IoT Architectural View

COCSC20

Basic Premises

Devices

send and receive data interacting with the

Network

where the data is transmitted, normalized, and filtered using

Edge Computing

before landing in

Data storage / Databases

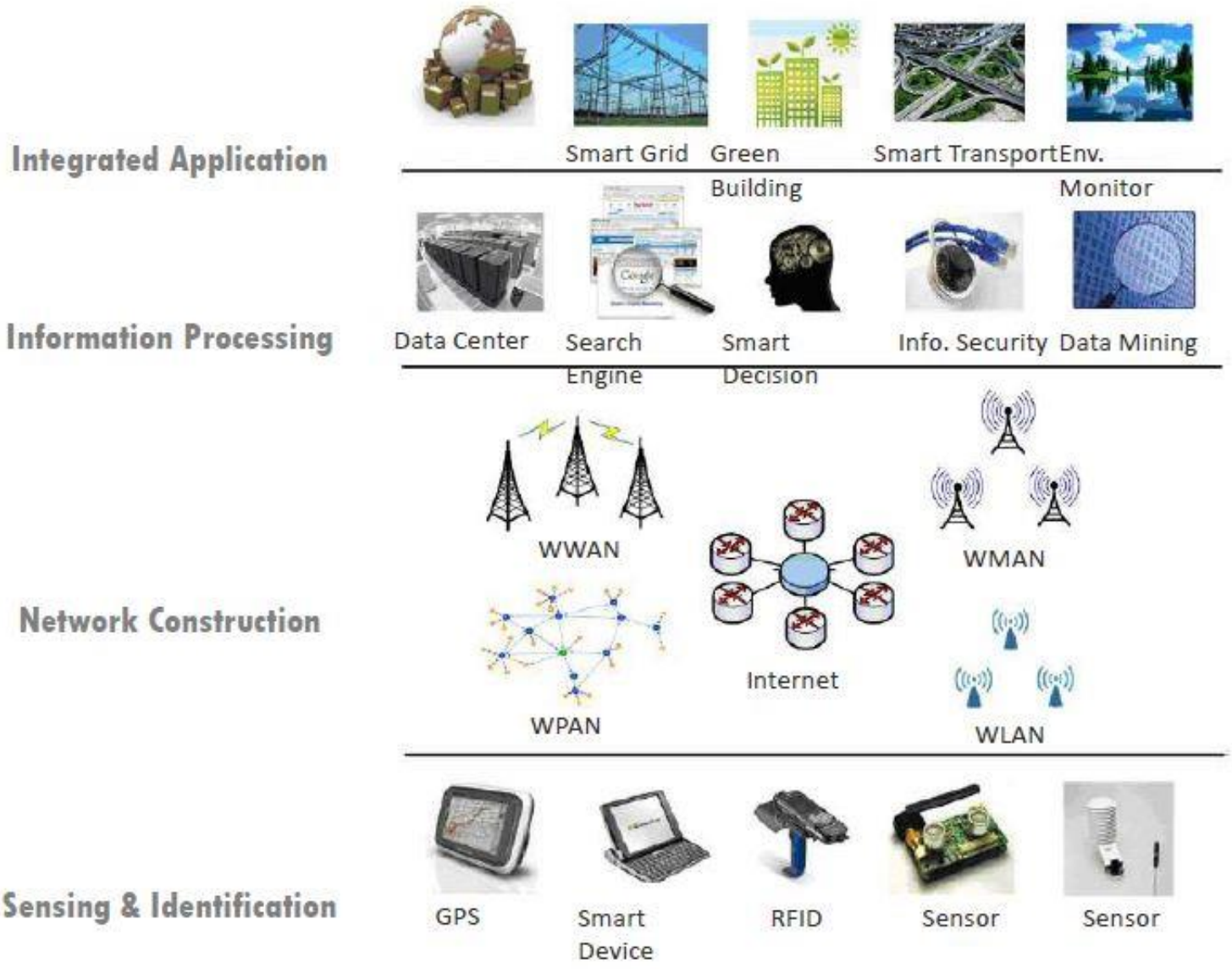
accessible by

Applications

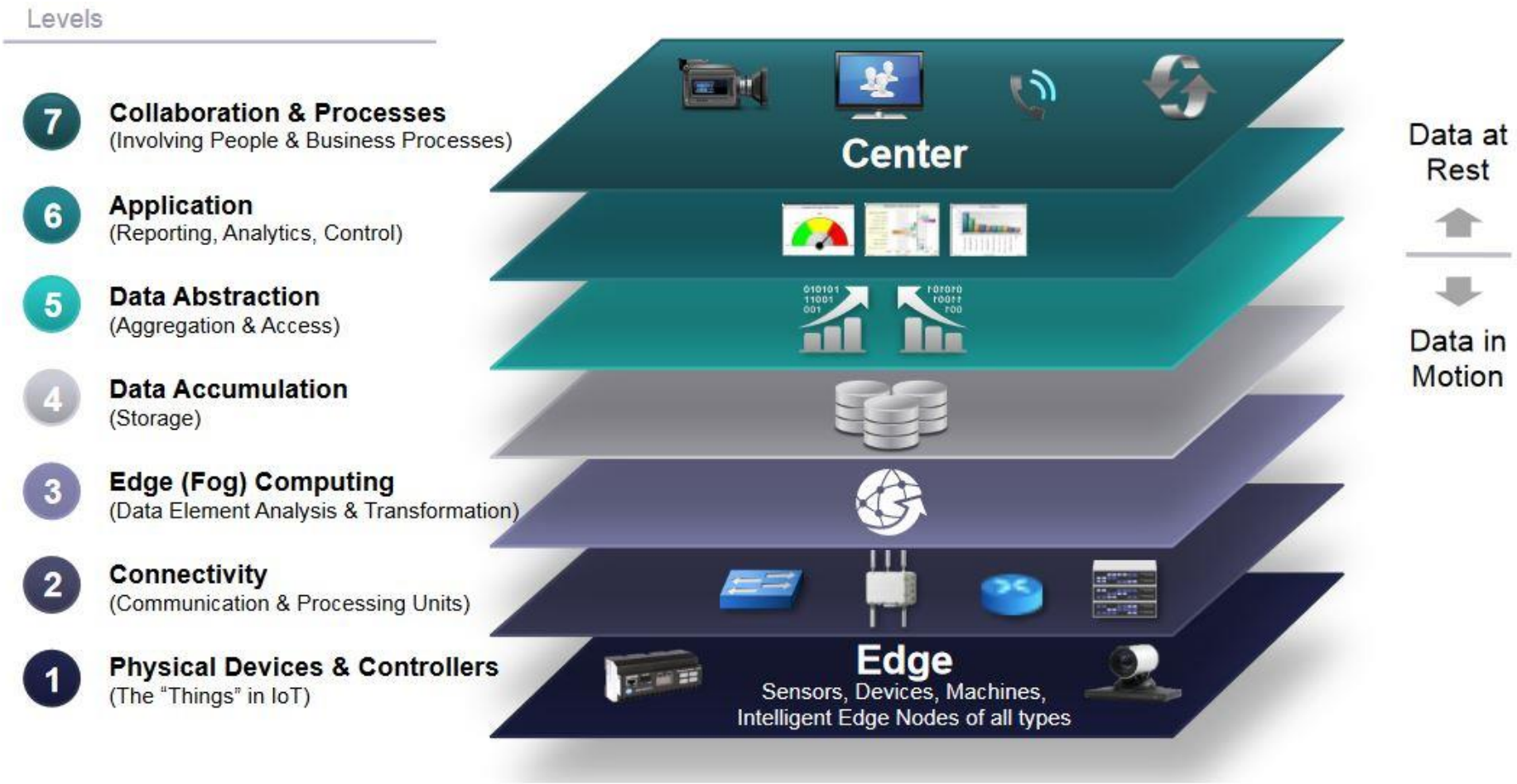
which process it and provide it to people who will

Act and Collaborate

IoT 4 Layers model



Reference Model



CISCO IoT Reference Model

1 Physical Devices & Device Controllers

(The "Things" in IoT)

IoT "devices" are capable of:

- Analog to digital conversion, as required
- Generating data
- Being queried / controlled over-the-net

2 Connectivity
(Communication & Processing Units)

Level 2 functionality focuses on East-West communications

Connectivity includes:

- Communicating with and between the Level 1 devices
- Reliable delivery across the network(s)
- Implementation of various protocols
- Switching and routing
- Translation between protocols
- Security at the network level
- (Self Learning) Networking Analytics

