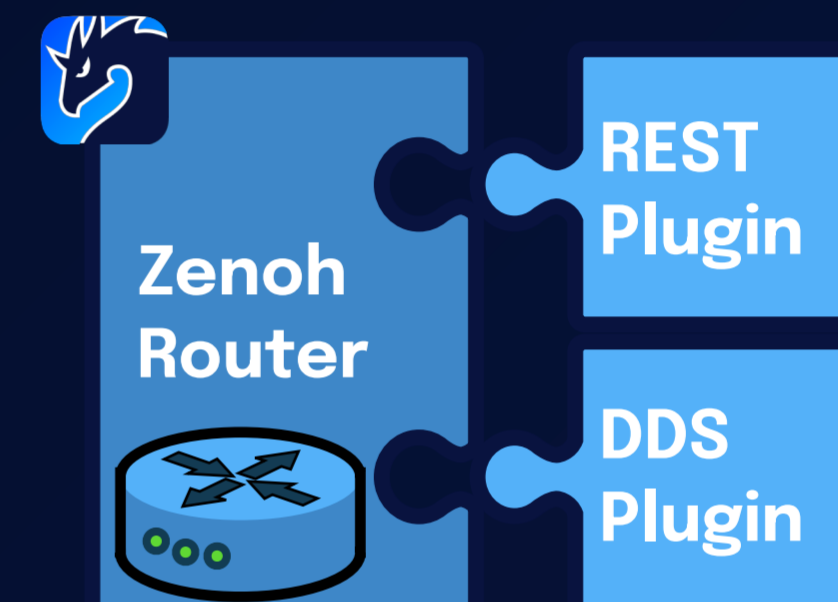
Extensible



Plugin or standalone ?

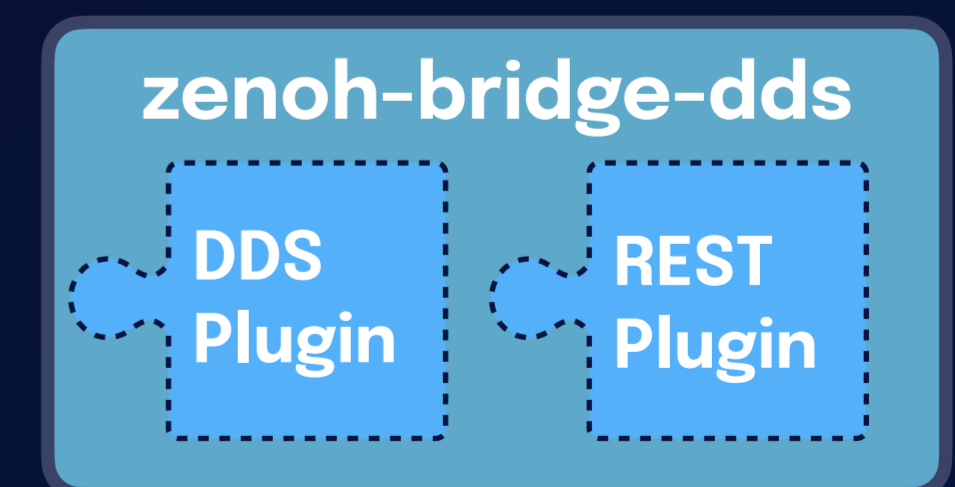
Plugin:

- Dynamic library (in Rust)
- Loaded by a Zenoh router (at startup or at runtime)
- Shares the Zenoh Runtime with the router
=> direct method calls to the router



