



SNS College of Engineering

An Autonomous Institution

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Redesigning Common Mind & Business Towards Excellence



Build an Entrepreneurial Mindset Through Our Design Thinking Framework

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Internet Of Things



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WEB COMMUNICATION PROTOCOLS FOR CONNECTED DEVICES



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- Data of connected devices routes over the web in two types of communication environments. The environments are:
- **Constrained RESTful Environment (CoRE):** IoT devices or M2M devices communicate between themselves in a Local Area Network.
- A device typically sends or receives 10s of bytes. The data gathered after enriching and consolidating from a number of devices consists of 100s of bytes.
- A gateway in the communication framework enables the data of networked devices that communicate over the Internet using the REST software architecture.
- Devices have the constraint in the sense that their data is limited in size compared to when data interchange between web clients and web servers takes place using HTTP, Transmission Control Protocol (TCP) and Internet Protocol (IP).
- Another constraint is data-routing when Routing Over a network of Low power and (data) Loss (ROLL).
- ROLL network is a wireless network with low power transceiver.



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- Another constraint is that the devices may sleep most of the time in low power environment and awaken on an event or when required (on client initiative).
- Devices' connectivity may also break for long periods, have limited up intervals in loss environment, and have limited data size.
- **Unconstrained Environment:** Web applications use HTTP and RESTful HTTP for web client and web server communication.
- A web object consists of 1000s of bytes. Data routes over IP networks for the Internet.
- Web applications and services use the IP and TCP protocols for Internet network and transport layers

