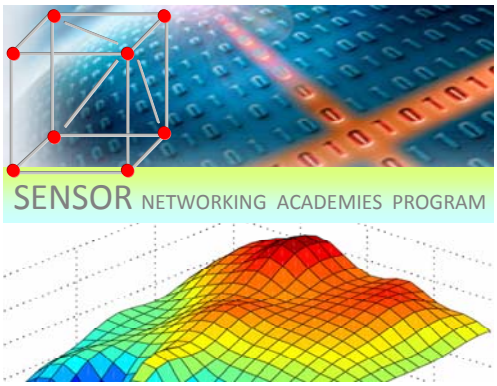


***ENERGY & HEALTHCARE***

## SNAP | SENSOR NETWORKING ACADEMIES PROGRAM : *Energy and Healthcare*

| | Description | Comment |
|---|---|---|
| Goal | Accelerate the diffusion of the concepts of<br>[1] energy conservation & energy efficiency<br>[2] healthcare monitoring & preventive medicine using principles of ubiquitous computing achieved from granular deployment of sensors. | [1] Advances in micro-metering may be catalytic to drive the return on investment for the smart grid.<br>[2] Without remote monitoring and preventive healthcare, the cost of attentive medical care will bankrupt the USA. |
| Outcome | Hands-on experience and education about sensors and dynamics of energy [sensors to monitor usage, optimize energy efficiency] and how to improve preventive medicine through remote monitoring. | Grass roots approach and an academic-industry channel to share science and data for issues on energy and climate change. Applicable for healthcare issues. |
| Aim | [1] Improve teaching of physics and mathematics<br>[2] Demonstrate use in energy and healthcare<br>[2] Build consumer awareness and market demand for wireless sensor networks and related tools / services.<br>[3] Workforce creation and job re-training | SNAP is aimed for school and college students as well as job re-training programs, in much the same way that John Morgridge of Cisco Systems started the Cisco Networking Academy[1] in 1996. |
| Target | [1] High schools<br>[2] Tertiary institutions<br>[3] Workforce re-training | Potential to engage with local and state authorities that may access stimulus funds for job growth and entrepreneurial innovation. |
| Investment | [1] Seed funds to implement the first Academy<br>[2] Support academic-industry partnership | Foundations and corporations as sponsors. |

[1] Cisco Systems initiated the Cisco Networking Academy in 1996 that started with a liaison that I created with the Thurgood Marshall High School (TMAHS) in the San Francisco Unified School District (SFUSD). Please see enclosed PDF and note that all the photographs are from TMAHS classrooms. Background: during 1995-1997, I was a Special Assistant to the Superintendent of SFUSD to develop academic operations to advance mathematics and science. Hence, I created the collaboration with Cisco Systems through a talented teacher, Mr Dennis Frezzo, who helped start the first Cisco Networking Academy (in SFUSD). It gained worldwide acclaim and cited by The White House as a key instrument for IT workforce creation. It was the cover story of the US News & World Report (2 Dec 1996) and widely cited (www.catholiceducation.org/articles/education/ed0026.html). A decade later, we have moved ahead from 'computers' as boxes and equipment to 'ubiquitous computing' as a function and service. Therefore, an inclination to re-create the former model but with new concepts for the 21st Century – hence – SNAP.

**Proposal from Dr Shoumen Datta, School of Engineering, Massachusetts Institute of Technology [shoumen@mit.edu]**

**Energy** http://dspace.mit.edu/handle/1721.1/45552 **Healthcare** http://esd.mit.edu/WPS/2008/esd-wp-2008-17.pdf

## Cisco Networking Academies Program

Through an innovative partnership with school districts across the U.S., Cisco Systems is preparing students for the demands and enormous opportunities of the information economy while creating a qualified talent pool for building and maintaining education networks.

Network switches. Routers. Patch cables and punch-down blocks. RJ-45 jacks. Not your ordinary list of back-to-school supplies. Then again, for students across the country in a unique new curriculum known as Cisco Networking Academies, the Fall '97 semester was anything but your ordinary back-to-school experience.

Now in the early stages of a nationwide rollout leading to international participation, the Networking Academies is a cooperative venture between school districts and Cisco, the world leader in networking for the Internet. In a lab setting that closely corresponds to the real world, students get their hands on the building blocks of today's global information networks, learning by doing as they design and bring to life local and wide-area networks.