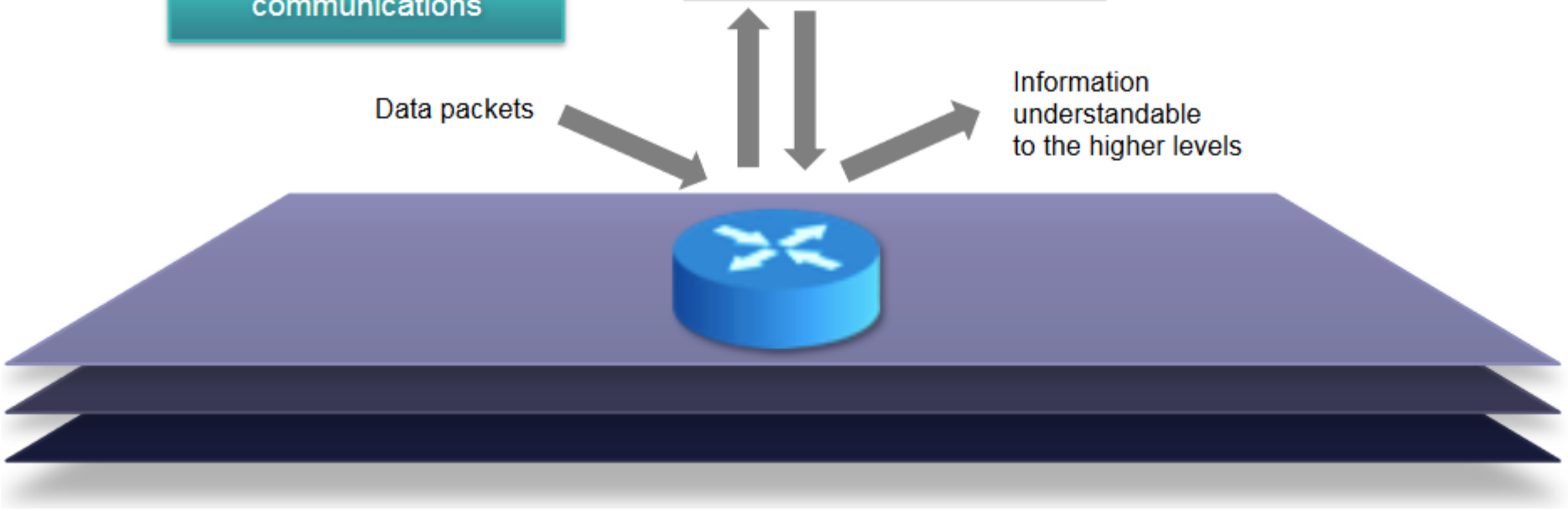
3

Edge (Fog) Computing
(Data Element Analysis & Transformation)

Level 3 functionality focuses on North-South communications

Include;

- Data filtering, cleanup, aggregation
- Packet content inspection
- Combination of network and data level analytics
- Thresholding
- Event generation



4 Data Accumulation (Storage)

- Event filtering/sampling
- Event comparison
- Event joining for CEP
- Event based rule evaluation
- Event aggregation
- Northbound/southbound alerting
- Event persistence in storage

Query Based Data Consumption

Event Based Data Generation

Making network data usable by applications

1. Converts data-in-motion to data-at-rest
2. Converts format from network packets to database relational tables
3. Achieves transition from 'Event based' to 'Query based' computing
4. Dramatically reduces data through filtering and selective storing