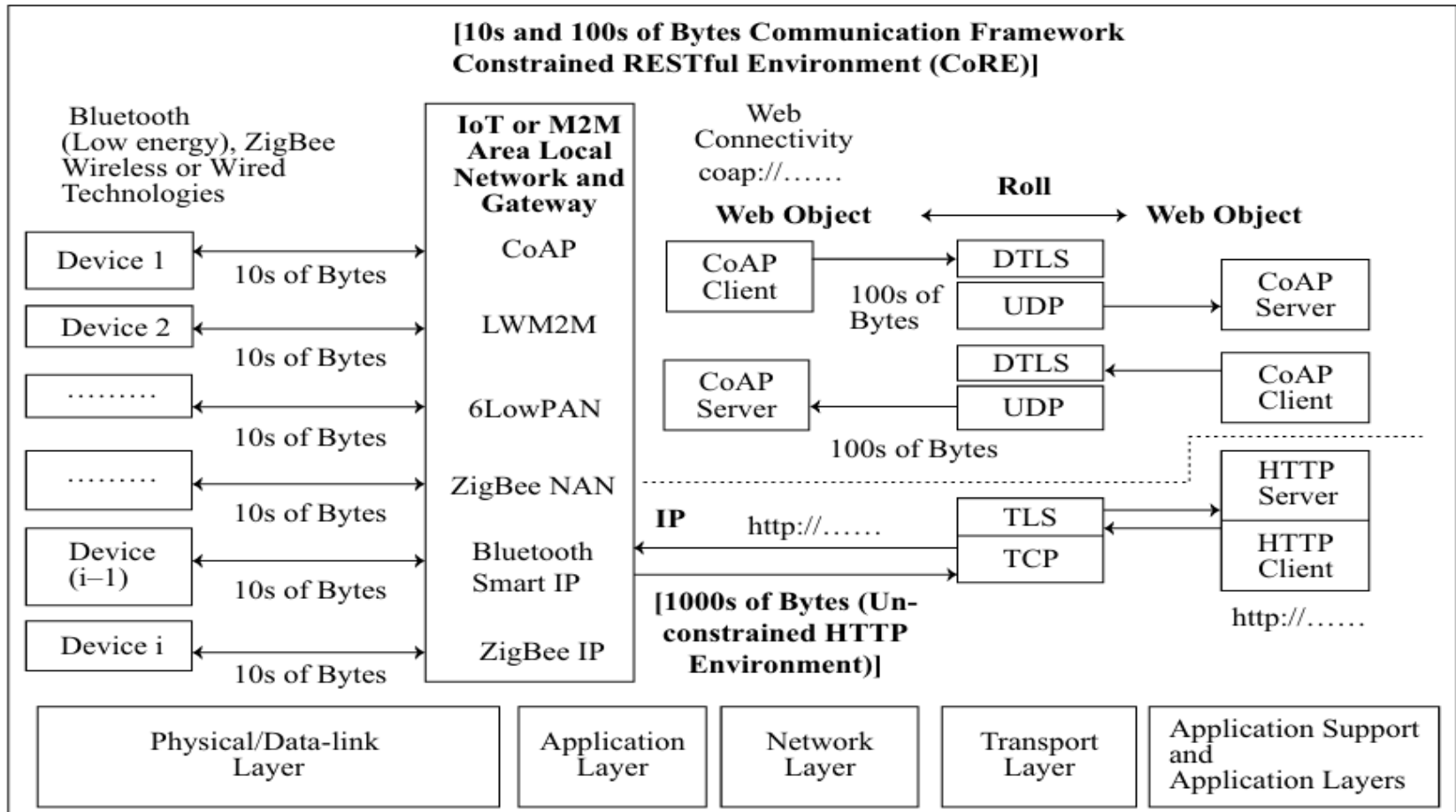


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Figure . shows device's local area network connectivity, web connectivity in constrained and unconstrained RESTful environments and the protocols for communication.



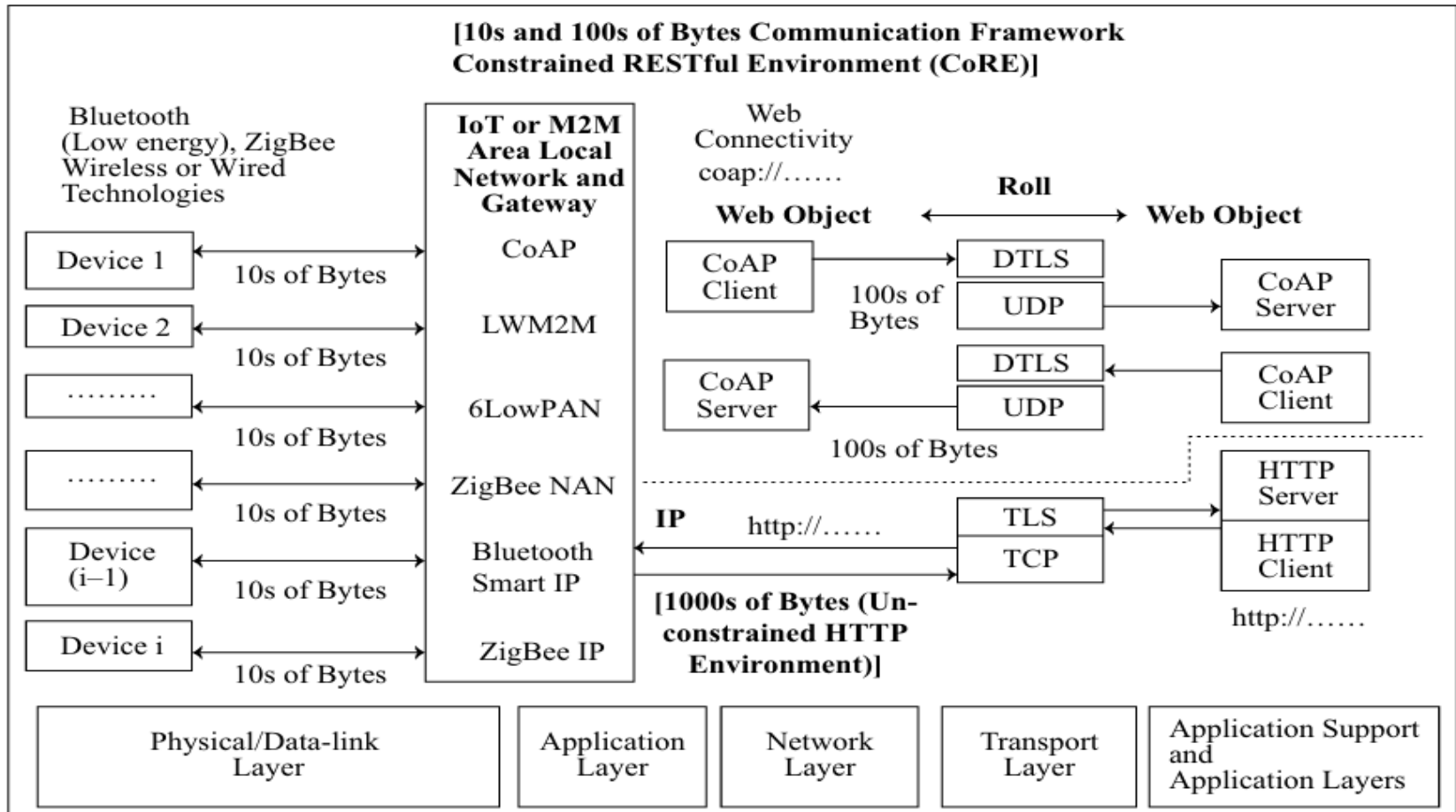


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Figure . shows device's local area network connectivity, web connectivity in constrained and unconstrained RESTful environments and the protocols for communication.





