

HW2 Solutions

1. Some HTTP response messages have an empty message body. For example, HTTP Status Code of 204 and 304 cannot include a message body. For Code 204, the server has successfully fulfilled the request and that there is no additional content to send in the response payload body. For code 304, a conditional GET or HEAD request has been received and the requested data has not been modified. (Either 204 or 304 should be fine for this question)
2. The message is first sent from Alice's host to her mail server over HTTP. Alice's mail server then sends the message to Bob's mail server over SMTP. Bob then transfers the message from his mail server to his host over POP3 (All three protocols need to be correct)
3. Iterative DNS resolving and recursive DNS resolving. For the iterative DNS resolving, if a DNS server does not have the answers to the request, it forwards the request onto another DNS server. For the recursive DNS resolving, If the answers are not cached, then the resolving name server will recurse up the DNS tree to find the server that is authoritative for the domain's record. (1pt for each approach. The explanations do not have to be exactly the same. But should highlight the difference between the iterative and recursive process)

4. Yes, an organization can have the same alias name for both its Web server and its mail server. An MX resource record type contains the host name of the mail server and an A resource record type contains the host name of the web server. (1pt for each question. The second one need to include both MX and A RR records)

5.

a. Total bits transmitted over the link: 2^{32} packets
 $\times 60 \times 8 = 2.06 \times 10^{12}$ bits

Transmission time = $\frac{2.06 \times 10^{12}}{10^9} = 2061.58 \text{ secs} \approx 34$
mins (2pts, 1pt for calculating the correct total
transmitted bits and 1 pt for the final result)

b. # of timestamps/per 34 mins = 1000. Thus, total
wrap around time for timestamp = $\frac{2^{32}}{1000} \times 34 \text{ mins}$
 $\approx 277 \text{ yrs}$ (1pt)

6.

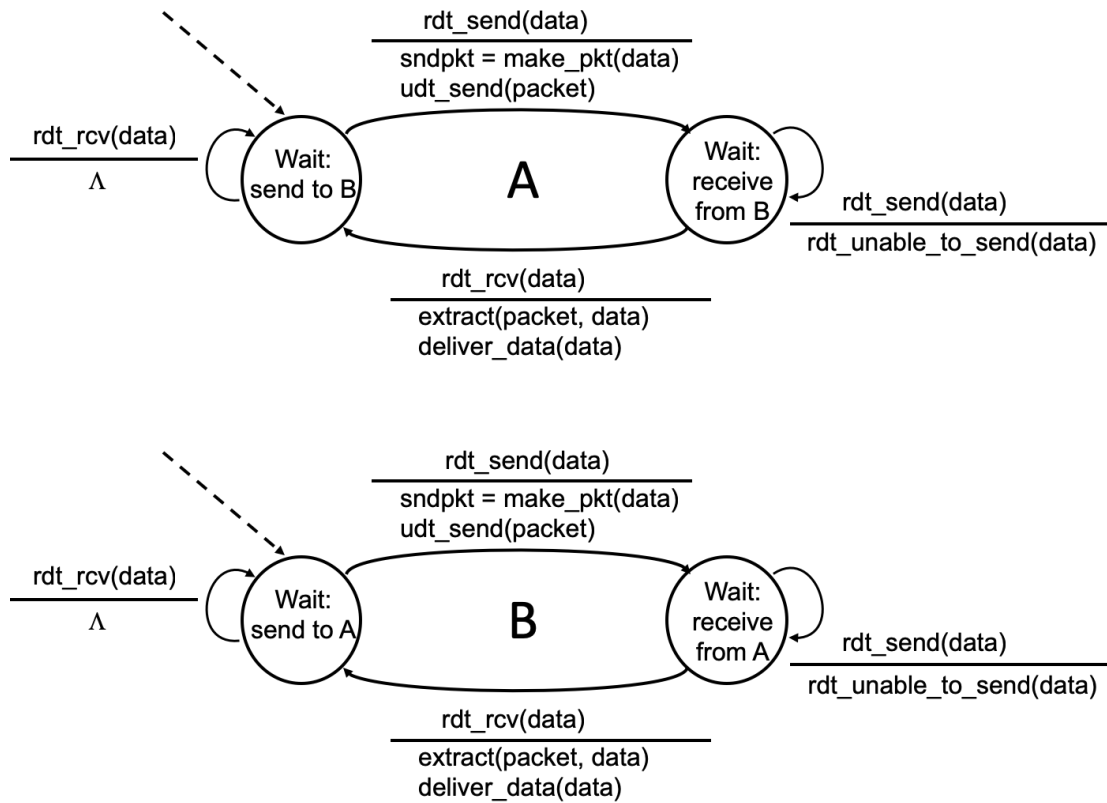
a.

	0	1	0	1	0	0	1	1	
	0	1	1	0	0	1	1	0	
	<hr/>								
	1	0	1	1	1	0	0	1	
	0	1	1	1	0	1	0	0	
	<hr/>								
wraparound	1	0	0	1	0	1	1	0	1
	<hr/>								
sum	0	0	1	0	1	1	1	0	
checksum	1	1	0	1	0	0	0	1	

(2 pts for the final results, but partial credit is possible for intermediate correct results)

- b. To detect errors, the receiver adds the four words (the three original words and the checksum). If the sum contains a zero, the receiver knows there has been an error. All one-bit errors will be detected. Without taking 1's complement sum, the receiver needs to compare the checksum with the sum of the three 16-bit integers, which is less efficient. (1 pt as long as the answers mention how the receiver performs checksum)

7.



(3pt for each FSM. Deduct 1 pt for each wrong state transition. Λ could be replaced with $\text{rdt_unable_to_send}(\text{data})$ or left empty)