

Bethlehem Central School District

In-School Internet Connectivity

JULY 2022



OFFICE OF THE NEW YORK STATE COMPTROLLER
Thomas P. DiNapoli, State Comptroller

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Report Highlights

Bethlehem Central School District

Audit Objective

Determine whether the Bethlehem Central School District (District) used resources to ensure the District's Internet connectivity meets the Federal Communications Commission's (FCC) recommended bandwidth.

Audit Results

The District's Internet connectivity met the FCC's recommended bandwidth of 100 Megabits per second (Mbps) per 1,000 students, as guided by New York State Education Department (NYSED). When tested, the average wireless Internet download speed was 142 Mbps.

The District's contracted bandwidth totaled:

- 1.0 Gigabits per second (Gbps) for primary Internet service at its middle and elementary schools.
- 500 Mbps, with the ability to burst to a total of 1 Gbps for its high school primary Internet Service.

Overall, of 35 teachers surveyed (10 percent of the population), 27 of 28 teachers responding to our survey who used Internet resources to provide instruction were satisfied with their Internet connectivity.

Additionally, the District's Information Technology (IT) department personnel monitored bandwidth usage and provided a system for users to submit Internet connectivity issues for resolution.

Our audit focused on the Internet connectivity in school buildings and did not look at the surrounding community's Internet connectivity. No recommendations resulted from this audit.

Background

The District is located in Albany County and is governed by an elected seven-member Board of Education (Board).

The Board is responsible for the general management of the District.

The Superintendent serves at the Board's direction and is responsible for day-to-day management.

The Chief Technology Officer (CTO) oversees the IT department and is responsible to plan for and provide the District's technology, infrastructure and data systems.

The District contracted with two Internet service providers (ISPs) to provide broadband Internet access.

Quick Facts

2020-2021 School Year

Staff	994
Students	4,203
School Buildings	7
ISPs	2

See Appendix A for select technical definitions.

Audit Period

July 1, 2020 – February 18, 2022

In-School Internet Connectivity

Access to broadband Internet connectivity has become essential for all students in all levels of education and is now a vital component of K-12 school infrastructure. When school districts adopt and integrate digital learning technologies into their curriculum, teachers and students may use these tools for increased learning opportunities, such as posting content to school district learning management systems, accessing e-textbooks and assignments online, downloading streaming media or conducting online assessments. Additionally, they may use videoconferencing to interact with other classes or with subject area experts.

To enable the use of digital learning tools, school districts need to extend Internet access to every classroom and instructional space. The ongoing increase in new digital learning technologies and the need to connect students to information has led to a steady rise in demand for high-speed broadband Internet capabilities. Our audit focused on the Internet connectivity in school buildings and did not look at the surrounding community's Internet connectivity.

What Is the Recommended In-School Internet Connectivity Speed?

NYSED guides the use of resources in enhancing Internet connectivity and meeting the FCC's current recommended Internet connectivity speed. The FCC adopted standard Internet connectivity speeds of 100 Mbps per 1,000 students and staff (users). NYSED guides school districts' student digital learning infrastructure, as a best practice, to use the FCC recommended Internet connectivity speed for students only.¹

Further, an FCC guide for households shows that a student should have a minimum of 5 to 25 Mbps of Internet download speed depending on their online activities. Guidelines provided for typical online activities by the minimum download speed in Mbps needed for adequate performance for each activity is shown in Figure 1.

Figure 1: Minimum Download Speeds for Selected Online Activity (in Mbps)^a

General Browsing and Email	1
HD Video Teleconferencing	6
File Downloading	10
Streaming Ultra HD 4K Video	25
Student	5-25

a) FCC household guideline speeds and are not based on surveys or experiments conducted. See <https://www.fcc.gov/consumers/guides/broadband-speed-guide>

¹ Standard Internet connectivity speeds of 100 Megabits per second (Mbps) per 1,000 students.

