
Calendar Year 2019

Submitted in Accordance with CGS § 61a, Sec. 4d-80(c)(8)

Hartford, Connecticut
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Progress and Vision

In 2019, the Connecticut Commission for Educational Technology continued efforts to ensure equitable access to technology for all learners, and to expand the uses and benefits of those resources. From helping schools and libraries pay for Internet connections and ensuring the privacy of student data to promoting the use of free digital learning materials, the Commission’s leadership and advocacy have had a significant, positive impact on students and institutions this year. In the context of broader social, political, and market trends, this work has proven especially relevant and timely.

Learning and civic engagement depend more than ever on technology access and literacy. The use of artificial intelligence (AI) and personal data promises greater insights and efficiencies but also poses concerns about privacy and job security. The “gig economy” should provide skilled employees with greater flexibility to work anywhere, anytime; yet without access to digital learning resources, individuals face the threat of downsizing or under-employment through job automation. Technology does not drive change; its application by humans does. For this reason, citizens of all ages need digital literacy skills to discern fact from fiction; be good stewards of their personal, health, and financial data; take full advantage of the digital economy; and master new modalities in learning to gain sought-after skills that build job security.

In education, our state’s schools and colleges leverage affordable software and cloud-based collaboration tools to make personalized learning possible at scale. They do this empowered by the State’s flagship Connecticut Education Network (CEN) and local investments that have made devices available to most students. At the same time, educators and learners rightfully concern themselves with protecting personal data; wrestle with defining the proper amount of “screen time”; and look for creative ways to ensure that access — or lack thereof — to technology outside of school does not deepen the digital divide. Most recently, government and private-sector leaders have celebrated the promise of 5G networks in areas such as business, healthcare and entertainment. They must also consider and take steps to ensure that new technologies help level the playing field for learners, not tilt it toward the privileged.

Digital innovation will continue to disrupt all aspects of society, including education. This report reflects a vision that those innovations can and should benefit all learners and educational institutions. Harnessing technology as a means of empowering and providing opportunity for all students remains central to the Commission’s work. Its members encourage all stakeholders in learning to engage in these efforts and share new ideas for how technology can deepen and broaden education across our great state.
The use of open education resources (OER) holds great promise to strengthen the quality and reduce the cost of textbooks and other learning materials. Of the hundreds of educators and leaders surveyed about their use of OER, 72 percent create their own learning materials, and 86 percent are ready to share them with colleagues.

→ See Open Education Resources, pages 13 – 14

Through presentations statewide and at national conferences, live and recorded Webinars, and the provision of curriculum resources, the Commission equipped more than 1,200 educators and leaders with the resources they need to support student and teacher digital learning competencies.

→ See Proficiency Standards, page 14

The Commission’s work continues to address the estimated 8 percent (40,000) of Connecticut K – 12 students without access to the Internet outside of school. More than 150 communities have used the Digital Equity Toolkit, a playbook to provide 24 X 7 learning using existing free and low-cost solutions, including the promising Eduroam system.

→ See Digital Equity, page 15

Through direct outreach to schools and libraries, the Commission has equipped leaders with the resources they need to take advantage of unused federal E-rate dollars to fund Internet connections and support wireless networks.

→ See E-rate Maximization, pages 15 – 17
Compliance Insights

With no additional resources, the Commission assumed new responsibilities in providing insights to the General Assembly and districts on the compliance of schools and companies with Connecticut’s privacy statute.

→ See Privacy Compliance, pages 18 – 19

$2M+ Cost Avoidance

Since its 2017 launch, the Commission’s Educational Software Hub has saved districts an estimated 20,000 hours in staff time — not even including external legal fees — to comply with Connecticut’s data privacy law. The Hub helps schools leverage innovative technology solutions that support personalized learning while remaining compliant with state statute.

→ See Educational Software Hub, pages 19 – 20

$39M Content Savings

The Connecticut State Library continues to deliver exceptional value through researchIT (formerly iCONN), the digital library free to all Connecticut residents. This service delivered $41M in digital content subscriptions at a cost to the state of $1.5M.

→ See researchIT CT, pages 28 – 29

$25M Network Savings

The Connecticut Education Network (CEN), launched in 2000 through the Commission, delivers Internet connections, federally mandated content filtering, and cyber protection services to schools, colleges, libraries, towns, and open access members at a cost that saves these institutions approximately $25M this year alone.

→ See Connecticut Education Network, page 32
Introduction
The Connecticut Commission for Educational Technology ("the Commission" or "CET") was established in 2000 by Public Act 00-187 to serve as the State’s principal educational technology policy advisor. This document summarizes the Commission’s progress in attaining its statewide technology goals during the past calendar year, in accordance with its governing statute (CGS § 4d-80). The report serves to inform and provide recommendations to the joint standing committee of the General Assembly having cognizance of matters relating to education, appropriations, and the budgets of state agencies; the State Board of Education; and the Board of Governors of Higher Education. Readers accessing this report online may use the embedded links to view minutes, watch recorded meetings, and review publications.

Background and Membership

<table>
<thead>
<tr>
<th>Name and Position</th>
<th>Representing or Appointed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark Raymond, CIO, Chairman</td>
<td>Department of Administrative Services</td>
</tr>
<tr>
<td>Michael Mundrane, UCONN Vice Provost and CIO, Commission Vice-Chair</td>
<td>University of Connecticut</td>
</tr>
<tr>
<td>Doug Casey, Executive Director</td>
<td>Commission for Educational Technology</td>
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<tr>
<td>Colleen Bailie, Director, West Haven Public Library</td>
<td>CT Library Association</td>
</tr>
<tr>
<td>Nick Caruso, Senior Staff Associate</td>
<td>CT Association of Boards of Education</td>
</tr>
<tr>
<td>Charles Dumais, Executive Director, Cooperative Educational Services</td>
<td>Governor's Office</td>
</tr>
<tr>
<td>Tom Dillon, Principal, David A. Fields Group</td>
<td>Minority Leader of the House</td>
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<tr>
<td>John Elsesser, Town Manager, Town of Coventry</td>
<td>CT Council of Small Towns</td>
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<tr>
<td>Russell Feinmark, CT General Assembly</td>
<td>Speaker of the House</td>
</tr>
<tr>
<td>Ajit Gopalakrishnan, Chief Performance Officer</td>
<td>Connecticut State Department of Education</td>
</tr>
<tr>
<td>Rich Mavrogeanes, President, Discover Video</td>
<td>President Pro Tem of the Senate</td>
</tr>
<tr>
<td>Andrew Minikowski, Staff Attorney, State Broadband Policy and Program Coordinator</td>
<td>Office of Consumer Counsel</td>
</tr>
<tr>
<td>Open Position</td>
<td>Minority Leader of the Senate</td>
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<tr>
<td>Maura Provencher, Vice President of Research and Administration</td>
<td>CT Conference of Independent Colleges</td>
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<tr>
<td>Bart Stanco, Vice President, Gartner</td>
<td>Governor's Office</td>
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<tr>
<td>Steve Stephanou, Deputy General Manager, Town of Manchester</td>
<td>CT Conference of Municipalities</td>
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<tr>
<td>John Vittner, Director of IT Policy</td>
<td>Office of Policy and Management</td>
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<tr>
<td>Ken Wiggin, State Librarian</td>
<td>Connecticut State Library</td>
</tr>
<tr>
<td>Scott Zak, Senior Director of Learning Technologies</td>
<td>CT Board of Regents for Higher Education</td>
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</tbody>
</table>
This past year included several changes to the Commission membership. In the late summer, State Broadband Coordinator Bill Vallee retired. The Office of Consumer Counsel (OCC) appointed Staff Attorney Andrew Minikowski to replace Mr. Vallee. In September, long-time member Scott Shanley stepped down from his position, with Steve Stephanou, Manchester’s Deputy General Manager, appointed to fill that seat on behalf of the Connecticut Conference of Municipalities (CCM). Shortly after the September meeting, Carl Fortuna of Old Saybrook stepped down from his seat. The Commission looks forward to the Minority Leader of the Senate’s appointment of a chief elected official to replace Mr. Fortuna.

Leadership

Mark Raymond, the Chief Information Officer for the State, continued his service as Chair of the Commission. Michael Mundrane, the University of Connecticut’s Chief Information Officer and Vice Provost, serves as the Commission’s Vice-Chair. Douglas Casey serves as the Commission’s Executive Director, with responsibility for the CET’s planning and activities as described on the Web sites of the Connecticut General Assembly (Chapter 61a) and Commission (www.CT.gov/CTEdTech).

In addition to its members, the Commission benefits from the insights of Advisory Council members. Ten Commission members and alternates as well as nearly 40 subject matter experts from across the state serve on these Advisory Councils, representing a broad diversity of constituents to help guide the Commission’s priorities and programs. The list of Advisory Council members follows:

Digital Learning Advisory Council

- Nick Caruso (Chair) — Senior Staff Associate for Field Service, CABE*
- Katie Bauer — Director of Library Research Services & Collections, Trinity College
- Kevin Corcoran — Executive Director of Digital Learning, Connecticut State Colleges and Universities
- Jonathan Costa — Assistant Executive Director, EdAdvance
- Larry Covino — Director, Bristol Adult Education
- Andy DePalma — Director of Technology, EASTCONN
- Sarah Edson — Dean of Academic Technology and Innovation, Ethel Walker School
- Josh Elliott — Director of Educational Technology, Fairfield University Graduate School of Education and Allied Professions
- John Elsesser* — Town Manager, Town of Coventry
- Barbara Johnson — Library Media Specialist, Colchester Public Schools and President, Connecticut Educators Computer Association (CECA) and Connecticut Association of School Librarians (CASL)
- Karen Kaplan — Technology and Communications Director, Hamden Public Schools
- Dawn La Valle* — Director, Division of Library Development, Connecticut State Library
- Shannon Marimón — Executive Director, ReadyCT (formerly Connecticut Council for Education Reform)
- Laura McCaffrey — Director of School Support and Academic Services, Hartford Archdiocese

*Also serves as a Commission member or alternate.
• Greg Mcverry — Professor, Southern Connecticut State University
• James Mindek — Director of Technology & Operations, Connecticut Technical High School System
• Brandon Rush — Director of Technology, New Milford Public Schools
• Josh Smith — Superintendent, Region 15 Public Schools
• Karen Skudlarek — Educational Technologist, University of Connecticut
• Jim Spafford — Coordinator of Business Services and Partnerships, Manchester Adult Education
• Shelley Stedman — Past President, Connecticut Association of School Librarians
• Chinma Uche — Computer Science Teacher, CREC Academy of Aerospace and Engineering, and President, CT Computer Science Teachers Association
• Christopher Weiss — Principal, Riverside School (Greenwich)
• Jennifer Widness* — President, CT Conference of Independent Colleges
• Scott Zak* — Senior Director of Learning Technologies, CT State Colleges and Universities

