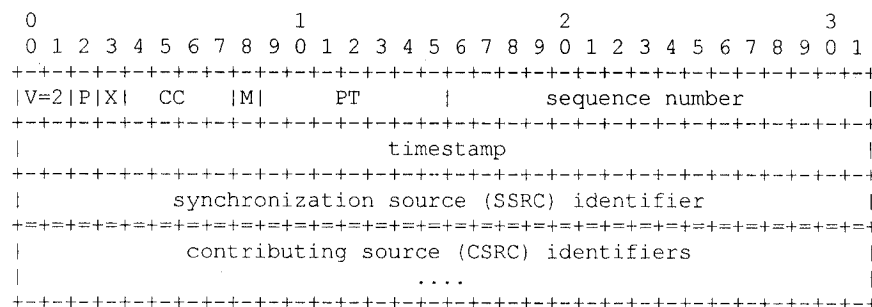


Please write readably.

There are three classes of questions: (a) expecting (relatively) short answers, (b) expecting more elaborate answers, and (c) a small design task. The questions are marked accordingly.

Questions:

1. [6p, a] Describe two issues that require special consideration when employing a NACK-based reliability in a protocol. For each of the two, give one example approach how to address it.
2. [6p, a] Using multicast makes key distribution harder than in a unicast protocol. What are the functional reasons and which is the primary non-functional issue?
3. [6p, b] To improve TCP performance across paths with a high *bandwidth × delay* product, it was proposed to increase the initial window size (from one segment to two or four or even beyond). What kind of issues do you see with such approaches? Sketch an alternative solution that is more promising (and explain why).
4. [6p, a] How does a TCP SYN flooding attack work? How can you counter (in principle) TCP SYN flooding attacks? How does SCTP address this problem?
5. [6p, a] Sketch and motivate three relevant guidelines (there are surely more) for the high-level case “text vs. binary” when choosing protocol encodings.
6. [6p, a] Explain the *technical* aspects of the end-to-end argument. Give an example for a *non-technical* development interfering with “end-to-end” and describe its consequences.
7. [6p, b] (a) Describe by example how a Network Address Translator (NAT) may interfere with an application protocol.
(b) Discuss two alternatives how to address the issue identified in (a). Which is the better one and why?
8. [12p, c] The following figure shows the RTP header defined in RFC 3550:



- (a) Describe one scalability issues you see with the RTP header. How would you fix it?
- (b) Sketch which additional fields and corresponding protocol mechanisms (local algorithms and packet flow rules) would be needed to add a minimum of congestion control to RTP. How would you add these in a “backwards-compatible” manner and which procedures would you use to infer that your peer understands these mechanisms as well?
- (c) Can RTCP help? Why or why not?