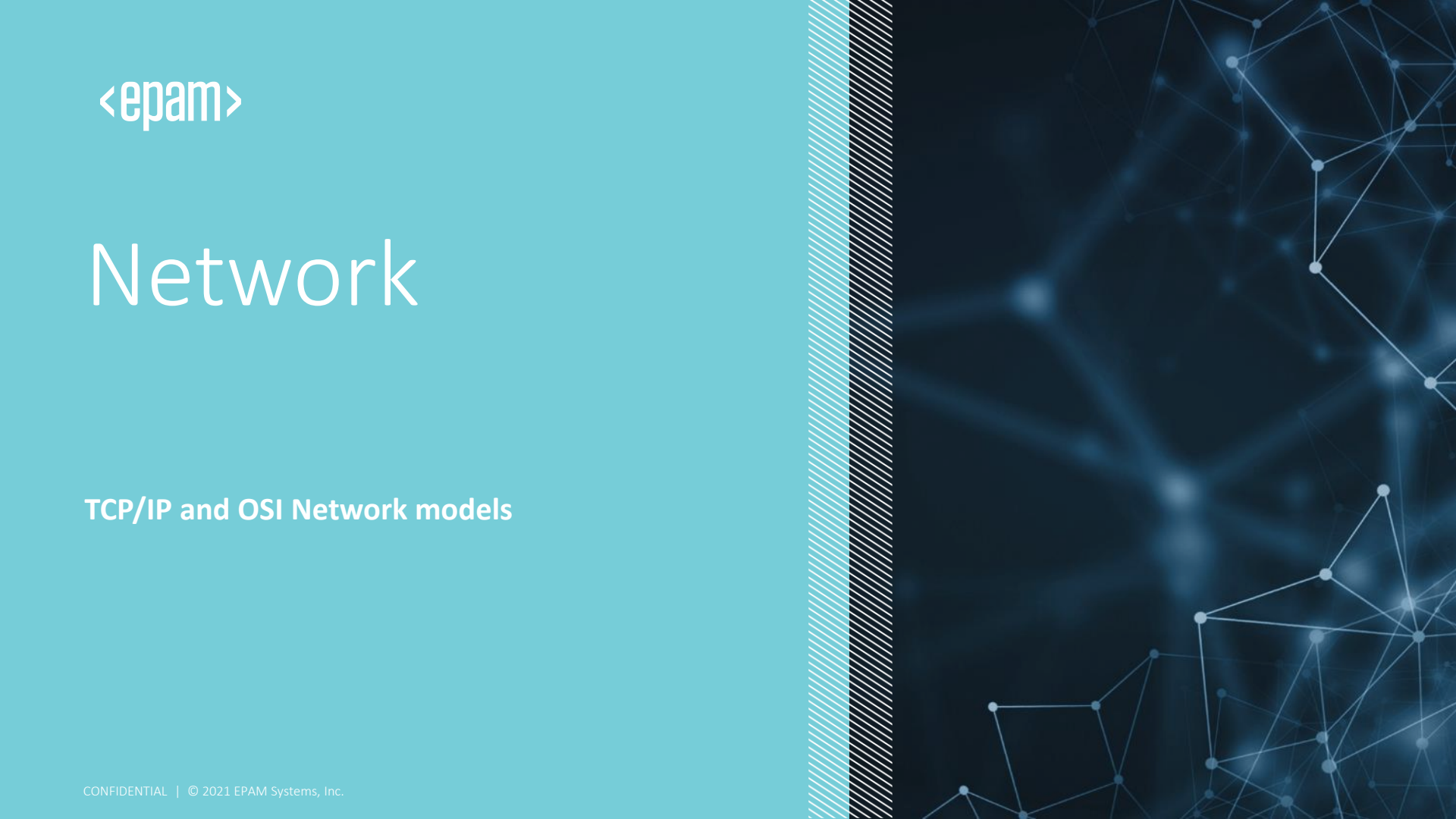


# Network

**TCP/IP and OSI Network models**

# Principles

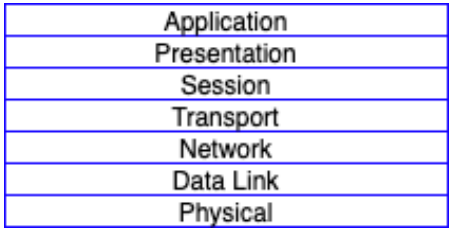
Companies in the past had problems with everything:

- Only IP is alive?
- Only Ethernet is alive?
- Standards?

