NYSERNET is a non-profit organization. Our mission is to advance the research and educational missions of our members by delivering a full range of customized, progressive, and affordable end-to-end data and networking technology solutions.

Our contribution doesn’t end there.

The networks we build with technology are only as effective as our community network. This is why we consistently cultivate opportunities to collaborate through our widely accessible professional development conferences and events.
CONTENTS

Letter From The President .................................................. 2
Board of Directors ............................................................... 3
Conferences And Training ....................................................... 4
Expanding Our Network ......................................................... 6
Member Highlights ............................................................... 8
LoLa: Making Beautiful Music Together ....................................... 10
New Services Launched .......................................................... 12
2017 New Employees And Interns .............................................. 14
NYSERNet Leadership And Staff ............................................. 15
NYSERNet Member Institutions ............................................... 16
At our biennial retreat in the fall of 2016, the NYSERNet board of directors set four strategies for 2017 and 2018:

1. Partnering with colleges, museums and libraries to develop relationships and foster participation
2. Enhancing the value of our network and network services
3. Promoting and expanding our role in advancing research
4. Fostering collaboration, diversity and innovation.

These strategies were developed as a direct result of our commitment to advance the missions of our members. With these objectives in mind, I am happy to share this annual report as a summary of the great progress we made in 2017 and a preview of some of the great advancements to come in 2018.

In the North Country, we partnered to expand our network footprint to reach Potsdam, adding reach and new connectivity options for the northern edges of New York. Given the increased dependence on our network, new fiber assets were acquired from Buffalo back to New York City, giving us a redundant ring across Upstate and diverse points of presence in New York City. And, with the new reach and redundancy, we extended our services that provide direct access to key cloud and content providers and more than doubled our connectivity to other networks and providers.

Our education and training efforts were augmented with several new elements. In partnership with SUNY SAIL, we launched a CIO academy to prepare the next generation of CIOs for New York’s education community. The NYSERNet community-led program committees extended our technical conference with additional tracks on research computing and cybersecurity. Finally, the NYSERNet board provided support for our first year of diversity awards to address the lack of women and minorities in IT.

Looking forward, we are excited about the opportunities to come in 2018, as we plan to extend our network on Long Island and in the Southern Tier, participate in the development of a national research platform, and create new community programming for our member institutions. As you read through the pages of this annual report, I hope you are as excited as I am about the progress made to date and the promise of even better things to come. I welcome your feedback, and I thank you for your continued commitment as a member of the NYSERNet community.

Best regards,

Chris M. Sedore
BOARD OF DIRECTORS

T. SIMEON ANANOU
Vice President for Information Technology Services/Chief Information Officer
University at Albany

J. BRICE BIBLE
Vice President/Chief Information Officer
University at Buffalo

JEANNE CASARES
Associate Vice President/Chief Information Officer
Rochester Institute of Technology

MICHAEL G. CATO
Vice President for Computing and Information Services/Chief Information Officer
Vassar College

BRIAN COHEN
Vice Chancellor for Technology/Chief Information Officer
City University of New York

THOMAS FURLANI
Director, Center for Computational Research
University at Buffalo

ARMAND GAZES
Director, Information Technology
The Rockefeller University

CHRISTINE HAILE
Chief Information Officer (retired)
University at Albany

ROBERT JUCKIEWICZ
Vice President for Information Technology
Hofstra University

JOHN KOLB
Vice President for Information Services and Technology/Chief Information Officer
Rensselaer Polytechnic Institute

PATRICIA KOVATCH
Senior Associate Dean for Scientific Computing and Data Science
Icahn School of Medicine at Mount Sinai

TIMOTHY LANCE
Chief Research Officer
NYSERNet.org, Inc.

FRANCIS LEES
Emeritus Chair, NYSERNet Board of Directors

DAVID LEWIS
Vice President for Information Technology/Chief Information Officer
University of Rochester

GASPARE LODUCA
Vice President for Information Technology/Chief Information Officer
Columbia University

JUAN MONTE"ES
Chief Information Officer
American Museum of Natural History

LEONARD PETERS
Vice President, Information Technologies/Chief Information Officer
New York University

SHARON PIT"T
Vice President of Information Technology/Chief Information Officer
Stony Brook University

SAMUEL SCOZZAFFAVA
Vice President for Information Technology/Chief Information Officer
Syracuse University

CHRISTOPHER SEDORE
President
NYSERNET.org, Inc.

