SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE308- WIRELESS TECHNOLOGIES FOR IOT

III ECE / VI SEMESTER

UNIT 1 – OVERVIEW OF INTERNET OF THINGS

TOPIC 9 –web communication protocols used by connected IoT/M2M devices,

Web communication protocols

- Data of connected devices routes over the web in two types of communication environments
  - Constrained RESTful Environment (CoRE)
  - Unconstrained Environment:

Constrained Environment for Connected Devices

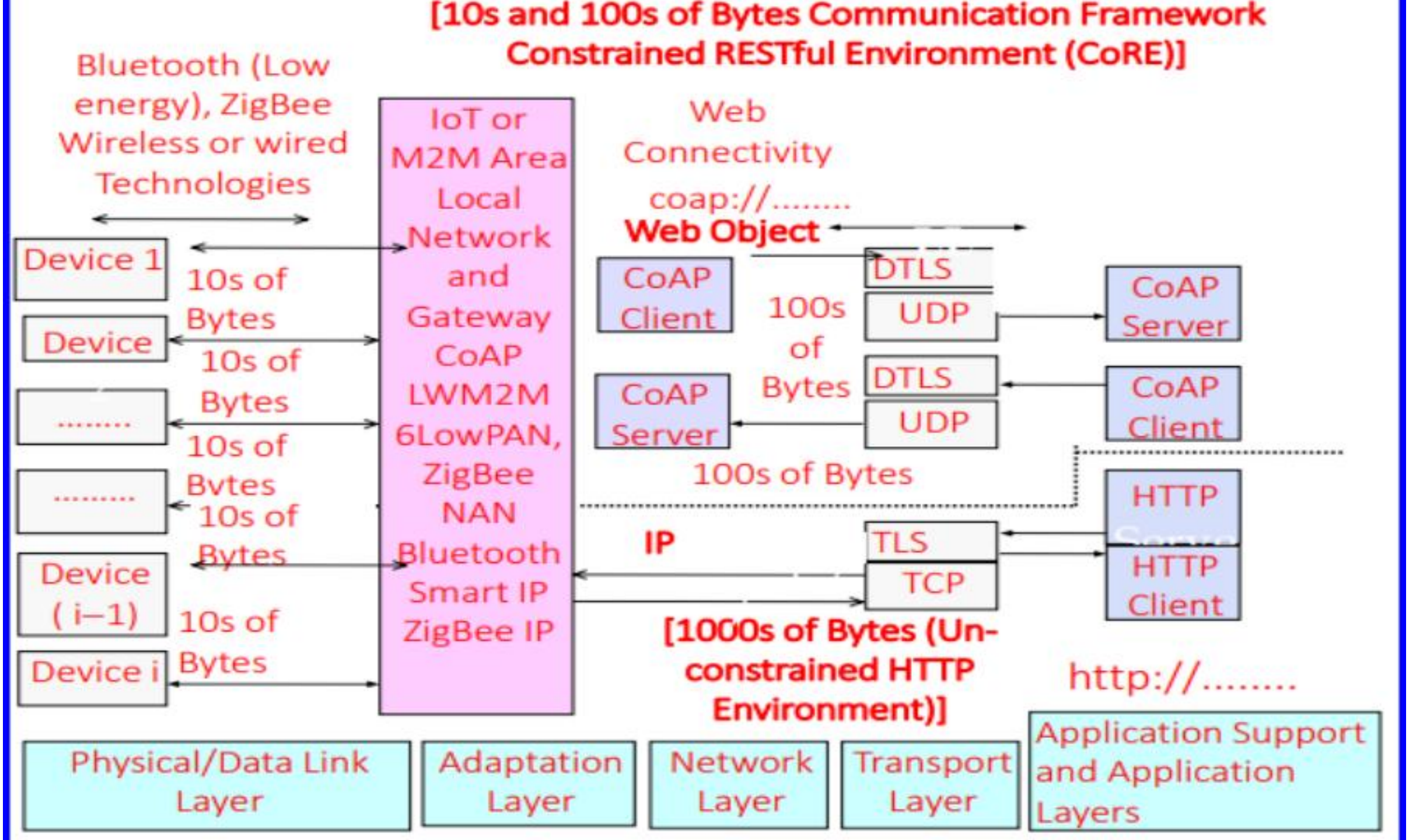
- Data is limited in size
- 10s of Bytes from a device
- Limited compared to data interchange of 1000s of bytes between web clients and web servers when using HTTP, TCP and IP