This innovative program is a prime example of private industry creating a mutually beneficial relationship with schools—not a short-term fix, but a relationship designed to last because of the lasting benefits it can provide. For Cisco and private industry, the program is a meaningful step toward developing sorely needed technology skills in the next generation of workers. For the schools, Cisco Networking Academies represents vital technology support and resources to supplement limited funds. And for students, Networking Academies is highly relevant preparation for the increasingly technology-dependent economy into which they will emerge.

### The Challenge

The information economy will demand an unprecedented level of technology literacy from tomorrow's workers. A few statistics foreshadow a potential crisis in the American workplace:

- Currently, mid- to large-sized companies in the U.S. alone have about 190,000 unfilled technology jobs. And 82 percent of technology companies expect to increase their information technology (IT) staffs in the next several years.
- Nearly 70 percent of technology companies cite a lack of skilled IT workers as a barrier to growth.
- As teachers around the world begin to integrate the vast resources available to them on the Internet and as networks become an important tool for boosting administrative efficiency and communication, education institutions face the same shortage of network-support personnel.
- Schools are under pressure to prepare students with the necessary skills to be successful in the 21st century. Eighty-six percent of America's classrooms lack a direct Internet connection.

Cisco Systems

## Background

In 1993, Cisco embarked on an initiative to design practical, cost-effective networks for schools. It quickly became apparent that designing and installing the networks was not enough—the schools also needed some way to maintain the networks after they were up and running. Cisco Senior Consulting Engineer George Ward developed training for teachers and staff for maintenance of school networks. He soon discovered that the personnel lacked the time required to learn the material, so he moved to the next population of learners in the school—the students themselves. The success of these student seminars led to requests from participating schools across the country for Cisco to develop a curriculum that could be integrated as elective courses taught in a semester format. The formalized curriculum and support activities evolved into the Cisco Networking Academies program.

The concept proved to be a powerful draw for students, many of whom initially volunteered for classes outside normal school hours. Today, thousands of students coast to coast are pioneering a school-to-work program engineered for a new global economy.

## The Solution

Through the Cisco Networking Academies program, high school and college students can learn the information needed to prepare them for the Cisco Certified Networking Associate exam. This certification positions them for immediate openings in a talent-hungry job market or for engineering- and science-focused college studies. In a nutshell, Cisco Networking Academies is a complete, four-semester program on the principles and practice of designing, building, and maintaining networks capable of supporting national and global organizations.


### EXECUTIVE SUMMARY

**Challenge**

The American economy runs on information—yet companies today face a shortage of information workers. And although America's schools are struggling to supply the needed skills, more than 80 percent of our nation's classrooms lack the basic technology tool of a direct Internet connection.

**Solution**

The Cisco Networking Academies program is a revolutionary partnership between Cisco Systems and schools across the nation. Through a range of information-age teaching media and methods, the Networking Academies goes beyond traditional computer-based education, helping students develop practical computer networking knowledge and skills in a hands-on environment.

**Results**

In its first full year, the fast-growing program will be giving thousands of students across the nation the school-to-work experience they need to take immediate positions in networking—along with a solid foundation for further study at the college level in highly sought-after technical disciplines.


Cisco provides course work for a complete range of basic through advanced networking concepts—from pulling cable through such complex concepts as subnet masking rules and strategies.

The program uses Regional Academies as hubs, each of which supports a minimum of ten Local Academies. These Regional Academies teach the teachers who oversee programs at the Local Academies under their jurisdiction. The Regional Academies funnel input to Cisco on topics such as individual school performance, curriculum quality and effectiveness, and student progress.

The format for the classes reflects the content: interactive lessons stored largely on the classroom's Cisco MicroWeb server. The academy design also accommodates diverse learning styles. For those who learn by reading, text is available. More-visual learners can focus on the course material's extensive graphics and QuickTime movies. To promote development of the personal skills that underpin successful careers, projects require students not only to resolve technical issues, but also to successfully address network users' needs.

Local Academies receive mentoring and technical support from the Regional Academies and are backed by SMARTnet™ services, a service and support program that provides a round-the-clock access to assistance from Cisco's Technical Assistance Center (TAC) and the Cisco Connection Online (CCO) Web site, plus major software and maintenance releases, product documentation updates and next-day delivery of replacement parts.

