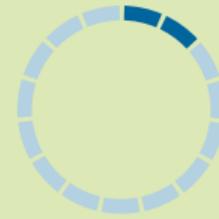




TCP/IP - History

- Roots of web technology can be found in the original Internet protocols (known collectively as [TCP/IP \[1\]](#)) developed in the 1980s



[TCP/IP](#)

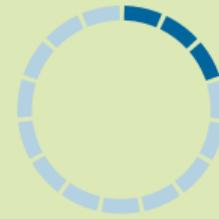
[Acronyms](#)

[References](#)

TCP/IP - ARPANET

ARPANET [1]

- Named after *Advanced Research Projects Agency (ARPA)* of the *U.S. Department of Defense (DoD)*
- Results of the efforts in 1970s to develop a *network architecture* that is
 - open
 - common
 - distributed
 - decentralized
- Avoid problems resulting from typical networks of that time
 - Single point of failure (centralized)
 - Incompatibility (proprietary)



TCP/IP

Acronyms

References

TCP/IP - ARPANET

Single point of failure [1]

Foremost design goal was establishing a *decentralized, distributed network topology*. To achieve this goal, **ARPANET** employed a *packet-switching* technology, where each “message” is split into packets, each of which might take different routes over the network and still be reassembled and understood by the recipient.

Incompatibility [1]

To promote *interoperability*, the *Internet Working Group* (**INWG**) was formed to examine the issues associated with connecting heterogeneous networks in an open, uniform manner, providing an open platform for proposing, debating, and approving protocols.



TCP/IP

Acronyms

References

TCP/IP - Internet Working Group

The Internet Working Group evolved into other bodies, over time [1].

- *Internet Assigned Numbers Authority* ([IANA](#))
- *Internet Engineering Task Force* ([IETF](#))
- *Internet Engineering Steering Group* ([IESG](#))

Proposals for new and updates of existing protocols are provided in the form of *Requests for Comments* ([RFCs](#)).

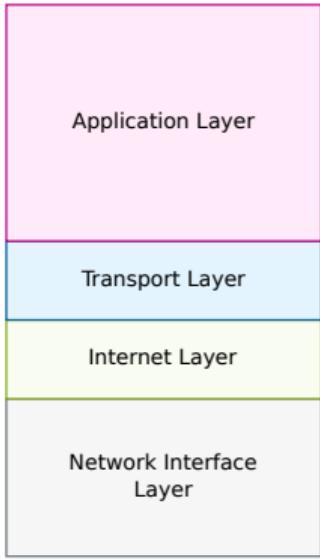


TCP/IP

Acronyms

References

TCP/IP - Protocol Layers [1, 2]



Application Layer

scope within which applications and process communicate user data, remote and local.

Transport Layer

provides end-to-end communication services between applications running on remote (or local) systems.

Internet Layer

exchange datagrams across network boundaries, providing a uniform network interface and hiding the topology of the underlying network connections.

Network Interface Layer

lowest layer of data transmission, responsible for facilitating communication with the underlying network.

Figure 1: TCP/IP Protocol Layers

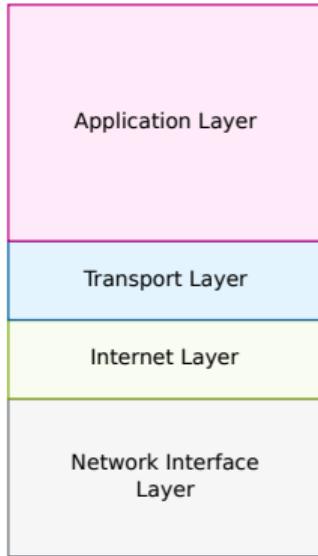


TCP/IP

Acronyms

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TCP/IP - Protocol Layers [1, 2]



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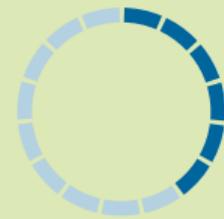
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Figure 1: TCP/IP Protocol Layers