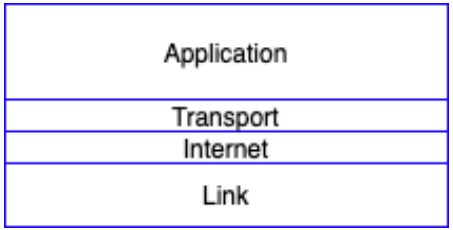
# OSI or TCP/IP(DoD) models

TCP/IP stack and TCP/IP model are different!

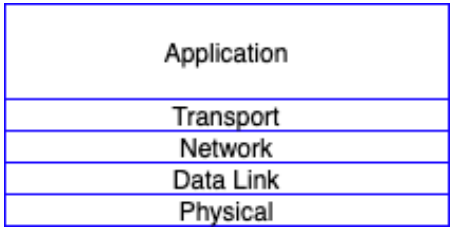
OSI




TCP/IP model (old)




TCP/IP model (current)




Reason:
standards
encapsulation/hiding
every layer has functions
Every “level” is responsible for Protocol

# OSI example

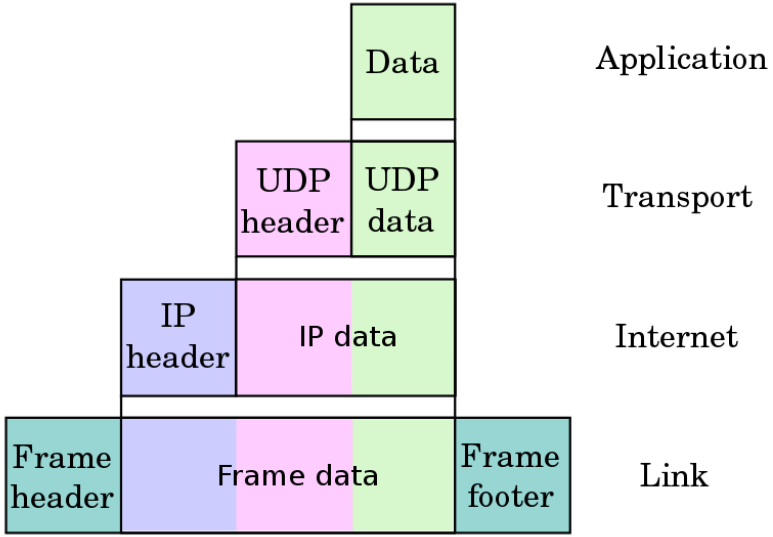
| | |
|---|---|
| Application | HTTP/HTTPS/DHCP/DNS/FTP/LDAP/NTP/POP/SIP/SSH/Telnet/SNMP |
| Presentation | |
| Session | |
| Transport | TCP/UDP |
| Network | IP/ICMP/IGMP |
| Data Link | Ethernet/PPP/Frame-relay/x.25/ATM |
| Physical | Electricity/Light/Sound |

Simplified model from a network engineer perspective:

| |
|---|
| Application |
| Transport |
| Network |
| Data Link |
| Physical |

http://standards.iso.org/ittf/PubliclyAvailableStandards/s020269_ISO_IEC_7498-1_1994(E).zip

