Bachelor PO - SmartUniversity using

RIOT

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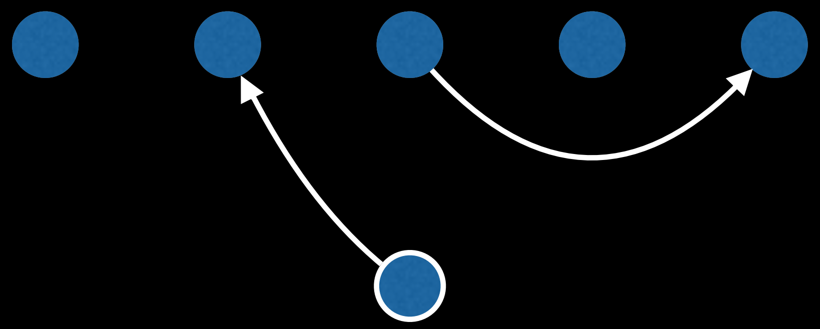
Agenda

1. Network communication
2. HTTP + REST
3. RIOT + COAP

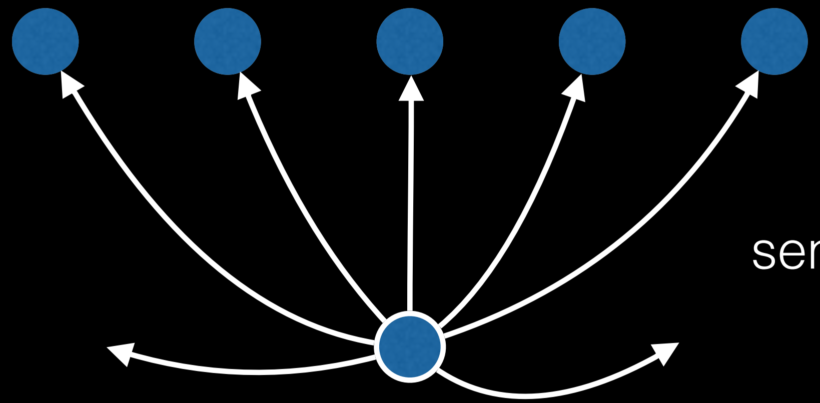
Patterns

- Unicast 1:1



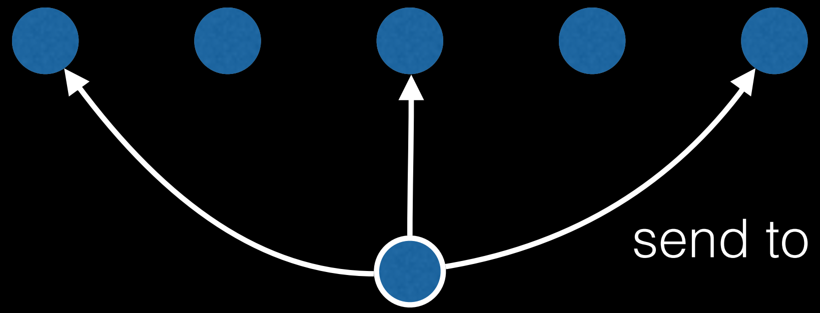
client-server like

- Broadcast 1:*



send to broadcast address

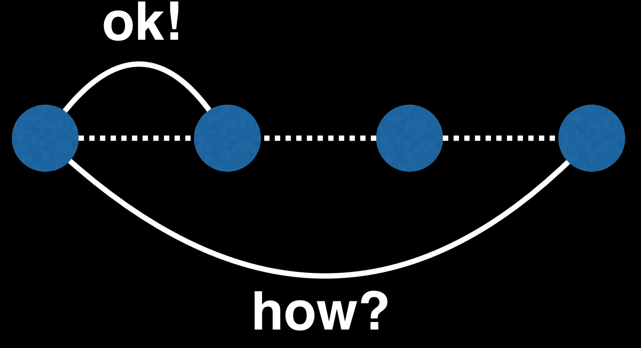
- Multicast 1:n

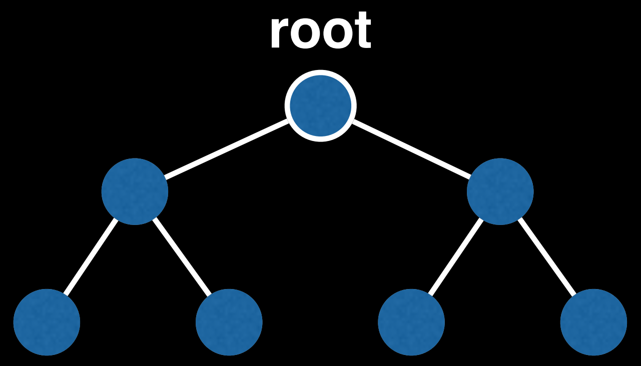


send to multicast address

Multihop

- characteristics of sensor networks:
  - low power, lossy, wireless connections
  - multiple hops between sender and receiver
- requires routing protocol for sensor networks
- RIOT supports RPL to enable multihop routing
- RPL enables 1:n and m:1 communication





Signaling

- Polling
    - (periodic) request data from sensor node
    - 1 request + 1 response/data message
- Timer
    - periodically send sensor data to server/gateway
    - 1 data message [+ 1 ACK message]
- Event
    - send sensor data triggered by event, e.g., threshold
    - 1 data message [+ 1 ACK message]

RESTful API

- uses standardized HTTP methods:
  - GET retrieve data item, 1 GET-Request + 1 Response
  - PUT update data item, 1 PUT-Message
  - POST create data item, 1 POST+ 1 Response (new ID)
- resources are encoded and accessed via URLs:

```
https://en.wikipedia.org/wiki/Wireless_sensor_network
schema  <- host = IP ->  <----       PATH       ---->
send [GET /wiki/Wireless_sensor_network] to en.wikipedia.org
```

- example usages:
  - GET /temperature   or   GET /temperature/node01/
  - PUT /temperatures/node01/2015-10-16_08-55-10
  - POST /temperatures/node01/

COAP

- Constrained Application Protocol, RFC 7252
- lightweight HTTP equivalent for the IoT
- wide variety of payload types (like MIME)
- uses UDP transport, unlike HTTP+TCP
- optional ACK-like mechanism and retries
- libraries for C/C++, Java, Python, etc...

RIOT

- COAP support by *libcoap* or *microcoap*
- we recommend microcoap:
  - lightweight and simple
  - but, no ACKs or retries
- add to Makefile:

```
usepkg += microcoap
```

- see: http://coap.technology

RIOT

www.riot-os.org