April 7, 2014

Ms. Lisa Hone (via email)
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Dear Lisa,

At the request of the FCC in our meeting on 2/19/14, we are responding to the request for additional information with respect to the use of digital video streaming in K-12 schools. As previously addressed in our prior public comment, our experience with digital video streaming in 11,000 schools since 2005 has been as the industry leader. While the amount of streamed educational video can vary widely from school to school based on the existence of mobile devices in students’ hands, the approach to instruction and available bandwidth, we have aggregated a considerable amount of data to provide the FCC with the following summary.

We have examined video streaming utilization rates, numbers of video plays, and peak hours of usage at 7 of our SAFARI Montage school district customers from across the country and isolated data from schools that had a mobile device for each student initiative. Our interest was to explore peak video streaming rates and to measure those usage rates against the student enrollment and teacher count for the associated school or school district in the appropriate time period. This data allows us to look to the future for how networks at institutions that support having a mobile device for each student will be impacted on a more granular per student basis. We have then extrapolated the per student data to a sample district containing 10,000 students and 15 schools to determine how much total bandwidth would be consumed by streaming educational video to the entire district. This is important because we know what the fixed and variable costs would be for that district to move the hosting of that video inside their Wide Area Network onto video caching servers, which can theoretically be contrasted with what the saved internet bandwidth would have cost them on an annual basis.

Our focus on the use of streamed educational video in SAFARI Montage schools was limited to schools that had a mature initiative which resulted in approximately one mobile device per student. We have no way of knowing if the average number of devices per student being used simultaneously was greater than one, so we have only assumed a single device.

There are two types of users who stream educational digital video in schools who are of interest.

1) The amount of peak video streaming bandwidth usage consumed by students in schools that had a "mature" implementation of mobile devices for students.
2) The amount of peak video streaming bandwidth usage consumed by teachers in any school.

Our findings suggested that peak video consumption typically occurs in schools between the hours of 11am and 2pm.
Student use of streamed educational video
We can see an average peak range for some schools at a low of 8% of enrolled students simultaneously streaming educational video to a high of 29% of all enrolled students playing video concurrently. In our case, since SAFARI Montage video servers limit the bit rate at which students can stream to their devices, students are streaming video at 300kbps and associated audio at 125kbps. Therefore, the averaged peak student consumption of streamed educational video is approximately 18.5% \(\frac{(8\% + 29\%)}{2}\) of enrolled students at 425Kbps (300kbps + 125kbps). This means that each student today needs 79kbps (18.5% x 425kbps) of bandwidth allocated for them just for educational video streaming. We believe that this number will rise as the use of video in the classroom has historically risen and continues to rise with student mobile device initiatives.

Teachers’ use of streamed educational video
Teachers are streaming educational video in the classroom, as well, naturally. Since SAFARI Montage is hosted within the school district’s Wide Area Network, Teachers are able to use video freely without internet buffering and the uncertainty of having a reliable video stream. In SAFARI Montage, teachers are permitted to stream video at the high resolution bitrate of 1.6Mbps (1600Kbps), so they can present it adequately on a large classroom screen. This high resolution is more than adequate, but is not High Definition, which we believe is a bandwidth luxury that schools cannot currently afford. In our data analysis, simultaneous teacher usage of video peaks at 11% of all teachers in that school to as high as 33% of all teachers in that school. Using an average peak of 22% of all of classroom teachers simultaneously streaming educational video at 1.6Mbps, plus 125Kbps audio, would mean that each teacher would need to be allocated 380kbps (22% of 1.725Mbps) of educational video streaming bandwidth today. We believe this number will continue to grow, as well.

Therefore, if we combine both student and teacher usage of educational video and deliver it in terms of student enrollment, in a school that had 750 students and 50 teachers, there is a required allocation of educational video streaming bandwidth of 78.25Mbps [(750 students x 79kbps) = 59.25Mbps + (50 teachers x 380kbps) = 19Mbps]. This equates to a little over 100Kbps per student just for educational streaming video peaks, but excludes other types of video streaming bandwidth including videoconferencing and interactive gaming, and all other network use.

The 100kbps/student of needed educational video streamed bandwidth can be supported without increasing internet bandwidth at all very easily in a modernized E-rate program designed to meet the needs of the 21st Century learner, which is heavily reliant on video.

A cost-effective approach to digital video streaming in K-12 school districts
Every video stream that occurs from a server hosted inside the school district's Wide Area Network is an educational video which does not draw on internet bandwidth. The simplicity and elegance of a video solution which hosts video inside the district’s WAN is that it automatically preserves the far more expensive internet bandwidth.

In our sample school, the 78.25Mbps of bandwidth would be expensive if having to draw it from the internet, but far cheaper if hosted inside the school district. Our sample school is inside a sample district of 15 schools and 10,000 students. This school could choose to draw that 100kbps/student of video from a district hosted server at a mere fraction of the cost of internet bandwidth. The savings are immense. Here's a look at what a single caching server of video with storage, bandwidth optimization software would cost from SAFARI Montage:
• **One 12-bay video caching server with 20TB of drive storage, plus software providing bandwidth optimization tools.** (The server can satisfy the video streaming and storage needs of a 15 school district and would need to be refreshed (re-purchased) approximately every 3 years.) Therefore, the server, installation and storage would cost $18K, and the software costs $1/student/annually to maintain and upgrade. In a district with 10,000 students, this server would cost $40,500 over 3 years, or $13,500/year, or $1.35/student/year to satisfy the previously detailed 100Kbps/student peak educational video streaming need. The aggregate peak need for video streaming in this sample district would be **1Gbps** (100kbps x 10,000 students)...all of which should more intelligently be handled using WAN fiber, not internet bandwidth.

Therefore, in this sample school district, an internally hosted server solution costs the district $13,500/year to effectively **give back or save** 1GB of precious internet bandwidth. As the FCC knows, pricing for 1GB of internet bandwidth varies widely, but is obviously many multiples higher in even the least expensive regions.

**Recommendations**

We would ask the FCC to consider extending the use of video caching servers for E-rate eligibility and adding video storage, video bandwidth optimization tools and their maintenance to the eligibility list. The FCC asks what limiting factors to be used to limit the amount of storage which can be considered eligible, to which we would recommend the following:

- Storage could be limited to digital **video** storage
- Storage must be on eligible video caching servers hosted inside the WAN
- Total video storage capacity can be limited by full student district enrollment (not just free and reduced lunch student enrollment) of 2GB per student.

None of these recommendations should cover content licensing or acquisition costs.

Please feel free to contact us directly should you have any further questions.

Thank you.

Andrew Schlessinger
CEO & Co-Founder
SAFARI Montage I Schlessinger Media
610-645-4500
www.SAFARIMontage.com

Cc:  Mr. James Bachtell (via email; james.bachtell@fcc.gov)
     Mr. Mark Nadel (via email; mark.nadel@fcc.gov)
     Mr. Charles Eberle (via email; charles.eberle@fcc.gov)
     Mr. David Strickland (via email; david.strickland@fcc.gov)
     Mr. Soumitra Das (via email; soumitra.das@fcc.gov)
     Mr. Mark Walker (via email; mark.walker@fcc.gov)