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Design and Deployment in Edge Computing

A Case Study

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Kynetics LLC - Santa Clara, CA

OPEN
NETWORKING
& EDGE
SUMMIT

Agenda

- Use case
- System design
- Remarkable issues
- Conclusion

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Purpose of the system

- Streaming and recording audio over BT on a cluster of ARM computers

- Updating OS and applications in the infrastructure

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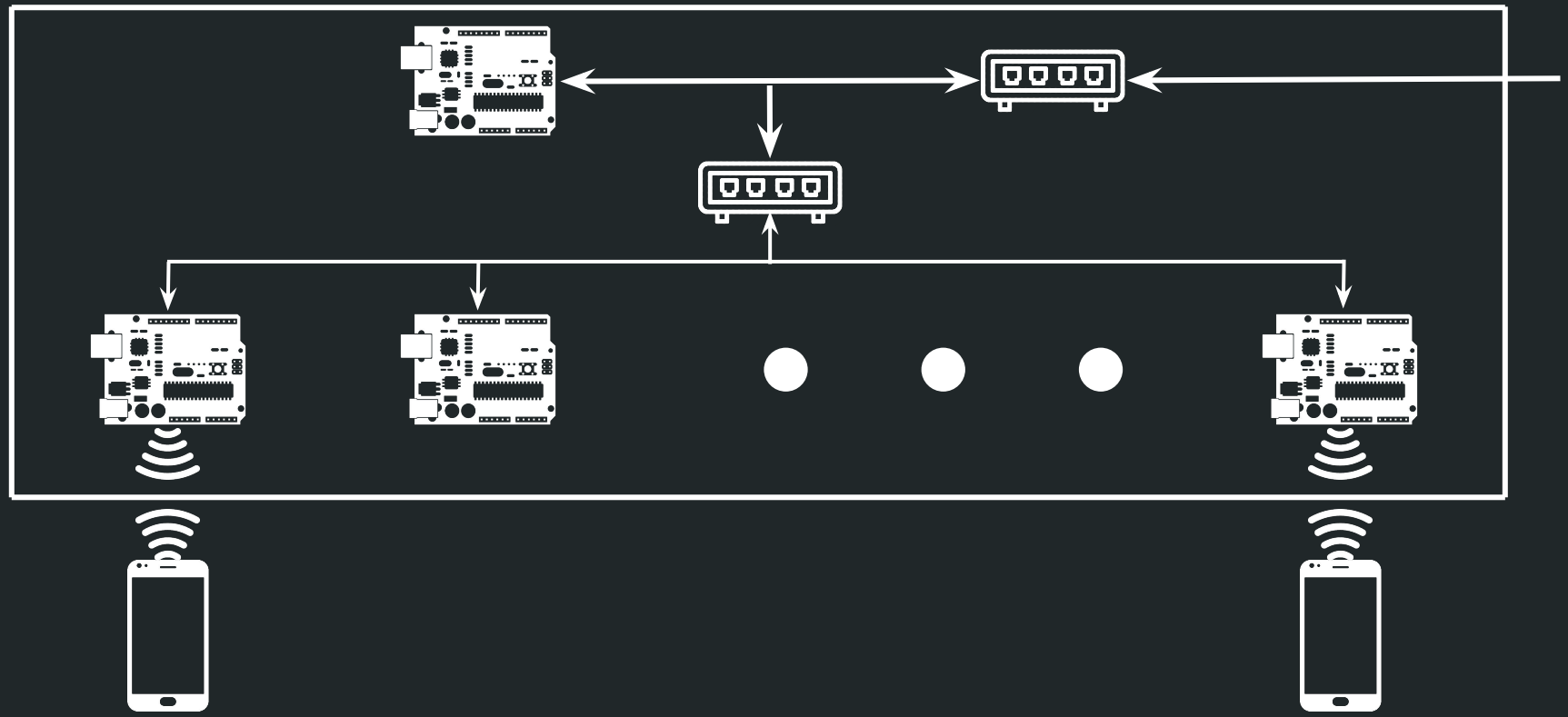
The system - Helicopter view



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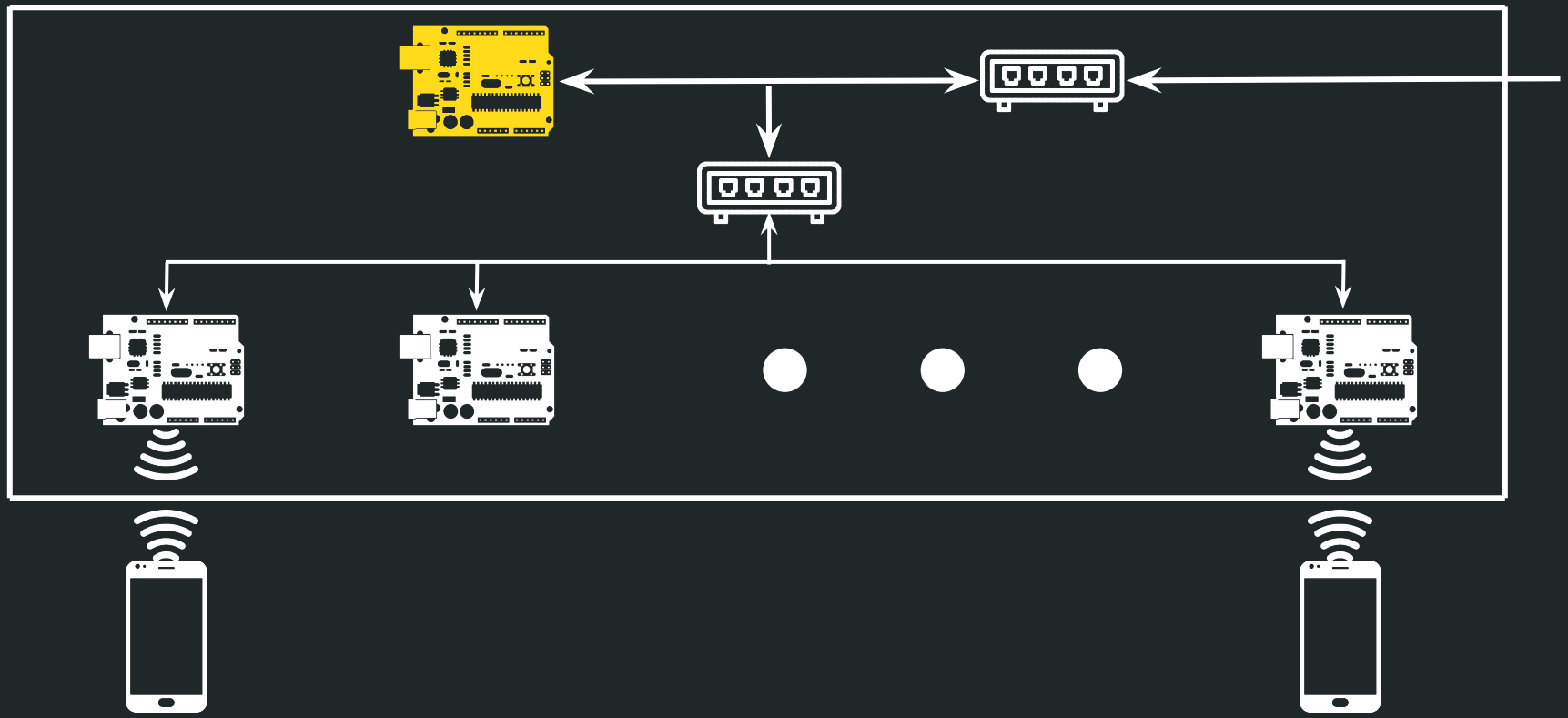

