Constrained Application Protocol(CoAP)

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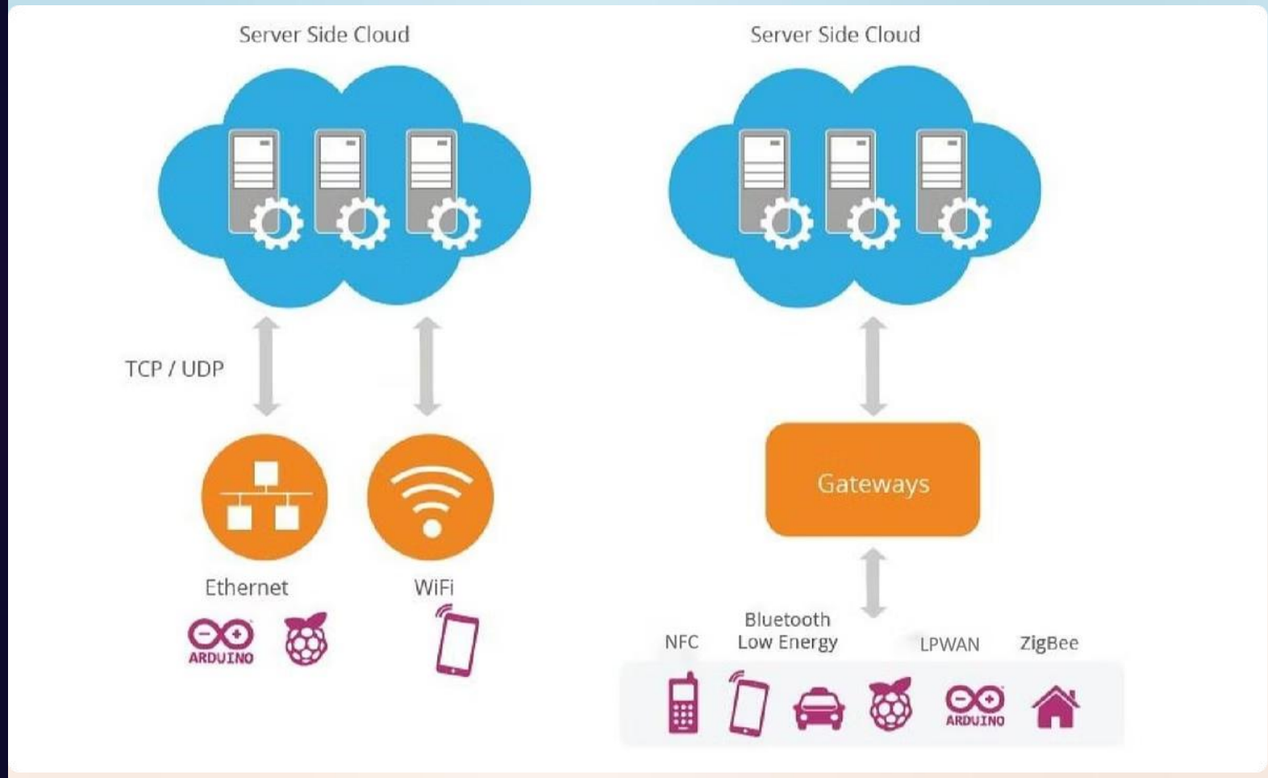
What is CoAP

The Constrained Application Protocol (CoAP) is a lightweight web transfer protocol designed for constrained devices and networks. It is optimized for applications in the Internet of Things (IoT), ensuring low power consumption and efficient bandwidth usage.



