1. Service, interface, and protocol are not distinguished

- The TCP/IP model did not clearly distinguish the concepts of service, interface, and protocol.
- Good software engineering practice requires differentiating between the specification and the implementation, something that OSI does very carefully, but TCP/IP does not.
- Consequently, the TCP/IP model is not much of a guide for designing new networks using new technologies

2. TCP/IP model is not a general model

- TCP/IP model is not at all general and is poorly suited to describe any protocol stack other than TCP/IP.
- For example, if we try to use the TCP/IP model to describe Bluetooth, it is completely impossible

3. Host-to-network layer is not really a layer

- The host-to-network layer is not really a layer at all in the normal sense of the term as used in the context of layered protocols.
- The host-to-network layer is an interface between the network layer and data link layer.
- The distinction between an interface and a layer is crucial, and one should not be careless about it

4. TCP/IP model does not distinguish or not even mentioned the physical layer and data link layer

- The TCP/IP model does not distinguish (or even mention) the physical layer and data link layer.
- These layers are completely different. The physical layer has to do with the transmission characteristics of copper wire, fiber optics, and wireless communication. The data link layer's job is to delimit the start and end of frames and get them from one side to the other with the desired degree of reliability.
- A proper model should include both physical layer and data link layer as separate layers. The TCP/IP model does not do this.

5. Minor protocols deeply entrenched & hard to replace

- The IP and TCP protocols were carefully thought out and well implemented, many of the other protocols were adhc, generally produced by a couple of graduate students hacking away until they got tired. The protocol implementations were then distributed free, which resulted in their becoming widely used, deeply entrenched, and thus hard to replace. Some of them are a bit of an embarrassment now.