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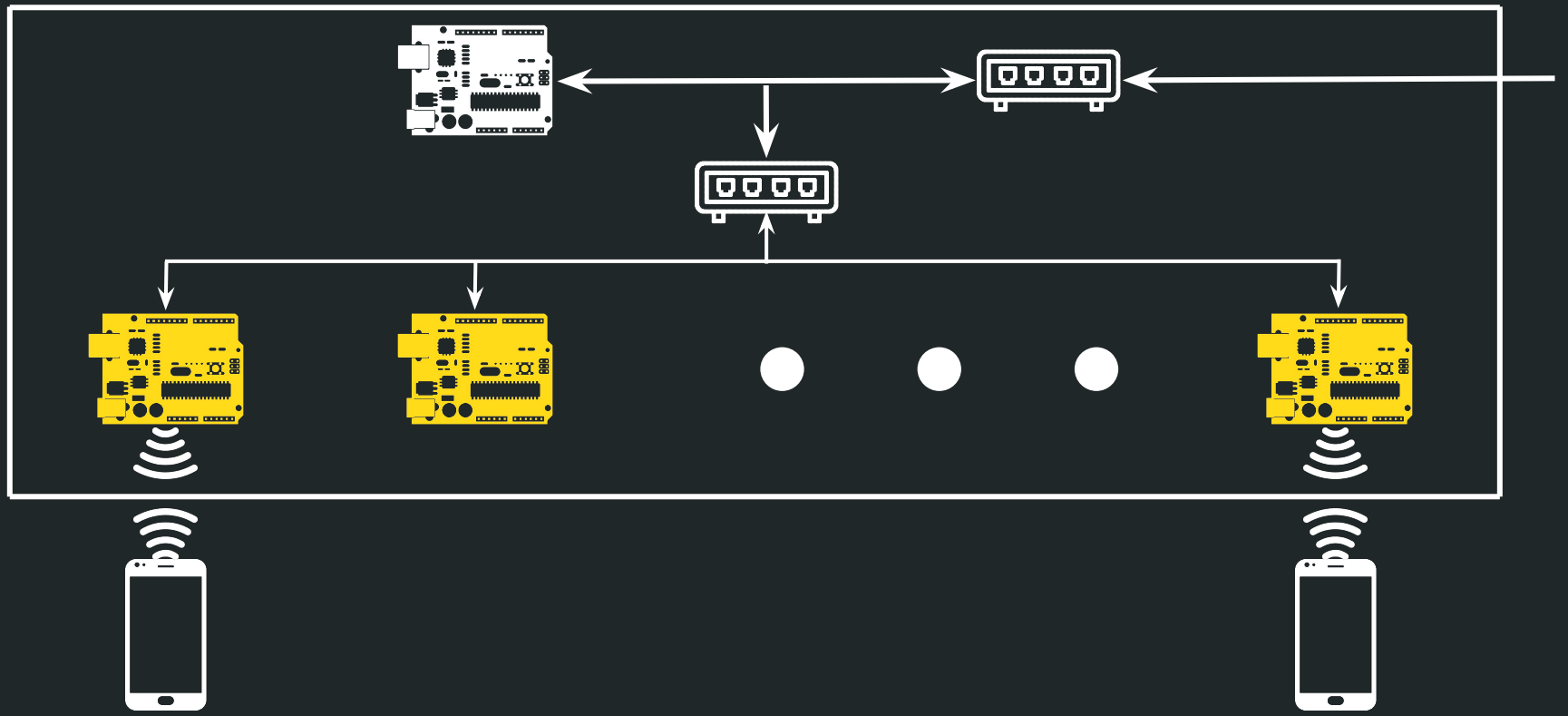

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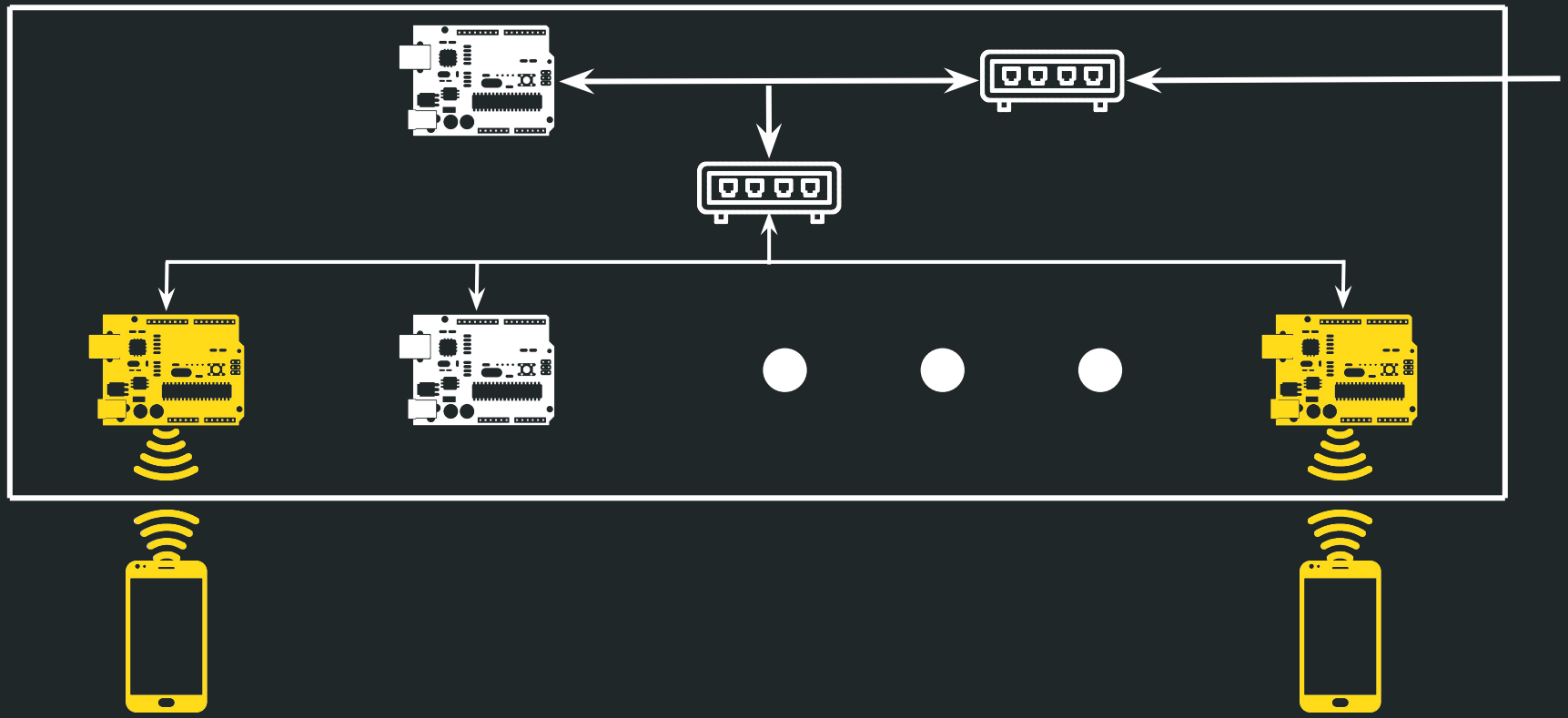