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- **Constrained Application Protocol**
- IETF recommends Constrained Application Protocol (CoAP) which is for CoRE using ROLL data network.
- Features of CoAP are: An IETF defined application-support layer protocol
- CoAP web-objects communicate using request/response interaction model. A specialised web-transfer protocol which is used for CoRE using ROLL network.
- It uses object-model for the resources and each object can have single or multiple instances.
- Each resource can have single or multiple instances.
- An object or resource use CoAP, DTLS (security binding with PSK, RPK and Certificate) and UDP protocols for sending a request or response.
- Supports the resource directory and resource-discovery functions

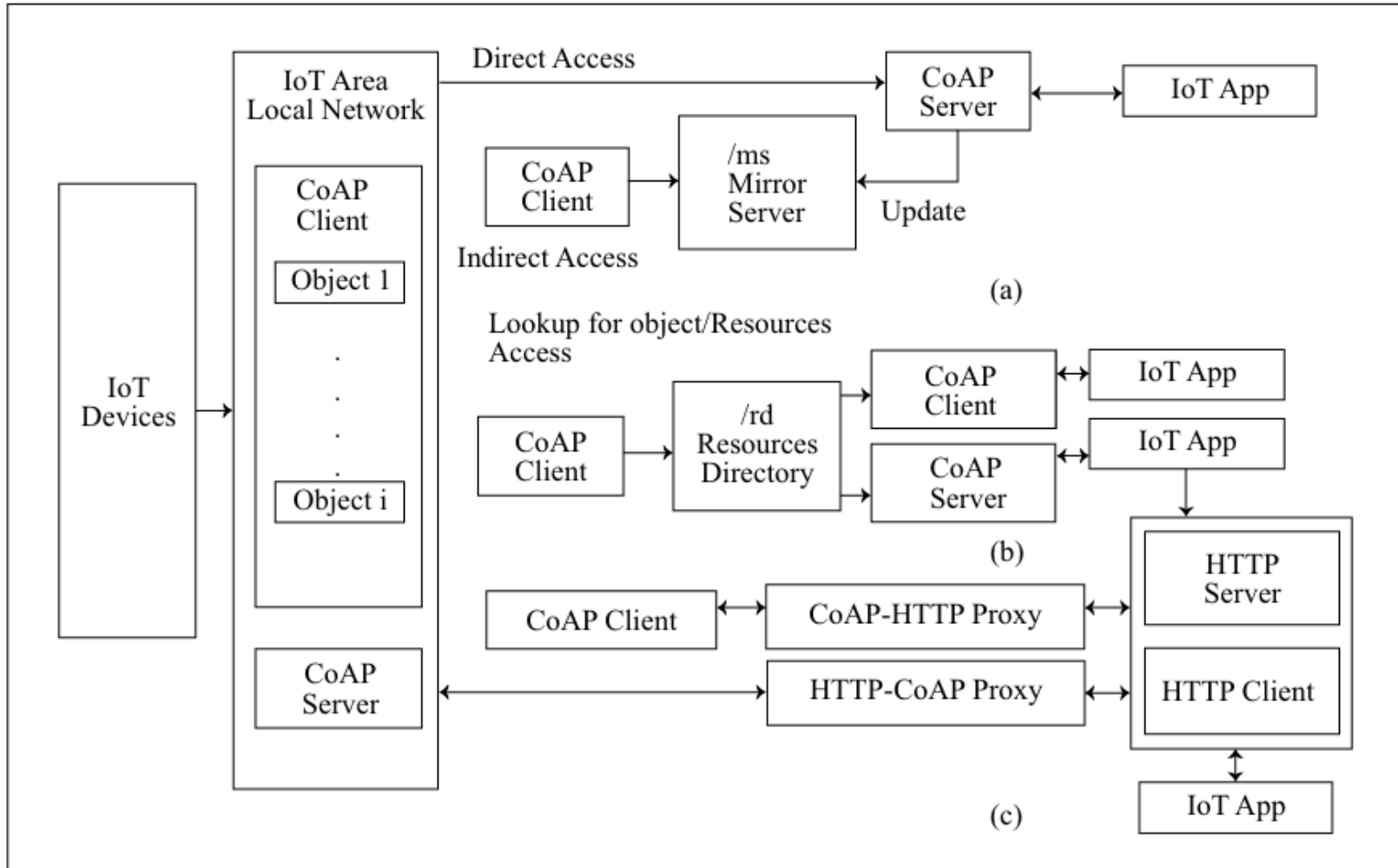


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- Constrained Application Protocol