Infrastructure Advisory Council
• Tom Dillon (Chair)* — Principal, David A. Fields Group
• Colleen Bailie* — Library Director, West Haven Public Library
• Joe Campbell — Educational Technology Consultant, Connecticut Technical High School System
• George Claffey — Interim Chief Information Officer, Central Connecticut State University
• Fred Kass — Director of Networking & Infrastructure Services, Trinity College
• Kerri Kearney — Supervisor of Instructional Technology, Manchester Public Schools
• Ryan Kocsondy — Director, Connecticut Education Network (CEN)
• Michael Mundrane* — Vice Provost and CIO, University of Connecticut
• Brandon Rush — Director of Technology, New Milford Public Schools
• Susan Shellard* — Chief Administrative Officer, Department of Economic and Community Development
• Sabina Sitaru — Interim Chief Operating Officer, CT Health Information Exchange
• Bill Vallee* — CT Broadband Policy and Programs Coordinator, CT Office of Consumer Counsel
• Rick Widlansky — System Manager, Libraries Online (LION)
• Rob Wilson — Director of Technology and Information Services, Somers Public Schools

*Also serves as a Commission member or alternate.
Meetings

### Commission Meetings

<table>
<thead>
<tr>
<th>Date</th>
<th>Agenda</th>
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</thead>
<tbody>
<tr>
<td>Monday, March 4</td>
<td>- Digital Literacy Standards Campaign</td>
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<tr>
<td></td>
<td>- Social Media Monitoring</td>
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<td></td>
<td>- Commission Web Site Redesign</td>
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<td></td>
<td><a href="#">Meeting Minutes</a></td>
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<tr>
<td>Monday, September 9</td>
<td>- Role of 5G in Education</td>
</tr>
<tr>
<td></td>
<td>- Eduroam for Digital Equity</td>
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<td></td>
<td>- Resolution on the Role of Libraries to Support Digital Equity</td>
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<tr>
<td></td>
<td><a href="#">Meeting Minutes</a></td>
</tr>
<tr>
<td>Wednesday, October 23 (Special Meeting)</td>
<td>- Recommendations to Revise Commission Statute</td>
</tr>
<tr>
<td></td>
<td>- Intent to Reinstate Positions that Represent K – 12 Educators</td>
</tr>
<tr>
<td></td>
<td><a href="#">Meeting Minutes</a></td>
</tr>
<tr>
<td>Monday, December 2</td>
<td>- State OER Survey and Opportunities</td>
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<tr>
<td></td>
<td>- Advocacy and Impact</td>
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<tr>
<td></td>
<td>- Statement on Role of New Technologies to Support Learning</td>
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<td></td>
<td><a href="#">Meeting Minutes</a></td>
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[Video Archive](#)
### Advisory Council Meetings

#### Digital Learning Advisory Council

<table>
<thead>
<tr>
<th>Date</th>
<th>Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, February 4</td>
<td>• ISTE Standards Implementation • Social Media Monitoring</td>
</tr>
<tr>
<td></td>
<td>• Data Privacy • Statewide Technology Needs</td>
</tr>
<tr>
<td><strong>Meeting Minutes</strong></td>
<td></td>
</tr>
<tr>
<td>Tuesday, April 30</td>
<td>• Open Education Resources • 5G Implications and Guidance</td>
</tr>
<tr>
<td></td>
<td>• Learning Competencies • Measuring Ed Tech Efficacy</td>
</tr>
<tr>
<td><strong>Meeting Minutes</strong></td>
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<tr>
<td>Wednesday, August 14</td>
<td>• Open Education Resources • Impact of 5G on Teaching and Learning</td>
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<tr>
<td></td>
<td>• Digital Equity Initiatives • Technology Cost Savings</td>
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<tr>
<td><strong>Meeting Minutes</strong></td>
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<tr>
<td>Tuesday, November 12</td>
<td>• 5G to Support Learning • Technology Purchasing Efficiencies</td>
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<tr>
<td></td>
<td>• OER Report and Next Steps • Student Data Privacy</td>
</tr>
<tr>
<td><strong>Meeting Minutes</strong></td>
<td></td>
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</table>

#### Infrastructure Advisory Council

<table>
<thead>
<tr>
<th>Date</th>
<th>Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday, February 5</td>
<td>• Strategic Planning Resources • Measuring Statewide Technology Needs</td>
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<tr>
<td></td>
<td>• E-rate Report and Recommendation: Digital Inclusion</td>
</tr>
<tr>
<td><strong>Meeting Minutes</strong></td>
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</tr>
<tr>
<td>Wednesday, August 7</td>
<td>• Cybersecurity Issues and Resources • CEN Member Feedback</td>
</tr>
<tr>
<td></td>
<td>• Closing the Homework Gap</td>
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<tr>
<td><strong>Meeting Minutes</strong></td>
<td></td>
</tr>
<tr>
<td>Wednesday, October 30</td>
<td>• 5G to Support Learning • Volunteer Cyber Corps</td>
</tr>
<tr>
<td></td>
<td>• Closing the Homework Gap • Network Management re. 1:1</td>
</tr>
<tr>
<td><strong>Meeting Minutes</strong></td>
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</tbody>
</table>
State Educational Technology Goals and Plan

In 2017, the Commission released its five-year State Educational Technology Goals and Plan, with the following Vision Statement:

**That every learner and educator in Connecticut benefits from the full potential of technology to support personalized and impactful teaching, learning, research, and advancement.**

To support that vision, the following Mission Statement defines the strategies and activities of the Commission:

**Design, steward, and promote policy, programs, insights, and resources that support the effective use of technology for all learners and educational organizations in Connecticut.**

In the past year, the Commission has faithfully stewarded, promoted, and enlisted assistance to deliver upon the initiatives defined in the Goals and Plan. That blueprint for educational technology in our state addresses eight broad initiatives falling under three focus areas: Digital Learning, Infrastructure, and Data and Privacy.

**Digital Learning**
- Open Education Resources
- Student-Centered Learning
- Technology Proficiency Standards

**Infrastructure**
- E-rate Maximization
- Digital Equity
- Educational Technology Standards and Best Practices

**Data and Privacy**
- Privacy Compliance
- Privacy Best Practices

At all quarterly meetings, Director Casey provides members with an update on progress made against the Goals and Plan, reflecting the insights and efforts of the Commission members, Advisory Council members, and other subject-matter experts enlisted to support this work. The following page provides a high-level summary of these efforts.
2019 Goals and Plan Progress Updates

<table>
<thead>
<tr>
<th>Objective</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Digital Learning</strong></td>
<td></td>
</tr>
<tr>
<td>Open Education Resources</td>
<td></td>
</tr>
<tr>
<td>Obtain GoOpen Status</td>
<td>Completed (June 2017)</td>
</tr>
<tr>
<td>Promote OER Framework and Initiatives</td>
<td>In Progress and Ongoing</td>
</tr>
<tr>
<td>Engage in National OER Communities</td>
<td>In Progress and Ongoing</td>
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<tr>
<td><strong>Student, Teacher, and Administrator Standards</strong></td>
<td></td>
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<tr>
<td>Commission Endorsement of Student Standards</td>
<td>Completed (September 2016)</td>
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<tr>
<td>Commission Endorsement of Teacher Standards</td>
<td>Completed (September 2017)</td>
</tr>
<tr>
<td>Curation of Educator and Leader PD Supports</td>
<td>In Progress and Ongoing</td>
</tr>
<tr>
<td>State Board Adoption of Student Standards</td>
<td>Completed (June 2018)</td>
</tr>
<tr>
<td>Adoption of Administrator Standards</td>
<td>Completed (December 2018)</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td>E-rate Maximization</td>
<td></td>
</tr>
<tr>
<td>Statewide Survey Design and Feedback</td>
<td>Completed (July 2018)</td>
</tr>
<tr>
<td>Statewide E-rate Report</td>
<td>Completed (April 2019)</td>
</tr>
<tr>
<td><strong>Digital Equity</strong></td>
<td></td>
</tr>
<tr>
<td>Digital Equity Toolkit</td>
<td>Completed (December 2018)</td>
</tr>
<tr>
<td>Identification of “Beta” Communities to Use Toolkit</td>
<td>Completed (November 2018)</td>
</tr>
<tr>
<td><strong>Data and Privacy</strong></td>
<td></td>
</tr>
<tr>
<td>Educational Software Hub Design and Launch</td>
<td>Completed (August 2017)</td>
</tr>
<tr>
<td>Promotion of Privacy and Security Best Practices</td>
<td>In Progress and Ongoing</td>
</tr>
</tbody>
</table>

The following sections provide details on each of the above initiatives, as well as other related activities of the Commission and its Advisory Councils to ensure the effective use of technology in Connecticut schools, libraries, and institutions of higher education.
Digital Learning

Open Education Resources
The creation, sharing, curation, and use of open education resources (OER) have delivered a wide range of benefits to educators and students alike: cost savings, flexibility, equity of access, and relevancy of materials. In 2019, the Commission made significant strides in raising awareness of OER, assessing needs around their use, and designing resources to make them available to all schools, colleges, and libraries. These efforts support the Commission’s Educational Technology Goals and Plan and original charge, which includes “providing access for all public schools, public libraries, and libraries at institutions of higher education to a core set of online, full-text resources” [CGS § 4d-80(c)(2)(C)].

Branding and Awareness
Following work in 2018 to identify the greatest needs around OER, Director Casey worked with a diverse team of volunteers to design and launch a statewide awareness and needs assessment campaign. During the spring, he collaborated with a team of students under the leadership of Assistant Professor-in-Residence John Murphy of the University of Connecticut (UCONN) Digital Media and Design program to develop a brand and video testimonials endorsing the use of OER. That work resulted in a logo for “GoOpen Connecticut” (see image inset). The UCONN team also produced a series of videos by K–12 and college students, educators, and leaders around the benefits of OER. In addition, OER subject-matter experts assembled a list of resources for teachers and administrators, which Director Casey posted with the launch of the www.GoOpenCT.org Web site. Through a social media campaign (@GoOpenCT), he shared highlights of the testimonials and directed followers to watch the full videos and take advantage of the curriculum, planning, and governance resources on the Web site. Since its launch in May, more than 2,000 people have visited the site to access its resources and video content.

OER Use and Needs
In addition to raising awareness of OER’s benefits, the Commission assessed educators’ use and perceptions of open resources. The OER advisory group provided direction in the design of an online survey that served as the “call to action” for the awareness campaign. More than 300 teachers, professors, librarians, and district administrators completed the survey, helping to define opportunities, needs, and next steps for expanding the use of OER in Connecticut.

The report “Open Education Resources: Survey Results and Opportunities for Connecticut Schools and Libraries” includes quantitative and qualitative feedback from the educational community around OER. A total of 72 percent of respondents already create digital learning materials, of which 86 percent share that content with others. They
see cost savings (for schools at the K – 12 level, students in higher education) and relevancy as the two greatest benefits of OER. Respondents express a need for professional development, especially in copyright and publishing best practices. Addressing those demands while helping to expand the creation and sharing of open materials remains a focus of the Commission’s work in 2020.

Technology Proficiency Standards
Perhaps more than any other year, 2019 saw a need for digital literacy among all learners and the general citizenry. The Commission’s efforts have positioned Connecticut as a leader in this area, last year making our state the first to adopt the benchmark digital learning standards for students, educators, and education leaders of the International Society for Technology in Education (ISTE). To provide guidance and resources on how to develop these competencies, the Commission continued its series of online presentations, highlighting the exemplary work of Connecticut’s teachers and education leaders.

