

LORA - LOPY2LOPY AND LOPY2GW

42080 - COMUNICAÇÕES MÓVEIS

GROUP 1

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INTRO

TOPICS

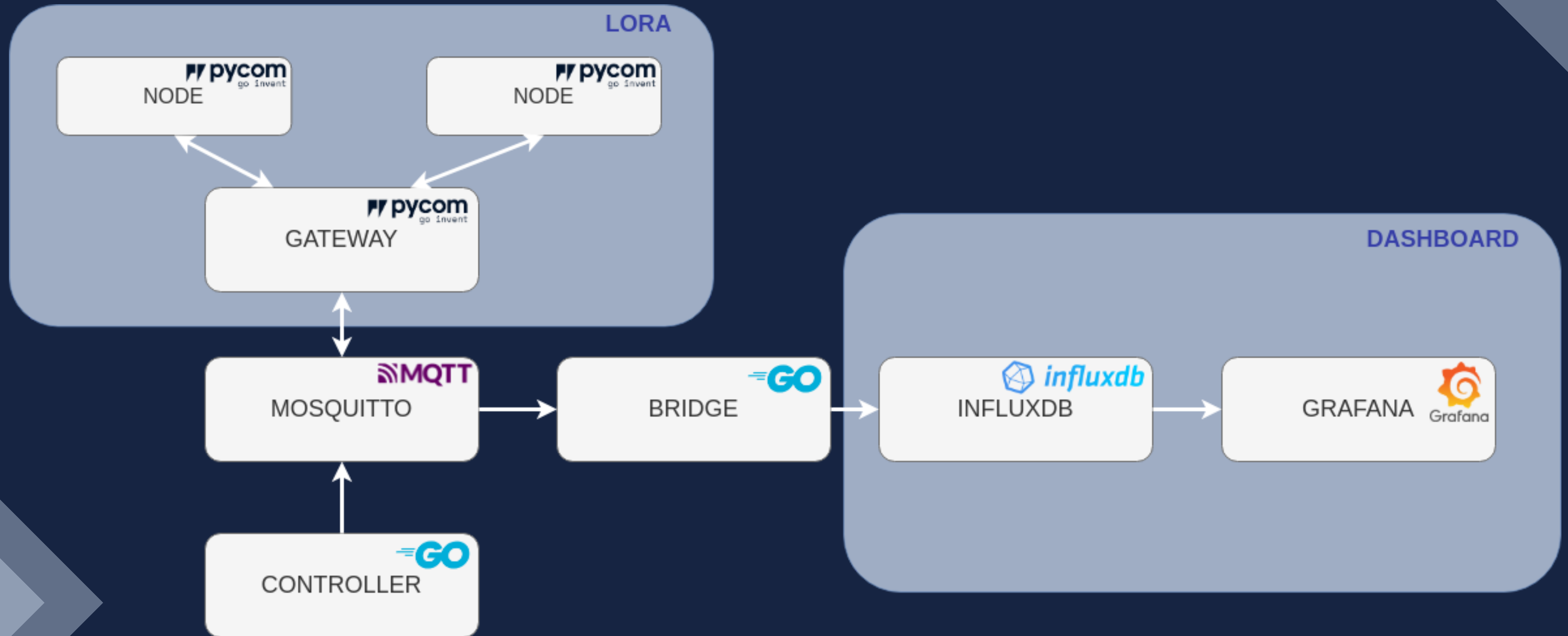
1. BRIEF INTRODUCTION
2. PROJECT ARCHITECTURE
3. PROTOCOL
4. MONITORING
5. DASHBOARD
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8. DEMO