JUSTIN SIPHER
Vice President of Libraries and Information Technology
St. Lawrence University

WILLIAM THIRSK
Vice President of Information Technology/Chief Information Officer
Marist College

R. DAVID VERNON
Assistant Vice President/Chief Technology Officer
Cornell University

MELISSA WOO
Senior Vice President for Information Technology/Chief Information Officer
Stony Brook University

NYSERNet LEADERSHIP

CHRISTOPHER M. SEDORE
President and CEO

STEPHEN R. KANKUS
Chief Operating Officer

WILLIAM C. OWENS
Chief Technology Officer

MARY C. HYLA
Chief Financial Officer

TIMOTHY L. LANCE
Chief Research Officer
CONFERENCES AND TRAINING

NYSERNet is committed to fostering professional development among New York’s higher education IT community. And we enjoy tremendous support from our members, whose representatives serve on our conference program committees, offer presentations to their peers and host our training events. In 2017, we continued to expand our educational services portfolio, offering members technical and leadership training, and professional networking opportunities via numerous workshops, conferences and discount programs.

*Here are just a few of the many educational opportunities we offered members this past year:*

**NYSCIO 2017**, the New York State Higher Education CIO Conference, took place at the Harbor Hotel in Clayton, New York, in July. Senior IT leaders — representing more than 40 member institutions — participated in three days of presentations and professional networking opportunities on the banks of the St. Lawrence River. Highlights included a presentation by Notre Dame University’s Mike Chapple, academic director of the Master of Science in Business Analytics Program, on regulatory compliance; and another by Cathy O’Neil, best-selling author of “Weapons of Math Destruction: How Big Data Increases Inequality and Threat.” NYSCIO 2018 takes place July 18 to 20 at the Otesaga Hotel in Cooperstown, New York.

In October, our annual technical event, **The NYSERNet Conference**, was held at the recently restored, historic Marriott Syracuse Downtown. More than 100 network and security practitioners from 37 member institutions attended. Through an expanded program that included four tracks, two keynote speakers, 20 community member-led and seven vendor-led presentations, participants learned about cutting-edge technical solutions and technology trends shaping the future of campus IT. The 2018 NYSERNet Conference returns to the Marriott Syracuse Downtown this October.

In 2017, NYSERNet launched **CIO Academy**, developed in collaboration with SUNY’s Strategic Academy and Innovative Leadership Institute (SAIL). Twenty aspiring chief information officers participated in this three-month multidisciplinary program designed to prepare the next generation of higher education IT leaders. The program consisted of monthly workshops and online growth sessions aimed at examining leadership styles, learning effective ways to communicate,
motivating, leading and developing teams, and creating a compelling and unifying IT vision. In November, CIO Academy was awarded the Association for Talent Development’s "Best Award" by the Central New York ATD Chapter.

Our successful partnership with the Research & Educational Networking Information Sharing & Analysis Center (REN-ISAC) continued in 2017. NYSERNet purchased REN-ISAC vouchers that our members redeemed to participate in the center’s numerous educational offerings. Because we purchased the vouchers in bulk, members were able to save as much as 50 percent off the list price of REN-ISAC security training, which proved a boon to our many smaller member campuses.

In April and December, NYSERNet sponsored three-day ITIL workshops at Yeshiva University in New York City and Hudson Valley Community College in Troy. Thirty-four participants received an introduction to ITIL and a better understanding of how an integrated IT Service Management framework can improve business integration, reduce costs and increase IT productivity. At the conclusion of the workshops, all were ITIL certified.

NYSERNet partnered with ESnet, Indiana University and Internet2 to sponsor two Science DMZ workshops in 2017 – the first in Syracuse and the second at The Rockefeller University in New York City. Ninety individuals representing 49 institutions attended, learning how to implement a campus Science DMZ architecture, as well as how to design, deploy and operate SDN networks, how to use perfSONAR to measure and improve network performance, and how to construct and integrate Data Transfer Nodes into the Science DMZ environment.
NYSERNET network engineers, Jeff Harrington and Bill Owens, prepare new optical equipment to be deployed in the NYSERNET network as part of our statewide expansion and backbone upgrade.
In 2017, NYSERNet continued an initiative to reacquaint ourselves with the needs of the people and programs at New York colleges and small universities, so that we could develop strategies to better serve them.