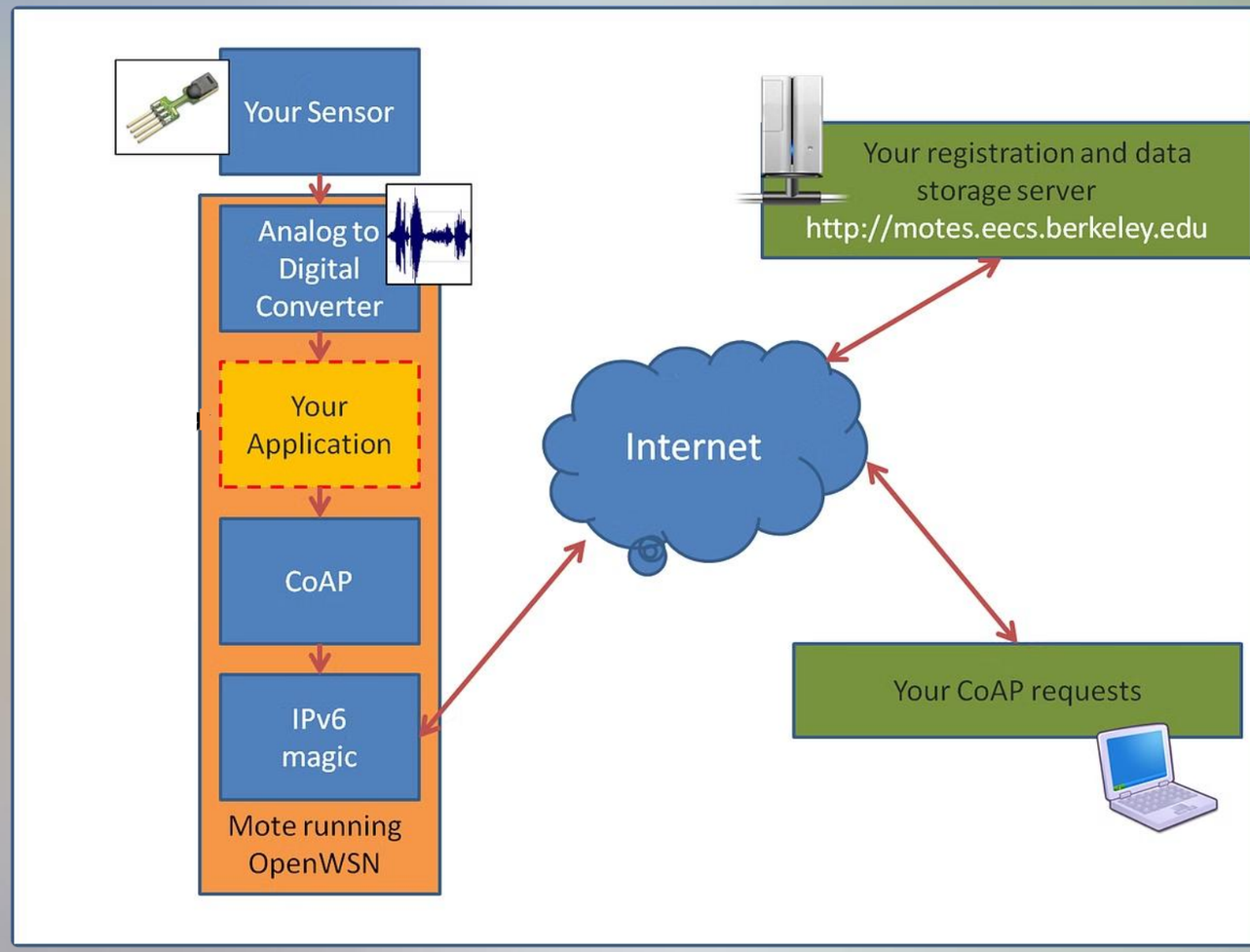
Purpose of Development CoAP

Why CoAP?

- Efficient communication in low-bandwidth, high-latency networks.
- Low resource consumption for constrained devices.
- Easy integration with web technologies.
- Easily adaptable to various devices across IoT applications
- Send information to multiple devices simultaneously.

Applicatioin Layer Connections

- Optimized RESTful architecture
- Supports block-wise transfer
- Supports optional secure communication through DTLS.
- Supports resource discovery
- Caching repeated data



Communication Type and Encoding

1 Serial Communication

CoAP messages are transmitted serially.