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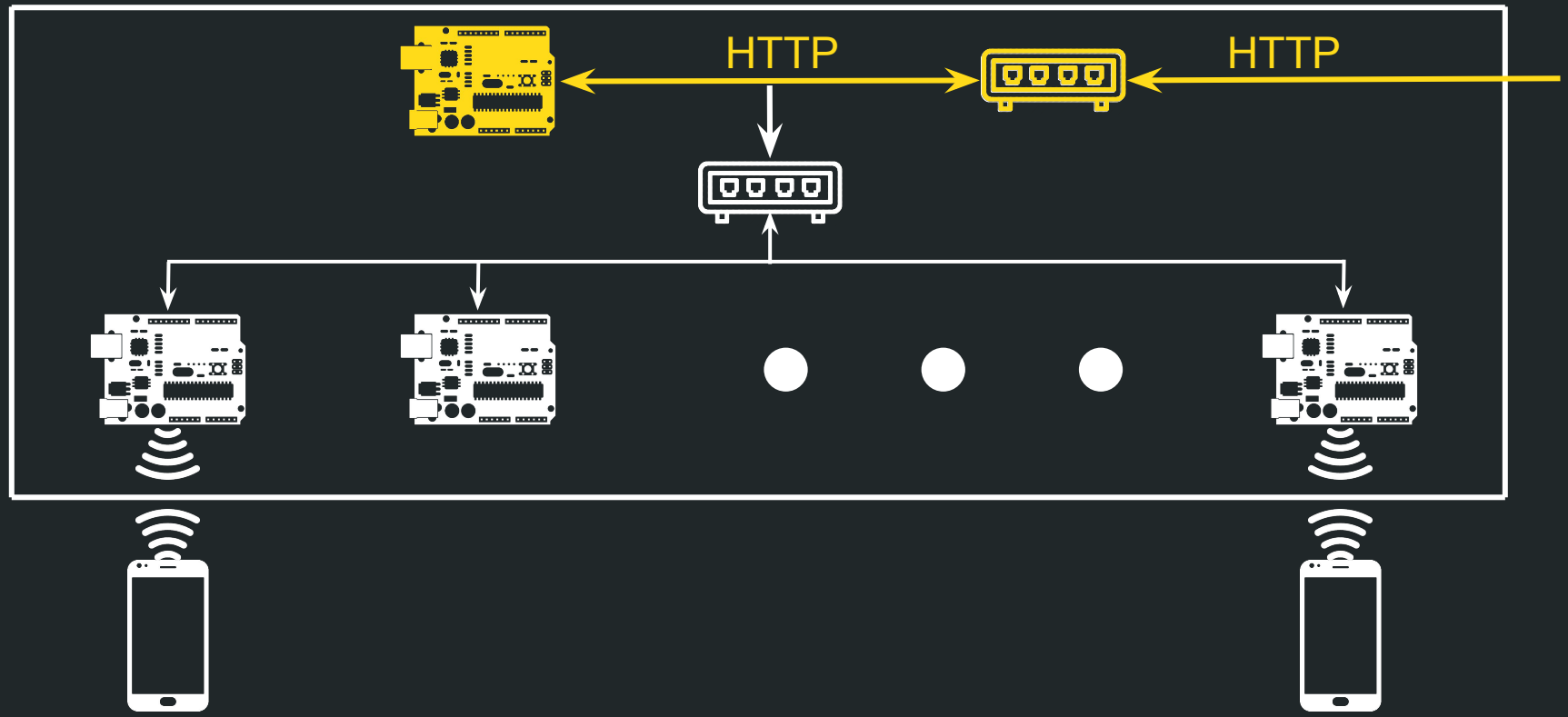

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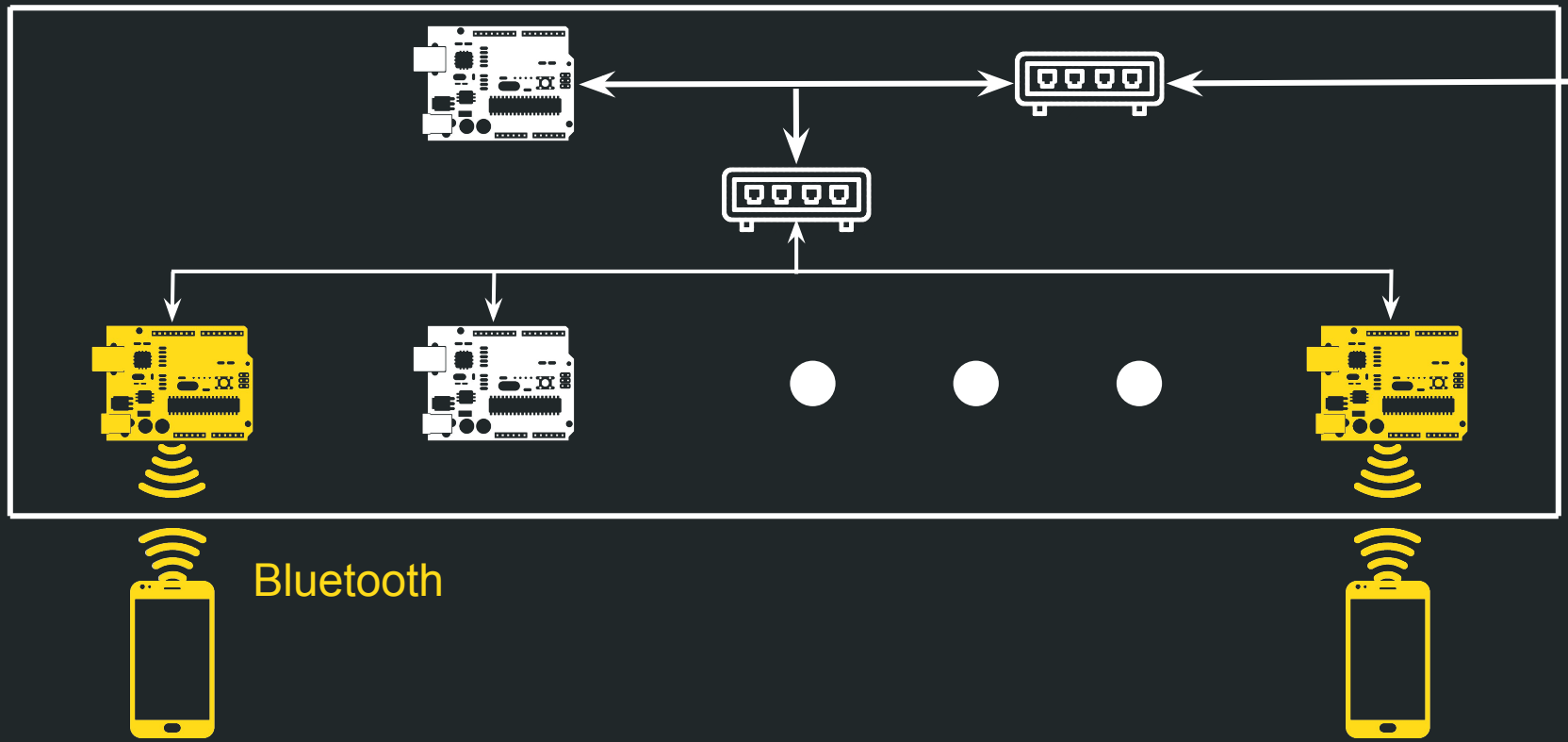