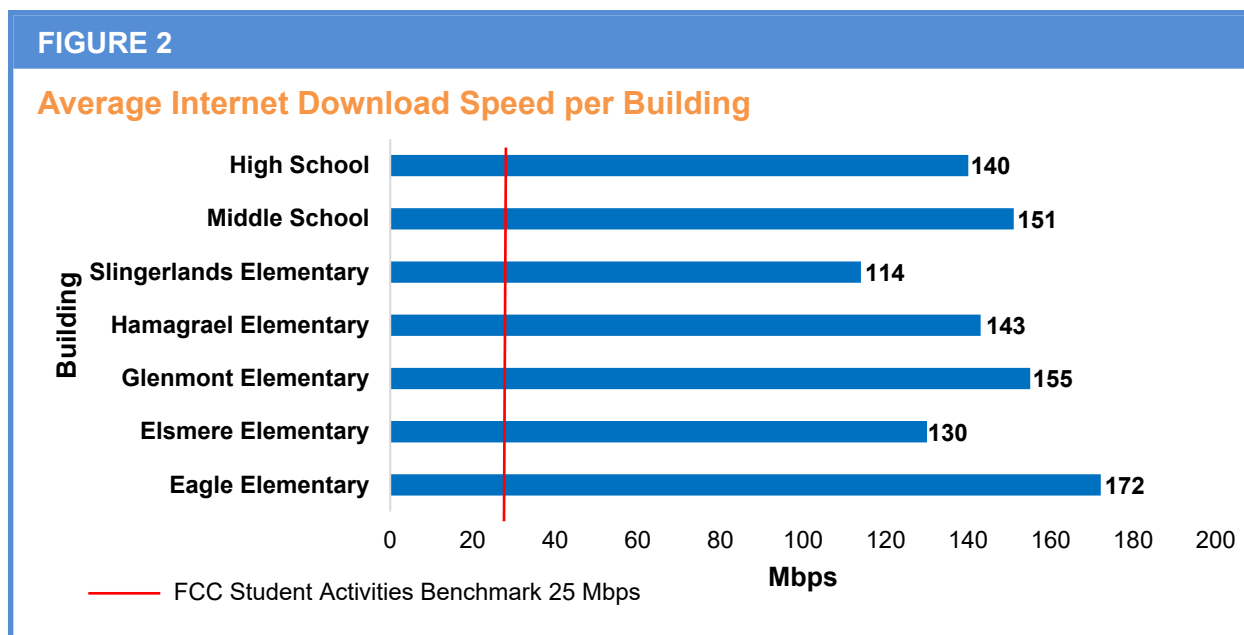
School districts should monitor and review comprehensive and accurate bandwidth usage information to ensure that contracted bandwidth is received, adequate speed is available for student learning and educational needs are met. School districts should provide a tool for users to submit Internet connectivity issues to the IT department for resolution.

The District Met the FCC Recommendation and Officials Monitored Connectivity

Internet Connectivity: The District contracted with two ISPs for bandwidth of 500 Mbps and 1 Gbps, respectively.² If needed, one ISP allowed the contracted bandwidth of 500 Mbps to burst to 1 Gbps, for additional bandwidth. One ISP serves as the primary connection for the high school and the other ISP serves as the primary connection for the middle school and five elementary schools with both serving as a failover if the other is not working.

Each average ISP incoming Internet download speed was reasonable; 822 Mbps for the contracted service of 500 Mbps and 871 Mbps for contracted service of 1 Gbps.

The District met the FCC’s recommended bandwidth amount, 100 Mbps per 1,000 users, or students. Both the District-wide average Internet download speed, 142 Mbps, and the per-building average speeds, which ranged from 114 Mbps to 172 Mbps, were above the FCC defined minimum download speeds needed for typical household student online activities, as shown in Figure 2.



² Increased amount in August 2020 from 500 Mbps to 1 Gbps.

Monitoring: The CTO assigned the daily monitoring responsibility to the Senior Network and System Technician who acts as the Network Administrator. We observed the Network Administrator monitoring bandwidth usage and speed for each ISP connection, as well as the number of users, including students connected to the District's network. The Network Administrator told us he monitors the District's bandwidth usage during the school day and resolves issues as they arise. The IT department has a help desk system to receive and address incidents and users can submit issues in person, online or by phone.