# Encapsulation




History about koschei or matreshka

# OSI & encapsulations. Step 1


Little history about the task and the standard

# Ethernet port pictures

# OSI & encapsulations. Step 2

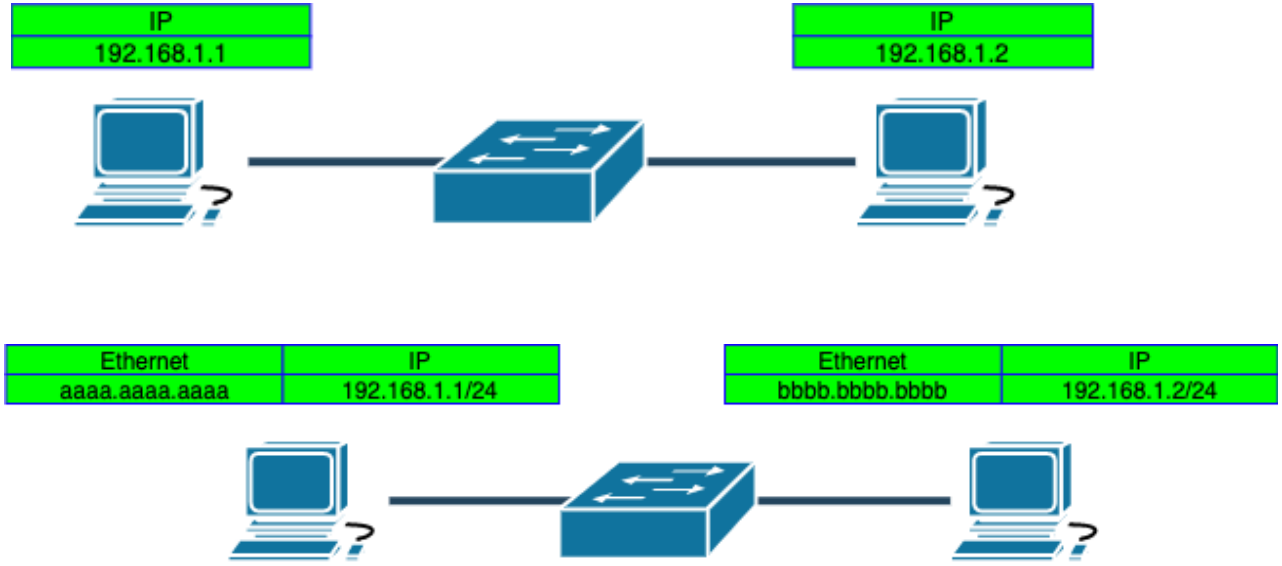

Is that possible to deliver the DATA over ETHERNET without IP/TCP/UDP?
YES!
But standard is DATA over IP over ETHERNET (to have routing)

# OSI & encapsulations. Step 3

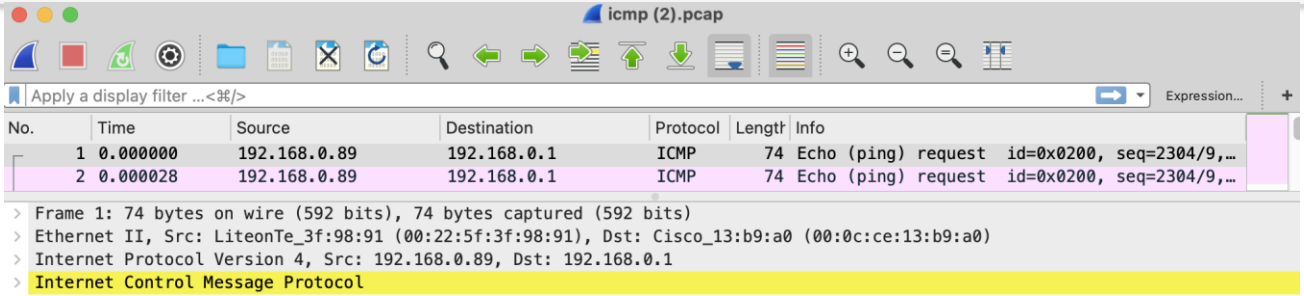

| | |
|---|---|
| HTTP/S | DATA over TCP over IP over ETHERNET |
| ICMP | DATA over IP over ETHERNET |
| FTP | DATA over TCP/UDP over ETHERNET |
| DHCP | DATA over TCP/UDP over ETHERNET |
| DNS | DATA over TCP/UDP over ETHERNET |
| Torrent | DATA over UDP over ETHERNET |
| VOIP | DATA over UDP over ETHERNET |
| TELNET | DATA over TCP over ETHERNET |
| SSH | DATA over TCP over ETHERNET |

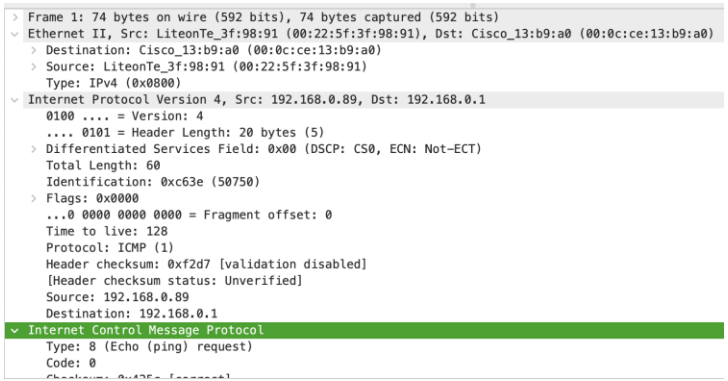
In OS there is a Library with matching

# Don’t think that way



# Encapsulations




wireshark
https://wiki.wireshark.org/Internet_Control_Message_Protocol?action=AttachFile&do=view&target=icmp.pcap

# Encapsulations

Can IP be sent without an Ethernet header via an Ethernet port?
No!

Can PPP be sent via Ethernet port?
No! PPP can be sent only over Ethernet. Hello to PPPoE

What about IP over Ethernet over MPLS over IP over Ethernet?
Yes.

IP over MPLS over IP over Ethernet?
Yes

Ethernet over Ethernet?
Not really.

# THANK YOU