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Remarkable issues

- Transmission of data and commands
- Consistency of the state
- Update roll-outs

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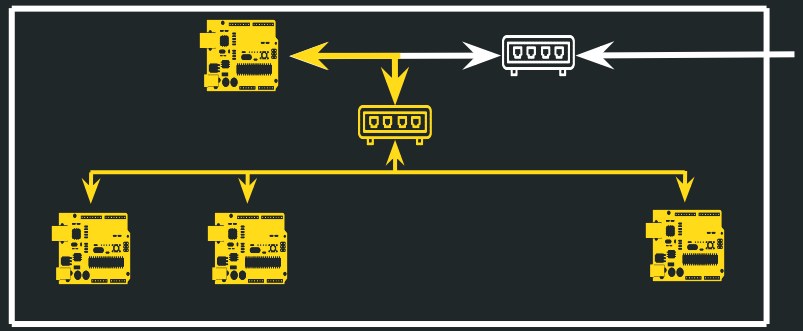
Remarkable issues

- Transmission of data and commands
  - Within the cluster
- Consistency of the state
- Update roll-outs



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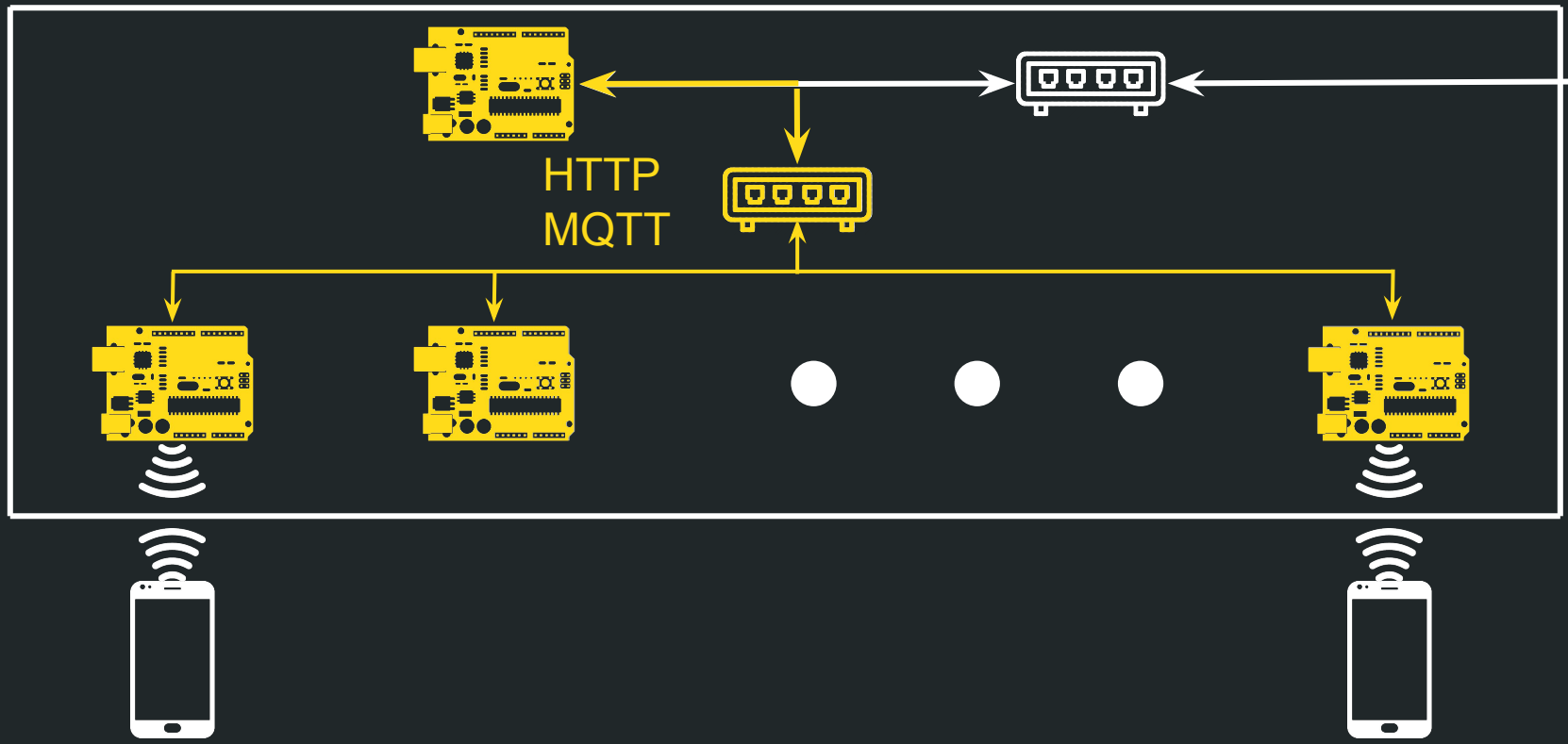
The system - Internal Communication



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Remarkable issues

- Transmission of data and commands
- Consistency of the state
  - Both locally and globally
  - In presence of asynchronous events
- Update roll-outs