INTRO

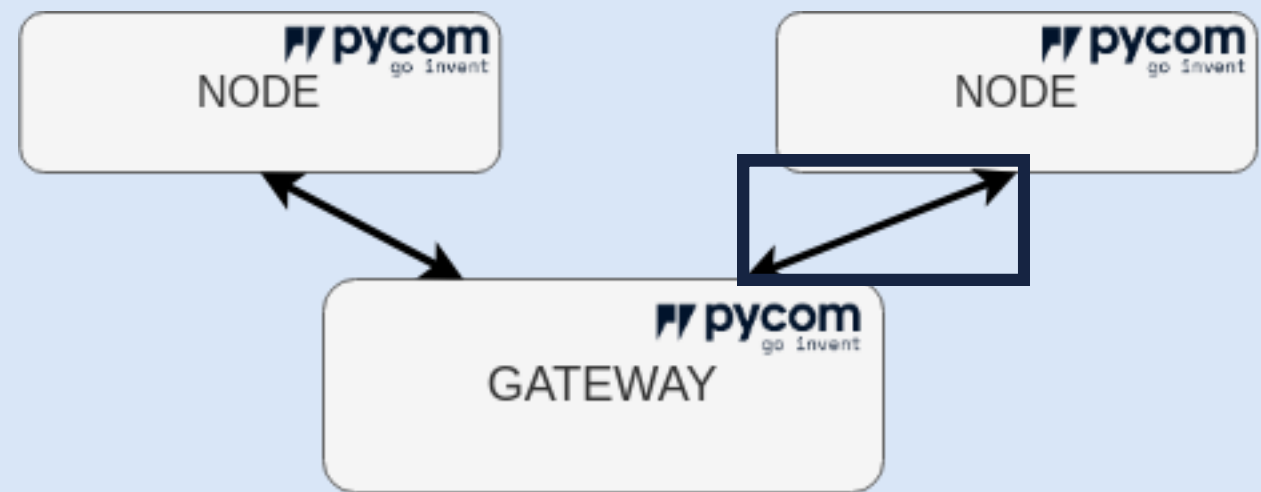
MAIN GOALS

- STUDY CONNECTION AND EXCHANGE OF INFORMATION IN LORA ENVIRONMENTS
 - CONNECTION BETWEEN 2 NODES
 - CONNECTION BETWEEN NODE AND GATEWAY
- ENSURE CORRECT DELIVERY OF MESSAGES
- ALLOW SENDING DIRECT MESSAGES BETWEEN DEVICES
- UNDERSTAND WHAT CAUSES IMPACT/INTERFERENCE IN MESSAGES EXCHANGED

