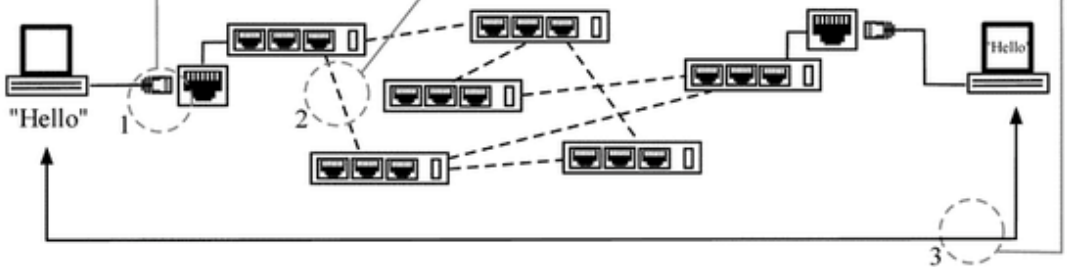
IoT Protocols

&

Standards

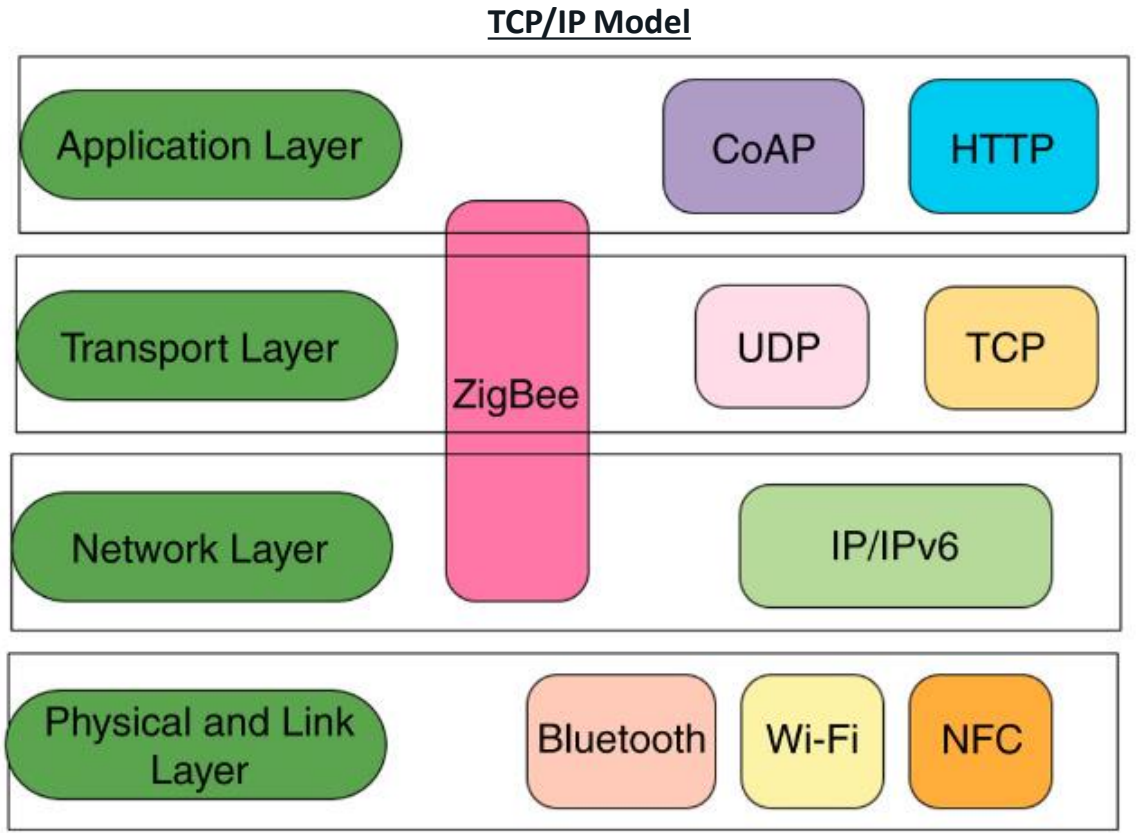
OSI Model

	data unit	layer	examples	
host / service layers	data	application	HTTP, FTP, 'IoT protocols'	peer-to-peer protocols
		presentation	TLS, SSL	
		session	NetBIOS	
	segment / datagram	transport	TCP, UDP	
device / media layers	packet / datagram	network	IP, ARP, ICMP, IPSec	network protocols
	frame	data link	Ethernet, ATM, PPP	
	bit	physical	Ethernet, WiFi, USB, Bluetooth, SPI, I2C	



Adryan, et. al. (2017, p217)