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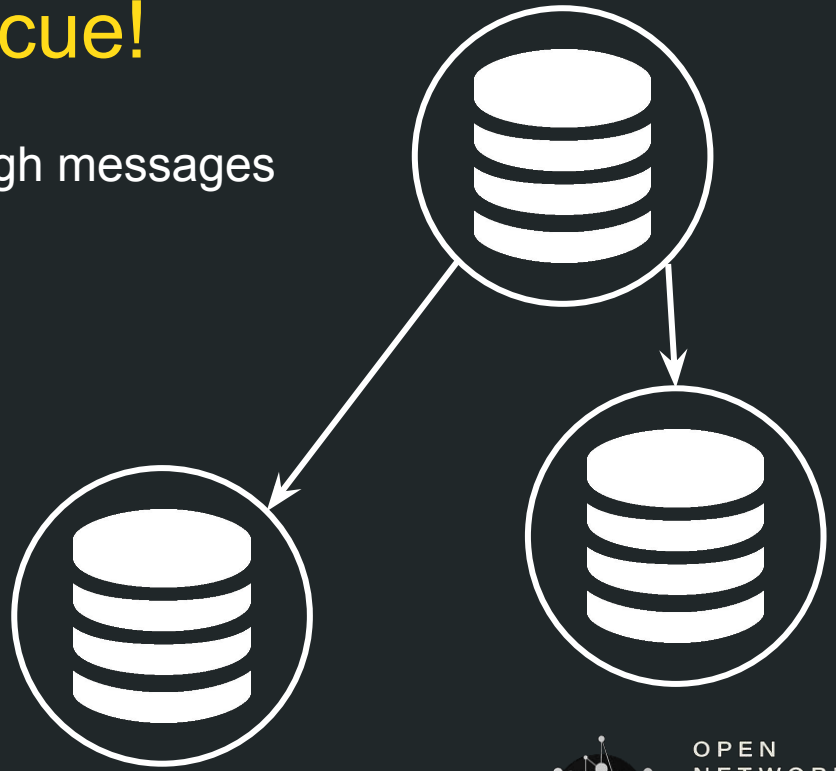
The system - Asynchronicity

Actors model to the rescue!

- Internal communication happens through messages
  - Asynchronous
  - Immutable
  - Deposited into a mailbox
  - Worked through one at a time
- No race conditions



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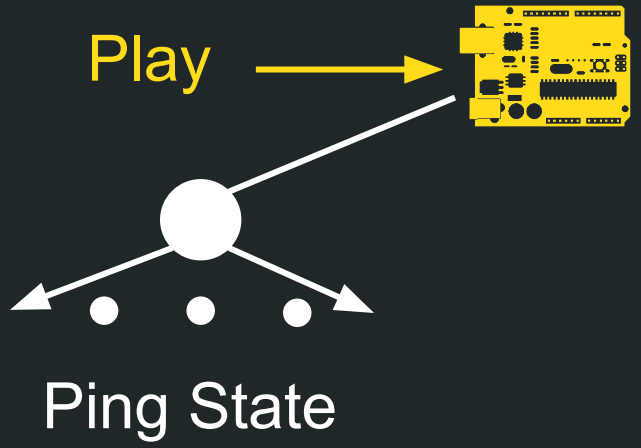
A use case example



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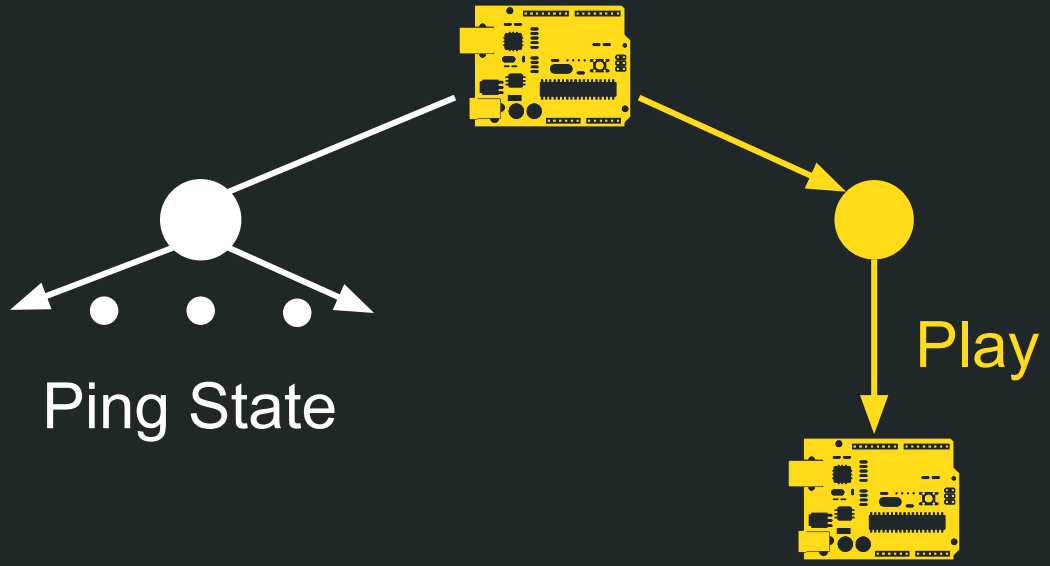

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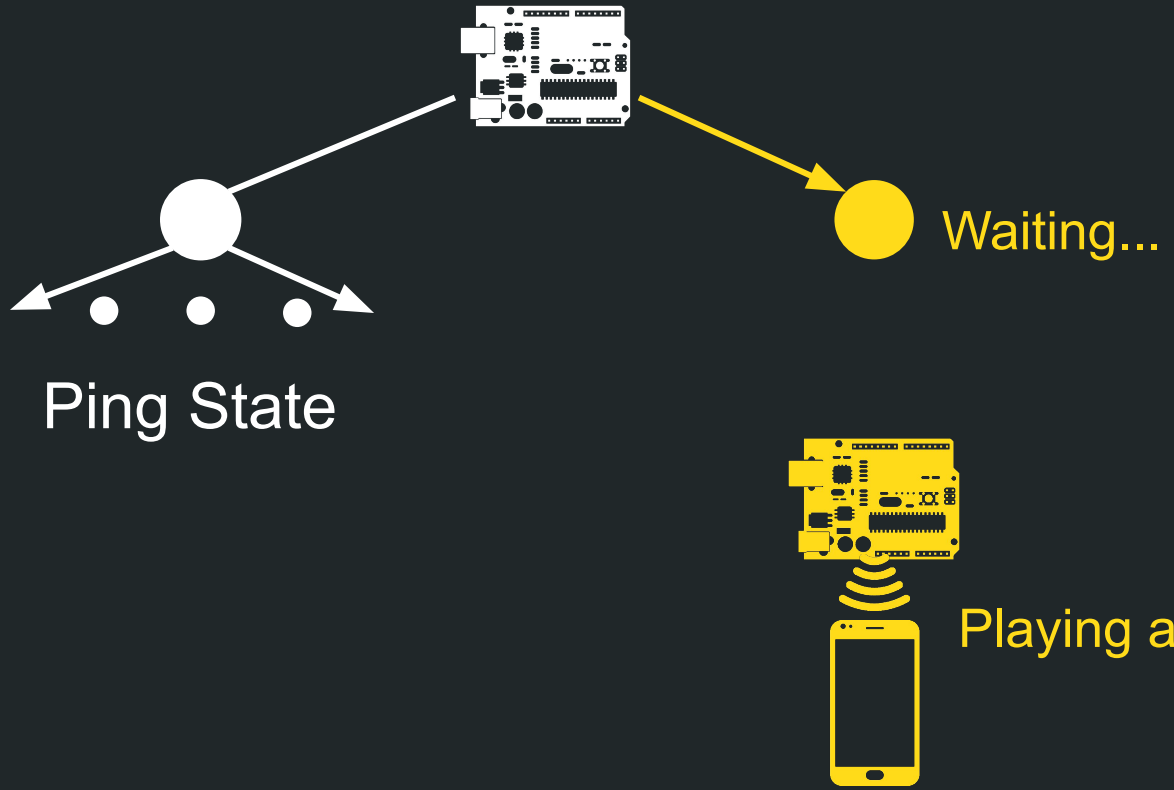