The January Webinar on the ISTE Educator standards featured members of the Digital Learning Advisory Council — Josh Elliott of Fairfield University and Laura McCaffrey of the Hartford Archdiocese (Hartford Catholic Schools) — as well as leaders of the 4,000+ member ISTE Teacher Education Network. In February, the Commission hosted a session on the ISTE Education Leader standards, those that guide the competencies that principals, superintendents, board members, and other school leaders should possess. Commission members Nick Caruso and Chip Dumais, as well as former Commission member and current Region 15 Superintendent Josh Smith, walked attendees through the standards and shared insights on how to build these leadership competencies. More than 150 people attended the Webinars, now available for streaming through the Commission’s Digital Learning Competency Standards page (www.CT.gov/ISTE).

The Commission’s growing collection of resources to support best practices in digital learning continue to serve the state’s educational community. In 2019, downloads surpassed 400 of the “ISTE Guide to Implementing Standards,” which normally costs $15 but that the Commission makes available at no charge through an agreement with ISTE. Teachers, library media specialists, administrators, and technology directors from nearly 250 schools have taken advantage of this one resource alone.

Recognizing that teachers play a critical role in building student learning competencies, the Commission and Digital Learning Advisory Council members have endorsed the ISTE Educator Certification program. Efforts this year helped launch certification programs through the Regional Education Service Centers (RESCs) and Fairfield University. The Commission will continue to support teacher competencies and certification, which in turn deepen their ability to model and foster digital learning skills in students.

The Commission’s work continues to garner national recognition. In June, Director Casey accepted the ISTE “Making IT Happen” award, presented to just three recipients a year for innovation in educational technology. He also continues to serve on the ISTE Advocacy Advisory, which develops policy guidelines and best practices for schools, state education agencies, the U.S. Department of Education, Congress, and other education leaders.
Infrastructure

Digital Equity
Many gaps exist in equipping Connecticut learners of all ages with the devices, Internet access, skills, and support to make full use of digital learning and citizenry opportunities. While CEN connects all districts and public universities as well as most towns and libraries to virtually unlimited broadband circuits, learning takes place increasingly outside the four walls of these institutions. Districts have invested heavily in 1:1 laptop programs, with more than half of middle school and nearly three-quarters of high school students equipped with a personal computer. However, when they leave school, approximately 8 percent (about 40,000) of public school students do not have access to the Internet at home. In such cases, technology becomes a force that further divides the haves and have-nots. The Commission’s Goals and Plan provide multiple avenues to address these disparities, many of which appear in last year’s Digital Equity Toolkit.

Eduroam
Efforts over the past year have greatly expanded the prospect of community-based, wireless educational networks using Eduroam (www.eduroam.org). This authentication framework allows students to log into wireless hotspots across the globe using the credentials (i.e., user name and password) issued by their local school or university. Eduroam has proven highly successful among institutions of higher education, allowing faculty and students to get online at any participating college or university worldwide. In 2019, the Commission supported the adoption of Eduroam in multiple Connecticut cities and towns as an effective platform through which anchor institutions can grant Internet access to students.

Under the unflagging leadership and enthusiasm of Infrastructure Advisory Council chair Tom Dillon, pilots are underway or in discussion in five Connecticut communities: Bridgeport, Hartford, Middletown, New Haven, and Stratford. This work represents strong collaboration among Advisory Council members including Colleen Bailie (Bridgeport), Fred Kass (Hartford), Ryan Kocsondy (all locations), and Sabina Sitaru (Hartford and New Haven), among others. The next year should see a continued expansion of Eduroam pilots and students served.

E-Rate Maximization
As defined in its statute (CGS Sec. 4d-82), the Commission continues to take steps that “maximize participation and grant attainment rates, and reduce overly burdensome administrative requirements which discourage local involvement” in the federal Universal Service Schools and Libraries Program. Known as “E-rate,” the fund provides financial offsets to connect schools and libraries to the Internet and fund their internal wired and wireless networks. Based on usage data, Connecticut schools and libraries have not taken advantage of available funding. Our state’s schools (not even counting libraries) were eligible for a total of $49M over the previous four years to pay for internal network connections and hardware, and yet our districts have only filed for $27M in funding.
In 2018, members of the Infrastructure Advisory Council designed a statewide survey of schools and libraries to identify barriers to using the E-rate program. Leaders from 130 districts and libraries submitted responses, which captured quantifiable and open-ended feedback on topics ranging from historical participation in E-rate, perceived benefits and challenges of the program, and use of external consultants.

In April 2019, the Commission formalized and published the report, “E-rate in Connecticut: Survey Results and Opportunities for Schools and Libraries.” The report highlights a number of common themes:

- **Barriers:** Predominant challenges to leveraging E-rate include a lack of matching funds (schools) and reluctance to filter content (libraries).

- **Common Support Providers:** Nearly all schools use the same third-party E-rate consulting firm; most libraries leverage one State of Connecticut employee as their consultant.

- **Value:** Both schools and libraries find strong value in the assistance provided by consultants who possess deep knowledge of the program.

- **Return on Investment:** Schools using consultants find a high (2X) return on investment, even when accounting for consulting fees.

- **Complexity and Inefficiency:** The technical and administrative complexities of fully leveraging E-rate drive dependence on external support, leading to inefficiencies in the form of direct and indirect costs for each participating district or library.

Members of the Commission and its Infrastructure Advisory Council — as well as expert reviewers outside of Connecticut — identified several opportunities brought to light through the survey for schools and libraries to appreciate greater benefits from the E-rate program:

- **Request for Proposal (RFP) for Consulting Services:** Given that four out of five schools use the same E-rate consultant, exploring efficiencies in procuring these services affords opportunities for cost savings and transparency. Director Casey has enlisted the input of Connecticut schools and libraries as well as E-rate specialists in other states to gather requirements for such an RFP. Responses to these requests have taken longer than expected, but Director Casey expects to develop an RFP in 2020.

- **Hardware and Circuit Bid List:** Similar to the approach taken for E-rate consulting services, a common bid list of frequently purchased hardware and data circuits might prove helpful to districts and libraries. Input gathered from CEN members through an online survey currently collecting responses will help define common areas of need and specific product preferences, enabling targeted cooperative purchasing.
• Consortium Pricing: Libraries already benefit from the Connecticut Libraries Fiber Consortium by collectively bidding on data circuits and other E-rate services. Doing so for schools might also provide cost savings and transparency in pricing.

• State-Level Matching Funds: Other states such as California, Rhode Island, and Texas have a universal fee assessed through telecommunications providers to help offset school and library matching costs. Connecticut legislators could consider the same approach to provide an efficient means of covering the full cost of E-rate services, increasing program participation, and maximizing the allocation of available federal funds for schools and libraries.

• Training and Information Resources: Given the highly complex nature of the E-rate program, schools and libraries would benefit from the availability of training sessions and educational materials. These supports already exist through CEN’s annual conference and events organized through its Engagement & Development Advisory Council.

• Outreach and Awareness: State and local leaders would appreciate the insights shared in this report. Since its publication, Director Casey has presented its findings and recommendations with the state’s superintendents, members of boards of education, and town leaders. These talks have prompted subsequent discussions among school leaders as to why they may not fully leverage E-rate funds, whether simply from a lack of filing or unwillingness to commit matching funds, for example.
Privacy Compliance

The Commission expanded efforts to support schools, technology companies, and the Connecticut General Assembly (CGA) in helping to ensure access to educational software while protecting student data privacy. This work comes in the form of direct support to the CGA Education Committee, the expansion of free tools for districts and private companies, and assistance to providers to ensure their compliance.

Data Privacy Task Force

The original student privacy law, Public Act 16-189, called for the creation of a Task Force to study and make recommendations regarding the statute to the CGA. In 2018, Director Casey was appointed co-chair of the Task Force. In the absence of a second co-chair appointment, he convened the other appointees with the objective of drafting a report for the consideration of the General Law and Education Committees for the 2019 legislative session. The Task Force included Commission member Ajit Gopalakrishnan as well as state and national student privacy experts. The group convened several times to draft and deliver the Report of the Student Data Privacy Task Force on March 25. That document includes the following recommendations:

- Reduce Inefficiencies While Ensuring Privacy: Throughout the report, the Task Force acknowledges the importance of protecting student privacy in ways that also minimize impact on the limited resources of districts, especially small ones.

- Strengthen Penalties: Define and reference measures that compel vendors to comply with the law, pointing to existing state statute, when possible.

- Leverage and Ensure Coherence Across Statutes: Connecticut’s data privacy law does not require additional definitions regarding requests for data deletion or public hearings, which federal statute, Connecticut law, and local board of education policies already address. Furthermore, new state education and general privacy statutes should align with the current and future versions of the Connecticut student data privacy law.

- Training and Professional Development: Developing high-quality training materials by the State would minimize the need for districts to do so individually. Such coordination would also likely strengthen the digital literacy competencies of all members of the educational community without placing additional resource burdens on districts.

- Further Study: A formal review of the qualitative and quantitative impacts of the law would help identify the collective direct and indirect costs on Connecticut’s schools.

The report reflects a substantial investment of time and effort by members who possess deep subject matter expertise and oversee significant responsibilities outside of their role on the Task Force. Despite the insights shared in direct alignment with the mandates of the original statute and quick turnaround of the document, no revisions to the law took place during the 2019 Legislative Session.
Exemption Reporting
The 2018 session brought changes to Connecticut’s statute governing student data privacy (CGS §§10-234aa-dd). These updates, instituted in Public Act 18-125, include an exemption to the law that schools may claim in support of individualized education plans (IEPs) and accommodations provided through Section 504 of the Rehabilitation Act of 1973. The revised statute requires that all districts report to the Commission on whether they used the exemption. Those who did must provide details including the software title, its provider, and assurances that the district made reasonable efforts to comply with all other aspects of state and federal privacy statute.

Early in 2019, Director Casey developed a set of secure data-capture tools for registering district exemption reporters and for collecting their annual reports. He then created and shared detailed instructions targeted at K–12 student services directors, who manage IEP and 504 data. Outreach took place in partnership with Bryan Klimkiewicz, SDE Bureau Chief for Special Education; CONNCASE; CAPSS; CABE; and other educational groups. Director Casey provided significant assistance to dozens of school districts throughout the year to clarify questions on exemption reporting.

Results from the first year of reporting reflect a lack of response from districts and a low incidence of exemption use among reporting districts. On September 17, Director Casey shared the reporting data, available through the Connecticut Open Data portal (https://data.ct.gov), with the CGA Education Committee. In that communication, he included the following conclusions:

- Partial Response to Mandate: Only 57 percent (104 local education agencies) submitted reports for the 2018–19 school year.
- Limited Use of the Exemption: Of those districts that did report, only about 12 percent used the exemption one or more times. Of the 26 districts that did use the exemption, about half (14) used the exemption for just one software title. Only three districts used the exemption for more than 10 titles.
- Broad Distribution of Exempted Software: As a chart of exemptions by title illustrates, there were just a few software titles that multiple districts reported using through the exemption. In aggregate, the reports do not indicate that large numbers of districts are using the same software products under the exemption.
- Confusion Over Reporting Requirements: Many district reporters did not understand the requirements of the law, despite the outreach mentioned above.

By the fall of 2019, Director Casey had re-opened the district reporting forms and distributed instructions to the individuals responsible for submitting exemption data by the end of the 2019–2020 school year.