We met with representatives from institutions in New York’s North Country, Southern Tier and Long Island in a concerted effort to uncover their concerns. We learned that most of the institutions have at least one faculty member, frequently several, whose research would be enhanced by a connection to our network. We also discovered that consolidation in the commercial internet marketplace has left many of the institutions with access to one, perhaps two, ISPs, leaving them vulnerable to price escalations and devoid of suitable backup options (a concern plaguing campuses in larger markets, too). We were especially pleased to learn that the institutions were eager to collaborate with us to address these challenges.

Together, in subsequent months, we created and piloted new services (like our Priority Peering, Managed Edge and Integrated Access Services), developed partnerships with regional network service providers around affordable local loops, and explored business models for new POPs that would bring our network closer to the campuses. Our objectives were to lower the cost and increase the value of connecting, furthering our goal to make sure that every New York State college and university — regardless of geography — has equal access to the internet connectivity necessary to support teaching, learning and research.

In collaboration with St. Lawrence University, Clarkson University, SUNY Potsdam, SUNY Canton and the Development Authority of the North Country, NYSERNet established a new POP in Potsdam in the fall of 2017. St. Lawrence and Clarkson became NYSERNet’s first IAS connectors. St. Lawrence University also became our first Managed Edge participant. SUNY Potsdam and SUNY Canton will connect in early 2018.

On Long Island, we are collaborating with Nassau BOCES, Hofstra University and others to explore development of a new POP there. With sufficient commitment, we hope to open it in mid-2018. It will include diverse network paths to New York City and the important network peering hubs located there.

A key part of this effort includes adding redundancy to our network, including a new optical path between Buffalo and Rochester and another between Rochester and New York City via Binghamton. In addition to the promise of greater network availability, the new path through Binghamton, along with the commitment of Binghamton University to connect to us there, means we will be opening a Southern Tier POP in early 2018.
STONY BROOK PRIORITIZES INCREASE IN NETWORK CAPACITY

Lack of bandwidth is a huge barrier to any institution’s research. Such was the case at Stony Brook University, a 25-year member of NYSERNet, where, according to Melissa Woo, senior vice president and chief information officer, there was a “giant swell of need” as an increase in research required moving massive amounts of data to various collaborators, national labs and the private sector.

The university made investing in overcoming this barrier a priority, and in January 2017 Stony Brook became the first higher education institution in the state to connect to NYSERNet at 100 Gbps, revolutionizing the quality, quantity and speed of digital research on campus. The addition is a key element in maintaining Stony Brook’s profile as an R1 university, which is a major factor in attracting star faculty and students, according to Woo.

“This connection supports Stony Brook’s regional leadership position in high-performance computing, while advancing our goal as a top public research university to educate and train future generations of scientists,” said University President Samuel L. Stanley Jr. “I’m looking forward to the many new possibilities this connection will offer for interdisciplinary collaboration, an essential element behind the expansion of our expertise and our success in science, technology, engineering and mathematics, as well as in the social sciences and humanities.”

The connection is so fast that researchers at the Long Island school can now transfer a complete copy of a human genome file to a lab for testing in just 90 seconds, send 300,000 X-ray images in one minute or download an e-book for each of Stony Brook’s 26,000 students in just four seconds. It also enables research in such areas as computational astrophysics and biomolecular imaging that could not possibly have been done without such a high-speed connection.

According to Woo, 2018 will see an on-going process to expand access to individual buildings and research labs on campus and work with the school’s IT staff and researchers to optimize the pipeline.

“It’s very important for Stony Brook research to have our infrastructure match our aspirations,” said Robert Harrison, director of the Institute for Advanced Computational Science (IACS). “Data’s big and messy, and if you’re going to share it or use it, you have to be able to move it — that’s why this connection is essential for us to continue to play our lead role.”