TCP/IP

Acronyms

References

TCP/IP - OSI Model

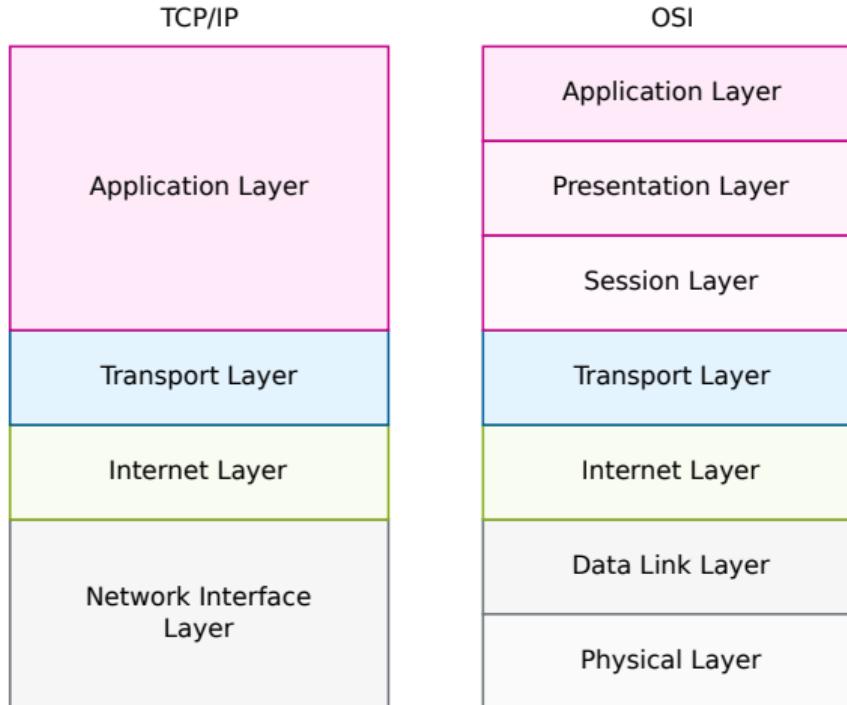
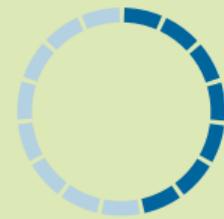


Figure 2: TCP/IP vs. OSI Model



TCP/IP

Acronyms

References

TCP/IP - Encapsulation

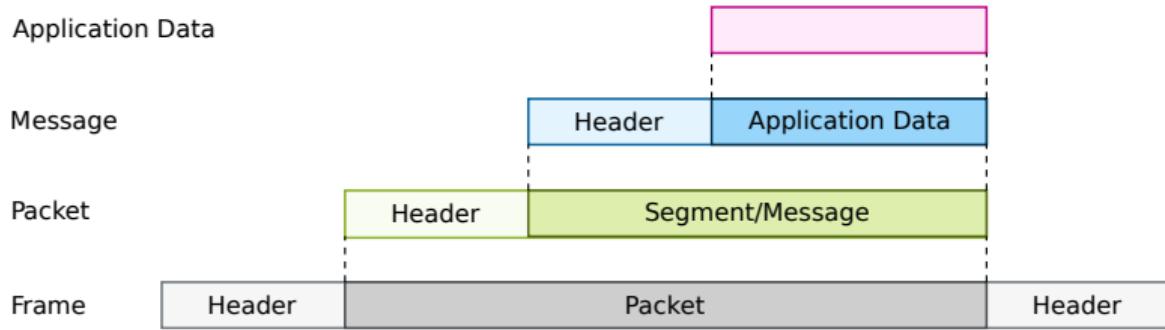
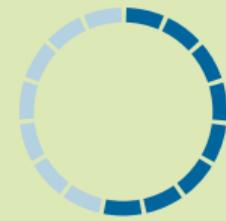


Figure 3: TCP/IP Encapsulation

TCP/IP

Acronyms

References

TCP/IP - Internetwork

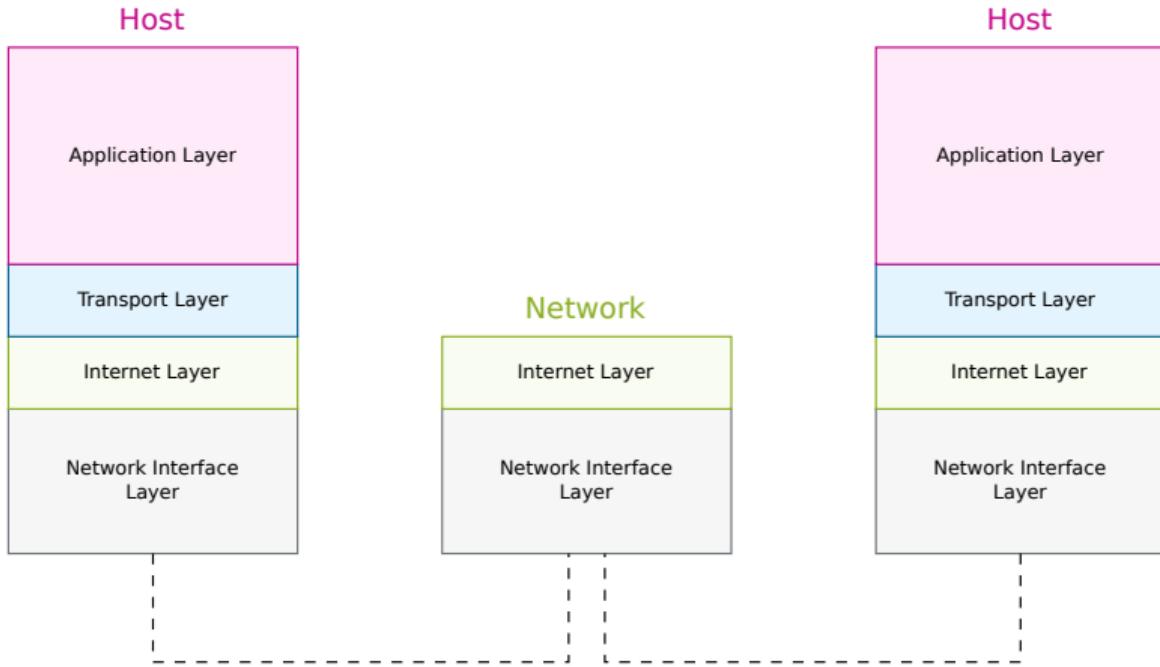


Figure 4: TCP/IP Internetwork



TCP/IP

Acronyms

References

TCP/IP - Internet Protocol Suite [1, 2]