2 Encoding

Compact binary format to minimize overhead.

3 Signal Production

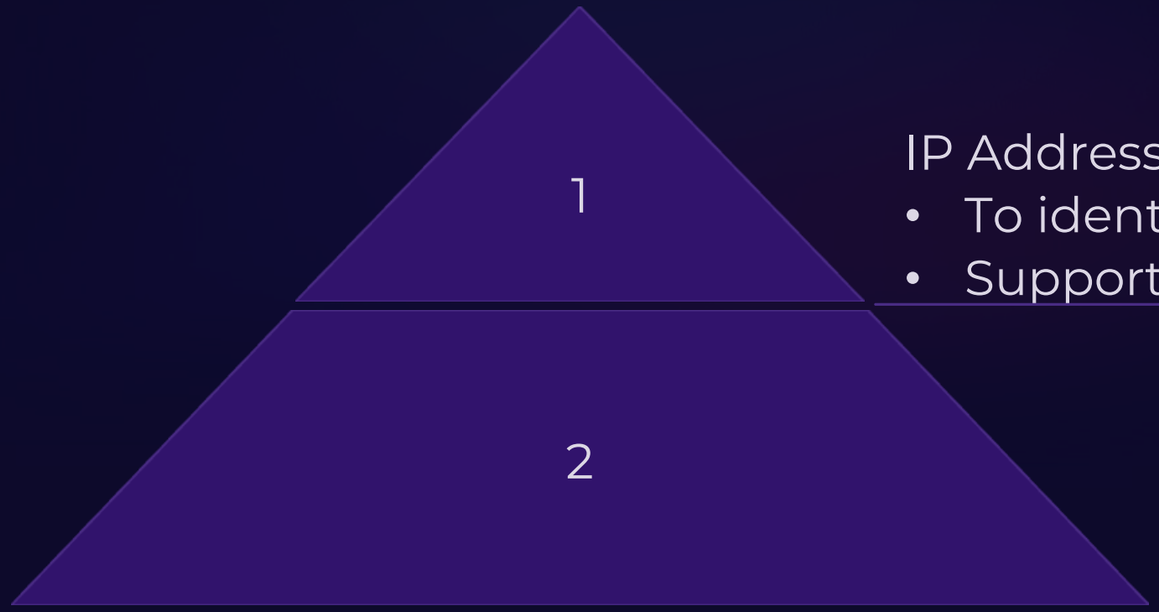
Utilizes UDP packets for asynchronous, low-latency communication.

Device Connectivity

Multi-Device Capability

Allows multiple devices to communicate with a single server.

Addressing and Routing



IP Addressing

- To identify and communicate with devices
- Supports unicast (1-to-1 and 1-to-many)

No Routing Features

Routing is managed by underlying network protocols (e.g., RPL).

Data Flow Management

1

Flow Control

- Managed by message acknowledgment.

2

Message Deduplication

- Ignore duplicate messages

3

Retransmission Mechanism

- Ensures data reliability in case of packet loss.

Error Detection

1

Data Link Layer

Integrity is maintained through UDP checksums.

2

Higher Layers

Application-level errors are identified through response codes(e.g,4.04).

Error Correction

CoAP primarily focuses on error detection and retransmission rather than complex error correction techniques.

Message Types and Formats

Version | Type | Token Length | Code | Message ID | Options | Payload

CoAP uses four message types:

- Confirmable.
- Non-confirmable.
- Acknowledgment.
- Reset.

Octet offset		0								1								2								3							
	Bit offset	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
4	32	ver		type		token length				request/response code								message ID															
8	64	token (0–8 bytes)																															
12	96																																
16	128	options (if available)																															
20	160	1	1	1	1	1	1	1	1	payload (if available)																							

Thanks for your attention

Under the guidance of Dr.Foshati

Interface Circuits Design

Fall 2024

Reference

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http://rfc-editor.org/rfc/rfc7252.html

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