5

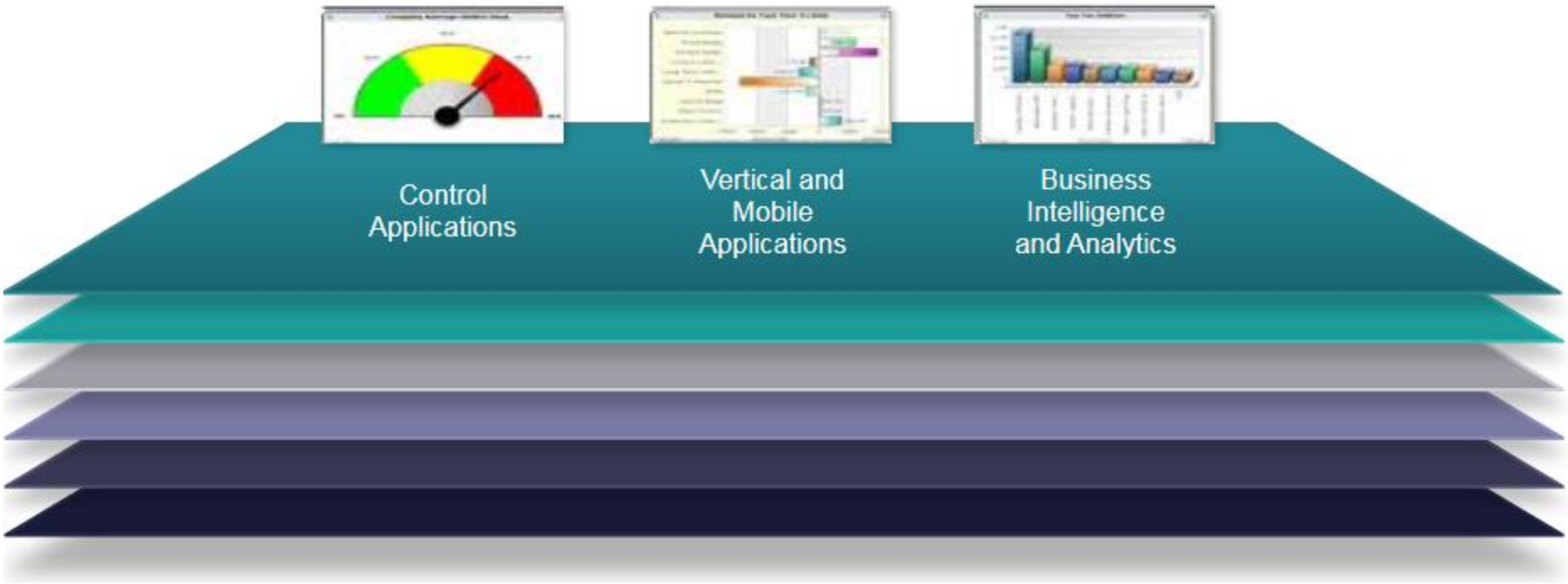
Data Abstraction
(Aggregation & Access)

Abstracting the data interface for applications

Information Integration

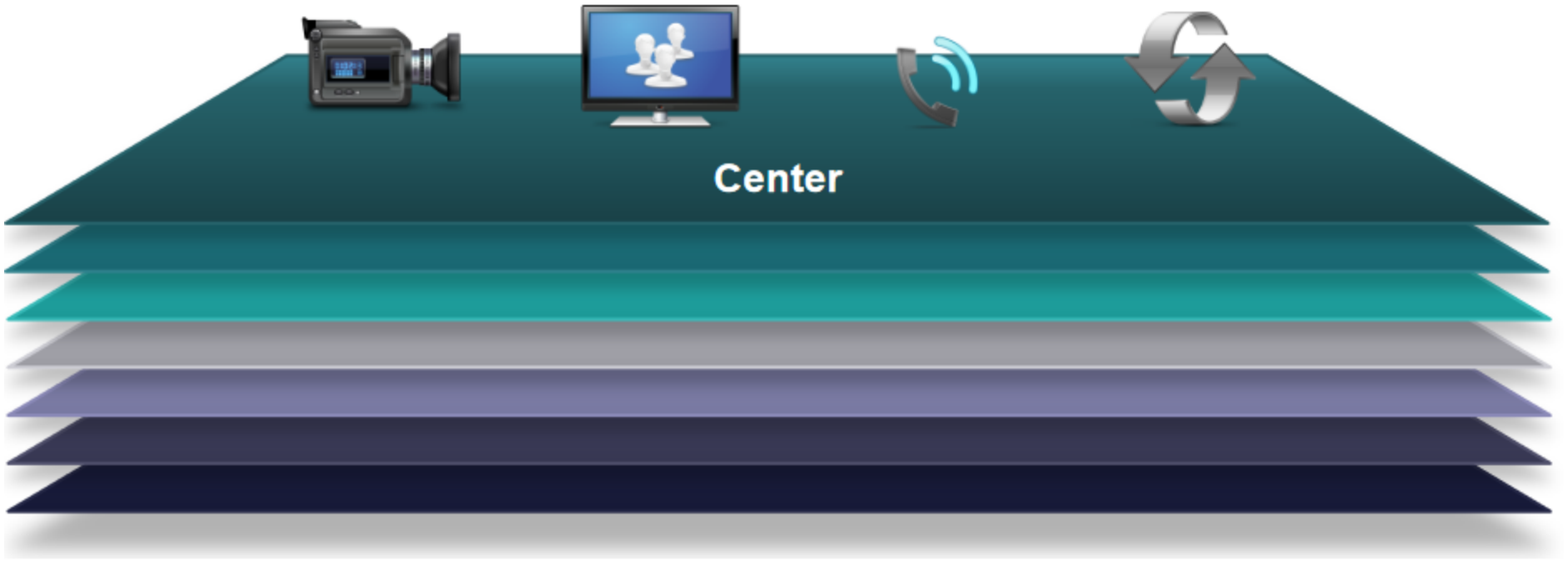
1. Creates schemas and views of data in the manner that applications want
2. Combines data from multiple sources, simplifying the application
3. Filtering, selecting, projecting, and reformatting the data to serve the client applications
4. Reconciles differences in data shape, format, semantics, access protocol, and security

6 Application
(Reporting, Analytics, Control)



7 Collaboration & Processes

(Involving people and business processes)



How Many Layers in OSI model?