TCP/IP vs OSI



OSI Layers 5, 6, & 7

OSI Layer 4

OSI Layer 3

OSI Layers 1 & 2

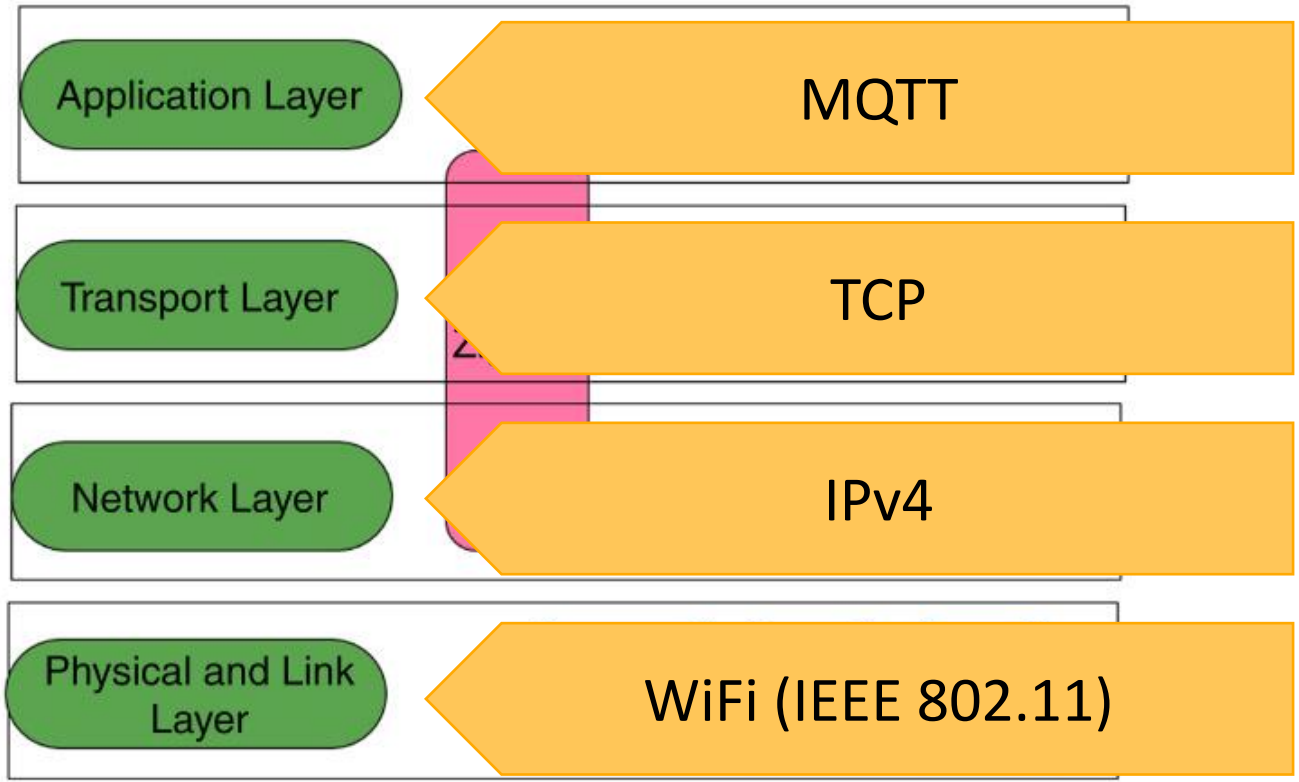
Also called Host-to-Host Layer

Also called Internet Layer

Also called Network Access or Host-to-Network Layer

IoT Protocol Stack in the TCP/IP Model

TCP/IP Model



ESP8266

IoT Protocol Comparison

Table 1.2 IoT Communication Protocols Comparison

Protocol Name	Transport Protocol	Messaging Model	Security	Best-Use Cases	Architecture
AMPQ	TCP	Publish/Subscribe	High-Optional	Enterprise integration	P2P
CoAP	UDP	Request/Response	Medium-Optional	Utility field	Tree
DDS	UDP	Publish/Subscribe and Request/Response	High-Optional	Military	Bus
MQTT	TCP	Publish/Subscribe and Request/Response	Medium-Optional	IoT messaging	Tree
UPnP	—	Publish/Subscribe and Request/Response	None	Consumer	P2P
XMPP	TCP	Publish/Subscribe and Request/Response	High-Compulsory	Remote management	Client server
ZeroMQ	UDP	Publish/Subscribe and Request/Response	High-Optional	CERN	P2P

IoT Standards

Table 1.4 IoT Standards

Organization Name	Outcome
Internet of Things Global Standards Initiative (IoT-GSI)	JCA-IoT
Open Source Internet of Things (OSIoT)	Open Horizontal Platform
IEEE	802.15.4 standards, developing a reference architecture
Internet Engineering Task Force (IETF)	Constrained RESTful Environments (CoRE), 6LOWPAN, Routing Over Low power and Lossy networks (ROLL), IPv6
The World Wide Web Consortium (W3C)	Semantic Sensor Net Ontology, Web Socket, Web of Things
XMPP Standards Foundation	XMPP
Eclipse Foundation	Paho project, Ponte project, Kura, Mihini/M3DA, Concierge
Organization for the Advancement of Structured Information Standards	MQTT, AMPQ