OSI VS TCP/IP

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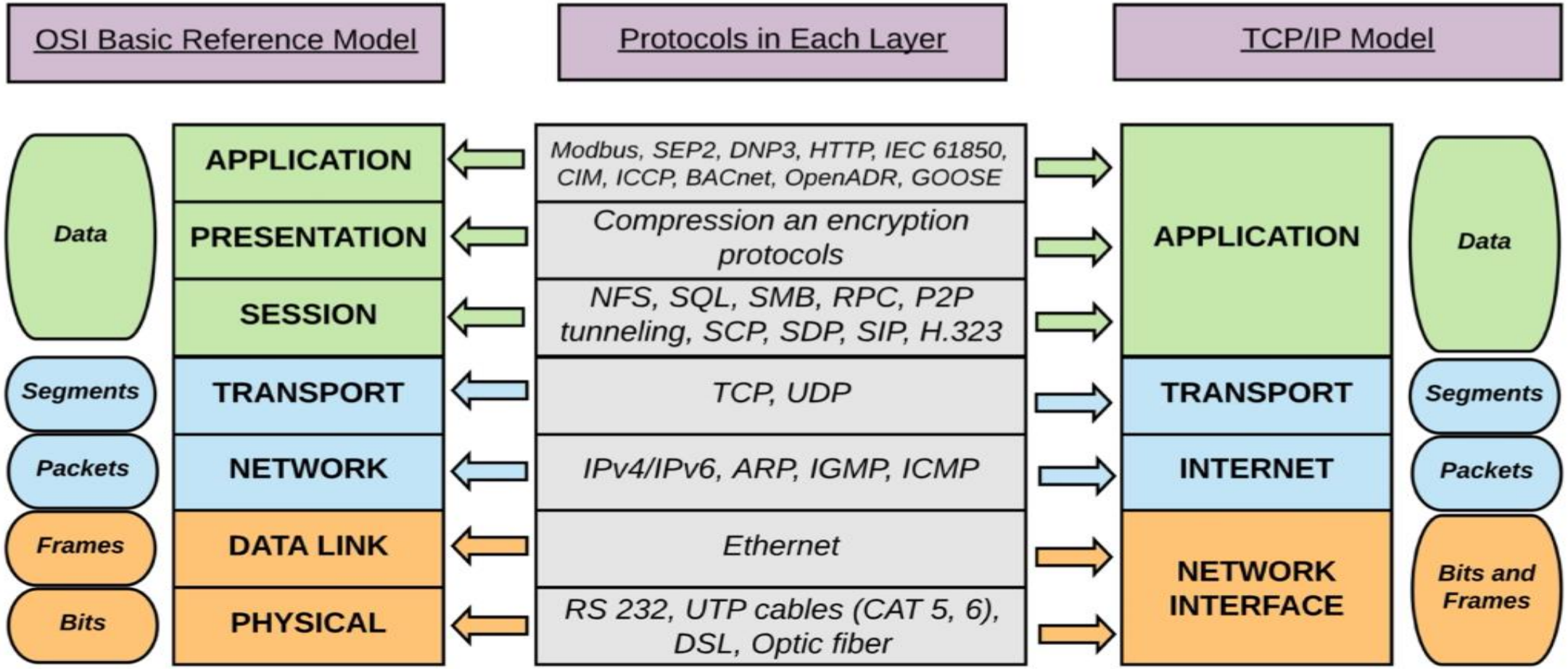
OSI Model vs TCP/IP Model



src: Sundararajan A et al. 2018, - A Survey of Protocol-Level Challenges and Solutions for Distributed Energy Resource Cyber-Physical Security

Would the Internet we have today be much better if it was based on the ISO/ OSI 7-layer model rather than TCP/IP?

- It depends!
- One model can work fine for one case and worst for the other
- No significant advantages of OSI over TCP/IP

Similarities

Both models are:

- **Reference Models**: reference from the specitifications will be helpful when implementing the network.
- **Layered Architectures**: OSI model has 7 layers, while TCP/IP has 4 layers.

Both models use:

- Different protocols in different layers for the proper implementation of the model.

Approximately same functionalities in layers

- **Application** layer of TCP/IP model acts as the (**Application, Presentation, and Session** layer) of the OSI model
- **Internet** layer in TCP/IP model acts as **Network** layer of the OSI model
- Rest of the layers in both the models works the same.

Differences – Evolution & Objective

OSI Model	TCP/IP Model
○ Logical and conceptual/theoretical model ○ Documentation first, then functionaltilies and protocols for each layer are specified. ○ Specify the connection procedures, layered architecture, services, interfaces, protocols. ○ Can be used in different types of networks as per the specifications.	○ Practical model ○ Implementation first with specified protocols, documentation comes after. ○ Provide a reliable and end-to-end transmission model. ○ Dependent on protocols and is compatible with the current Internet architecture.

Differences(cont.) – Documentation & Configuration

OSI Model	TCP/IP Model
○ Properly documented, major concepts are clearly specified ○ Easy and standardized to setup and configure ○ More modular (7 layers) ○ Protocol-independent, easy to implement our own protocol if needed	○ Not properly documented, specifications and functionalities are not so clear ○ Complex to setup and configure ○ Less modular (5 layers) ○ Protocol-dependent, complex to make changes or replace protocols

Differences(cont.) – Data Delivery & Connection

OSI Model	TCP/IP Model
○ Connection oriented ○ Guarantee the delivery of packets ○ No special mechanism for a reliable and secure connection.	○ Connection-oriented and connectionless transfer ○ Does not guarantee the delivery of packets ○ 3-way handshake mechanism for reliable and secure connection.

Technical-economic assessment

Pro TCP/IP	Pro OSI
Technical	
OSI too complex	OSI's security is considerably better
OSI protocols are slow	Overload of TCP/IP's addressing and routing system
OSI may lead to compatibility problems	OSI protocols were, in principle, more oriented towards long term future interoperability
Economic	
TCP/IP standards were for free, OSI standards were relatively expensive	Development and procurement of OSI products were supported by European governments (until 1994)
Availability of wide-spread technical expertise on TCP/IP	
Other	
TCP/ IP had proven itself	OSI was more often like a promise

Conclusion

Would the Internet we have today be much better if it was based on the ISO/ OSI 7-layer model rather than TCP/IP?

- Proper documentation, specification, and modularization -> OSI model
- Implementation, reliability, and security of the network -> TCP/IP model
- TCIP/IP has gained dominance in the market not necessarily due to technical superiority.
- Fitting protocol in OSI model is tedious. ->decrease in popularity
- In OSI model, layers cannot work in parallel -> decrease in speed

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