NYSERNet is proud to have been a collaborator in this groundbreaking project along with Internet2, Hewlett-Packard Enterprise, the IACS and the Division of Information Technology.
Over 100 years ago, Albert Einstein predicted the concept of gravitational waves based on his Theory of Relativity. Today, researchers at Syracuse University have made gravitational wave discovery one of their primary research concentrations in part thanks to a partnership with NYSERNet that allowed the Central New York institution to jump from 10 Gbps of Internet2 connectivity to 40 Gbps. This increased capacity supports its research needs, as well as provides cost avoidance for commodity internet bandwidth that students and faculty at the university depend upon.

"Ten Gbps was an impediment for our research community. The move to 40 Gbps in 2017 has already improved access to data and has allowed Syracuse to participate in research computing at a national level. NYSERNet worked collaboratively with members of the Syracuse team to make this happen," said Sam Scozzafava, CIO at Syracuse University. "The new models, services and capabilities that NYSERNet has been able to offer Syracuse University have been a tremendous help."

A founding member of NYSERNet, the university leveraged the increased bandwidth to advance data access to its existing research systems, including OrangeGrid, a 16,000 core High Throughput Computing system, and Crush, a private research cloud comprised of 12,000 cores. Enhanced access to data has been of particular benefit to researchers in the areas of high energy physics, gravitational wave astronomy and soft matter.

The new capabilities have not only provided internal benefits but have also increased the university’s visibility within the National Science Foundation — a critical component to research funding — as well as allowed interaction with national level infrastructure providers and supercomputing sites.

While Scozzafava acknowledges the university had to overcome a few technical hurdles to accommodate the increased capacity, including making sure there was no negative impact on the commodity internet traffic and addressing portions of the internal research network that wouldn’t allow full utilization of all 40 Gbps, Syracuse has worked through these challenges with little negative impact on its community.

"We don’t want our scientists to have to worry about how the systems work. Our goal is to make that transparent to them," Scozzafava said. "We know our researchers are enthusiastic about the increased capabilities and the national partnerships that allow them to enhance, and hopefully transform, their research — that’s very exciting."

Syracuse University is already considering a move to 100 Gbps in the near future and is examining how to best combine that level of capability with its existing commodity traffic.

"Without the capabilities NYSERNet has offered us, our ability to bring resources at this scale to our research community would have been limited," Scozzafava added. "NYSERNet has had a shift in bringing new services to its members — and the impact at Syracuse has been substantive."
Music is art, but behind today’s music there is increasingly a lot of science and technology. NYSERNet is proud of the many ways it is collaborating with its members to use 21st century technology and solutions to enrich conventional means of musical performance and education through advanced networking.

An excellent example of this involves NYSERNet’s recent adoption of LoLa, a low latency audio and video streaming system for high-speed networks.

LoLa was developed by Conservatorio di Musica Gisusepe Tartini in collaboration with the Italian research and academic network, GARR. The goal of the LoLa project was to enable real time musical performances across advanced networks between musicians at geographically separate locations, avoiding the expense and inconvenience of travel, while promoting the creation of new forms of musical collaboration and bringing together young musicians with master instructors.

LoLa is, in effect, a very specialized, single purpose computer. Its developers offer a recipe that specifies the CPU, memory, storage, video monitor, audio cards and high-definition video camera necessary to assemble an appliance designed to introduce as little latency as possible. (Latency is the enemy of musical collaboration over networks, with delays above 30 milliseconds sufficient to make it difficult to coordinate a performance among remote players.)

The heart of the appliance, the LoLa software, encodes and decodes audio and video for transport across the network between the remote locations.

Once NYSERNet assembled its own LoLa, it needed testing and fine-tuning to optimize it for use on our network. NYSERNet Systems Administrator Adam Wojtalewski, who built the appliance, worked with Network Operations Manager Jeff Harrington and individuals at the New World Symphony in Miami, the Cleveland Institute of Music and the Berklee College of Music in Boston to make that happen.

Next, NYSERNet sought partners to help explore and demonstrate LoLa’s capabilities. In April 2018, NowNet Arts is sponsoring “Network Music: Artistic and Technological Strategies for Public and Private Networks” on the campus of Stony Brook University. The conference will employ LoLa to facilitate presentations and collaborations by and among researchers from across the globe. In June, the New York State Distance Learning Consortium will demonstrate LoLa’s ability to reshape public school music education with a live performance featuring students and musicians at remote locations.

