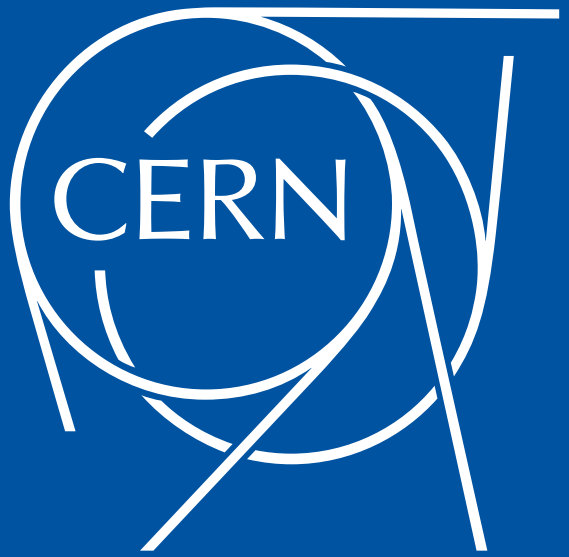
CERN

CERN's proximeter

Christoph Merscher

Introduction

Detecting

Backend Architecture

Conclusion

Contributors

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The problem ?

Due to COVID-19, distances of 2 meters should always be maintained.

The solution

The proximeter

- Small device 10.5 x 6 x 2.5 cm
- Carried by all members of CERN
- Recognizes when people are getting too close to each other

What technology should be used ?

- WIFI
- IoT

What is IoT ?

A network of physical objects not limited to devices, vehicles, buildings and other items that can collect and exchange data.

What is IoT ?

Everything that can be connected will be connected:

- Sensor
- Car
- Building
- City

Low Power Wide Area Network

Low Power Wide Area Network (LPWAN) especially aim to achieve:

- Low power $\rightarrow$ long battery live time
- Wide area

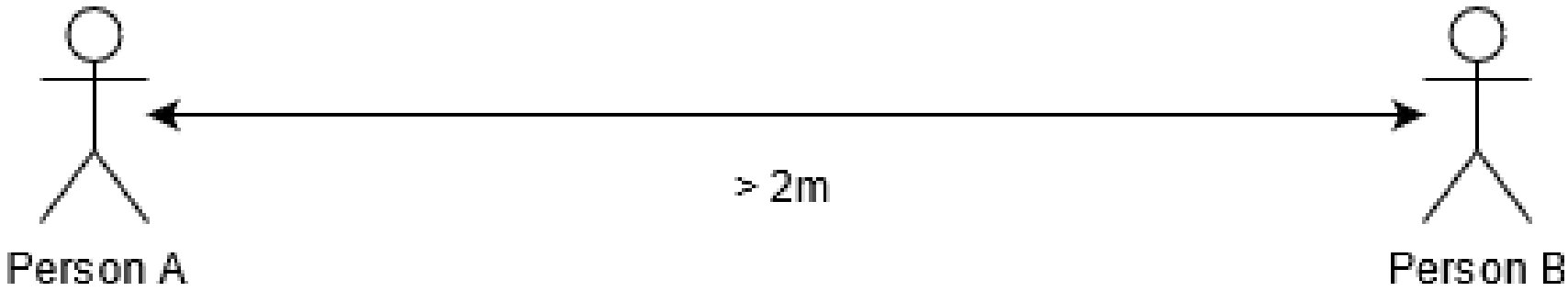
At CERN LoRaWAN have been chosen (see HEPIX fall 2017)