Survey: We surveyed 35 of the 341 teachers to learn if they were satisfied with the District's in-school Internet connectivity. Six teachers did not respond to the survey and one teacher responded they did not use Internet resources to provide instruction. However, 27 of 28 teachers responding to our survey who used Internet resources to provide instruction (96 percent of respondents) were satisfied with their Internet connectivity.

The CTO told us she believes the District has enough bandwidth for their needs, and that the District manages the network by monitoring usage during the school day and addressing issues as they occur.

Conclusion

The District provided in-school Internet bandwidth that met the FCC's recommended Internet connectivity speed. As a result, the instructional needs associated with student activities should be met, such as, the ability to access multimedia content, participate in online video conferences, and utilize electronic online learning tools during the school day.

Appendix A: Key Technical Definitions

General Definitions

Bandwidth: The maximum amount of data that can be transmitted over a particular connection in a specified amount of time. This is the volume of information that can be sent over a connection in a measured amount of time.

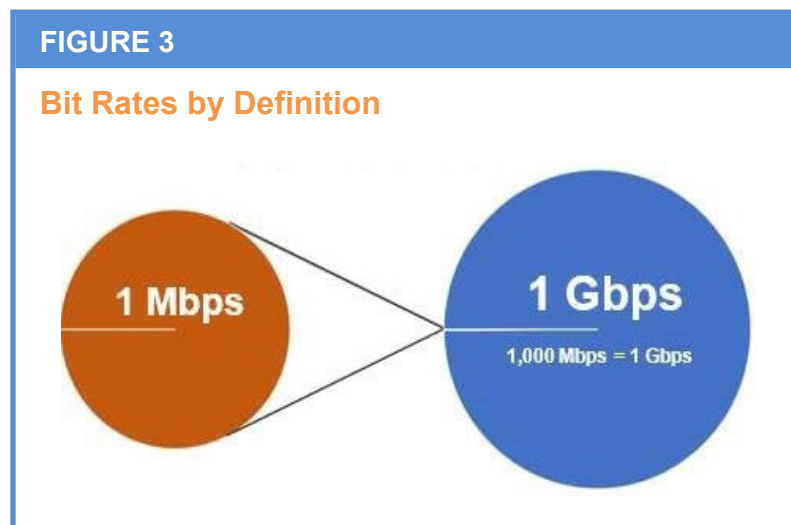
Broadband: High-speed Internet access and advanced telecommunications services for homes, commercial establishments, government, schools and community anchor institutions. In New York State, broadband service is primarily delivered via cable modem, fiber-optic cable, digital subscriber line (DSL) or through mobile wireless (5G/4G LTE), or a combination.

Burst: Bursting is when Internet service providers allow customers to use greater bandwidth than the contracted amount for short periods of time.

Internet Service Provider: An organization that provides services for accessing, using or participating in the Internet. These organizations often provide broadband Internet access to their customers.

Bandwidth Speed Definitions

Mbps (Megabits per second) and Gbps (Gigabits per second) are units of measurement to show the speed at which a network or Internet connection can transfer data (Figure 3). The FCC standard is 100 Mbps per 1,000 students and staff.



Appendix B: Response From District Officials

Erin Sheevers
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BETHLEHEM Central School District



<http://www.bethlehemschools.org>

ACADEMICS

CHARACTER

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WELLNESS

June 7, 2022

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RE: Bethlehem Central School District In-School Internet Connectivity Audit

The Bethlehem Central School District acknowledges the receipt of the draft report of In-School Internet Connectivity Audit issued by the Office of the State Comptroller (OSC). The District respects the work performed by OSC and accepts that their audit findings were factual.

There were no findings or recommendations from this audit.

We thank [REDACTED] for their professionalism during the conduct of their audit, and are pleased that the audit has confirmed the bandwidth capabilities of the school district.

