

Dan,

Thank you for your assistance in getting this information to the members of the Rural Schools Task Force for tomorrow's hearing. I greatly appreciate your help.

A couple of preliminary points regarding the topic and data below:

- As we discussed with Representative Swearingen, through the current BadgerNet and TEACH programs, any school district located anywhere in the state can have access to up to a 100Mbps (Megabits per second) broadband connection for \$250 per month. Additional broadband capacity is available above 100Mbps for schools using Department of Administration negotiated prices.
- The information below for four northern school districts shows the capacity of their current BadgerNet broadband connection, what their capacity is at or below 95% of the time, and a recent peak.
- Unfortunately, we didn't have access to Three Lakes data nor reliable Goodman-Armstrong data.
- As we also discussed, the Internet Service costs (from either the local ISP or one of the DOA approved ISPs, including WiscNet) is a separate purchase from the connection provided through BadgerNet.
- Again, in all of the scenarios below, additional broadband capacity is available at the DOA negotiated pricing.

Here is the analysis of the four districts we investigated:

- **Rhineland High School:** Their current BadgerNet broadband connection capacity is 100Mbps – 95% of the time they are using 73.2Mbps or less of their bandwidth capacity. They recently peaked at 96.7Mbps.
- **Lakeland High School:** Their current BadgerNet broadband connection capacity is 98 Mbps – 95% of the time they are using 52.5Mbps or less of their bandwidth capacity. They recently peaked at 94.7Mbps.
- **Northland Pines High School:** Their current BadgerNet broadband connection capacity is 56Mbps – 95% of the time they are using 49.6Mbps or less of their bandwidth capacity. They recently peaked at 53.5Mbps.
- **Phelps School:** Their current BadgerNet broadband connection capacity is 9Mbps – 95% of the time they are using 8.5Mbps or less of their bandwidth capacity. They recently peaked at 8.7Mbps.

Additional key points regarding school broadband usage:

- For many school districts, their bandwidth usage peaks around noon, when many students may be accessing the school wireless network using their personal tablets or smartphones. We have been able to verify that lunch time peaking is a common, but not necessarily daily, occurrence for the two largest schools above: Rhinelander High School and Lakeland Union High School.
- There may also be unique non-school events during school hours that drive bandwidth peaks. For example, we are aware that the day the Apple iOS 7 upgrade was released around noon...students and/or teachers with Apple devices used school wireless broadband connections at lunch time and in study halls to update their iPhones instead of using their connections at home.
- In terms of how a school may be using their broadband connection most efficiently, let's consider a classroom full of 30 students with some type of tablet. The teacher wants them all to individually watch a Youtube video on a particular topic. From a traffic perspective, there are suddenly 30 requests to and resulting data streams coming from the Youtube server(s) that have that video. The content is identical for all 30, but might be time shifted slightly depending on when the student found the link and clicked on it. Making technology work smarter and not harder would involve a local caching device, basically a server with a lot of hard disk space. When the first student requests the Youtube video, the caching device looks to see if it already has it (perhaps the teacher screened it the day before). If it has the video, it serves it up locally and the Internet link to/from the outside world does not get bombarded. If the caching device does not have the file, the request goes through and then as the video is streamed back from Youtube, the caching server makes a copy of it as it passes through to the student's device. When the second student device requests it, the caching server sees that it now has it and serves it up off its own disks. This works for most kinds of content, whether a video, image (picture, logo, etc), Windows or Apple OS update file, or text (Word doc, PDF file, etc). It eliminates a lot of repetitious downloads of identical (classroom) content. WSTA members have experimented with caching devices internally and they do improve overall response time and reduce bandwidth in situations like this.

Please let me know if you have any questions. I know Kent Disch (AT&T) and Bill McClenahan (Access Wisconsin) will be at the hearing. In addition, I believe Steve Jones (Frontier Communications) will also be in attendance.

Thank you,

Bill

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