NYSERNet’s LoLa project is integral to our effort to explore new ways to use our network, extending its capabilities to user communities beyond our traditional roots in academic research.
LoLa is, in effect, a very specialized, single purpose computer. Its developers offer a recipe that specifies the CPU, memory, storage, video monitor, audio cards and high-definition video camera necessary to assemble an appliance designed to introduce as little latency as possible.
NEW SERVICES LAUNCHED

NYSERNet introduced three new services in 2017: Priority Peering, Integrated Access and Managed Edge — each conceived and designed to make connecting to NYSERNet easier, more affordable and more worthwhile.

**PRIORITY PEERING**

Until recently, NYSERNet peered exclusively with regional, national and international research and education networks, like Internet2, ESnet, CANARIE, NoX and others. We still connect to these networks, so any member institution that wishes to connect to our pure R&E network offering may do so. However, many of our members expressed interest in getting more value from their NYSERNet connections. We responded with our new Priority Peering service.

With Priority Peering enabled, connected institutions can access the internet’s most important commercial destination networks and content providers (like Google, Amazon and Netflix) on NYSERNet’s high speed backbone, thus leveraging capacity to improve network performance to and from these providers, while reducing utilization of their commercial internet connections. Participating members are routinely reporting reductions in CIS utilization of 40 percent or more, which represents significant financial savings and performance gains.

**INTEGRATED ACCESS SERVICE**

Integrated Access was born of two challenges. First, consolidation in the internet service industry has reduced CIS options for many institutions. The resulting lack of competition leads to higher prices, but it also makes it difficult to procure reliable, redundant internet service — a necessity in our connected age. Second, while institutions with large research enterprises can justify the cost of connecting to our pure R&E network, smaller institutions typically cannot, despite the benefits to faculty and student research.

IAS addresses these challenges by bundling R&E network access, Priority Peering and long-haul network transport into one affordable 10Gb service. Institutions participating in IAS can use the transport component (a VLAN) to connect to ISPs in larger cities, like New York City, where internet services are typically cheaper. When supplemented with Priority Peering, the result is a decrease in the overall cost of CIS with the added benefit of a second connection. R&E network access is a bonus, enabling even the smallest of schools to satisfy researcher demand for high performance connectivity.

Clarkson University and St. Lawrence University, both mid-sized institutions in New York’s North Country, were our first IAS connectors. Today, these institutions have direct access to the networks and services they need, with better performance and at lower cost. Several other schools — SUNY Canton and SUNY Potsdam among them — are committed to participating in IAS in 2018.
While our new services were welcomed by our membership, concerns did arise around how individual institutions would be able to maintain complex connections to multiple service providers without putting an undue burden on their networking staff. NYSERNet was quick with an answer as its new Managed Edge Service relieved this responsibility by bundling the edge router, network design and configuration, equipment maintenance and connection monitoring into one package. St. Lawrence University became our first Managed Edge participant in 2017, as part of a pilot program. SUNY Canton and SUNY Potsdam will rely on Managed Edge when they connect in 2018.
MICHAEL EVANS  
Director of Information Technology and ISO  
Certifications:  
CISSP, CCNA, QIR, Security+ and MCSE  
Former Positions:  
CISO/IT Security Manager at DUMAC Business Systems  
Senior Network and Systems Analyst/Acting CISO at Colgate University  
The director of information technology and ISO is a key leadership position at NYSERNet. Working in collaboration with NYSERNet staff, vendors and members of NYSERNet’s IT department, the IT director is responsible for leading the development of NYSERNet’s IT vision, developing and implementing supporting IT projects and overseeing operation of our complex IT environment. In collaboration with our chief operating officer and chief technology officer, the director of information technology and ISO leads the development of systems designed to support NYSERNet’s member-facing operations, including network monitoring, network statistics, customer information systems and document management systems.