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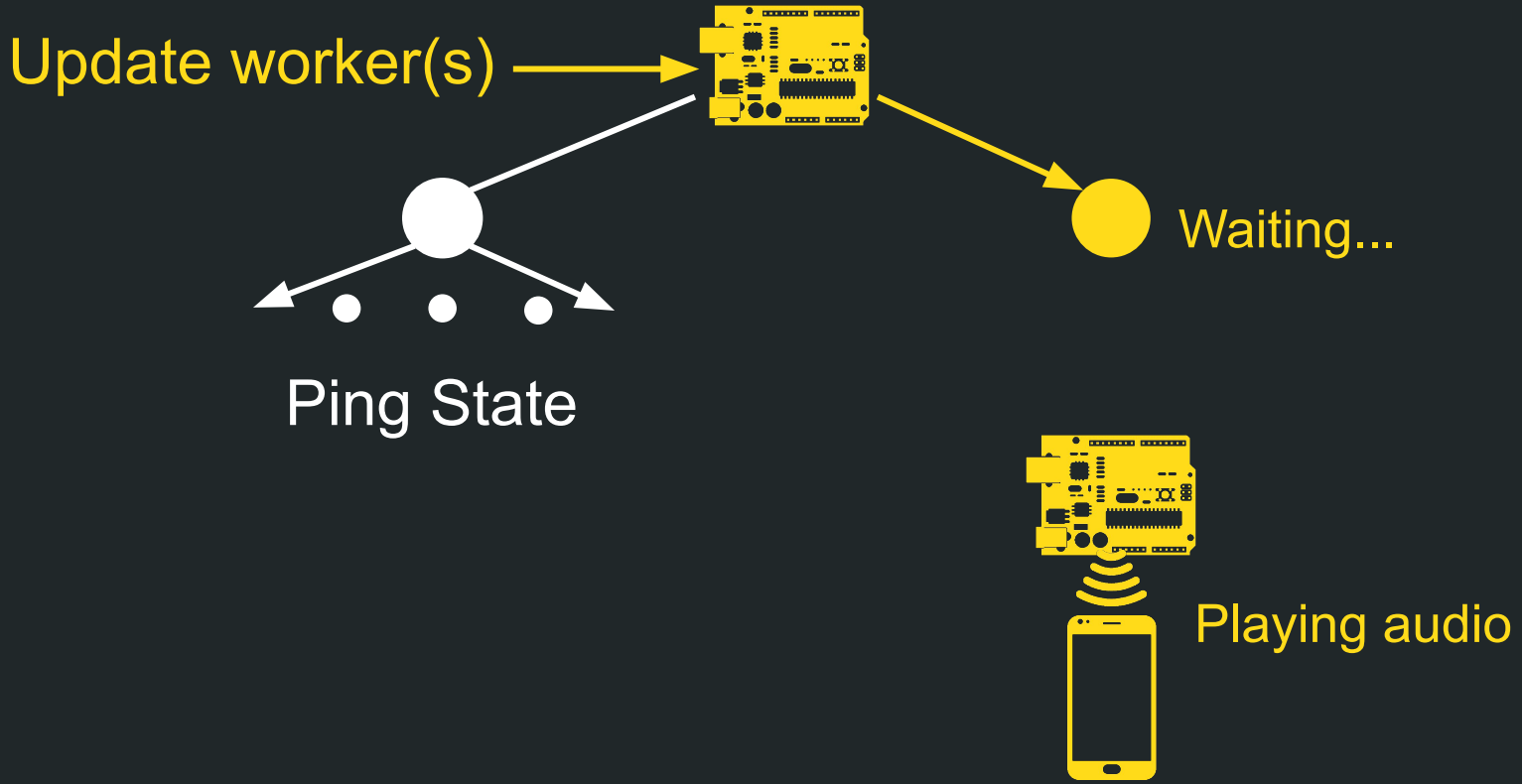

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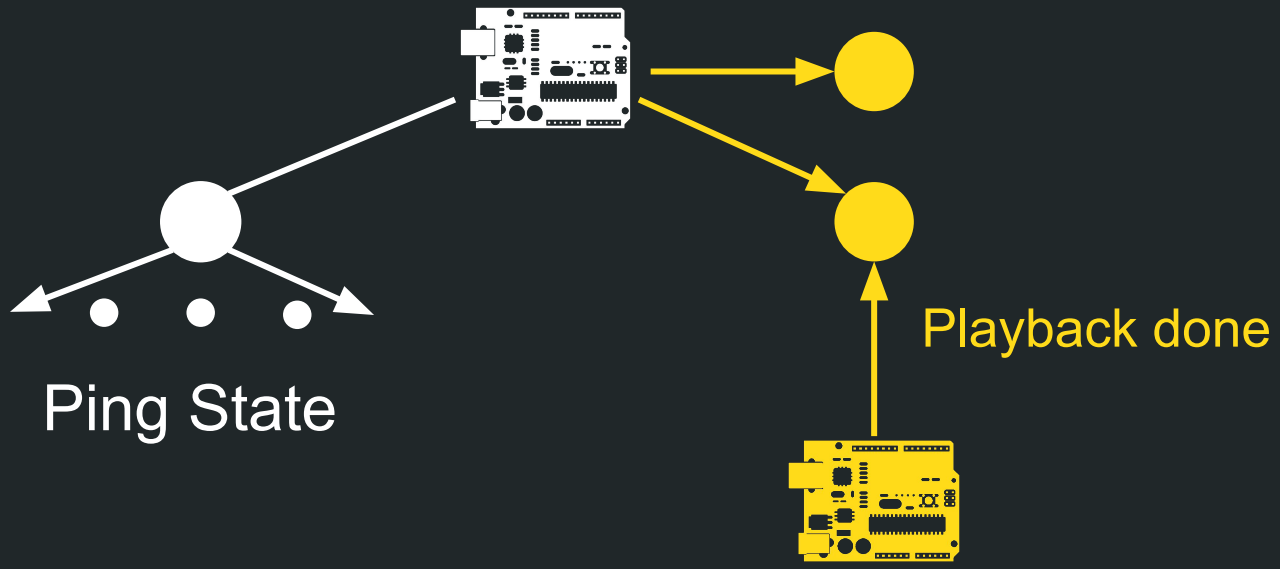