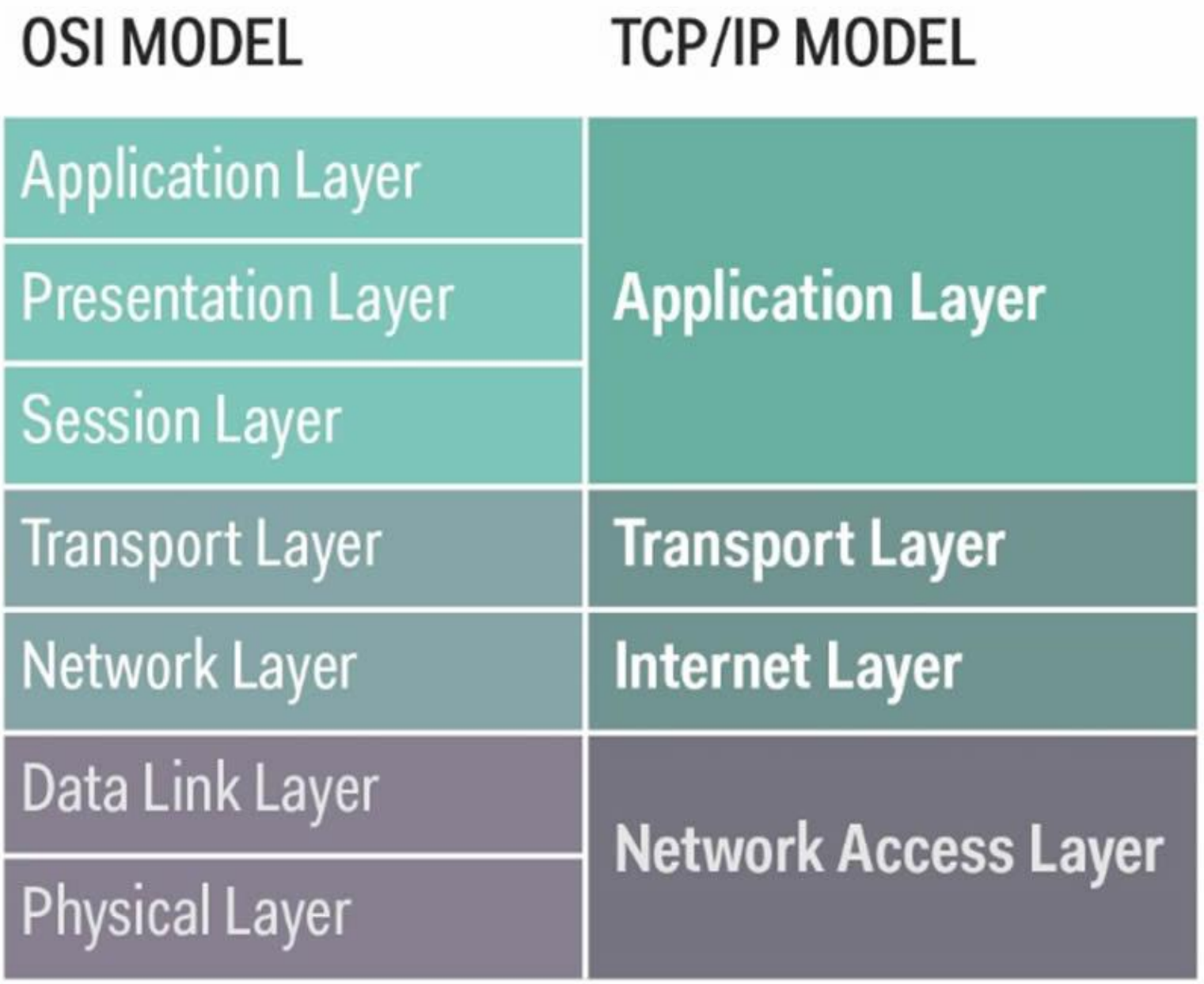
A. Four
B. Five
C. Six
D. Seven
E. None of the above.