Sincerely,

Erin Sheevers

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Appendix C: Audit Methodology and Standards

We conducted this audit pursuant to Article V, Section 1 of the State Constitution and the State Comptroller's authority as set forth in Article 3 of the New York State General Municipal Law. To accomplish our audit objective and obtain relevant audit evidence, our procedures included the following steps:

- We judgmentally selected the District for audit using a random number generator applied to a list of districts, spread by geographic location.
- We interviewed District officials and employees to gain an understanding of the District's network environment, as well as planning for and monitoring in-school Internet connectivity.
- We reviewed records supporting network analysis, and contracts specifically related to in-school Internet connectivity and bandwidth.
- Using a third-party speed test application while connected directly to each ISP connection, we performed three speed tests at the off-peak Internet activity time defined by District officials. We calculated the average Internet download speed for each ISP connection and compared to contractually defined bandwidth to determine whether the District's average speed was reasonable (at least 80 percent of the measured-to-contracted bandwidth as accepted by the FCC). When average speed deviated from the contractually defined bandwidth, we spoke with District officials to determine the reason.
- Using a third-party speed test application while connected wirelessly to the District's network, we performed speed tests at a sample of locations within each of the seven District school buildings. We calculated the average speed per user, 0.1 Mbps, using the FCC standard of 100 Mbps per 1,000 students and staff (user). We then averaged the Internet download speed results to calculate the district-wide average Internet download speed and compared the results to the FCC defined minimum download speeds needed for typical student online activities.
- We determined the total number of individuals employed by the District during our audit period by reviewing an employee listing. We judgmentally selected 35 teachers to send surveys regarding in-school Internet connectivity.
- Using third-party survey software, a survey was sent to the selected teachers regarding their experience with the in-school Internet connectivity, including whether issues were reported to the IT department. We set a survey deadline, and from the responses received we calculated the number and percentage of teachers satisfied and not satisfied with their in-school Internet connectivity.

We conducted this performance audit in accordance with generally accepted government auditing standards (GAGAS). Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a

reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.

Unless otherwise indicated in this letter, samples for testing were selected based on professional judgment, as it was not the intent to project the results onto the entire population. Where applicable, information is presented concerning the value and/or the relevant population size and the sample selected for examination.

The Board has the responsibility to initiate corrective action. A written corrective action plan (CAP) that addresses the findings and recommendations in this report must be prepared and provided to our office within 90 days, pursuant to Section 35 of General Municipal Law, Section 2116-a (3)(c) of New York State Education Law and Section 170.12 of the Regulations of the Commissioner of Education. To the extent practicable, implementation of the CAP must begin by the end of the fiscal year. For more information on preparing and filing your CAP, please refer to our brochure, *Responding to an OSC Audit Report*, which you received with the draft audit report. The CAP should be posted on the District's website for public review.

Appendix D: Resources and Services

Regional Office Directory

www.osc.state.ny.us/files/local-government/pdf/regional-directory.pdf

Cost-Saving Ideas – Resources, advice and assistance on cost-saving ideas

www.osc.state.ny.us/local-government/publications

Fiscal Stress Monitoring – Resources for local government officials experiencing fiscal problems

www.osc.state.ny.us/local-government/fiscal-monitoring

Local Government Management Guides – Series of publications that include technical information and suggested practices for local government management

www.osc.state.ny.us/local-government/publications

Planning and Budgeting Guides – Resources for developing multiyear financial, capital, strategic and other plans

www.osc.state.ny.us/local-government/resources/planning-resources

Protecting Sensitive Data and Other Local Government Assets – A non-technical cybersecurity guide for local government leaders

www.osc.state.ny.us/files/local-government/publications/pdf/cyber-security-guide.pdf

Required Reporting – Information and resources for reports and forms that are filed with the Office of the State Comptroller

www.osc.state.ny.us/local-government/required-reporting

Research Reports/Publications – Reports on major policy issues facing local governments and State policy-makers

www.osc.state.ny.us/local-government/publications

Training – Resources for local government officials on in-person and online training opportunities on a wide range of topics

www.osc.state.ny.us/local-government/academy

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