Constrained Environment for Connected Devices

- Data routes over the low power and lossy (ROLL) network
- Devices may sleep most of the time in low power environment
- Awakes when required (when a client initiates)
- The connectivity breaks for long periods
- Have limited up intervals in lossy environment

Constrained RESTful Environment (CoRE)

- The gathered data from number of devices consists of 100s of Bytes after enriching and consolidating at Gateway
- Communication framework enables that data of networked devices communicate over the Internet using the REST software architecture

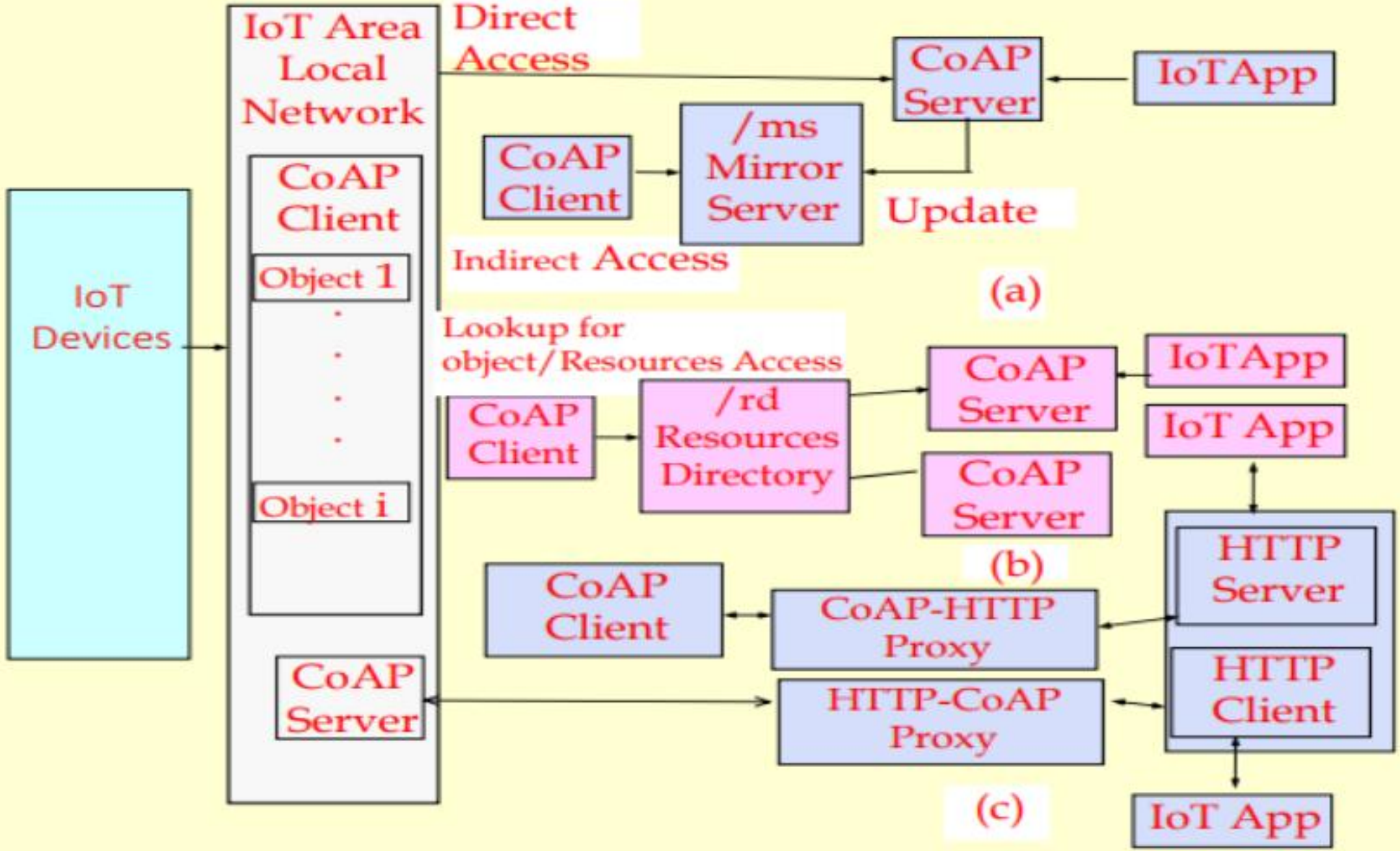

[10s and 100s of Bytes Communication Framework
Constrained RESTful Environment (CoRE)]
Bluetooth (Low energy), ZigBee Wireless or wired Technologies
IoT or M2M Area Local Network and Gateway CoAP LWM2M 6LowPAN, ZigBee NAN Bluetooth Smart IP ZigBee IP
Web Connectivity
coap://.....
Web Object
Device 1
Device
.....
.....
Device (i–1)
Device i
10s of Bytes
10s of Bytes
10s of Bytes
10s of Bytes
10s of Bytes
CoAP Client
CoAP Server
DTLS
UDP
100s of Bytes
DTLS
UDP
CoAP Server
CoAP Client
100s of Bytes
IP
TLS
TCP
HTTP Server
HTTP Client
[1000s of Bytes (Un-constrained HTTP Environment)]
http://.....
Physical/Data Link Layer
Adaptation Layer
Network Layer
Transport Layer
Application Support and Application Layers

CoAP (Constrained Application Protocol)

- An IETF recommended protocol for constrained environment devices
- A web-object's data transfer standard protocol for sending a request or response
- For example, RESTful CoAP

CoAP Client and Server

- Object or resource uses CoAP