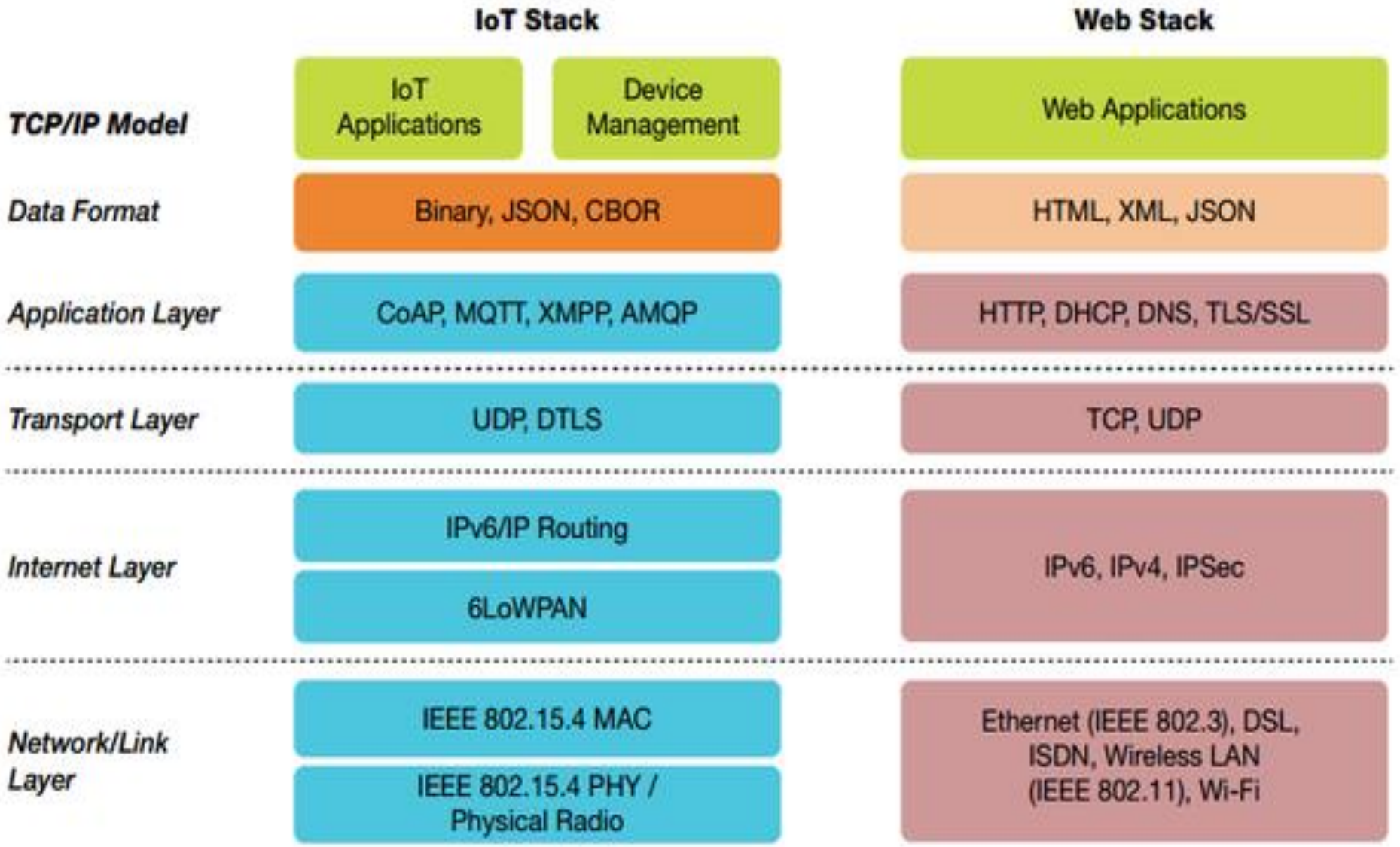
TCP/IP stands for?