TINA O’MARA  
Executive and Board Relations Assistant  
Former Position:  
Executive Assistant to the Senior Vice President of Enrollment Management at Syracuse University  
The executive and board relations assistant provides administrative support to NYSERNet’s president, including travel and meeting arrangements, preparing correspondence and meeting materials, and organizing and tracking tasks and deadlines. The executive assistant also provides administrative support to the NYSERNet board, including coordinating, scheduling and supporting semi-annual board meetings, the bi-annual board retreat and board committee meetings; keeping the board handbook and email distribution lists current and managing the annual conflict of interest process. The executive assistant is also responsible for administrative support for our chief financial officer, including human resources, finance and accounting responsibilities, while also greeting visitors, managing office supply inventory and assisting our educational services manager with event planning.

VISHAL ANANTHARAMAN  
Network Analyst Intern  
Experience: Master of Science in Telecommunications and Network Management from Syracuse University; Bachelor of Engineering in electronics and communication engineering from Anna University, College of Engineering  
The network analyst intern works on performance measurement using Perfsonar and other tools to build a test methodology that can validate that NYSERNet’s network backbone is configured to perform at 100Gbps. In addition to methods, the intern works to build, configure and maintain testing nodes, validating that the configurations are optimally tuned, resolving configuration issues, and tracking and diagnosing anomalies generated in the testing process.

REBEKAH ROBERTS  
Social Media Intern  
Experience: Information Management and Technology major at Syracuse University’s iSchool  
The social media intern tracks RSS feeds, speaks to college and university media relations representatives, occasionally interviews principal researchers and scientists and writes pieces for the NYSERNet website, social media and other longer-form digital and print publications. The intern also promotes our workshops, seminars and NYSERNet conferences through LinkedIn, Facebook and Twitter.
NYSERNET LEADERSHIP AND STAFF

CHRISTOPHER M. SEDORE  
President and CEO

STEPHEN R. KANKUS  
Chief Operating Officer

WILLIAM C. OWENS  
Chief Technology Officer

MARY C. HYLA  
Chief Financial Officer

TIMOTHY L. LANCE  
Chief Research Officer

SHARON M. AKKOUŁ  
Director, NYC Metro Fiber Services

ROBERT J. BLOOM  
Director, Data Center Services

MICHAEL EVANS  
Director of Information Technology and ISO

LAWRENCE G. GALLERY  
Membership Manager  
K-20 Program Manager

JEFFREY HARRINGTON  
Manager, Network Operations

KATRINA LAWRENCE  
Accounting Specialist

TINA M. O’MARA  
Executive and Board Relations Assistant

ADAM WOJTALEWSKI  
Senior Systems Administrator

CHRISTY ROHMER  
Manager, Education Services

JAMES SHAFFER  
Supervisor, Colocation and Fiber Optic Services
NYSERNET MEMBER INSTITUTIONS

Albert Einstein College of Medicine  
Alfred University  
American Museum of Natural History  
ARTstor  
Binghamton University  
Buffalo State College  
Canisius College  
Capital Region BOCES/NERIC  
City University of New York  
Clarkson University  
Colgate University  
The College of St. Rose  
Columbia University  
Cornell University  
Daemen College  
Erie 1 BOCES/WNYRIC  
Erie Community College  
Fordham University  
The Frick Collection  
Hofstra University  
IBM Watson Research Center  
Icahn School of Medicine at Mount Sinai  
The Intrepid Museum  
Le Moyne College  
Long Island University  
Madison-Oneida BOCES  
MAGPI  
Manhattan College  
Marist College  
Massachusetts Institute of Technology  
Monroe One  
The Museum of Modern Art  
The New School  
New York Genome Center  
New York Presbyterian Hospital  
New York State Department of Health: Wadsworth Center  
New York University  
Onondaga-Cortland-Madison BOCES/CNYRIC  
Rensselaer Polytechnic Institute  
Rochester Institute of Technology  
The Rockefeller University  
St. Lawrence University  
Siena College  
Skidmore College  
Stony Brook University  
State University of New York at Canton  
State University of New York at Geneseo  
State University of New York at Oswego  
State University of New York at Potsdam  
Syracuse University  
Union College  
University at Albany  
University at Buffalo  
University of Rochester  
Upstate Medical University  
Vassar College  
Weill Medical College of Cornell University  
Weill Medical College of Cornell University in Qatar  
Yeshiva University