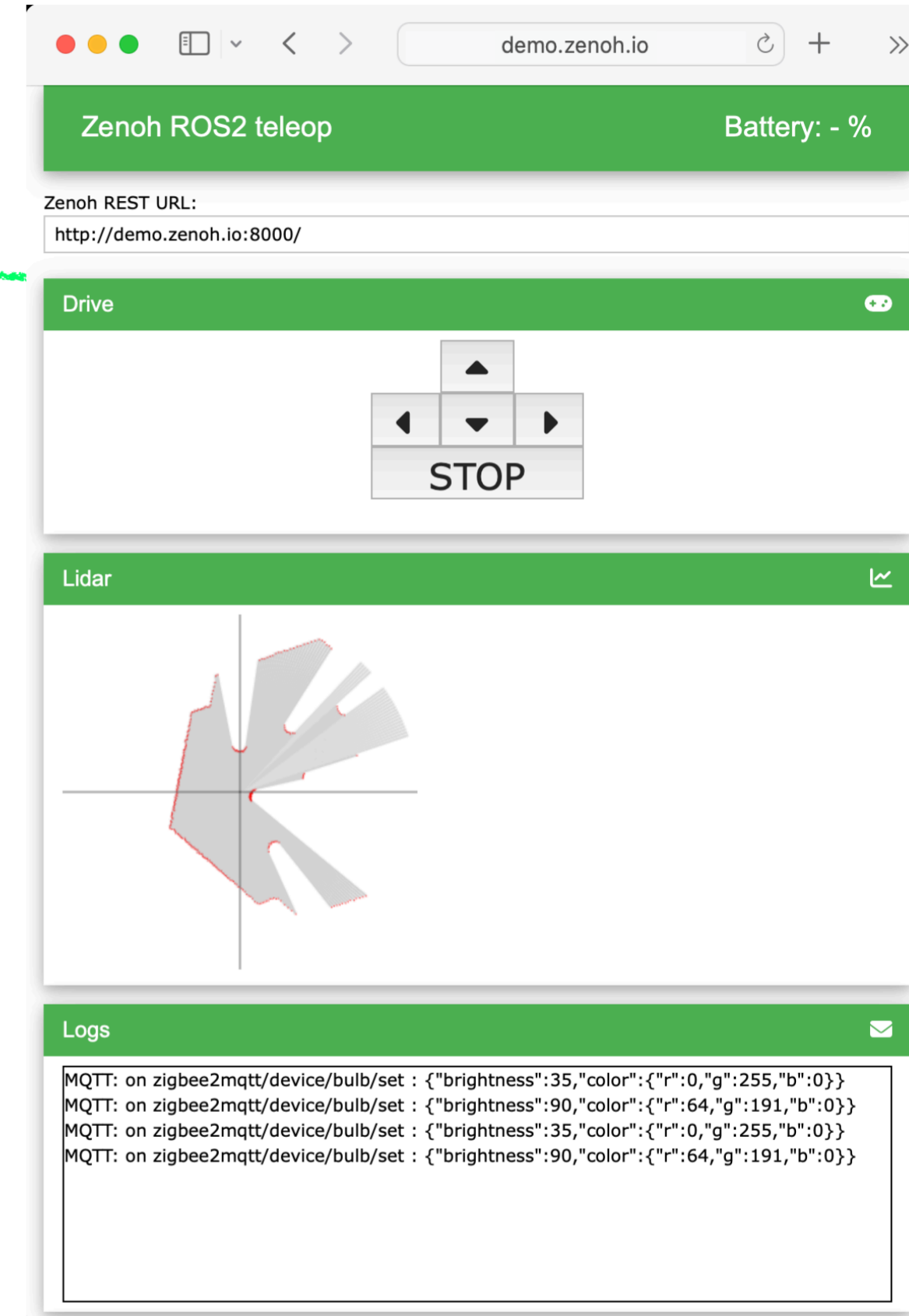
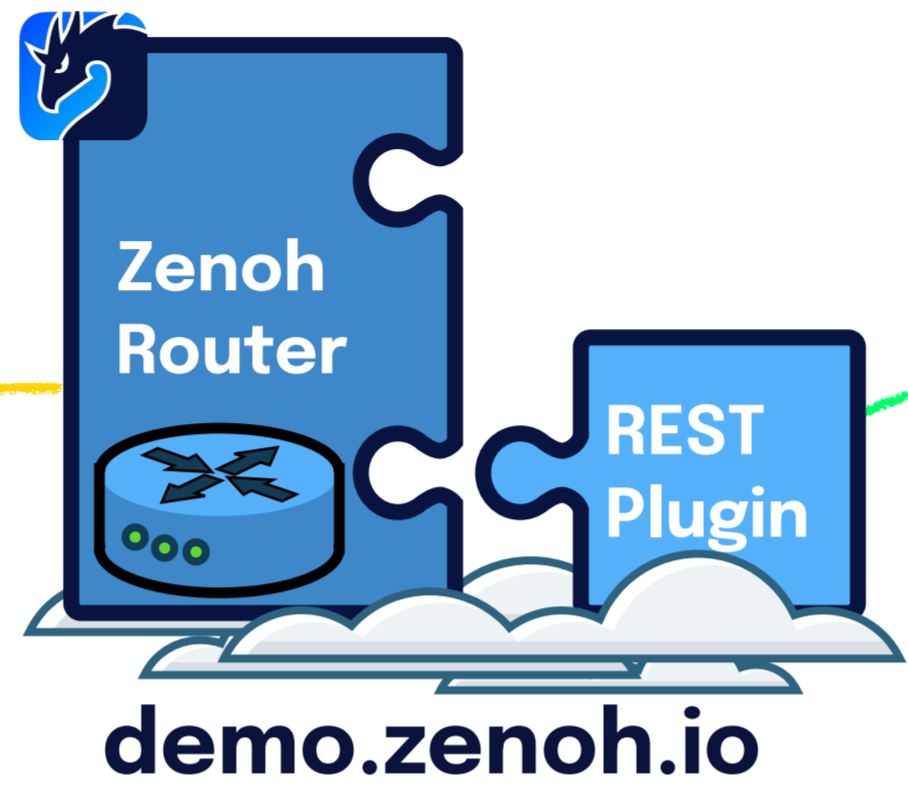
Standalone:

- Same plugin but statically linked !
- Just a main() starting a Zenoh Runtime and 1 or more plugins
- Can be a Zenoh peer or a Zenoh client



 **Hands-on !**

Robot + IoT integration

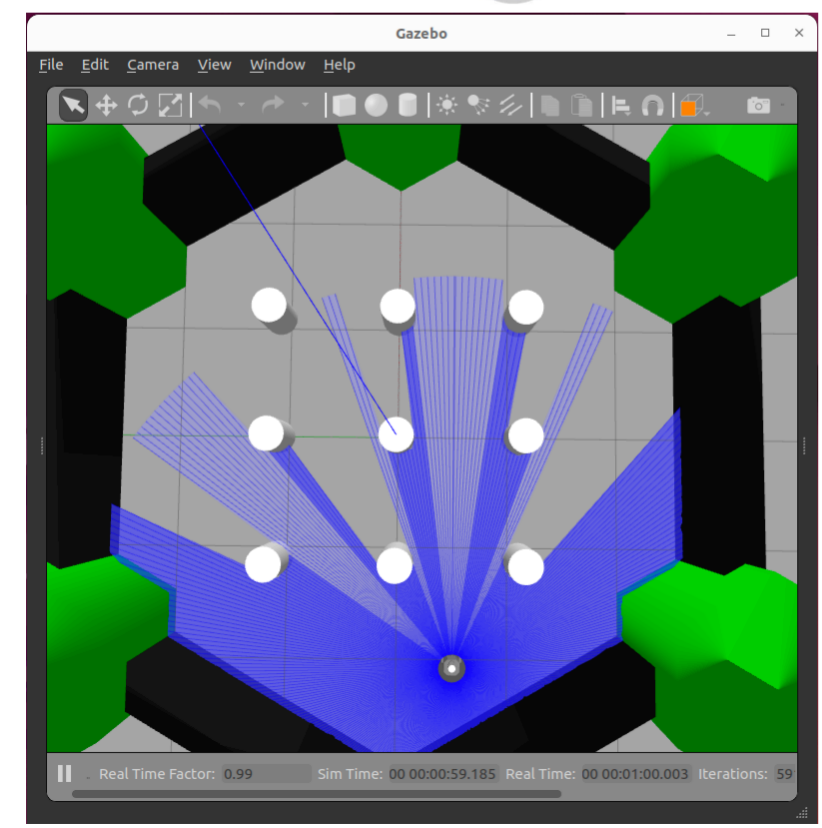