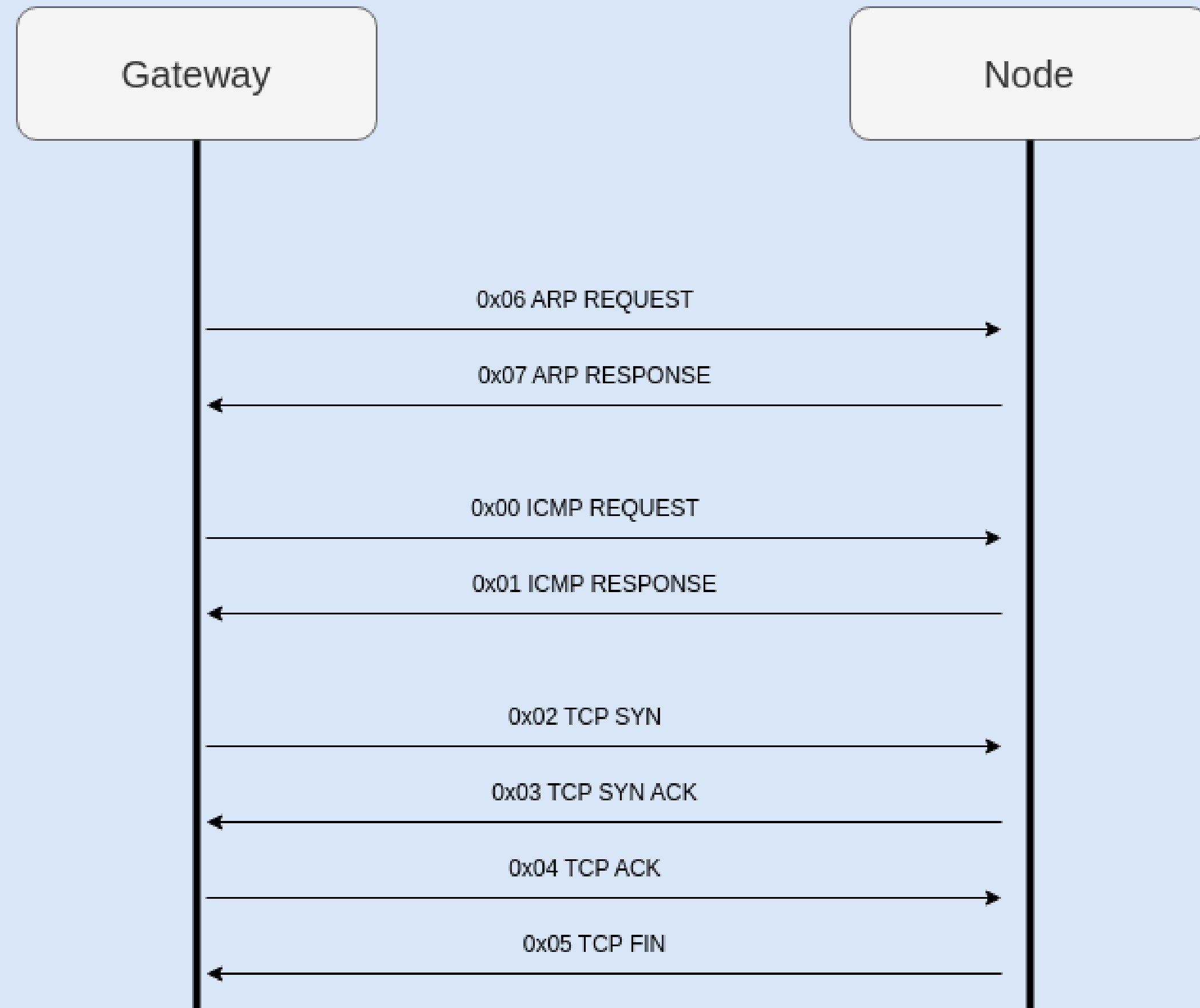
ARCHITECTURE



PROTOCOL

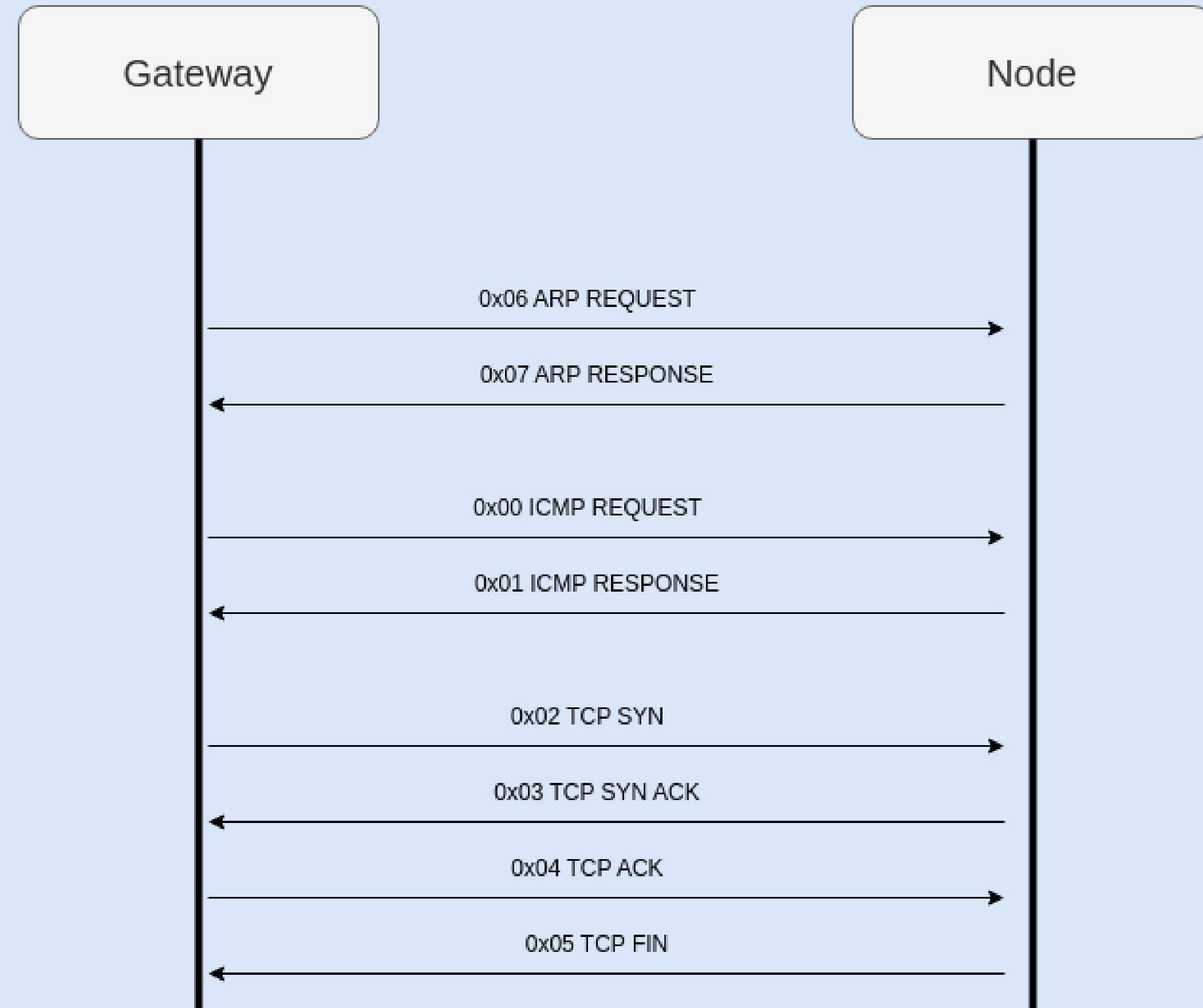


- BASED ON ALREADY KNOWN/STUDIED PROTOCOLS
- EACH PACKET IS IDENTIFIED WITH AN ID . THIS ID CORRESPONDS TO THE FIRST VALUE OF THE FRAME
- ALL FRAMES INCLUDE: ID, TIMEOUT VALUE, SIZE, MAC ADDRESS OF SOURCE AND DESTINATION



