**Questions:**

1) **What does the paper argue are the main issues with current video streaming approaches? What is the main idea behind the paper?**

   It's a significant challenge in estimating future capacity since the capacity can vary widely over time. Hence, the paper suggests an alternative: rather than presuming that capacity estimation is required, it is perhaps better to begin by using only the buffer, and then ask when capacity estimation is needed (i.e., in startup phase).

2) **Summarize the BBA-0 algorithm in 2-3 sentences.**

   BBA-0 algorithm has fixed-size reservoir (90s) to handle VBR and playback buffer (240s). The video rate is a linear function that reaches Rmax when the buffer is 90% full. And it stays at the current video rate if the rate suggested by the rate map does not cross the next higher or lower discrete video rate.

3) **What is the difference between CBR and VBR video? What is the main advantage of VBR video?**

   The difference lies in how videos are encoded. CBR encodes videos in the constant bitrate, while VBR encodes videos in the various bitrates. The main advantage of VBR is being able to accommodate variant network conditions to avoid rebuffering events.

4) **What is the main issue with the BBA-0 algorithm that is addressed by the BBA-1 algorithm? How is the issue addressed?**

   To address BBA-0's issue that assumes chunk size is fixed and thus adopts a fixed-size reservoir, BBA-1 calculates the size of the reservoir dynamically based on the chunk size variation by summing up the amount of buffer the client will consume minus the amount it can resupply during the next X seconds.

5) **What is the main limitation of the BBA-1 algorithm?**

   Due to no longer having a fixed mapping between buffer levels and video rates, it could result in a higher frequency of video date switches. Moreover, BBA-1 has a lower video rate compared with the Control algorithm during the startup period when the buffer is filling up.

6) **Summarize in 3-4 lines how the BBA-2 algorithm addresses the limitations of the BBA-1 algorithm.**

   BBA-2 tries to be more aggressive during the startup phase by incorporating a simple capacity estimation into the startup behavior and thus enters the risky area to ramp up quickly and fill the buffer with a much higher rate than what the map suggests, improving the video rate.

7) **The MPC-based paper that we saw last week used emulation experiments to compare different algorithms. What is the approach used by the buffer-based approach paper?**
**Comment on the strengths and weaknesses of this evaluation approach relative to an emulation approach (3-4 lines).**

The buffer-based approach paper uses real-world experiments to do the evaluation. The strengths are more likely to reflect real user experiences and more variables. However, the weaknesses are how to be fair and convincing regarding the choices of the groups of users and the timing of running such experiments.

8) **The paper uses two performance metrics to compare different algorithms. Which metric does BBA-0 perform better than the control algorithm on? Which metric does it perform worse on?**

BBA-0 performs better than the control algorithm in the metric number of rebuffers. BBA-0 performs worse than the control algorithm in the metric video rate.

9) **Does BBA-2 improve performance over BBA-1 on both performance metrics? If not, which one does it improve, and which metric does it perform worse on?**

BBA-2 improves performance over BBA-1 on video rate. On the other hand, since BBA-2 operates in the risky zone, it performs worse on the number of rebuffers.

10) **[Open-ended]: Compare this buffer-based paper with the MPC-based paper. Please comment on which approach you think would perform better and why. If you think the performance may depend on the conditions, explain when one algorithm may perform better, and under what conditions the other algorithm may perform better.**

I think the buffer-based approach would perform better since the MPC-based approach highly relies on throughput prediction, yet network condition truly is an unpredictable one, especially since the technology keeps changing nowadays. Besides, RobustMPC takes a conservative approach, while BBA-2 promotes a more reasonable solution.