<http://demo.zenoh.io>

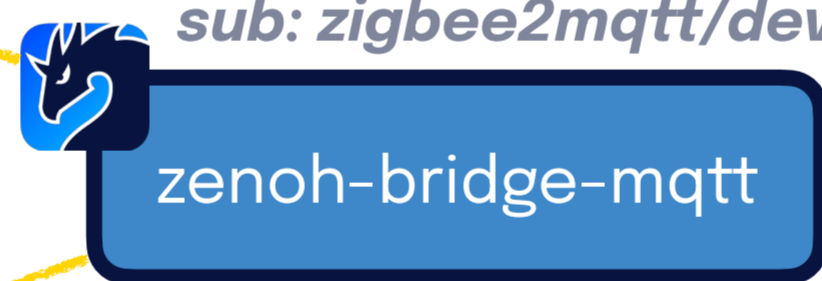
pub: simu/rt/scan
sub: simu/rt/cmd_vel



ROS2 DDS



pub: zigbee2mqtt/device/button
sub: zigbee2mqtt/device/bulb/set



Zenoh



sub: zigbee2mqtt/device/button
=> pub: simu/rt/cmd_vel

sub: simu/rt/scan
=> pub: zigbee2mqtt/device/bulb/set

HTTP

MQTT

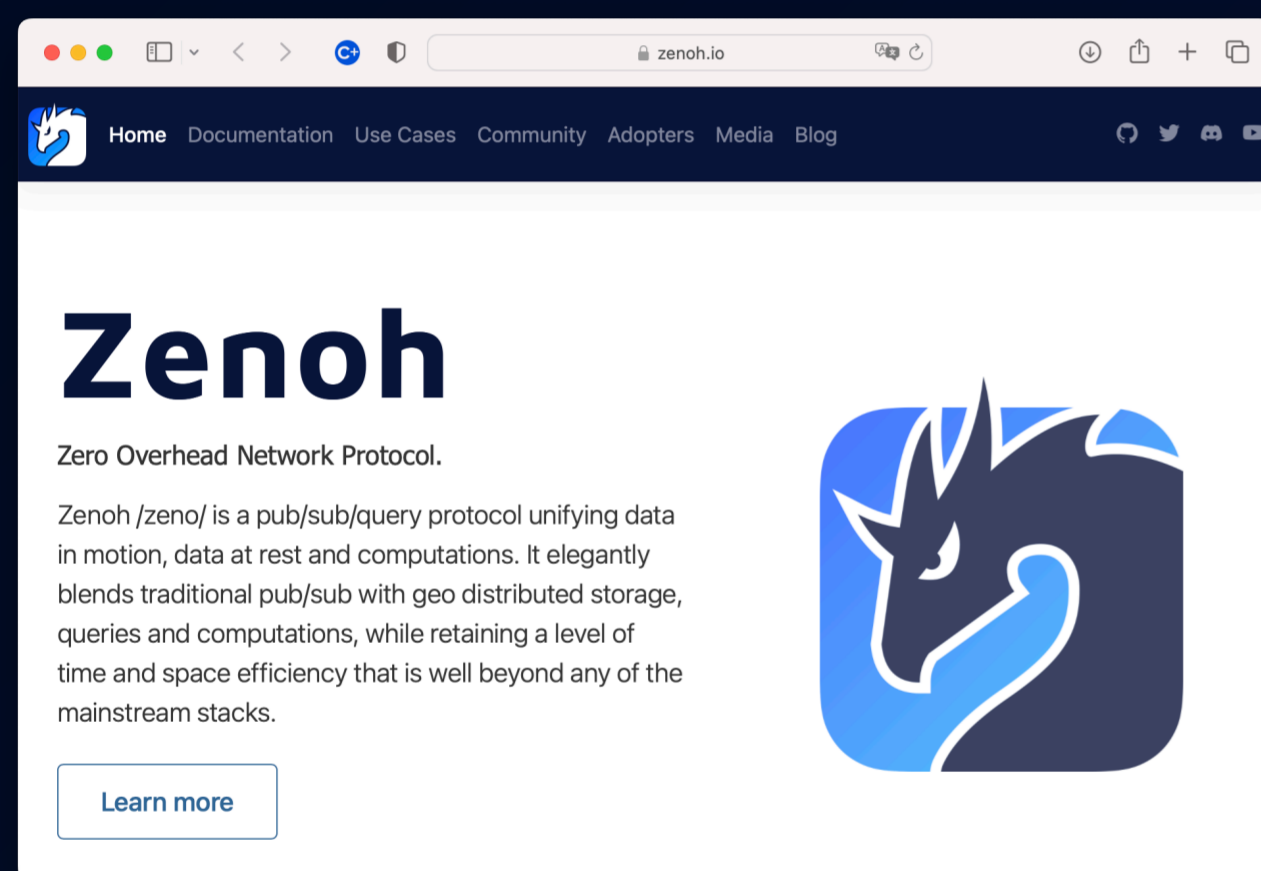
zigbee



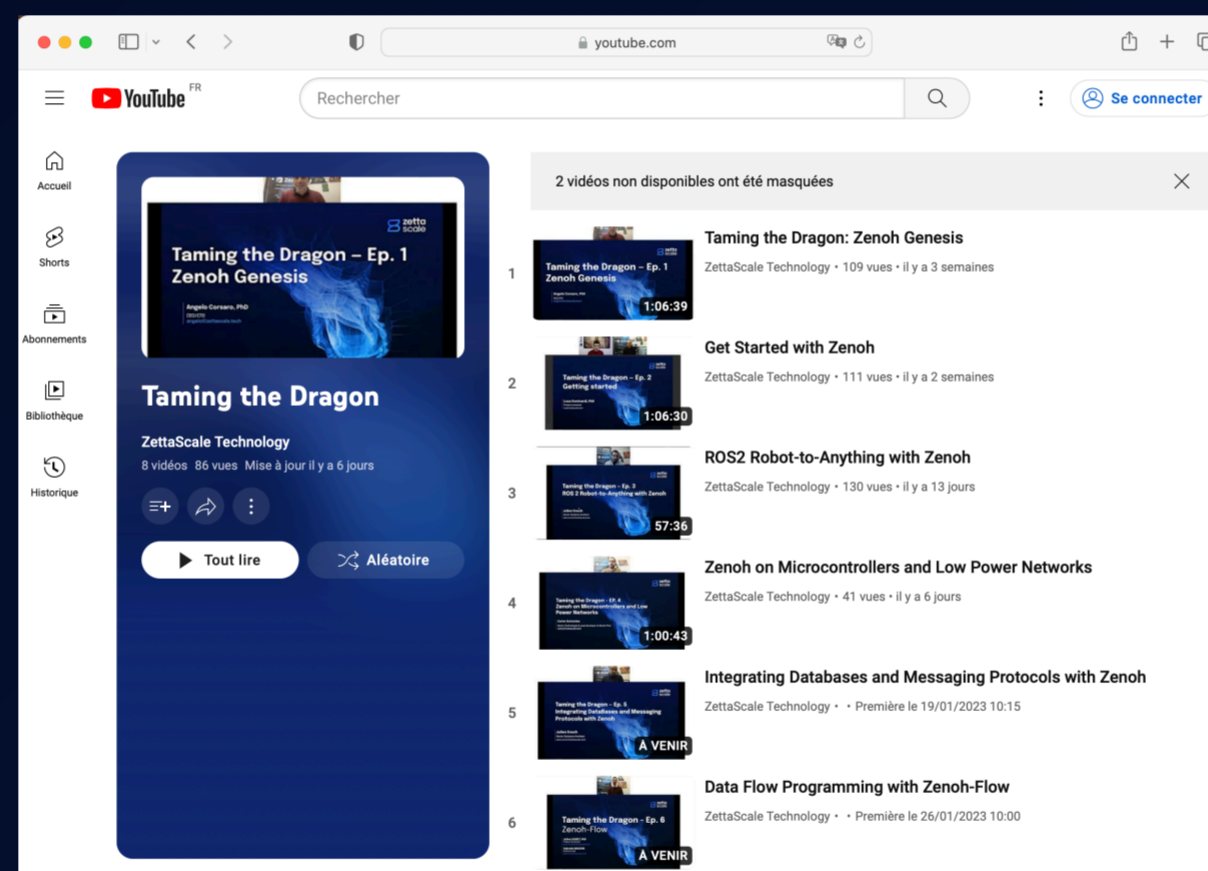
Don't forget to visit
Zenoh's website...

