Mobile network operators are challenged to meet subscribers’ growing demands for mobile video quality and bandwidth. Current architectures have high transit costs, poor subscriber quality of experience, and require high-capital investments. The ByteMobile Video Caching application allows operators to reduce the bandwidth needed to transport media across the Internet. Video caching ensures subscriber satisfaction with the mobile video experience while also lowering the operator’s network investment and total cost of ownership.

INTRODUCTION

Driven by subscriber demand for video, the exponential growth of Internet traffic shows no sign of slowing down. Mobile network operators are increasingly challenged to maintain an agile and efficient infrastructure to meet subscribers’ growing demands for quality and bandwidth.

Most mobile video is over-the-top (OTT), over which operators have no direct control. Delivering each video one at a time - directly from the content server - is costly and inefficient because of the sheer volume of bandwidth needed to deliver large, high-quality media files.

Based on their current architectures, operators are facing very high transit costs, poor subscriber quality of experience and require high capital expenditure.

To help operators overcome these challenges, ByteMobile has introduced the Video Caching application as a part of the ByteMobile Adaptive Traffic Management Solution. Video Caching allows operators to implement a robust caching solution either independently or in conjunction with web and video optimization applications.

Figure 1: Over 50% videos are candidates for caching
The Video Caching application caches the most popular video content in both the original and optimized versions (if optimization is implemented) on servers closer to subscribers. Video Caching allows operators to reduce the amount of bandwidth needed to transport media across the Internet without requiring any change in behavior or business logic of content servers, CDNs or subscribers.

**BENEFITS**

The Video Caching application provides operators with the following benefits:

- **Optimal quality of experience:** ensures that subscribers have a positive quality of experience by providing a high quality video, that is pre-optimized for the current mobile network conditions.

- **Reduced bandwidth costs:** minimizes the number of times video titles are delivered from content provider sites, substantially reducing the total volume of data crossing the transit links.

- **Enhanced network efficiency:** dramatically improves network conditions by decreasing the volume of OTT video traffic on the transit link: even during peak consumption periods. Improves performance for other non-cacheable network traffic, applications, services and non-cached video content.

- **Faster start times:** moves the content closer to the subscriber that mitigates the impact of distant peering leading to a significantly reduced video start time.
• **Reduced video stalling:** offloads traffic from content servers to improve subscriber quality of experience by reducing video stalling related to content server delays.

**KEY FEATURES**

The Video Caching application is designed to address the evolving nature of networks where video has become the fastest growing application. Key differentiating features of the Video Caching application include:

• **Content server transparency:** processes traffic from every major website without requiring any changes in content server configuration. Videos are saved to cache during user downloads, enabling support for content with dynamic URLs. To further improve caching efficiency, ensures that cached videos that have been deleted from the content server are not served.

• **Media classification:** the Video Cache inspects all the content in order to detect if the media is audio or video, therefore the application is intelligent in recognizing videos even if it has a non-video URL or content-type header.

• **High video hit rates:** designed to process the multimedia traffic of smartphones, laptops and tablets in 3G and 4G networks – HTTP progressive download videos, music, and streaming media – the video caching application results in hit rates of 30% to 60%.

• **Automated tiered storage:** improves performance by providing immediate access to the most popular videos from SSDs; less in-demand videos are stored in SAS. The video caching algorithm intelligently decides where specific content is stored.
• **Intelligent resources management:** uses resources intelligently when deployed in a cluster mode. Video Caching application first looks for video titles across all clusters before obtaining them from the content server. If a title is available in one of the clusters, it is served directly from that cluster.

• **Multiple layers of redundancy:** operates each cluster of the video cache application hardware in N+1 redundancy. If a video cache hardware element fails, the remaining hardware elements automatically take over the load for the failed unit.

• **Data protection:** protects stored data with RAID 5 with a hot spare. This includes tolerance of up to two disk failures, hot-swappable disk replacement, and automatic rebuild of data after replacement.

• **Subscriber safe:** the Video Cache always validates the user is permitted to view the content before serving.

• **Seamless integration with optimization capabilities:** integrates seamlessly with Adaptive Traffic Management’s web and video optimization applications. Operators can more easily manage issues that degrade video quality. Ensures subscribers experience smooth video streaming with minimal stalling.

**CONCLUSION**

To meet the challenges created by the growth of rich media applications, operators need a solution to help them balance growing subscriber expectations for quality and bandwidth with their own requirements for revenue and profitability. The ByteMobile Video Caching application and other applications of the Adaptive Traffic Management Solution allow operators to reduce the amount of bandwidth needed to transport media across the Internet, ensuring subscriber satisfaction with the mobile data experience while also lowering the operators’ network investment and total cost of ownership.
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