Educational Software Hub
The Commission’s innovative work in supporting student data privacy continues to garner national attention as reflected in media coverage and speaking requests (see
Communications and Outreach, especially regarding the efficiencies delivered through the Commission’s Educational Software Hub. Use of the Hub has significantly reduced the burden of compliance on districts and educational companies. The platform provides a single point of reference for software developers to learn about and pledge compliance to the State’s data privacy law. In turn, educators can search the site for software developed by companies that have pledged to comply with Connecticut’s statute.

Since its launch more than two years ago, the Hub has brought about significant direct and indirect cost reductions to the 1,800 registered users statewide who use the site to conduct compliance research. On the basis of survey results, the Hub saves staff across all districts approximately 10,000 hours annually from researching and negotiating privacy agreements with vendors. This translates into a conservative estimate of indirect cost avoidance in staff time of $700,000 annually across all districts.

In the spring of 2019, the addition of new data-tracking features to the Hub provided deeper insights for educational leaders, at no additional cost. Through an extension that schools install on Chromebooks — by far the most widely used type of student computer in Connecticut — administrators have access to a dashboard and detailed reports on which software students and teachers are using. These tools provide greater insights for district administrators into how students are leveraging investments in educational software. School leaders can also identify the use of unauthorized, non-compliant software. State-level reporting across the 50 districts using the Chrome extension shows 3,361 products in use; however, only 275 products have pledged compliance with Connecticut’s privacy law.

Vendor Relations
The Commission continues to engage directly with educational software providers to help ensure their compliance with Connecticut statute. Coming from the State’s educational technology leader, this guidance greatly assists companies and districts alike, providing a unified voice to clarify misunderstandings around the law.

In 2019, the Commission continued efforts to facilitate the compliance of educational technology products — including those by Apple, Google, Microsoft, and other major providers. This work comes through active collaboration with developers as well as education leaders representing a diverse set of constituents. In the spring and summer, Director Casey partnered with Department of Administrative Services counsel Michael Barrera to work with the Adobe education team to ensure compliance of its products with Connecticut statute. Nearly every district uses the company’s design and coding apps to prepare students for college and careers.

Similar efforts helped schools continue their “eSports” programs, which allow students to compete in online gaming leagues. The Connecticut Interscholastic Athletic Conference (CIAC) uses the Play VS product to organize district teams and track competitions. Director
Casey worked with senior leaders in CIAC and Play VS — including Digital Learning Advisory Council member Clint Kennedy — to review the company’s data privacy agreement and provide direction to schools on how to use the platform. These efforts made it possible for the statewide eSports program to continue.

Privacy and Security Best Practices
As the incidence and type of cyber-attacks and data breaches increase, the Commission continues to promote security and privacy best practices. These efforts take the form of presentations to educational groups, social media and electronic outreach, and influencing the work of state and national legislators and professional organizations.

Throughout the year, Director Casey has shared with leadership groups several frameworks that they should consider leveraging in order to establish a comprehensive privacy and security program for their institutions. These resources include the National Institute of Standards and Technology (NIST) Cybersecurity Framework, the Center for Internet Security (CIS) Controls, the Consortium for School Networking (CoSN) Trusted Learning Environment (TLE) framework, and the Connecticut Division of Emergency Management and Homeland Security Counter Terrorism and Intelligence Center (CTIC), among others. In March at the CoSN annual conference, CoSN Executive Director Keith Kruger presented Director Casey with a commendation for the Commission’s work around privacy and security.

On a national level, the Commission continues to advocate for resources that help educational institutions establish and maintain effective privacy and cyber-security programs (see Advocacy, next page). Public comments submitted on behalf of the Commission have argued for continued E-rate funding and for the program’s expansion to include cyber-security hardware and services. Director Casey works to coordinate these efforts and heighten their impact through involvement in several organizations in which he serves as a member or on the board of directors (see Professional and Advocacy Groups).
Related Activities
In addition to the above accomplishments aligned with the State Educational Technology Goals and Plan, the Commission has engaged in other activities that support its mission of promoting the effective use of technology for teaching and learning.

Advocacy
The Commission continues to follow and respond to issues on a state and national level that impact digital learning. On July 29, the Commission filed comments opposing the Federal Communications Commission (FCC) proposed rulemaking to combine the E-rate and Rural Healthcare programs. Such a move would not have streamlined either program and would likely have pitted school and healthcare technology needs against each other. At the time of this writing, the FCC will not likely move forward with this change in rulemaking, which would have negatively impacted Connecticut’s schools and libraries.

In August, the Commission submitted comments to the Public Utilities Regulatory Agency (PURA) opposing the eligibility of individuals to receive funds through the Public, Educational and Governmental Programming and Educational Technology Investment Account (PEGPETIA) program. The Authority’s decision posted on October 23 supports the views of the Commission and others that limiting PEGPETIA awards to educational entities would most efficiently fulfill the program’s design of serving the educational needs of Connecticut’s students and residents.

Framing the Evidence (State Educational Technology Directors Association)
Best practices in digital learning call for well-designed pilots to determine the efficacy of products and solutions. However, most schools do not have access to or cannot afford such efficacy studies. In addition, many districts deploy and pay for dozens — if not hundreds — of unused educational software titles, resulting in wasted classroom time and inflated curriculum budgets. For example, the 2019 LearnPlatform EdTech Usage Report presents school data showing that a mere 16 percent of all paid educational software meets instructional goals.

To make effective educational technology pilots available to districts across the country, regardless of their geographic location, Director Casey joined four other state leaders from the State Educational Technology Directors Association (SETDA) in designing the Framing the Evidence program. Over the past nine months, he and colleagues have designed different tiers of efficacy pilots, which SETDA staff will design and manage, to partner interested schools with SETDA’s private sector partners. Each engagement would address a specific instructional need unique to the participating district and deliver free or low-cost software and professional development to that district. Private sector partners benefit from having access to deidentified student data to improve their products.

Director Casey has promoted the program to Connecticut schools, which can participate free of charge and with obligation to explore potential matches. More advanced efficacy pilots could also benefit researchers at Connecticut institutions of higher education, who might have interest in co-designing the studies and publishing the results in scholarly journals. For additional details, visit www.setda.org/priorities/professional-learning.
**Libraries and the Digital Divide**

Connecticut libraries play a pivotal role in providing the connections, devices, digital literacy, and support services that citizens across the state need to participate fully in society. Over the past year, Vice-Chair Michael Mundrane and members Colleen Bailie and Ken Wiggin have refined a Resolution on the Role of Libraries to Support Digital Equity. Adopted unanimously at the September 9 meeting, the statement proposes the development of a plan to bolster library resources to combat the digital divide. The Resolution calls for the Commission to work with the Connecticut State Library and the Connecticut Library Association to develop a comprehensive, statewide initiative to provide public libraries with equipment, software, and infrastructure to advance digital citizenship in communities throughout Connecticut.
Communications and Outreach

To raise awareness of its work and gather feedback from its diverse constituents, the Commission leverages several online media channels, including the CET Web site, Twitter account, and e-mail listserv. Director Casey continues to present at state and national events, produce research and publications, submit news to educational media outlets, and participate actively in several professional and advocacy groups. The following sections provide highlights of these communication and outreach efforts.

Online Media

- **Web**: In the spring of 2019, Director Casey migrated and expanded the Commission’s Web site, [www.CT.gov/CTEdTech](http://www.CT.gov/CTEdTech), to the State’s new content-management system. In the past year, the site provided 17,000 visitors with a wide array of research, resources, meeting minutes, and publications.

- **Twitter**: The Commission’s Twitter account, @CTEdTech, serves as a means of communicating important research and policy updates to 500 followers, up from 400 over the last year.

- **Statewide Listserv**: In early 2016, the Commission launched a statewide e-mail listserv to share research, best practices, and announcements with the K–12 educational technology community. Since that time, the list has grown to include approximately 350 members, including school technology leaders from nearly every Connecticut public school district. In the past year, contributors have submitted more than 2,300 posts that include event announcements, requests for recommendations on software and hardware solutions, and time-sensitive security alerts. Comments from district technology leaders indicate that the service provides an easy and powerful means of quickly communicating with and sharing best practices among members of the Connecticut educational technology community.
Presentations

Director Casey and other Commission members shared the CET’s work statewide and nationally in 2019. The following list summarizes these presentations.

<table>
<thead>
<tr>
<th>Organizer – Audience</th>
<th>Topic(s)</th>
<th>Date</th>
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<tbody>
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<td>Commission</td>
<td>ISTE Standards for Educators¹</td>
<td>Jan 15</td>
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<tr>
<td>Florida Educational Technology Conference</td>
<td>Building a Technology Ecosystem to Meet District Needs</td>
<td>Jan 30</td>
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<tr>
<td>Florida Educational Technology Conference</td>
<td>Ensuring Student Data Privacy and Security as EdTech Expands</td>
<td>Jan 30</td>
</tr>
<tr>
<td>Stamford Public Schools</td>
<td>Student Data Privacy Best Practices</td>
<td>Feb 4</td>
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<tr>
<td>Commission</td>
<td>ISTE Standards for Education Leaders²</td>
<td>Feb 13</td>
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<tr>
<td>Fairfield University</td>
<td>Educational Technology Collaboration Day</td>
<td>Mar 21</td>
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<tr>
<td>EdAdvance</td>
<td>Technology Council</td>
<td>Mar 22</td>
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<tr>
<td>Commission</td>
<td>LearnPlatform: Free Tools to Measure EdTech Usage and Compliance</td>
<td>Apr 24</td>
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<tr>
<td>C.E.S.</td>
<td>Technology and Library Councils</td>
<td>May 3</td>
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<tr>
<td>NYSCATE (New York)</td>
<td>Chief Technology Officer Clinic: Data Privacy</td>
<td>May 9</td>
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<tr>
<td>CEN</td>
<td>Annual Conference: OER and Data Privacy</td>
<td>May 10</td>
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<tr>
<td>Connecticut Town and City Management Association</td>
<td>CTCMA Annual Conference: Commission and CEN Resources</td>
<td>Jun 7</td>
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<tr>
<td>ISTE</td>
<td>School Transformation with the ISTE Standards</td>
<td>Jun 23</td>
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<tr>
<td>SETDA</td>
<td>K – 12 Cybersecurity</td>
<td>Jun 23</td>
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<tr>
<td>ISTE</td>
<td>Leadership Forum</td>
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<tr>
<td>Future of Privacy Forum</td>
<td>Connecticut Data Privacy Best Practices</td>
<td>Jul 27</td>
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<tr>
<td>ACES</td>
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<td>Sep 20</td>
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<td>DAS – BEST</td>
<td>State IT Summit: Design Thinking</td>
<td>Sep 23</td>
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<tr>
<td>C.E.S.</td>
<td>State Technology Plan Updates</td>
<td>Sep 26</td>
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<tr>
<td>CT Department of Education</td>
<td>Performance Matters: Commission and CEN Overview³</td>
<td>Oct 17</td>
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<td>SETDA</td>
<td>School Privacy and Ed Tech Efficacy</td>
<td>Nov 5</td>
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<tr>
<td>U.S. Senate</td>
<td>Senate Briefing on Broadband</td>
<td>Nov 6</td>
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<tr>
<td>CABE-CAPSS</td>
<td>Annual Conference: College and Career Readiness⁴</td>
<td>Nov 15</td>
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<tr>
<td>SETDA</td>
<td>Framing the Evidence: Member Overview</td>
<td>Nov 18</td>
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<td>SETDA</td>
<td>Framing the Evidence: Partner Overview</td>
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<td>CAPSS Board</td>
<td>Open Education Resources</td>
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<td>SETDA</td>
<td>Framing the Evidence: District Overview</td>
<td>Dec 9</td>
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2. With Commission members Nick Caruso and Chip Dumais and Digital Learning Advisory Council member Josh Smith.
3. With CEN Director Ryan Kocsondy.
Media Coverage

Outreach campaigns and publishing opportunities promoted the work of the Commission and resulted in coverage across a number of media channels this year. The following table lists stories, interviews, and publications that highlight the Commission’s efforts and impact.