_____

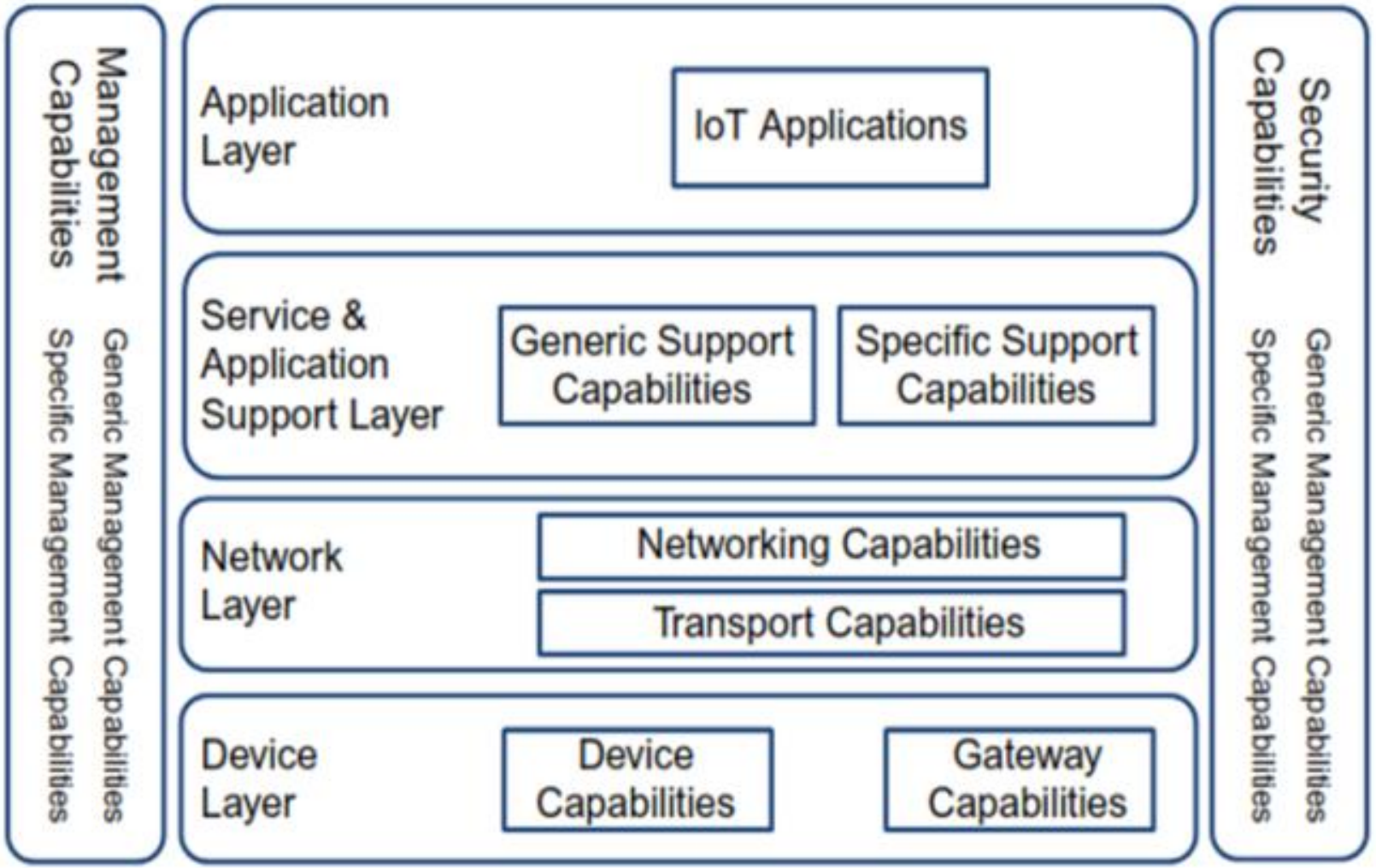
Transmission Control Protocol/Internet Networking Protocol have

A. Four
B. Five
C. Six
D. Seven
E. None of the above.


OSI MODEL
TCP/IP MODEL
Application Layer
Presentation Layer
Session Layer
Application Layer
Transport Layer
Transport Layer
Network Layer
Internet Layer
Data Link Layer
Physical Layer
Network Access Layer


IoT Stack
Web Stack
TCP/IP Model
IoT Applications
Device Management
Web Applications
Data Format
Binary, JSON, CBOR
HTML, XML, JSON
Application Layer
CoAP, MQTT, XMPP, AMQP
HTTP, DHCP, DNS, TLS/SSL
Transport Layer
UDP, DTLS
TCP, UDP
Internet Layer
IPv6/IP Routing
6LoWPAN
IPv6, IPv4, IPSec
Network/Link Layer
IEEE 802.15.4 MAC
IEEE 802.15.4 PHY / Physical Radio
Ethernet (IEEE 802.3), DSL, ISDN, Wireless LAN (IEEE 802.11), Wi-Fi