Important information regarding LoRa

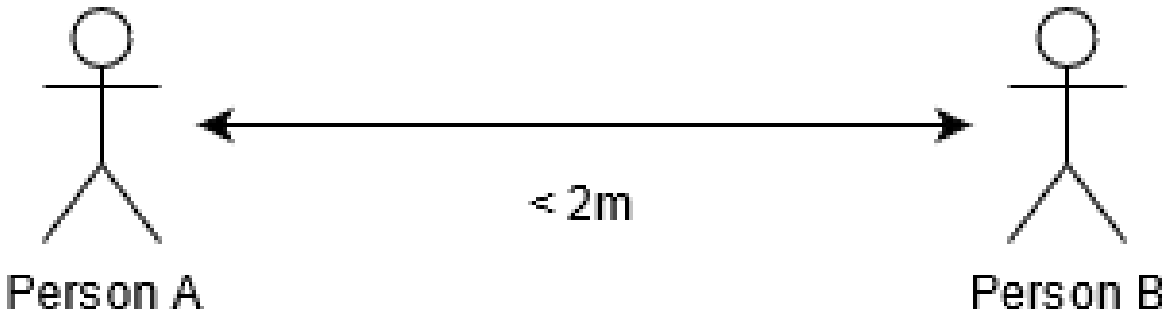
- Optimize the battery lifetime of the device
- High range
- Packet size should not exceed 51 Bytes
- Network is subject to the duty cycle