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<th>Publisher</th>
<th>Title</th>
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<tr>
<td>Education Week</td>
<td>Are State Student-Data-Privacy Laws Changing Companies’ Behavior?</td>
<td>Jan 2</td>
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<td>Edutalk</td>
<td>Using EdTech to Achieve Equity</td>
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<td>EdCircuit</td>
<td>Podcast Interview at Future of Educational Technology Conference (FETC)</td>
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<td></td>
<td>How EdTech Can Promote SEL, Equity, and Engagement (FETC Insights Series)</td>
<td>Jan 25</td>
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<tr>
<td>The EdTech Roundup</td>
<td>Creating an Effective Edtech Ecosystem &amp; Making the Best Use of Tech Tools</td>
<td>Jan 25</td>
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<td>CUBE</td>
<td>E-rate: Is Your District Leaving Money at the Table?</td>
<td>May 31</td>
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<td>Edtech</td>
<td>Teachers, Schools Embrace Today’s Technology</td>
<td>Aug 17</td>
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<td>CABC</td>
<td>Commission Back-to-School Resources</td>
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<td></td>
<td>Commission Back-to-School Resources</td>
<td>Aug 21</td>
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<tr>
<td></td>
<td>Cybersecurity Updates and Recommendations</td>
<td>Aug 29</td>
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<tr>
<td>CABE</td>
<td>Connecticut One of 20 States Leading the Charge on Creating Open Education Resources That Stretch From K-12 to College</td>
<td>Sep 3</td>
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<tr>
<td>CAS</td>
<td>CAS Conversations Podcast: Cybersecurity</td>
<td>Oct 28</td>
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<td>Education Superspyway</td>
<td>Ed Tech Innovation: Norwalk Public Schools</td>
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<td>LAW360</td>
<td>Regulators, Schools Must Expand Connectivity Vision</td>
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<td>Broadband Breakfast</td>
<td>State Officials Say Better Broadband Necessary for Pedagogy and Equity</td>
<td>Nov 6</td>
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<td>UNESCO</td>
<td>Rethinking Pedagogy: Exploring the Potential of Technology in Achieving Quality Education</td>
<td>Jan 11</td>
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<tr>
<td>Education Week</td>
<td>How K – 12 Vendors Are Adjusting to a Tough State Data-Privacy Law</td>
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</table>
Professional and Advocacy Groups
To garner support for Commission initiatives, deepen understanding of constituent needs, and identify funding opportunities, Director Casey actively participates in the following groups:

- Connecticut Association of Public School Superintendents (CAPSS) Technology Committee: Monthly Commission updates to state superintendents
- Connecticut Educational Technology Leaders (CTETL) Board: Partnership efforts to build awareness of best practices and assess district needs
- Connecticut State Department of Education (SDE) Computer Science Advisory Committee: Assistance in establishing curriculum frameworks, teacher certification standards, and talent pipeline initiatives
- Office of the Governor Computer Science Advisory: Direction on current educational and workforce needs as well as state legislation
- International Society for Technology in Education (ISTE) Policy Advisory: Input on digital learning policy at the national, state, and local levels, including the recently published Guide to Implementing the Student Support and Academic Enrichment Grant, shared with Connecticut districts to support the effective use of federal technology funds (ESSA Title IV-A)
- National Advisory Council for K – 12 Cybersecurity (NACC) Board of Directors: Definition and promotion of best practices in K – 12 cybersecurity and privacy through presentations and publications
- (NEW) Schools, Health, and Libraries Broadband Coalition (SHLB) Board of Directors: Advocates for national policy and funding to connect community anchor institutions
- Skills21 Board: Support to Regional Education Service Center that provides technology-based curriculum and programming in STEM subjects
- (NEW) State Educational Technology Directors Association (SETDA) Board of Directors: Service through national affinity group, access to federal agencies and lawmakers, and platform to promote Connecticut’s exemplary programs
- U.S. Department of Education and Council of Chief State School Officers (CCSSO) State GoOpen Leaders: Monthly discussions sharing best practices on the design and governance of state-level OER programs
Connecticut State Library

researchIT CT

As part of the Connecticut Education Network and administered by the Connecticut State Library, researchIT CT (https://researchitct.org/) provides all Connecticut students, faculty, and residents with online access to essential library and information resources, including secured access to licensed databases, and is available to every resident in Connecticut. These resources support the Division of Library Development's effort around the seven literacies: Digital Literacy, Health Literacy, Financial Literacy, Legal Literacy, Civic/Social Literacy, Basic Literacy, and Early Literacy. In addition, college students and faculty have access to specialized research information. The researchIT CT service also includes a collection of downloadable eAudios and eBooks for mobile devices such as smartphones and tablets.

Goals of researchIT CT are as follows:

- Ensure universal access to a core set of library and information resources for every Connecticut resident from home and through their public library, school, and college
- Provide necessary information resources to every school in Connecticut so that all students are prepared to function in an information society
- Provide information resources to the increasing number of students taking advantage of online courses at Connecticut's colleges and universities
- Support the information needs of all Connecticut residents

Budget

In the spring of 2019, the Division of Library Development coordinated a Request for Proposal (RFP) process for the databases that comprise researchIT CT. After three years of stable pricing, the resulting proposals included some increases that extended maintenance costs beyond the existing budget. After carefully evaluating usage and costs, researchIT subscriptions to HeritageQuest and the Business Market Research Collection from ProQuest were canceled. Other ProQuest offerings remain the same. Access to EBSCO eBook collections (Public Library, High School, K – 8, and Cricket collections) were ended. The Connecticut State Library (CSL) negotiated access to the following three additional EBSCO resources: Health Source: Consumer Edition, Magil IOn Literature Plus, and the Small Business Reference Center. Other EBSCO offerings in researchIT remain the same.
Annual Savings / Cost Avoidance (FY 2019)
The value of all subscriptions included in the researchIT CT databases this past year to local communities exceeds $41 million, while the cost to provide those databases was just in excess of $1.5 million. This represents a cost avoidance of more than $39 million. For more details, see the following publication:

Cost Benefit: What researchIT CT Saves the State’s Libraries and Municipalities

Usage (FY 2019)
For researchIT CT’s licensed, full-text databases, there were a total of 5,337,907 page views (a measure of when search results are actually viewed), with 445,795 or 8.4% from public library patrons; 951,814 or 17.8% from school library patrons; and 3,940,298 or 73.8% from academic library patrons. The total number of page views represents a 16.9% decrease compared to the previous fiscal year. In addition, public libraries viewed CSL Collections in Ancestry.com 15,265,904 times in FY 2019.

findIT CT
findIT CT, Connecticut’s statewide library catalog, went live in May 2016 and now contains the holdings of more than 314 libraries in Connecticut, with more libraries being added on an ongoing basis. As of July 2019, findIT contained 12 million records and 20 million items.

requestIT CT
requestIT CT, the statewide interlibrary loan service in findIT CT, began in September 2017. As of July 2019, 131 libraries in Connecticut participated in the service. Librarians can easily place requests on behalf of patrons, update requests, and track the status of requests as they make their way through the interlibrary loan process. Participating libraries filled 14,236 interlibrary loan requests during FY 2019 using the system.
Digital Collections

The Treasures of Connecticut Libraries digital collection remains available and had 7,186 item views in 2019. It contains 1,869 objects from 51 libraries and their partnering institutions. Readers can find more information about the Treasures project at:

http://cslib.cdmhost.com/cdm/landingpage/collection/p128501coll0

The State Library added the first issues of the Newspapers of Connecticut digital collection in 2011. This collection on Content DM includes 7,359 newspaper issues from more than 95 newspaper titles. The collection had 12,694 item views in FY 2019 and has been moved to the Connecticut Digital Archive (CTDA, https://ctdigitalarchive.org) for preservation. During FY 2019, the State Library added four more newspapers to the CTDA, bringing the new total to 99 newspapers. In September 2018, the CTDA became a service hub for the Digital Public Library of America (https://dp.la), so the newspapers are now discoverable there as well. Readers can find more information about the project at:


eGO

SimplyE app

The eGO CT initiative acquires digital content such as eBooks and eAudios, making them available to users statewide primarily through the SimplyE app. This open source app is currently available for Android and iOS devices. Library users can download the app and use it to easily discover, check out, and read or listen to digital books and recordings. The app includes content that is available in the statewide collection from the Connecticut State Library and from users’ local library collections.

The Division of Library Development began offering eGO information sessions at locations around the state starting in November 2019. Public library staff members can attend a session to become familiar with SimplyE as well as Library Simplified, the platform that allows staff members to customize how information appears to patrons in the SimplyE app. Public libraries should begin rolling out SimplyE to their users starting in January 2020.

When launched to the public starting in FY 2020, SimplyE will make it possible for Connecticut public library users to access eBook titles from their individual public library; a parent regional library system; the Digital Public Library of America (DPLA) Open Bookshelf; the New York Public Library SimplyE Collection; and the CSL RBDigital collection, DPLA Content Exchange collection, and Axis 360 collection, all in one intuitive, easy-to-use mobile app for iOS or Android. The service will include downloadable eAudios as well as eBooks.
Content
As of November 2019 and accessible to library users when SimplyE becomes available to the public in spring 2020, the statewide eAudio and eBook collection includes the following:

- Baker & Taylor Axis 360: 242 eAudios, 230 eBooks
- DPLA Exchange: 1,225 eBooks
- DPLA Open Bookshelf: 6,032 eBooks
- NYPL Instant Classics: 5,648 eBooks
- RBdigital: 2,496 eAudios, 265 eBooks (available now through RBdigital Web site and app)

Usage (FY 2019)
Because the digital collections are available through a self-service model, State Library staff have no role in the circulation process and are responsible only for collection development and licensing. Usage statistics show that the statewide collection of downloadable books and audiobooks includes 4,110 titles that were checked out 37,863 times, a 249.2% increase over last fiscal year.
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Overview

CEN Members,

The Connecticut Education Network (CEN) finishes 2019 marking significant progress on a new direction for the Network that will carry us into the next decade. A new, five-year strategic plan was developed in concert with our members, updating our mission and vision, and capturing the needs of the community as CEN looks to leverage the platform and engage, innovate, and expand service offerings; advocate for each other’s needs; and drive additional value for the membership and state.

