

# ECSE-6600: Internet Protocols

## Informal Quiz #02 **SOLUTIONS (part I)**

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**Review of Networking Concepts (II):  
[i.e. slide set #3]  
Informal Quiz  
SOLUTIONS**

# T F **Review of Networking Concepts (II)**

- √  Without layering, you would need to translate between all possible combinations of applications and networking systems functions
- √ The interface between layers seldom outlives the technology used to implement each layer
- √ The service interface defines the message formats and conventions exchanged with the peer.
- √ A layer can use the services provided by the layer just above it in the layering stack
- √ One key difference between the Internet and the Telephone network is that the latter (I.e. telephone network) places its intelligence at the end-systems
- √  The end-to-end argument strongly encourages placement of the functions at the highest layer where it can be completely and correctly implemented.
- √ The end-to-end argument precludes function-placement at lower layers at all costs, and does not even allow it for performance gains
- √ The end-to-end argument is a principle, I.e. it can never be violated in Internet design

# T F **Review of Networking Concepts (II)**

- ✓ Network architecture should specify both the placement of functions and detailed guidelines on how to best implement them
- ✓ □ The application-layer framing suggests that it would be advantageous to have application visibility and control mechanisms into as many networking functions as possible
- ✓ □ RTP is a protocol designed to fit the ALF philosophy, I.e. it provides an application-extensible transport layer format and functionalities
- ✓ Performance considerations are always absolute (I.e. relative performance questions such as: how much is A faster than B are not entertained)
- ✓ □ A useful rule of thumb from Amdahl's law is that we should focus our performance improvement efforts on the portion of the system that accounts for a significant share of performance (I.e. the "common case")
- ✓ □ Performance objectives and metrics depend upon the perspective taken (operator/user vs designer/implementor)
- ✓ A useful general rule of thumb in system design is to tradeoff scarce resources and optimize on abundant resources (I.e. be frugal about what is already abundant)

# T F **Review of Networking Concepts (II)**

- √  To apply Amdahl's law, you first need accounting of the performance contribution due to individual components or interactions between components.
- √ When capacity is cheap, we would design a system that optimizes capacity.
- √  When capacity is costly, we would design a system that optimizes capacity.
- √  The impact of technology trends is that the relative costs of components (eg: memory capacity vs memory access bandwidth vs optical link capacity) may change dramatically.
- √  When the relative cost structure of components is expected to change in the future, the system design should allow options for re-composition, while identifying appropriate interfaces that are likely to be stable despite the changes in technology (eg: using techniques like modularity).
- √  Putting the “brains” or system intelligence in end-systems limits the scope for system-wide disruption when a single end-system fails (aka limited fate-sharing scope).
- √  Edge-boxes can be considered to be a “higher” level than core-routers when applying the e2e principle, and deciding where to place QoS functions.
- √ The E2E principle first focuses on performance optimization, and only then on correctness and completeness as a secondary objective
- √  Cross-layer design across adjacent layers that are implemented by the same entity are not uncommon (eg: PHY/MAC layer, transport/application layer).
- √  The danger with cross-layer design is that it may impede technological progress enabled by Moore's law etc in the name of short run performance optimization