Detecting

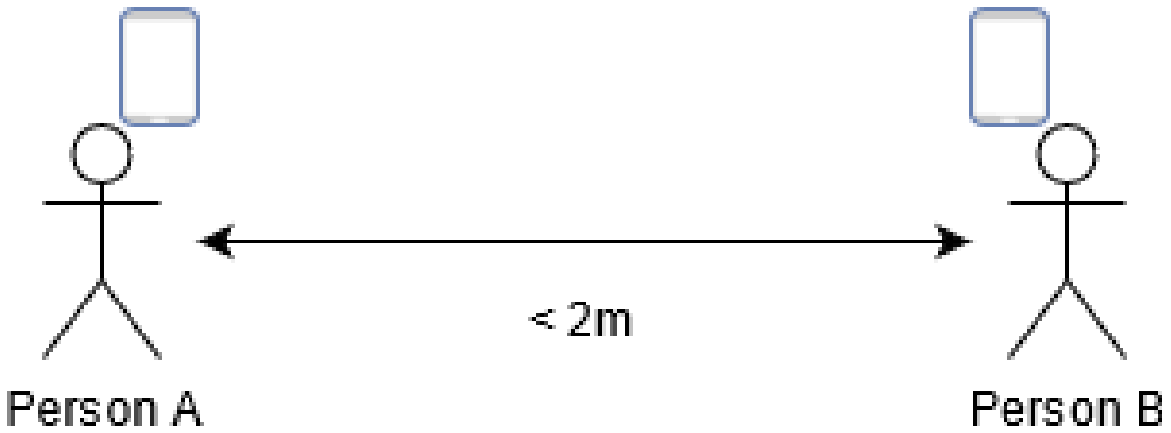
Optimal Use Case



Most common Use Case



Detection

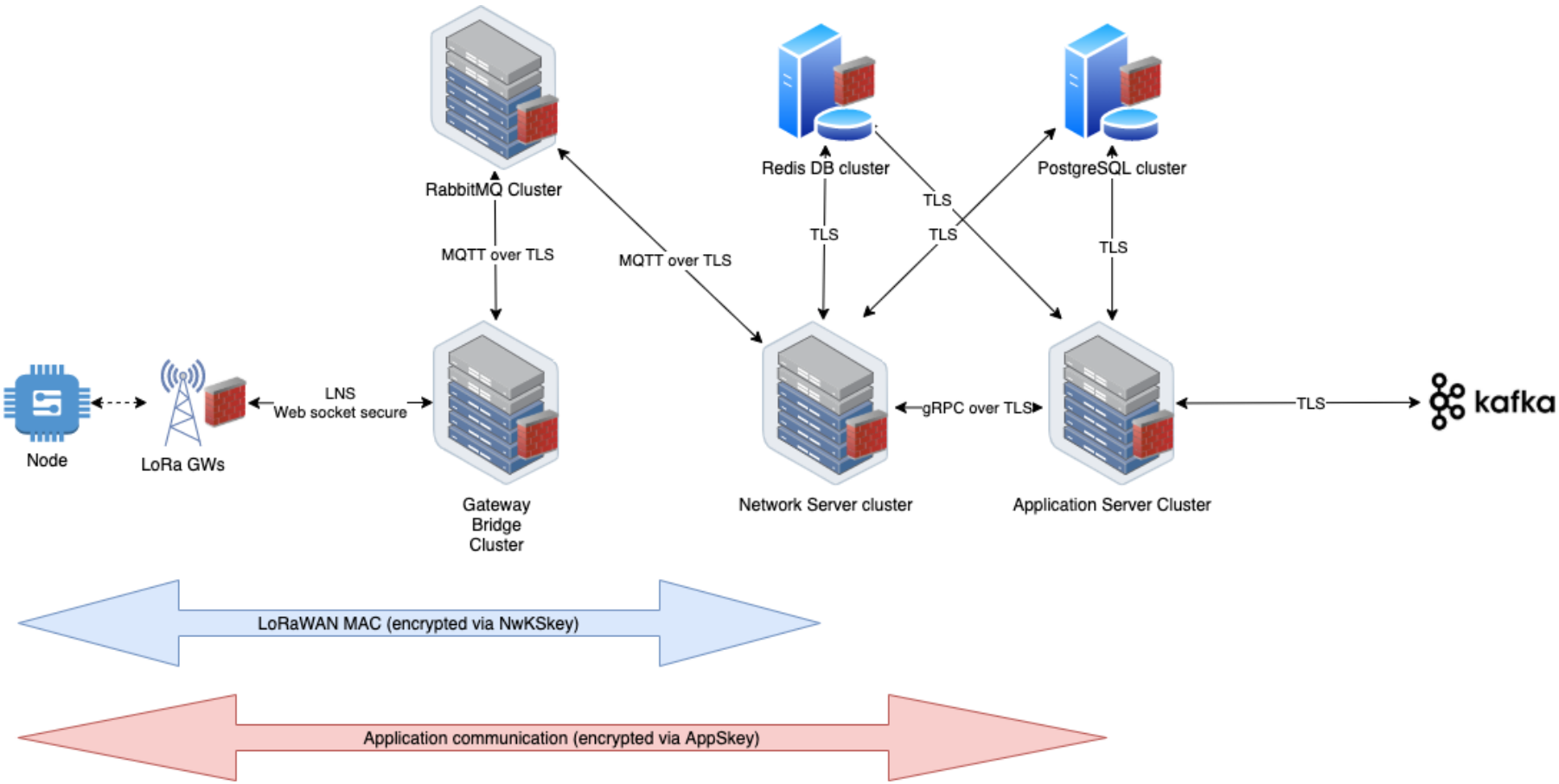


Detection

- Person closer than 2 meter to each other
- Maintain this distance for at least 30 seconds
- Message will be send via the IoT network server

Backend Architecture

Chirpstack


RabbitMQ Cluster
Redis DB cluster
PostgreSQL cluster
MQTT over TLS
MQTT over TLS
TLS
TLS
TLS
TLS
Node
LoRa GWs
LNS
Web socket secure
Gateway
Bridge
Cluster
Network Server cluster
gRPC over TLS
Application Server Cluster
TLS
kafka
LoRaWAN MAC (encrypted via NwKSkey)
Application communication (encrypted via AppSkey)

Problems that could occur

- What happens when all devices are on site ?
- LoRa being used in a *hacky* way ?
- What happens when other devices pollute the network?
- What happens if one or several services are down ?

Conclusion

Conclusion

- Does not prevent people from getting closer to each other
- Allows to better track who have been in contact with whom (yet anonymous)
- No one can trace a device back to a person
- Storing meta information to continuously improve meta data
- Allows the spread of the virus at CERN to be countered as best as possible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