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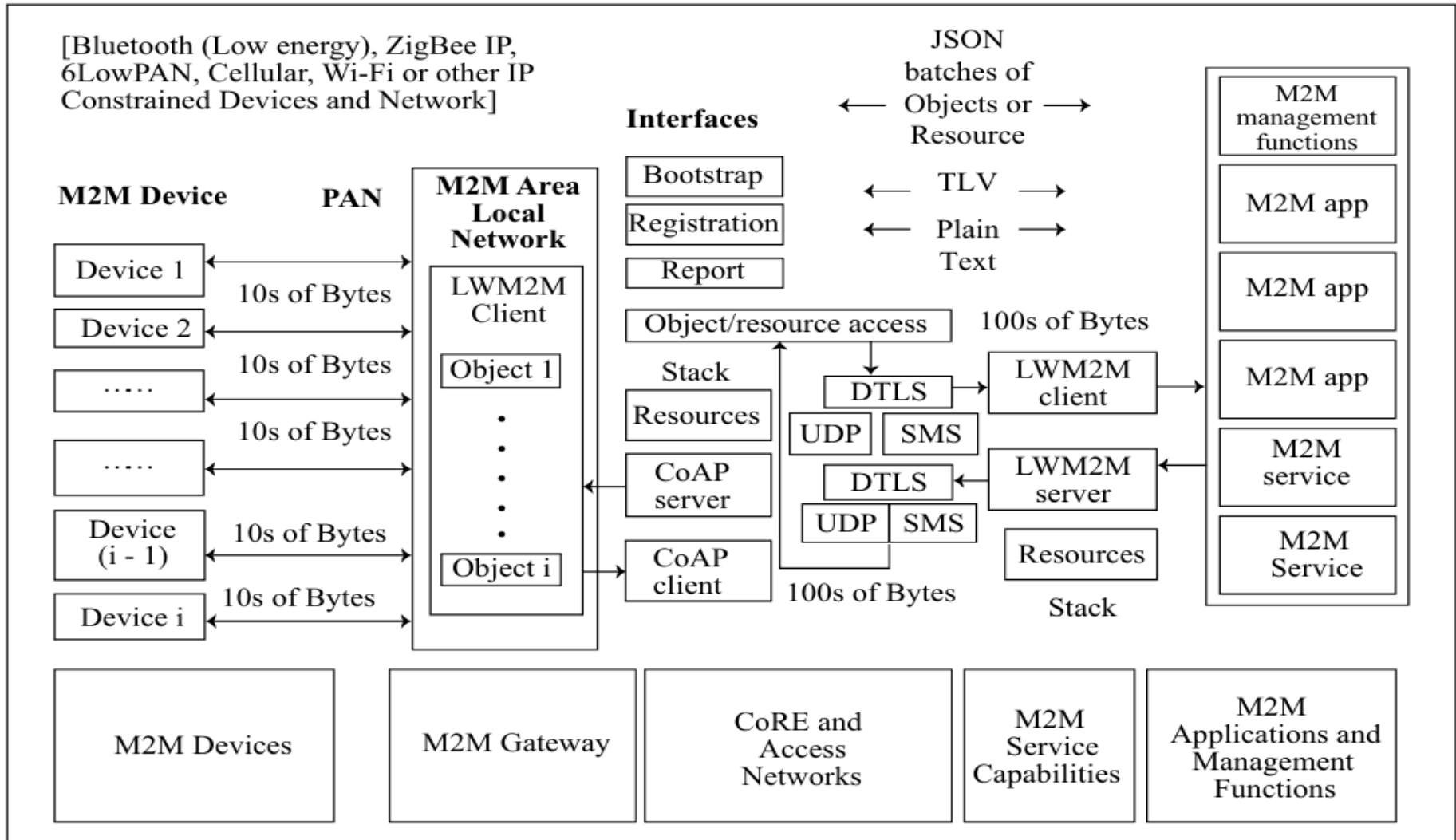
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- **Lightweight Machine-to-Machine Communication Protocol**
- Lightweight Machine-to-Machine Communication (LWM2M) protocol is an application layer protocol specified by Open Mobile Alliance (OMA) for transfer of service data/messages. It finds applications in M2M.
- The protocol enables communication between LWM2M client at IoT device and an LWM2M server at the M2M application and service capability layer.
- The protocol is a compact one, meaning small header. It has an efficient data model. It is generally used in conjunction with CoAP.



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Lightweight Machine-to-Machine Communication Protocol





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Thank
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