With hype about 5G cellular services bringing more promise than solution and growing concerns about how the repeal of Net Neutrality may limit access to content, CEN remains steadfast in our approach to delivering flexible, high-performance Internet and network-based services to Connecticut’s community anchor institutions and open-access members. The distinct design of the Network helps ensure delivery of high-quality, resilient, and secure services. The overall operation and approach help the state avoid millions of dollars in cost annually when compared to distributed activities and commercial alternatives. CEN’s statewide, all-fiber network connects more than 1.8 million students, educators, researchers, state and municipal employees, and citizens in for learning, workforce development, and economic growth.

Connecticut remains one of the most digitally connected states, yet still has areas in need of quality connections. Established in 2000 and expanded through the years to suit the needs of Connecticut’s community anchor institutions, CEN provides critical infrastructure that could not be re-built for its replacement cost today. CEN connects most anchor institutions, offering unparalleled and equitable service to urban and rural areas alike. The Network provides robust services at scale, operates on a cost-recovery model, and fosters a strong customer-provider partnership model that doesn’t exist elsewhere in the state.

As we close out this decade and look forward to 2020, we celebrate 20 years of CEN at our annual conference in May. In the year 2000, early leaders of the Network didn’t know what CEN would be become, but they did know it would make an appreciable difference to the Connecticut landscape. That vision remains alive today, with a shared dedication to grow the Network — built for stakeholders rather than stockholders — and deepen its benefit to the state.

Thank you for your continued engagement and support.

Ryan Kocsondy
2019 By the Numbers

- Citizens Served: 1.8 + Million
- Member Institutions: 628
- Network Devices Managed: 692
- Active Ports: 18,458
- DDoS Attacks Mitigated: 988
- Cost Avoidance Savings: $25 Million
- Backbone Capacity: 2.13 Tbps
- Data Transferred: 234.1 PB
- Incidents Opened: 2,531
- Incidents Closed: 2,524
- Advisory Council Members: 56
- Full Time Staff: 11
Strategic Plan Overview & Reporting

VISION

CEN serves as the trusted partner through which Connecticut’s digital and human networks connect, collaborate, and share resources to realize the full potential of digital learning, research, and citizenry.

MISSION

Empower our member institutions to execute their missions through technology, collaboration, and digital transformation with secure, reliable, and value-added network and Internet solutions.

PLAN GOALS AND STRATEGIES

The goals and strategies in this plan represent the needs of the community and what CEN must do to remain competitive and relevant (Goal 1), differentiate itself from commercial counterparts and ensure continual alignment with our members (Goals 2 – 4), and support the foundational platform on which all other goals depend (Goal 5).

2019-2024 STRATEGIC GOALS

GOAL 1: PROVIDE VALUE — Expand the service portfolio to provide value and enhance Internet and network capabilities at scale, heighten security, and increase the overall knowledge and understanding of those technologies and services.

GOAL 2: IGNITE INNOVATION — Empower members through a suite of services tailored to their needs that encourage excellence and innovation.

GOAL 3: FOSTER COLLABORATION — Engage the local membership and national R&E community to provide technical and functional network services that serve the specific needs of CEN member communities.

GOAL 4: PROMOTE ADVOCACY — Pursue activities to enhance brand awareness so members and policy makers can articulate CEN’s value and impact public policy initiatives.

GOAL 5: ENHANCE CORE RESOURCES — Pursue opportunities to leverage, develop, and enhance CEN’s core technology and human resources for the foundational success of the program in pursuit of member needs.

Full plan can be viewed and downloaded at https://ctedunet.net/strategic-plan/
Goal 1: Provide Value

CEN’s top priority is to provide value to its member institutions in the form of quantifiable cost avoidance as well as through the more intrinsic benefits of the unique set of services the Network offers. Both derive from high-quality, personalized, and responsive service delivered through a partnership rather than traditional provider – customer model. As we leverage the platform to provide scalable services and broaden the service portfolio, the Network will continue to provide unparalleled value to its members and the state.

Cost Avoidance

The following section provides details on the estimated cost avoidance that CEN customers appreciate. In total, we calculate approximately $25 million in annual cost avoidance across the membership for Internet and related services. Cost avoidance savings are calculated as (cost of alternative acquired individually) minus (CEN provided at scale) and are as follows:

- $386,500 savings for web content filtering
- $6.6 million for Internet services for all CEN member constituent groups compared to average price across NY, MA, and RI. E-rate source data utilized for the basis of the calculations.
  - Savings using national average E-Rate cost is approximately $11 Million per year.
- $18 million for DDoS protections
  - Aggregate of third-party, emergency services
  - Does not include indirect cost of lost productivity

Similarly, federal E-rate base data was used in a recent study with assistance from Education Superhighway (www.educationsuperhighway.org) — which recognized CEN as a connectivity leader for the fourth straight year — connectivity costs for K–12 institutions fall anywhere from 19% to 138% below the cost of similar services in neighboring states.

<table>
<thead>
<tr>
<th></th>
<th>Annual Cost</th>
<th>Annual Cost Difference</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT (CEN)</td>
<td>$3,017,146.80</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>CT with NY pricing</td>
<td>$7,178,438.04</td>
<td>$4,161,291.24</td>
<td>137.92%</td>
</tr>
<tr>
<td>CT with MA pricing</td>
<td>$5,691,724.65</td>
<td>$2,674,577.85</td>
<td>88.65%</td>
</tr>
<tr>
<td>CT with RI pricing</td>
<td>$3,589,680.84</td>
<td>$572,534.04</td>
<td>18.98%</td>
</tr>
</tbody>
</table>

New York and Massachusetts do not have Research and Education (R&E) regional networks that service K–12, and cost is relative to the markets and incumbent providers who serve them. Rhode Island has a regional network serving K–12 and is the closest to CEN in capability, though different in scale given the relative sizes of the states we serve.

As stated earlier, Education Superhighway recognized CEN as a connectivity leader in its 2019 State of the States report. That study’s assessment of CEN’s bandwidth, affordability, and fiber connectivity place Connecticut as one of the top K–12 providers in the nation. In addition, Education Superhighway profiled Norwalk (CT) Public Schools through an engaging video (https://youtu.be/oQacTGRKXMO) for its
innovative use of broadband provided through CEN to support personalized learning as well as college and career readiness.

**CT Library Fiber Consortium Project**

Over the past five years, CEN has helped connect libraries throughout the state to its high-speed fiber network by leveraging federal E-rate funds and matching State Library bond dollars. Many project sites connect underserved communities where connectivity options have remained relatively unchanged for decades. This project provides high-quality service at reasonable costs to bridge gaps in the digital divide and help libraries continue to thrive as community assets. Eligible libraries that pursue funding, like their predecessors, will transition from digital subscriber line (DSL) or cable Internet connections (typically 25/3 Mbps asymmetric service) to CEN’s fiber optic network with symmetric speeds of 1 Gbps initially and capacity for growth to 10 – 40 Gbps. In 2019 CEN was awarded and executed on phase 5 and responded to the RFP for phase 6.

The total number of fiber-connected libraries across all phases (1 – 5) is 158 (including 47 branches), representing 66% of all 239 libraries statewide with an additional 10 committed as we close out the year. Total savings on previous four funding years is $1,392,000, based on USAC E-rate dark fiber IRU savings.

**DDoS**

Distributed Denial of Service (DDoS) attacks flood targeted connections with massive amounts of data traffic, rendering affected institutions inoperable. When attacks take place, almost no legitimate traffic goes in or out of the target’s network connection, and all productivity is lost for regular end users and IT staff trying to troubleshoot. CEN’s DDoS Threat Management continues to be one of the most valuable services that CEN provides and is critical to maintaining smooth operations to the membership. The on-premise Arbor/NetScout solution mitigates attacks on a near-daily basis, with summary data as follows:

<table>
<thead>
<tr>
<th>Mitigated Incoming Attacks</th>
<th>Total Volume of Mitigated (Dropped) Traffic</th>
<th>Volume of Largest Mitigation</th>
<th>Rate of Largest Mitigation</th>
<th>Duration of Longest Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>988</td>
<td>33.8 TB</td>
<td>3.74 TB</td>
<td>20.03 Gbps</td>
<td>2 Days, 17 Hours, and 54 Minutes</td>
</tr>
</tbody>
</table>
The return on investment on DDoS mitigation services is well over 1,000% and provides an example of an aggregated service at scale helping members across the state avoid millions in direct costs if purchased individually and commercially, not to mention indirect productivity costs.

**Continued Member Growth**

The CEN Membership continues to grow and added 25 new members this year. Current member totals are as follows:

<table>
<thead>
<tr>
<th>2019 Member Counts</th>
</tr>
</thead>
<tbody>
<tr>
<td>186</td>
</tr>
<tr>
<td>CT Total</td>
</tr>
<tr>
<td>% of Total</td>
</tr>
</tbody>
</table>

Note: CEN Connects 100% of CT’s K – 12 districts. The K – 12 totals above represents districts and charter schools.

**Welcome New Members in 2019**

- 70 Audubon Association
- Andover Public Library
- Babcock Library - Ashford
- Danbury Fire Engine #25
- Flanders Fire Dept
- The Foote School
- Genie Innovations, Inc.
- Grove School
- Hamden Hall School
- Holy Cross High School
- Makerspace CT
- Marlborough Fire House
- Niantic Fire Dept
- Plymouth Police Dept
- Prospect Public Library
- Sacred Heart Academy
- Southwestern Regional Communications Center, Inc.
- St. Vincent’s College
- Town of Litchfield
- Town of Orange
- Torrington Police Dept
- United Way of CT
- West Hartford-Bloomfield Health District
- Wolcott Volunteer Fire Department
- Willington Hill Fire Department

Disconnected in 2019: Discover Video

**Goal 2: Ignite Innovation**

The goal of igniting innovation comes through a delivery of services tailored to member needs. Offerings help deliver quality services at scale through advanced architecture, features, and rigorous testing. In addition, support for research-based activities will continue to expand and stretch the limits of the Network and help it stay ahead of the day-to-day needs of every member.
Firewall Services

The goal of the new firewall service is to provide a high quality, high capacity, next generation firewall experience that can scale dynamically with the growth of member bandwidth and provide a front-line defense for our organizations (see ctedunet.net/managed-firewall/ for details). The service is offered in two versions to suit the different member sizes and internal technical capabilities. These include the virtual firewall, for those who are able to manage their own rule sets and policies, as well as a fully managed firewall, where CEN will have our managed security services provider (MSSP) to oversee firewall configuration and operations for those who need that level of care. As we close 2019, there are 12 members committed and three already utilizing the service.

Cloud Connect Service

The cloud connect service provides connectivity to cloud providers to enable more advanced and robust services at scale to benefit member business and service needs (see ctedunet.net/cloud-connect/). Announced in April and in partnership with Internet2, the Network provides no-cost transport for community anchor institutions to Amazon Web Services, Google Cloud Platform, and Microsoft Azure Express Route. Since announced in April, four members have committed to using this service and are in various stages of progress.

Eduroam K – 12 & Library Pilot

Eduroam (www.eduroam.us) is the secure, worldwide wireless access service developed for the international research and education community. Planning and pilots are underway to leverage Eduroam to help connect K – 12 and higher education students outside of their institutions (e.g., after school and on weekends). Using the established Eduroam solution, which has proven successful through a network of thousands of colleges and universities worldwide, should provide a more seamless network access experience for students and teaching staff connecting through CEN member locations. Current pilot collaborations include Hartford Magnet Trinity College Academy, the Hartford Public Library, and Trinity University; Middletown Public Schools, Middletown Library, and Wesleyan University; New Haven Public Schools; and Stratford Public Schools and Stratford Library. Tom Dillon, who chairs the Commission’s Infrastructure Advisory Council, is helping coordinate activities, with CEN providing modest fiscal support in the form of Eduroam end-user licenses.

