## Cache placement optimization for layered video content

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What placement strategy is optimal for layered video content? Should the cache be populated with the most popular content, or should it prioritize the lower layers of all content?



We analyze placement strategies in an edge caching network with layered video content. The network is composed by a server which has access to all formats of the video content, a cache with have limited size and a number of users. Each video can be requested in different qualities or resolution. Scalable video coding is assumed where a content is divided into a sequence of ordered layers that define varying qualities, starting with a base layer and followed by a number of enhancement layers. A user who requests the basic layer should only receive layer one, while whose who request higher quality should receive all previously encoded lower levels

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## **KEY FINDINGS**

Two placement strategies were proposed in the context edge caching with video layers content. The first strategy focuses on minimizing the average amount of content to be transmitted via the backhaul link (link between server and cache), and is referred as average transmission rate (ATR) scheme. The second strategy prioritizes maximizing the probability that users can be served entirely from cached content, referred as layered cache hit ratio (LCP) scheme. In practical scenarios, implementing the ATR scheme can potentially reduce congestion and improve network efficiency. On the other hand, the LCP scheme can enhance the user experience, especially when the backhaul link is not accessible. Algorithms were provided to solve both placement strategies and results shown that different caching placement techniques can lead to diverse outcomes concerning the average transmission, layered hit probability, and offloaded backhaul traffic. These findings offer valuable insights into achieving a balanced allocation of memory and backhaul resources when designing a cache-enabled network