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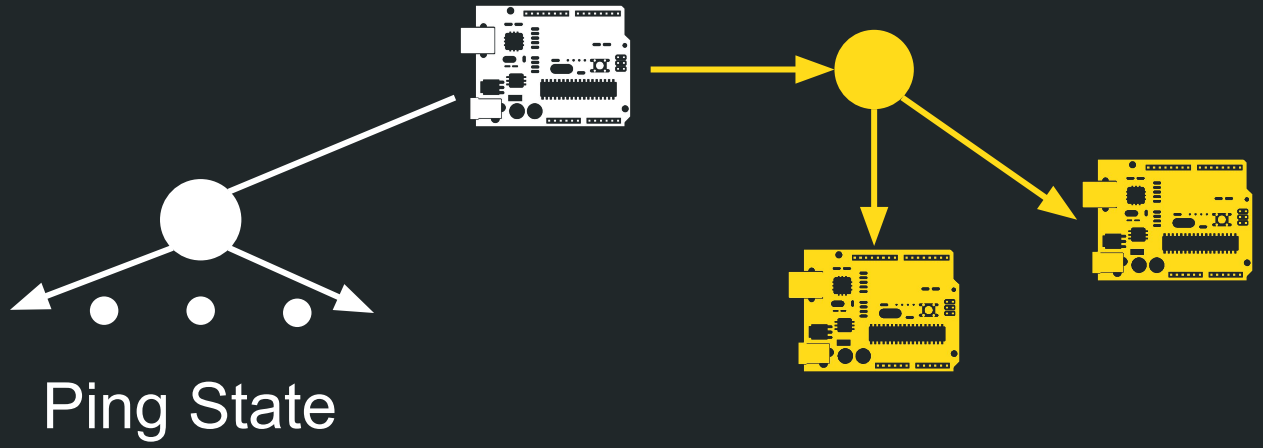

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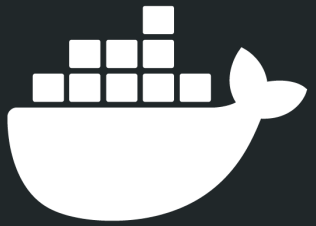
Remarkable issues

- Transmission of data and commands
- Consistency of the state

- Update roll-outs
  - Application and Operating System



docker

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Updating the system

- SWUpdate

- CD/CI pipelines
  - Updates as .swu files
  - The application kicks off the update and checks the outcome

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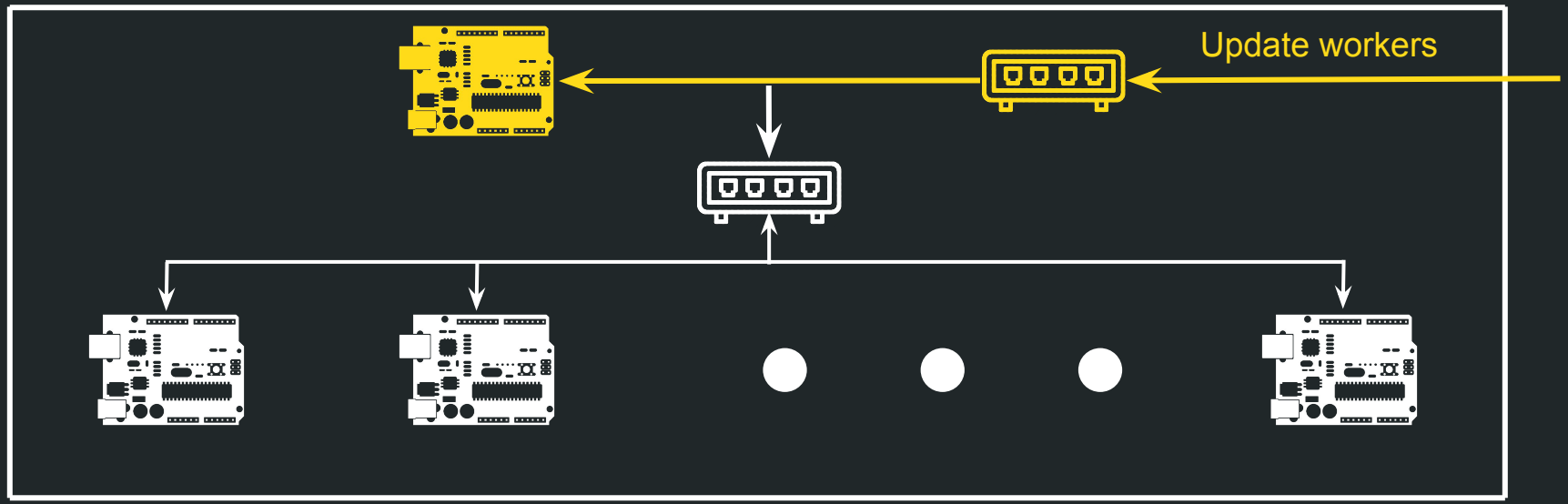
Updating the system - Workflow



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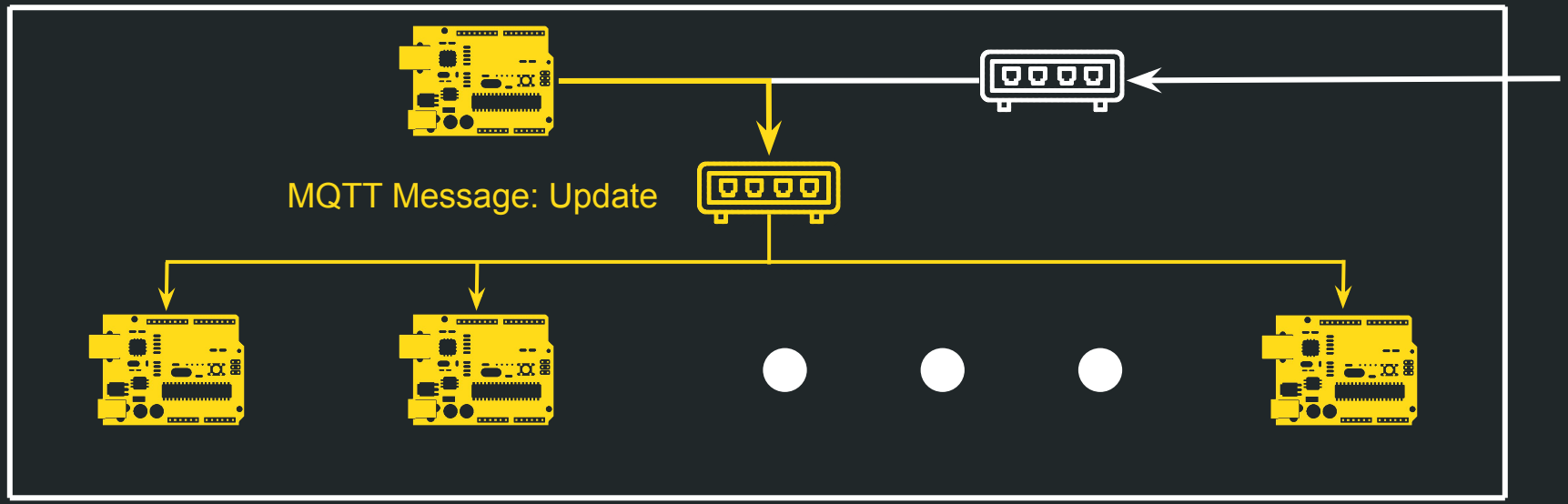
Updating the system - Workflow