PROTOCOL BUFFER

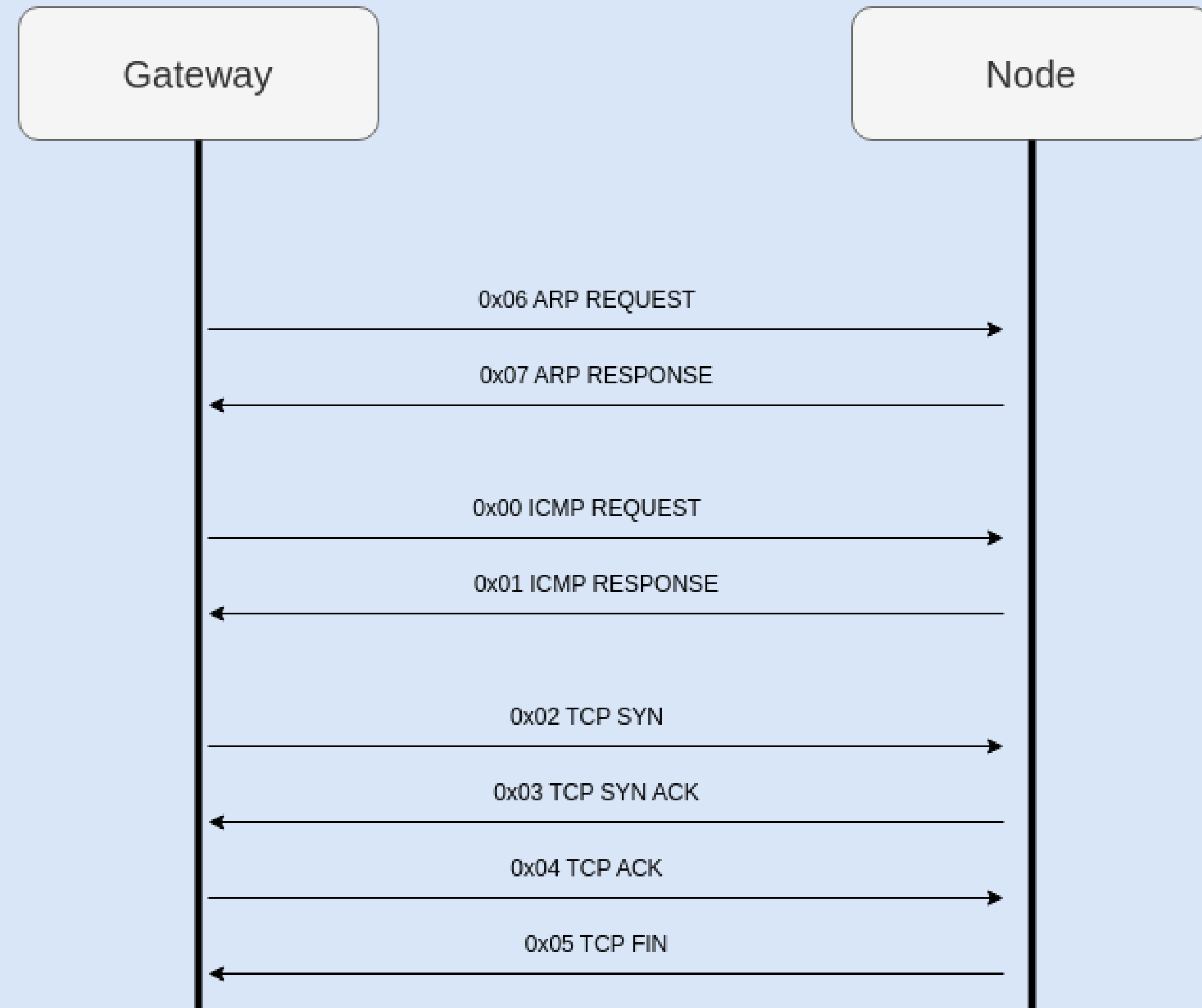
- THE PACKETS ARE POSITIONED IN A BUFFER IN ARRIVING ORDER (FIFO).
- EACH PACKET HAS A TIMEOUT VALUE ASSOCIATED, REACHING THIS VALUE MEANS EXITING THE BUFFER.
- BEFORE ANY PACKET IS SENT, THE PROGRAM VERIFIES IF THE CORRESPONDING ID IS PRESENT IN THE BUFFER, IF NOT, IT MAY BE SENT.



PROTOCOL

NODES

- ARP PACKETS ARE EXCHANGED TO FIND WHAT DEVICES ARE WITHIN RANGE (KNOWN NODES)
- ICMP PACKETS ESTABLISH THE CONNECTION BETWEEN THE NODES (ACTIVE NODES)
- TCP CONNECTION MAY BE ESTABLISHED BETWEEN ANY PAIR OF ACTIVE DEVICES