National Science Foundation (NSF) Grant Activities

The Network team embrace opportunities to apply for National Science Foundation (NSF) grants. Direct or indirect awards would assist the Network’s growth and performance capabilities, further enhancing and advancing member needs. Grant-funded activities can introduce new technologies and capacities supporting research not otherwise possible through traditional means. In this space CEN provided a letter of support the University of Connecticut’s Richard Jones, Ph.D. for “Shared Computing Resources for Large-Scale Science Problems,” assisting with connectivity and route optimization to Jefferson Labs in Newport News, VA (Award 1925716). In addition, CEN and Yale University were part of 12 Universities
and 6 regional networks in the northeast to jointly submit for a “Mid-Scale Research Infrastructure (RI)-1” grant in February (Solicitation 19-537). The initiative’s intent was to provide federated, multi-platform, high performance compute (HPC) clusters to maximize the collective capacities of participating institutions. The NSF provided positive comments in response to the submission but, unfortunately, did not award the proposal.

Goal 3: Foster Collaboration

At the heart of CEN is collaboration, where true partnerships are formed, and goals advanced together. Our approach has been to engage members through advisory councils and outreach events and to participate in national research and education (R&E) community activities. Both local and national communities create a fabric that is stronger together and provide insight and direction to the technical and functional network services that address the specific needs of CEN member communities.

Engagement and Development Advisory Council (EDAC)

The EDAG remains active with engagement activities and is settling into a regular cadence in its second year. Under the leadership of co-chairs Karen Warren (Wesleyan) and Rebecca Osleger (Suffield), the EDAG members design and deliver quarterly engagement events targeted at the needs of at least one segment of the CEN membership. The past year’s events include the following:

**Broadband Toolkit Workshop** (February 22). A total of 50 members attended this interactive, hands-on session designed to equip smaller member organizations and their often limited IT staff with the tools to understand and solve network technology challenges, diagnose and fix problems, assist local member institution staff with better diagnostics and problem descriptions, plan for the future, and become stronger advocates for infrastructure.

**Digital Accessibility Workshop** (June 6). This event provided an overview of global standards, the broad and narrow applications of digital accessibility, technology used to address accessibility and accommodations, guidance on how to draft a plan for universal institutional accessibility, and training resources for faculty, staff, and students.
**Cyber Defense Clinic** (October 3) Hosted at Central Connecticut State University (CCSU), and presented by CEN in collaboration with Cisco, provided hands-on interaction with the latest tools for IT professionals to hone cybersecurity expertise for nearly 80 members. Participants were able to play the role of the attacker and the defender learning techniques on hacking and protecting critical data.

**Ransomware Forum** (November 19) Hosted at CCSU, served 60 members by providing insights on protecting communities from ransomware attacks. Rebecca Osleger of Suffield and Michael Scott of Middletown as well as representatives from the Department of Homeland Security’s CT Intelligence Center (CTIC), Connecticut’s Computer Crimes and Electronic Evidence Laboratory, and SHI addressed common cybersecurity challenges and mitigation steps.

In addition to the above activities, the EDAG develops the Annual Conference program by helping solicit session proposals, ensuring alignment with program and member goals, and planning the day’s activities to maximize exposure for each member segment for the day.

**CEN Annual Conference**

In May, CEN held its 7th Annual conference in Hartford at the Connecticut Convention Center ([bit.ly/2BBJakU](bit.ly/2BBJakU)). The event was the most successful to date by many accounts. Themes of the day were Innovation & Education, Community Best Practices, Awareness, and Security. Member and vendor participation were at an all-time high with 674 registered, 613 attending, and 44 supporting vendors. The day’s program contained tracks with multiple options for each member group, with 28 total sessions across 4 morning and 4 afternoon time slots, an all-day security incident response workshop, and 4 closed meetings for affiliate groups that received meeting space from CEN at no additional charge.

**Service Management Advisory Council (SMAC)**

The SMAC, chaired by Matt Ross (Farmington Public Schools) and Jonathan Garbutt (Southern Connecticut State University), has been active in helping determine the next generation of services CEN could pursue and add to the portfolio. Engaging with the effort are many technical and functional partners who, with the support of CEN staff, developed a survey to help gather feedback on the need and timeframe of
specific services at scale. The intent was to bring the strength of the membership to the table when developing and negotiating solutions. The survey attracted 165 individual members across almost as many institutions. Responses will help serve as the guiding reference point in 2020 and beyond as we look to add services to the CEN portfolio. In addition, the group is active in assessing the current and future Web content filtering to allow K – 12 institutions and libraries to meet the Children’s Information Protection Act (CIPA) requirements. In addition, the SMAC members are helping develop community criteria for a service lifecycle for CEN to consider when pursuing new technologies as well as what criteria would be triggered to initiate a sunsetting action.

Technical Advancement Advisory Council (TAAC)

The TAAC, chaired by Kevin Ross (Plainville Public Schools and Town) and Tim Sheets (Yale University) have been charged with helping develop community standards for the next generation of the Network as well as assisting the SMAC with CIPA filtering options at a more technical level. Many of the meetings this year addressed the current CEN architecture, technologies, and vendors as a baseline for future expansion of the Network.

CXO Roundtable

CEN continues to support the CXO series by facilitating biannual meetings of Connecticut’s higher education technology leaders. The goals of the meetings are: increasing communication among Connecticut’s higher education institutions, identifying opportunities for collaboration through the network, and, where applicable, pursuing specific aggregated needs of the community. The Roundtable was hosted and co-moderated this Fall by Jean Kilbride, AVP for IT at Connecticut College. In the spring, the Roundtable was hosted by CEN at the annual conference and joined by representatives from Internet2 as well as Massachusetts Green High-Performance Compute Center (MGHPCC). The is a C Suit only forum for discussing shared interests, challenges, and initiatives.

New Web Site

In April the new http://ctedunet.net Web site was launched to address member content needs, increase usability, highlight program offerings, and provide a more professional online presence. Lead by CEN’s Rachael Collard with help from Richard LeFave and the UConn Web Development Lab, a nearly yearlong endeavor to modernize our Web presence was finally complete and moved over to UConn’s Aurora hosting platform powered by WordPress.
CEN Member Town Halls

Late in the year, town hall meetings took place at member institutions throughout the state to engage our constituents on questions regarding strategy, service updates, community training and future requests, an expanded member conference, and time for open-ended questions. Feedback remains positive for these events, which served 200 members total. Town hall locations took place in the following locations:

- Nov. 5: CEN Headquarters (Hartford)
- Nov. 15: SCSU (SCSU)
- Nov. 22: UConn Avery Point (Groton)
- Dec. 6: Fairfield University
- Dec. 13: EdAdvance (Litchfield)

Regional and National Collaboration

Participating in the R&E community — at a regional level with The North East Research and Education Network (NEREN) and Northern Crossroads (NoX) as well as The Quilt and Internet2 nationally — provides an opportunity for CEN to collaborate, learn, and share information in a non-competitive environment and represent CEN and Connecticut’s interests at regional and national levels.

Regionally CEN supported and promoted the NEREN ‘Bridging the Gap’ series of day-long seminars devoted to proposing and advancing ideas for regional collaboration in research computing and networking. The event on October 4th focused on AI and Machine Learning and attracted top researchers, CIOs and network operators from the region.

Director Kocsondy was elected as The Quilt (thequilt.net) CEO Roundtable Vice Chair, then later as the Secretary of the Quilt Executive Committee (QEC). The Quilt is the national coalition of non-profit U.S. regional R&E bodies representing 40 networks across the country. Quilt members provide advanced network services and applications to more than 900 universities and thousands of other educational and community anchor institutions. The goal of The Quilt is to promote consistent, reliable, interoperable, and efficient networking services that extend to the broadest possible community and to represent common interests in the development and delivery of advanced cyberinfrastructure that enables innovation through education and research.

Director Kocsondy was also elected to the Advisory Committee of Northern Crossroads (NoX, nox.org), a regional network managed by the Massachusetts Institute of Technology that facilitates advanced
networking among research institutions in New England. Participants include institutions of higher education and partner organizations that support research, education, and economic development.

**Goal 4: Promote Advocacy**

In 2019 CEN pursued activities that enhanced brand awareness and equip members and policy makers to understand and articulate CEN’s value.

**Education Superhighway (ESH)**

As stated earlier, Education Superhighway recognized CEN as a “Connectivity Leader” for the fourth year in a row in its State of the States report ([stateofthestates.educationsuperhighway.org](http://stateofthestates.educationsuperhighway.org)). As the largest provider in the state servicing K–12 schools and connecting every district, the report places Connecticut among the highest performing states in the country. Connecticut meets or exceeds the FCC minimum bandwidth goals (100 kbps per student), which ESH calculated as a median measure across all districts at 791 kbps. In addition to the bandwidth availability target, ESH highlights the affordability of CEN cost structure, where the median cost per Mbps nationally is $2.24 compared to CEN’s $.69.

While this report is helpful and favorable to the progress CEN has made over the years, it misses many qualities about the service that are not included in a simple Kbps/person or $/Mbps calculation. The feature sets of CEN internet service are tailored to our community, include things like DDoS at no additional cost, are delivered in resilient fashion for fault tolerance, and have no caps on bandwidth. These additional dimensions are not accounted for in these types of reports.

**State Educational Technology Directors Association**

In April, Connecticut and CEN were profiled in the “K – 12 Broadband Leadership 2019” report from the State Educational Technology Directors Association (SETDA). In addition, Director Kocsondy presented via Webinar to the national SETDA community about the CEN delivery model and approach to supporting Connecticut schools. CEN members participating in the webinar praised the services provided and partnership model we pursue and answered questions on CEN’s behalf to their colleagues nationally. This was an unexpected outcome and good show of Connecticut solidarity when the members stepped up as our strongest advocates.

In our presentation we highlighted a few districts as case studies, of which Norwalk Public Schools was highlighted for leadership in the integration of technology, digital learning, and Internet accessibility. Highlighting Norwalk’s excellence in leveraging technology for teaching and learning led ESH to highlight the district through its State of the States report and YouTube channel. All mention of CEN services and support was edited out of the final cut for public consumption, though those interviewed made it a point to reach out with apologies.

- Webinar Recording: [https://home.edweb.net/webinar/digitalcontent20190409/](https://home.edweb.net/webinar/digitalcontent20190409/)
- Norwalk Video: [https://youtu.be/oQacTGRKXM0](https://youtu.be/oQacTGRKXM0)
Statement on Network Security

In August, CEN released a statement on network security (https://ctedunet.net/policies/) intended to clarify CEN’s role, current capability, and plans to continue securing the Network. The statement came in response to district requests and to promote cybercrime reporting to the Connecticut Intelligence Center (CTIC). The statement also sparked conversations with CTIC, Homeland Security, and State Police about the ability of CEN to fend off DDoS attacks and how agencies can better collaborate with each other.