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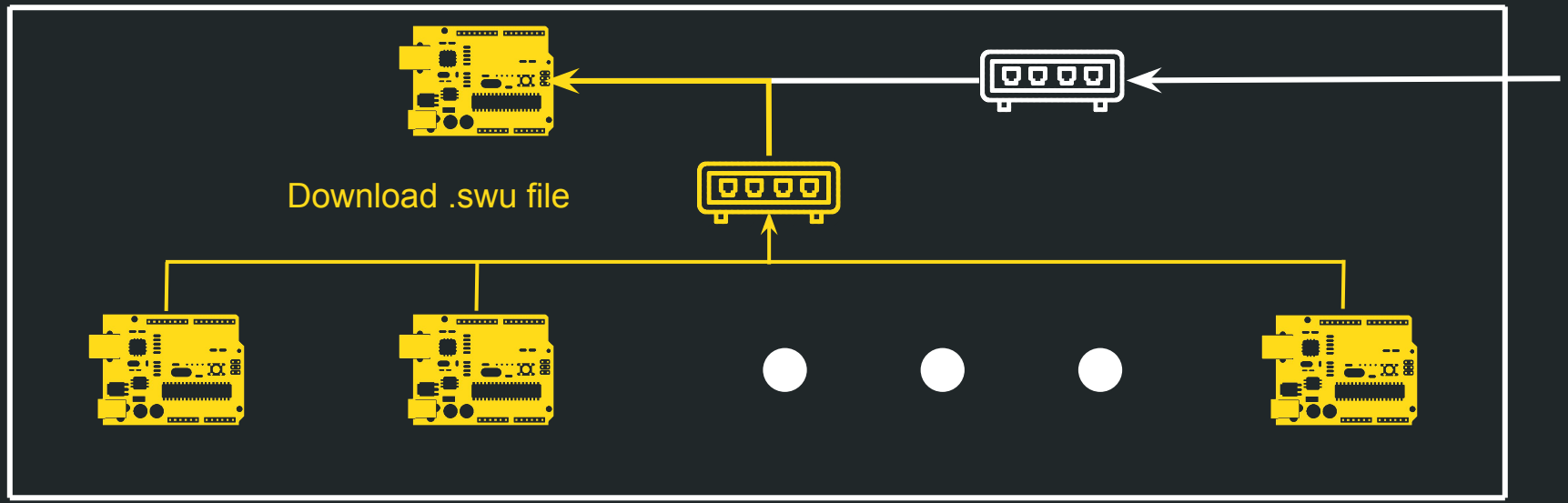
Updating the system - Workflow



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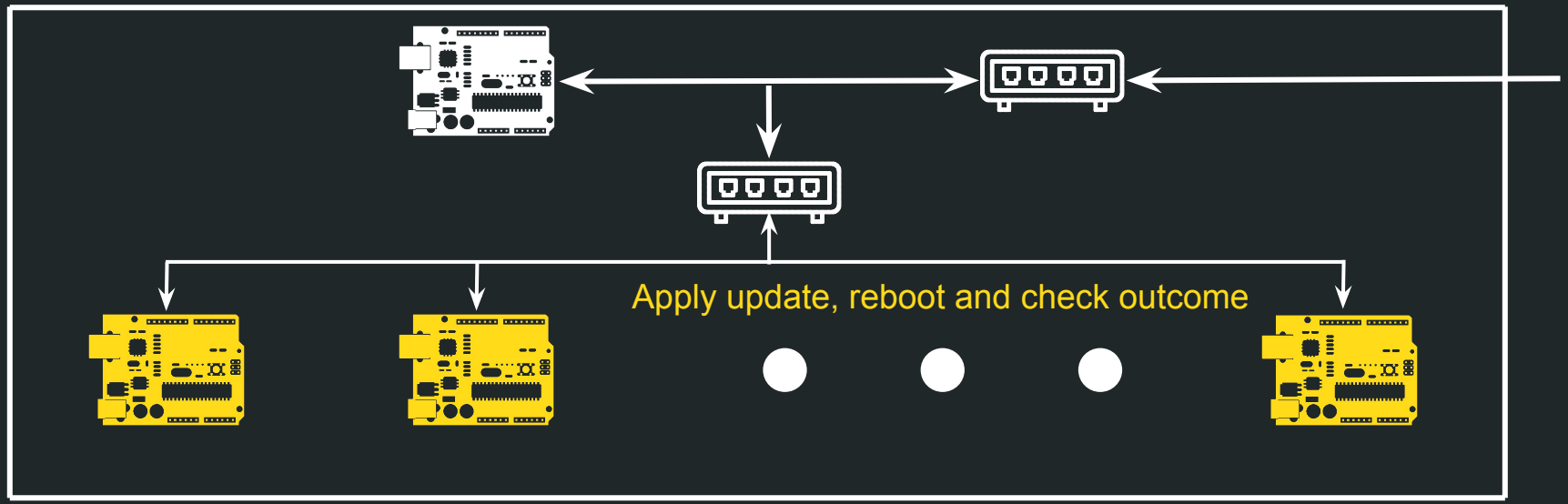
Updating the system - Workflow



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Could we use Docker instead?

Updating the system - Docker

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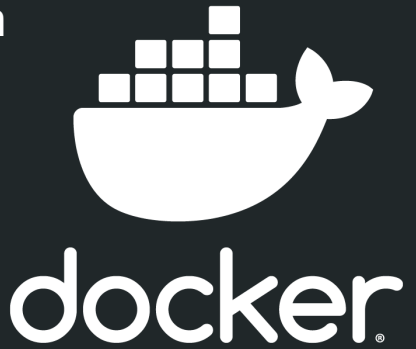
- ✓ Docker images can be distributed as .tar archives
- ✓ Reduced risk of breaking the board

- × More difficult to trigger the update from the application
- × Application-only updates more difficult to achieve
- × Interaction with external services
  - Audio
  - Bluetooth



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Conclusion

Network

Privacy

Scalability

Reliability

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Thank you

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