ECE 462 **Data and Computer Communications**
Solutions to Homework 1

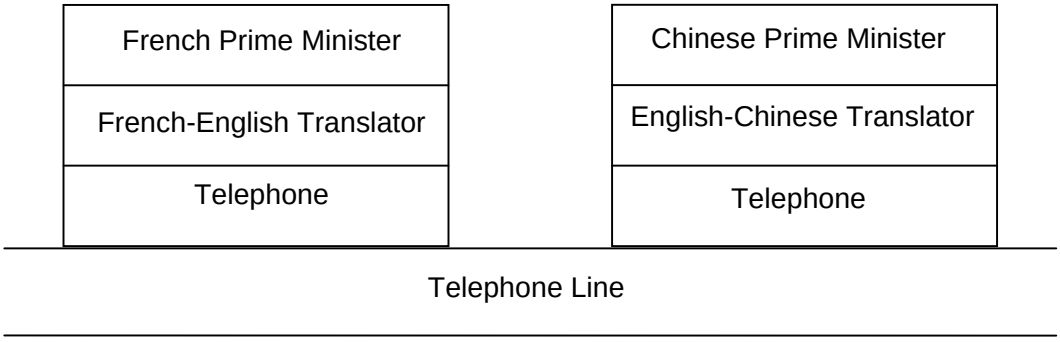
Problem 2.1

a) First, the guests talk to the host what they want; then, the host uses the telephone to make an order. The information for ordering pizza is exchanged through the telephone line. At the other end the order clerk takes an order through the telephone. (The host communicates with the order clerk via telephone to make an order – peer to peer communication) Then, the order clerk forwards the order to the pizza cook and the pizza
cook cooks the pizza.

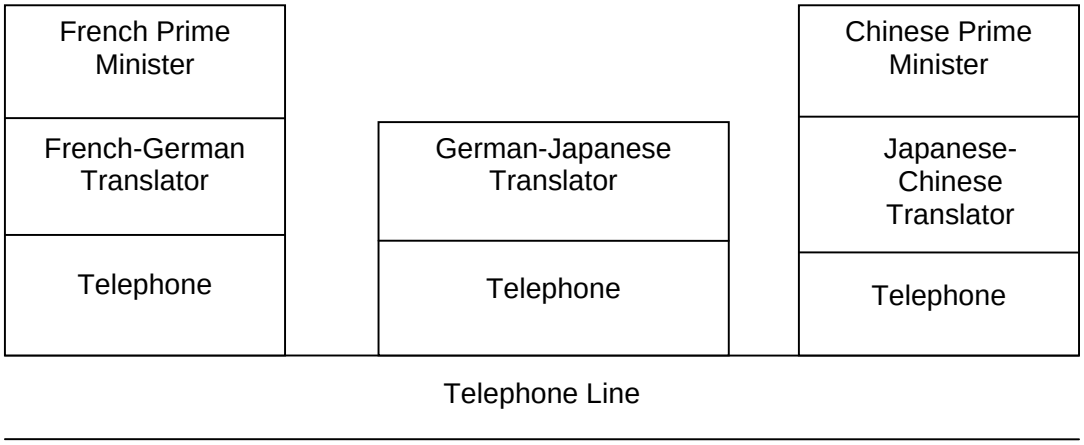
b) Once the pizza is done, the pizza cook forwards the pizza to the order clerk. When the delivery van is ready, the order clerk loads the pizza to the van. Then, the pizza is delivered to the host by the van through the road. Finally, the host takes pizza to the guests.

Problem 2.2

a) The model is: The Prime Ministers speak as if they are speaking directly to each other. When the French Prime Minister speaks, he addresses his remarks directly to the Chinese Prime Minister. However, the message is actually passed through two translators via the phone system. The French Prime Minister's translator translates from French into English and that is what is carried over the phone to the Chinese Prime Minister's translator who translates from English to Chinese.



b) An intermediate node is introduced to process the communication:



Similarly, the Prime Ministers speak as if they are speaking directly to each other. In this case, however, another translation process is required in Germany (Intermediate node) in order to let the Prime Ministers communicate each other.

Problem 2.3

• Too much overhead is added for communication through layered approach
• Data exchange through layer is very complex (Because Layer N needs simultaneously retrieve data from layer N+1 and layer N-1 and give data to layer N+1 and layer N-1)
• Standards do not define how data is to be passed between layers (making implementation complex)

Problem 2.4

There is no way to be assured that the last messages get through, except by acknowledging it. Thus, either the acknowledgement process continues forever or one army has to send the last message and act with uncertainty.

This is a classic problem of communication over unreliable channel known as “Two Army problem.”

Problem 2.5

If the broadcast network is connected with bridge, then there is no need of network layer.

However, if the broadcast network is connected with router, then network layer operation is required for routing and delivery of data between networks.

Problem 2.6

a) No. This would violate the principle of separation of layers. To (N-1) layer, the N layer
PDU is simply data. The (N-1) layer does not know about the internal format of the N-layer PDU. It breaks that PDU into fragments and reassembles them in the proper order.

b) Each N-layer PDU must retain its own header, for the same reason explained above.

Problem 2.7

Data plus transport header plus internet header equals 1820 bits. This data is delivered in a sequence of packets, each of which contains 24 bits of network header and up to 776 bits of higher-layer headers and/or data. Three network packets are needed. Total bits delivered = 1820 + 3 × 24 = 1892 bits.

Problem 2.8

UDP provides the source and destination port addresses and a checksum that covers the data field. These functions would not normally be performed by protocols above the transport layer. Thus UDP provides a useful, though limited, service.