CSDE Performance Matters Forum

In October, Douglas Casey and Ryan Kocsondy presented at the CSDE Performance Matters Forum held at the Connecticut Convention Center in downtown Hartford. The topic was ‘State Technology Resources and Student Success’ and highlighted Commission and CEN resources focused on K – 12 communities. The session provided an opportunity to share our work and plans with educators and leaders who typically aren’t directly involved in Commission and CEN activities.

CAPSS Technology Committee

In October, Director Kocsondy presented to the Connecticut Association of Public School Superintendents (CAPSS) on cybersecurity, malware, ransomware, phishing, and backups. All of these topics have been points of concern as some schools had been victims of ransomware and need help with incident response plans and education for their communities.

CAS Conversations — Cybersecurity Podcast

In October, the Connecticut Association of Schools (CAS) invited Directors Kocsondy and Casey to participate in its “CAS Conversations” podcast, addressing the issue of cybersecurity. East Hartford Chief Information Officer and CEN EDAC member Roberta Pratt also participated.

- Web Page: http://cas.casciac.org/?p=13846
- Podcast: https://storage.googleapis.com/files-gcs.casciac.org/casconversations/Episode14Cybersecurity.mp3

Goal 5: Enhance Core Resources

All CEN activities depend on the physical network and the staff who support it every day. CEN will continue to pursue opportunities to leverage, develop, and enhance CEN’s core technology and human resources for the foundational success of the program in pursuit of member needs.
CEN Staff

CEN’s staff are key to the success of the program. The close of 2019 saw an expansion of the team and a departure of one of our colleagues to accept a position with our parent organization at UConn. CEN currently has 12 full-time staff members, 6 part-time student workers, and 1 volunteer (1 day per week). Brad Tudisca started September 13 as a Network Technician, and Michael Harris started November 8 as our Business Services Supervisor. Prior to the close of the year, an offer was made to a new Program Administrator, and we had an open posting for an additional senior level network technician. We also thank Melanie Raczkowski for serving CEN for nearly eight years and congratulate her on her move back to UConn Information Technology Services (ITS).
The Network

The platform for all CEN activities is the physical network itself and key to the overall success of the program. The network as an asset is comprised of multiple layers of fiber and network equipment that provide unparalleled connectivity to all corners of the state. With the Network’s resilient design of a triangle core, meshed distribution layer, and multiple rings at the edge, members regularly attain 99.99% uptime, even when failures impacting the core and backbone connectivity. The Network has once again reached new heights for regular and peak daily download speeds at 104 Gbps, compared to 90 Gbps last year.

2019 Network Statistics

<table>
<thead>
<tr>
<th>Backbone Capacity</th>
<th>Total Traffic (Up/Down)</th>
<th>Network Devices Managed</th>
<th>Active Interfaces (ports)</th>
<th>Peak Daily Traffic</th>
<th>Backbone Availability</th>
<th>Core Node Availability</th>
<th>Aggregate Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.131 Tbps</td>
<td>234.098 PB</td>
<td>692</td>
<td>18,458</td>
<td>104 Gbps on 2019-11-18 09:21:00</td>
<td>99.98%</td>
<td>99.98%</td>
<td>99.99%</td>
</tr>
</tbody>
</table>

Internet Routing Registry Updates

The Internet Routing Registry (IRR) is a globally distributed routing information database. Established in 1995, the purpose of the IRR is to ensure the stability and consistency of Internet-wide routing by sharing information between network operators. The IRR consists of several databases where network operators publish their routing policies and routing announcements so that other network operators can use this data. Consistent with the previous year’s effort to become MANRS complaint, CEN performed comprehensive IRR updates in both ARIN and RADB for all directly attached members ensuring member information to IP address allocation is current. This multi-month endeavor was important due to major carriers and service providers such as Hurricane Electric and Google announcing filtering policies (IE. dropping traffic) based on incomplete or missing IRR information.

E-rate Provider Services

CEN partnered with E-rate Provider Services (EPS) in an effort to gain additional capacity and maximize eligibility for E-rate services to our eligible community. The company, based in Burlington, Connecticut,
works with customers nationally and will lend significant expertise to the CEN team. This partnership also reunites CEN with Bob Richter, EPS President and former City of Hartford employee, who helped with some of the original E-rate applications when the CEN network was being built in the early 2000s.

**State Funding Support**

In 2019 the State of Connecticut lent additional monetary support to the network even while initiating a “debt diet” (reduced bond commitments) for the 2020–21 biennia, resulting in a pause of bonded monies across all agencies. CEN’s requested amounts of $914,000 (FY19) and $820,000 (FY20) out of the Capital Equipment Purchase Fund (CEPF) monies were not made available as a result decreases in State bond commitments. Later in the year, a $1.5M bond was authorized and allocated to CEN, a continuance of a previous authorization, during the June 26, 2019 Special Bond Commission Meeting. Monies from this allocation are to target the distribution layer of the network that is approaching end-of-life/end-of-support. Proof-of-concept testing for replacement devices with two leading vendors in this space took place in the last two quarters of 2019, with a target decision by March 2020.

Special note: Due to a trade dispute and ongoing negotiations between the USA and China, federal tariffs on all products manufactured in China resulted in a 10-25% increase in equipment costs across all vendors.

**Fiber Contract IRU Renewal**

CEN’s nearly 2600 route-mile fiber network leverages contracts to connect many sites throughout Connecticut. The Network was established in 2000, and 20-year indefeasible right to use (IRU) contracts on the original fiber were coming due. IRUs are considered capital assets, and the market norm is to re-purchase the assets for another 20 years at the end of the term. DAS and CEN leaders, through a multiyear negotiation, successfully updated the contract terms and avoided the purchase of new 20-year IRU fiber assets. The new terms also extend maintenance on the existing fiber network for three optional 10-year extensions and adjust new build costs to market rates. The approach avoided a nearly $11,700,000 cost to re-purchase the IRUs staggered over the next twelve years and extend the maintenance at a predetermined rate schedule. The cost avoidance for network replacement or new buildout is closer to $130,000,000.

**GlobalNOC**

CEN’s Network Operation Center (NOC) services are essential to front-line operations of monitoring the Network, incident management, and proactively communicating with our members. In October, our NOC services were renewed for an additional three years with the Indiana University GlobalNOC, extending the partnership that originally began in 2014. GlobalNOC, established in 1998, provides high-quality NOC services for the R&E networking community and uses an array of custom-built monitoring and management tools tailored to our members’ needs. Unlike a typical NOC, they also research, develop, test, implement, and provide instruction on the latest innovations in network services, hardware, and software. CEN has utilized GlobalNOC for Tier 1 helpdesk support, network monitoring, and incident management.
Extranet Realignment & Expansion

Capacity management of CEN’s core network resources is key to maintaining “friction free” connectivity so that bandwidth supply outpaces demand and slowdowns don’t occur, even when members access Internet-based resources during the busiest times of the year or during a core node failure. Efforts in 2019 were made to realign the external networks, or extranets, for increased connectivity by enabling an east-west strategy of reaching into Boston and New York to diversify our Tier 1 Internet carriers, Internet exchanges points (IXPs), and Internet 2 options.

CEN along with its NEREN partners the University of Massachusetts, Network Maine, the University of New Hampshire, New York’s NYSERNET, Rhode Island’s OSHEAN, and the University of Vermont, have collaboratively built out the NEREN optical network to 32 Avenue of the Americas in lower Manhattan, one of the busiest telecommunications areas in the world. When complete, the project will provide a number of benefits to the Network and its members. The New York City connection will provide direct access to a diverse marketplace that offers lower commodity Internet rates; increased commercial peering to contain transfer costs; backhaul opportunities to hubs such as Ashburn, VA, and Chicago; and settlement-free peering with other regional optical networks (RONs) within the R&E space. While base connectivity takes place in partnership with NEREN, and overall project procurement issues remain unfinished, CEN’s New York node can now accept connections.

Also in collaboration with the NEREN partnership and shared optical ring, CEN enhanced connectivity in the Boston and Cambridge MA areas. Connectivity in Cambridge was enhanced by upgrading the equipment and backhaul to the core to 2x100G links. This new connectivity will enable additional peering capacity to the northern R&E networks and local exchanges. A new network node added connectivity to 1 Summer Street in Boston, known as the Markley Building. This site is the largest Internet and peering exchange point in New England and houses some of the top global Internet carriers. In 2019, CEN installed a 2x100 Gbps backbone and turned up a 100 Gbps handoff with a 20 Gbps committed data rate of service to GTT for Tier 1 backbone Internet connectivity at this location.

When complete in 2020, the extranet project will provide symmetrical services at each core location of 100 Gbps to Internet 2 as well as 100 Gbps to diverse Tier 1 carrier Internet providers. The project will also allow CEN to participate in major peering exchanges in two of three core locations. The Network’s core is already built for resiliency and capacity, and these expansion and realignment activities will optimize capacities while allowing for continued growth in years to come.
## Fiscal Overview

### FY19-2020 CEN Operational Budget (in $)

<table>
<thead>
<tr>
<th>Source</th>
<th>FY 19 Actual</th>
<th>FY 20 Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Appropriation</td>
<td>0</td>
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<tr>
<td>Member Billing</td>
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<td>Member Billing AR</td>
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<tr>
<td>USAC (E-rate) Reimbursement</td>
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<tr>
<td>Member Conference</td>
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<td>Member Conference AR</td>
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<td><strong>Total Revenue</strong></td>
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<td>8,263,000</td>
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<tr>
<td><strong>Expenses</strong></td>
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<td></td>
</tr>
<tr>
<td>Staff (Salary &amp; Benefits)</td>
<td>1,558,283</td>
<td>1,979,322</td>
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<tr>
<td>CET (Salary &amp; Benefits, SW)</td>
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<td>Contractual</td>
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<td>Professional Services</td>
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<td><strong>Total Expenses</strong></td>
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<tr>
<td><strong>Profit/(Loss)</strong></td>
<td><strong>538,171</strong></td>
<td><strong>533,103</strong></td>
</tr>
</tbody>
</table>

Note: FY20 Revenue for USAC (E-Rate) Reimbursements and Expenses for Fiber & Fiber Maintenance include fiber builds for CLFC project

### 2020 Outlook

As we look to 2020, CEN’s member-led model will help drive new offerings, continue to meet the needs of the membership, and add value to the membership and state. CEN will look to expand the network and upgrade capacity through additional member growth, completion of the Extranet project, and replacement of the distribution layer of the network. In addition, CEN will celebrate 20 years of progress at the 8th CEN Annual Conference on May 7-8 in Hartford, CT [http://bit.ly/CENMemberCon2020](http://bit.ly/CENMemberCon2020).
Acknowledgements

CEN Leadership as part of this annual report is formally acknowledging and thanking the following individuals and groups:

- The CEN staff for their dedication and diligent work in operating and expanding the network.
- The CEN membership for their loyal and active participation in developing a community network whose collective value exceeds the sum of its individual parts.
- Members of the Connecticut Commission for Educational Technology for their leadership and advocacy on behalf of the program.
- Mark Raymond and Michael Mundrane, who serve as trusted advisors to CEN.
- Richard LeFave, for his time and numerous contributions as a volunteer.
- George Claffey and CCSU for volunteering their facilities for many CEN engagement activities.
- CT DAS and UConn ITS, for their partnership and unfettered staff support.
- CT Executive and Legislative branches of government, whose support is critical and integral to CEN’s long-term success.