... our Webinars
series on Youtube ...

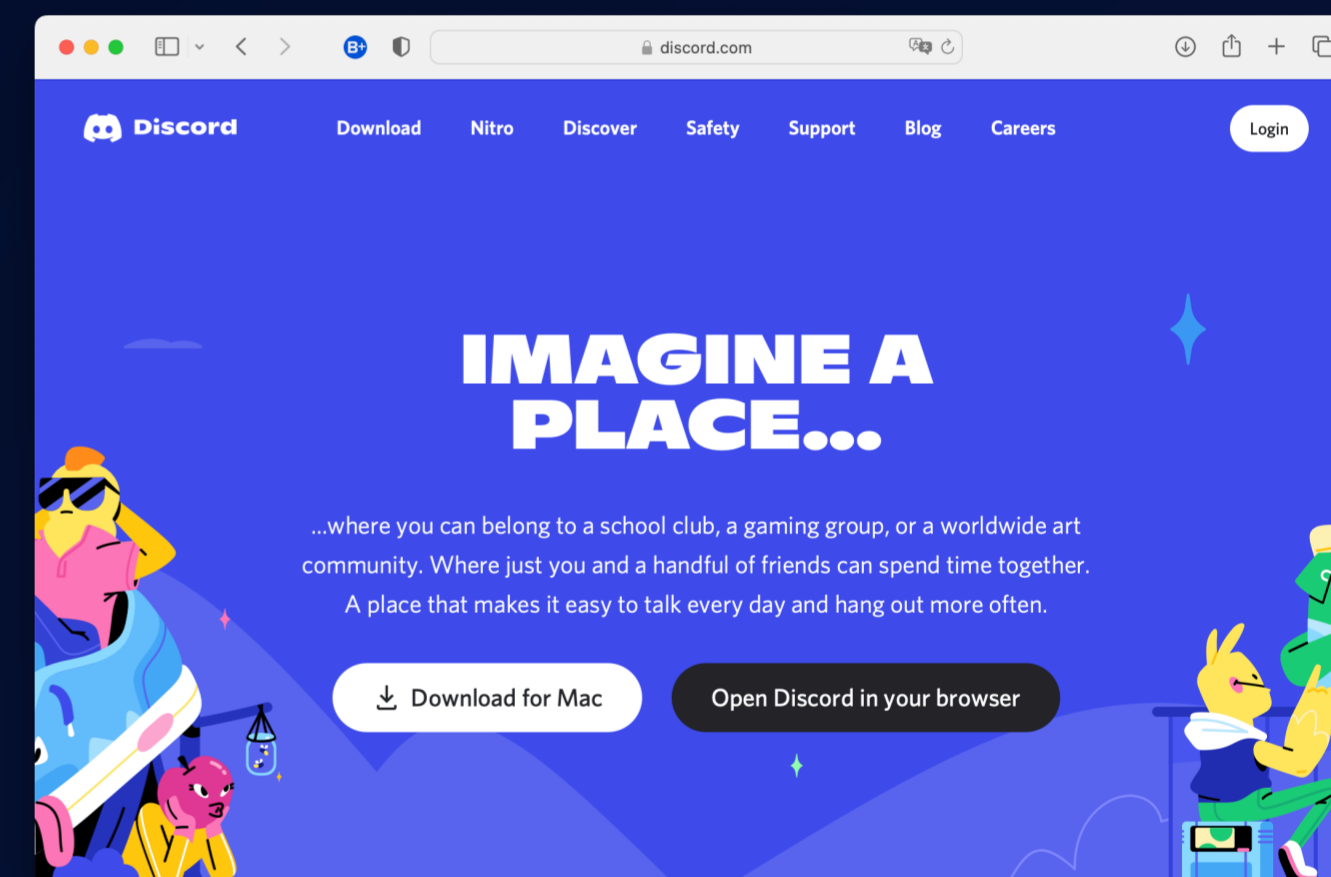
... and to join Zenoh's
Discord server!



<https://zenoh.io/>



<https://www.youtube.com/@zettascaletech/playlists>



<https://discord.gg/2GJ958VuHs>

Thank You

Patience, persistence and perspiration
make an unbeatable combination for
success.