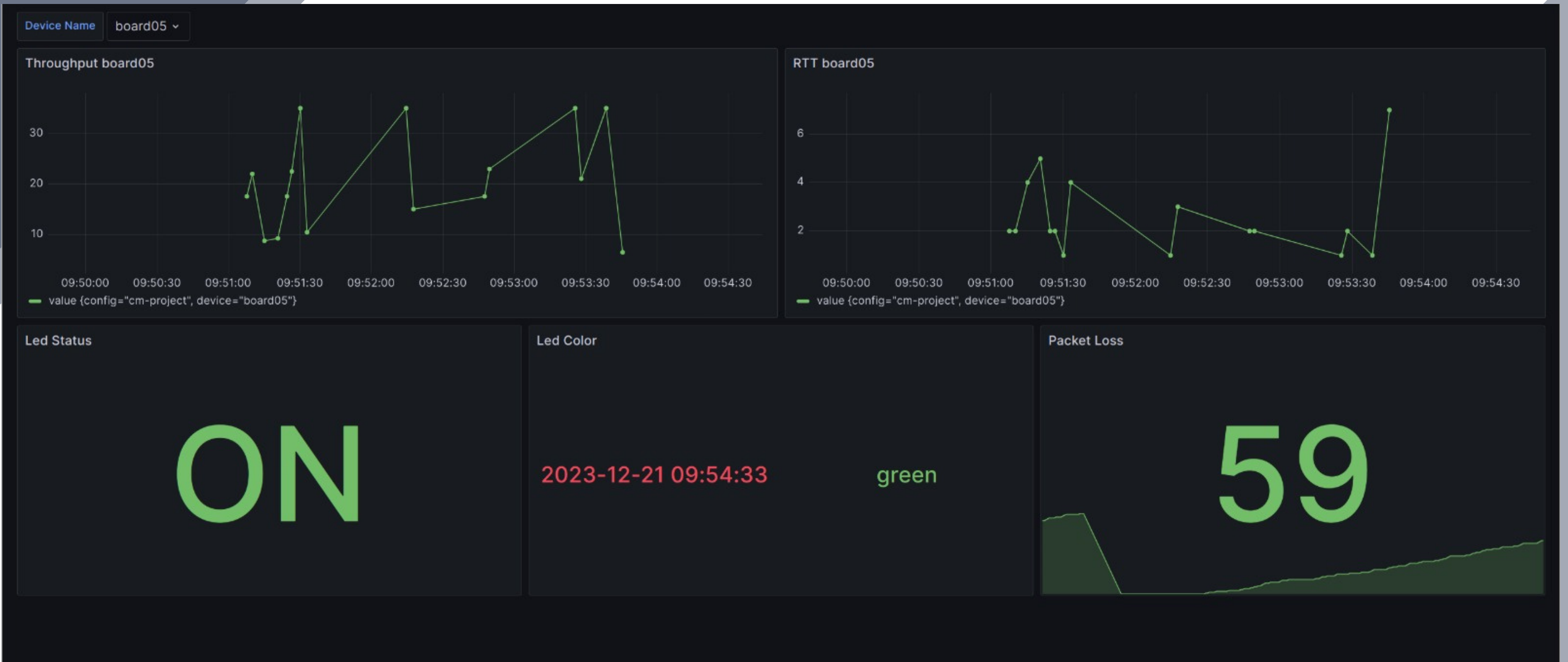


MONITORING

- MESSAGES ARE EXCHANGED THROUGH TCP ALIKE PROTOCOL
- THIS WAY WE CAN MONITOR RTT, PACKET LOSS VALUES AND THROUGHPUT
- THESE ARE WRITTEN TO MQTT, AS WELL AS LED STATUS AND COLOR
- THEY ARE LATER DISPLAYED IN THE DASHBOARD

DASHBOARD

OBTAINED RESULTS



NEGATIVE

PROJECT:

- no message encryption
- during development there may be some interference caused by other LoRa

LORA/PYCOM:

- some VS code extension's versions may not work properly
- during implementation, resetting the board is unpractical, not intuitive and time consuming

POSITIVE

PROJECT:

- diversity with the chosen protocols
- continuous status control (handling of packet losses)
- real-time visibility of results and data
- discards noise messages

LORA/PYCOM:

- long range
- high variety of libraries and documentation

TEST CONCLUSIONS

BANDWIDTH

ALTHOUGH INCREASING THE BANDWIDTH CAUSES A HIGHER BIT RATE, THE SIGNAL STAYS MUCH SENSITIVE TO NOISE AND THE MESSAGE EXCHANGING SHOWS A HIGHER DELAY

SPREADING FACTOR

HIGHER SPREADING FACTOR VALUES INCREASES THE SIGNAL'S RANGE AND DECREASES THE ERROR INCIDENCE

POWER

HIGHER TRANSMIT POWER INCREASES BIT RATE AND DECREASES BATTERY LIFE



DEMO