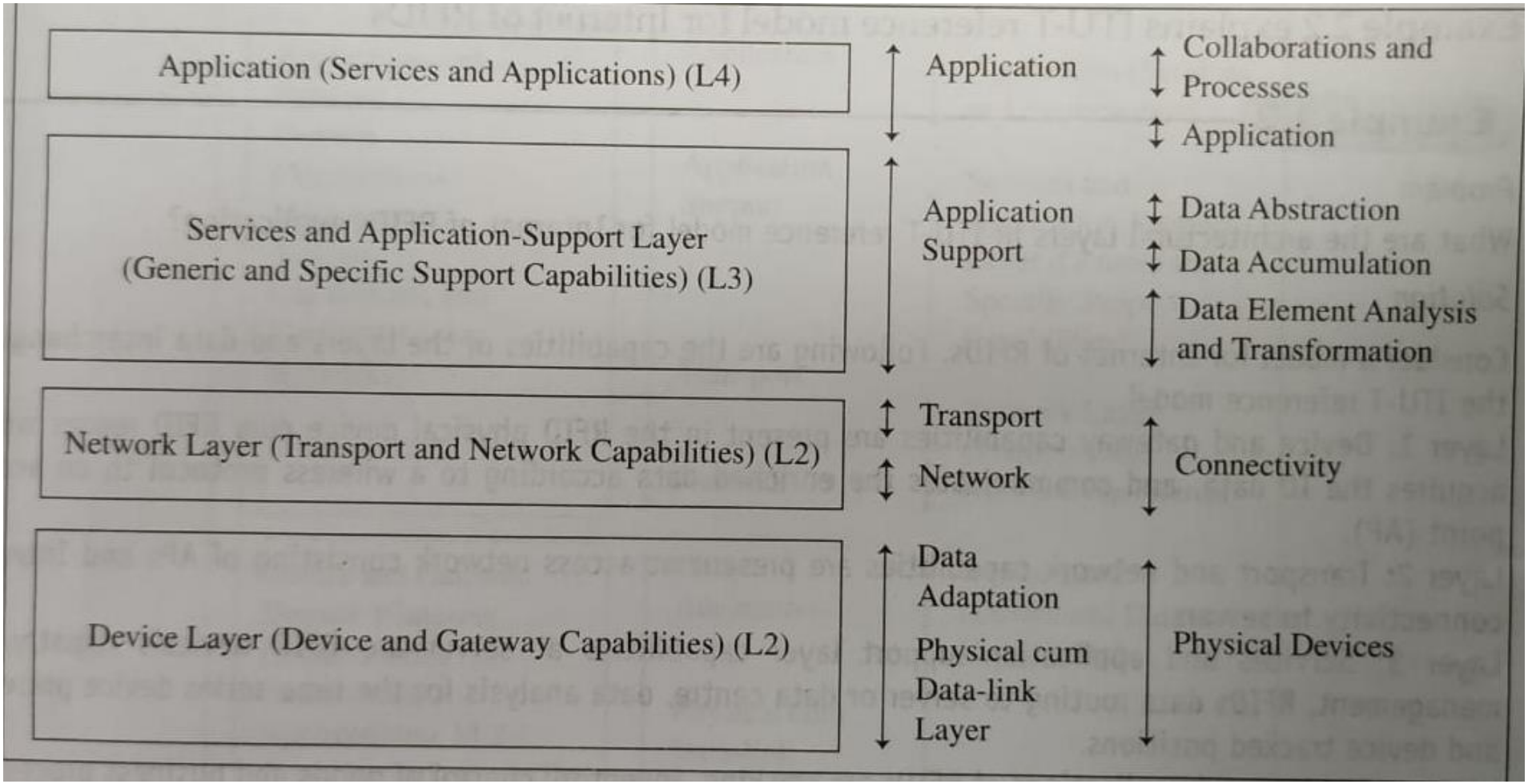
ITU-T IoT Reference Model



ICMP stands for

A. Internet Connect Message Protocol
B. Internet Control Message Protocol
C. International Connect Message Protocol
D. International Control Message Protocol

Comparison


Application (Services and Applications) (L4)
Services and Application-Support Layer (Generic and Specific Support Capabilities) (L3)
Network Layer (Transport and Network Capabilities) (L2)
Device Layer (Device and Gateway Capabilities) (L2)
Application
Application Support
Transport
Network
Data Adaptation
Physical cum Data-link Layer
Collaborations and Processes
Application
Data Abstraction
Data Accumulation
Data Element Analysis and Transformation
Connectivity
Physical Devices

Thank You

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