- CoAP client at a device, IoT/M2M Area Local Network or Gateway sends requests to a server
- CoAP server sends the responses, messages, resources and notifications


IoT Area Local Network
Direct Access
CoAP Server
IoTApp
CoAP Client
/ms Mirror Server
Update
CoAP Client
Object 1
Object i
IoT Devices
Indirect Access
(a)
Lookup for object/Resources Access
CoAP Client
/rd Resources Directory
CoAP Server
IoTApp
CoAP Server
IoT App
(b)
CoAP Client
CoAP-HTTP Proxy
HTTP Server
HTTP Client
CoAP Server
HTTP-CoAP Proxy
(c)
IoT App

CoAP Features

- Standard organisation IETF defined Application support layer protocol
- CoAP web-objects communication using request/response interactions model

CoAP Client and Server

- A specialized web transfer protocol used for CoRE using ROLL network.
- Use of object model for resources, and each object can have single or multiple instances.
- Each resource can have single or multiple instances

CoAP Features

- Supports resource directory and resource discovery functions.
- The resource identifiers use the URIs coap://...
- Small message-header of 4 bytes.
- CoRE communication is asynchronous communication over the ROLL
- Integrates easily with the web using the CoAP application cross-protocol proxies. Because HTTP and CoAP both share the REST model

UDP (Universal Datagram Protocol)

- A transport layer standard protocol sending a request or response datagrams

DTLS (Datagram Transport Layer Security protocol)

- Provisions for three types of security
- services (integrity, authentication and confidentiality
- Security binding with PSK or RPK or Certificate