Application Layer Protocols

DHCP, DNS, FTP, NTP, POP, HTTP, RTP, SIP, SMTP, SSH, Telnet, TLS/SSL

Transport Layer Protocols

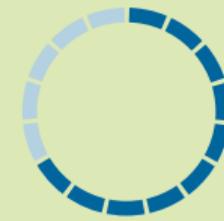
TCP, UDP, DCCP

Internet Layer Protocols

IP (IPv4, IPv6), ICMP, ICMPv6, IGMP, IPsec

Network Interface Layer Protocols

ARP, NDP, OSPF, PPP, MAC (Ethernet, Wi-Fi, DSL, ISDN, FDDI)



TCP/IP

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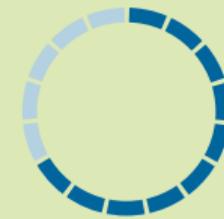
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TCP/IP

Acronyms

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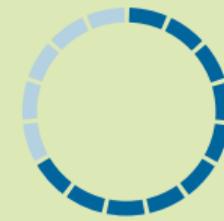
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TCP/IP

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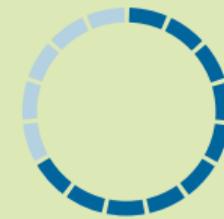
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TCP/IP

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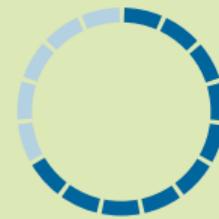
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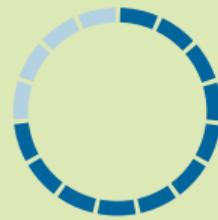


TCP/IP

Acronyms

References

Acronyms I

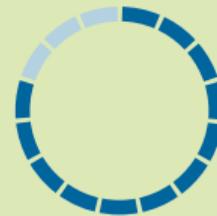


- ARP Address Resolution Protocol
- ARPA Advanced Research Projects Agency
- ARPANET Advanced Research Projects Agency Network
- DCCP Datagram Congestion Control Protocol
- DHCP Dynamic Host Configuration Protocol
- DNS Domain Name System
- DoD Department of Defense
- DSL Point-to-Point Protocol
- FDDI Fiber Distributed Data Interface
- FTP File Transfer Protocol

TCP/IP

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References



Acronyms II

HTTP Hypertext Transfer Protocol

IANA Internet Assigned Numbers Authority

ICMP Internet Control Message Protocol

IESG Internet Engineering Steering Group

IETF Internet Engineering Task Force

IGMP Internet Group Management Protocol

INWG Internet Working Group

IP Internet Protocol

IPsec Internet Protocol Security

ISDN Integrated Services Digital Network

MAC Media Access Control

TCP/IP

Acronyms

References

Acronyms III

NDP Neighbor Discovery Protocol

NTP Network Time Protocol

OSI Open Systems Interconnection

OSPF Open Shortest Path First

POP Post Office Protocol

PPP Point-to-Point Protocol

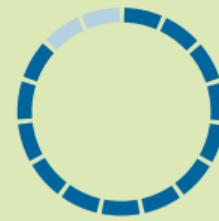
RFC Request for Comments

RTP Real-Time Transport Protocol

SIP Session Initiation Protocol

SMTP Simple Mail Transfer Protocol

SSH Secure Shell

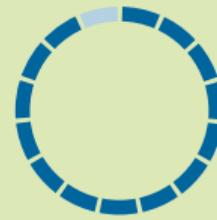


TCP/IP

Acronyms

References

Acronyms IV



- SSL Secure Socket Layer
- TCP Transmission Control Protocol
- TCP/IP Transmission Control Protocol/Internet Protocol,
Internet protocol suite
- TLS Transport Layer Security
- UDP User Datagram Protocol
- U.S. United States
- Wi-Fi Wireless Fidelity

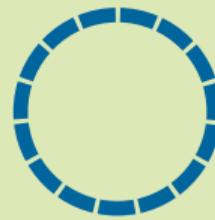
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Acronyms

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- [1] L. Shklar and R. Rosen, *Web Application Architecture*, 2nd ed. West Sussex, England: John Wiley & Sons Ltd., 4 2009. [Online]. Available: <https://www.wiley.com/en-us/Web+Application+Architecture%3A+Principles%2C+Protocols+and+Practices%2C+2nd+Edition-p-9780470518601>
- [2] Wikipedia contributors, “Internet protocol suite,” https://en.wikipedia.org/w/index.php?title=Internet_protocol_suite&oldid=918057612, 9 2019.



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