### Benefits and Results

The Cisco Networking Academies program is in its first full year at schools. The pilot semester at one site, Thurgood Marshall Academic High School in San Francisco, provides an indication of the potential impact: more than 15 percent of the students involved in the school's semester program in spring 1997 secured summer jobs as a direct result of their one-semester experience.

And for teachers who have seen the early impact on students and their futures, the Academy stands as a model for school-to-work programs.

Dennis Frezzo, technology instructor at Thurgood Marshall, says, "In one leap, Cisco has helped us have the most effective school-to-work program I've seen locally, and we're proud of that."

"The energy level of these students is so high, it's hard to find the words to describe it," says Barry Williams, who oversees Regional activities for the Round Valley School District in Springerville, Arizona. "Once, about half of my students had permission to leave school about 20 minutes early. But not a single one left. I talked topologies and media for 90 minutes without a break."

### Close-Up: Thurgood Marshall Academic High School Section

#### San Francisco, California

Thurgood Marshall Academic High School (TMAHS) was established in 1994 in the economically underdeveloped southeast corner of San Francisco. Focusing on a math, science, and engineering curriculum, the school gives students a rigorous course of academic study with an abundance of college-prep math, science, and English classes, plus three semesters of computer and technology electives.

The Cisco Networking Academies curriculum has been integrated into one of three areas for concentrated study selected by all TMAHS students after they reach their junior year. Juniors take Cisco I and II, and seniors complete the program with Cisco III and IV, supplemented by projects and courses in related engineering disciplines. "This is above and beyond what we normally do, but we thought this was an incredible opportunity for the kids," says Frezzo.

According to Jai Gosine, another Academy teacher at TMAHS, "Certification is the biggest benefit" for the school's nearly 70 Cisco Networking Academies students, who are spread among three classes. "Potential employers of students who earn their Cisco Certified Networking Associate status will feel comfortable hiring them," he says, "because they'll know these students have acquired a set of practical, valuable skills."

The Networking Academies program is also project-based, with students addressing challenges drawn from the real world of networking and finding solutions that work, not only in theory but in the model networks built and tested in the lab.

"A lot of people use these clichés, but they're really true," says Frezzo, "The old style of teaching was 'the sage on the stage.' Now we're trying to be the 'guide on the side,' helping in counseling and problem solving."

Senior Ricky Jackson notes, "The lessons aren't based on homework or tests so much. We do more hands-on work."

The project-based learning format helps truly instill skills that otherwise might be forgotten soon after the final exam, Jai Gosine explains. "A student's level of learning is determined by the form of assessment. In our case, it's not how much they can regurgitate, but how much they can do." Adds Frezzo: "Projects provide the ultimate in performance assessments. Was the job complete? Did the network work, with no excuses?"

For Jenica Lee, a TMAHS senior with tentative plans to pursue computer science in college, the interactive, project-based format of Networking Academies helps students develop into problem solvers. "I think you learn more, because you encounter problems and have to work through them to figure out the solution," Lee observes. "It's also more fun."

The pride is evident in Ricky Jackson's voice as he describes how, during their first full semester in the Academy, he and 23 fellow team members wired the San Jose Convention Center for the California Community Colleges in Education Foundation Technology Conference. Die-hard students on the project began early on a Sunday, working eight hours with teachers and Cisco mentors to provide state-of-the-art, high-speed Internet access to vendor booths and seminar rooms.

"Vendors, presenters, and the Foundation found it to be an invaluable service," remarked David Springett, the foundation's president. "Cisco's partnership with the high school students demonstrated how private industry's active involvement in education can advance students' skills and future prospects."

"In the advanced courses, the spirit of the curriculum is to make the network self-sustaining and apprentice students to the school district," Gosine says. "There's no way school districts have enough money to hire the expertise they're going to need to maintain stable networks. This is a way to accomplish that goal. It's a win for everyone involved."

Academy students also will be applying their skills in local middle and elementary schools, which "makes the vision of 'Internet everywhere' more attainable," Frezzo says.

### Close-Up: Lakes County Service Cooperative, Fergus Falls, Minnesota

Through Lakes County Service Cooperative, an association serving some 35 districts in nine counties in West-Central Minnesota, Networking Academies is finding a home in some fairly out-of-the-way places.

"Most of the Local Academies are at small-town schools like Parker's Prairie, with 350 students in K-12 and about 120 in high school," says Rick Vogt, media coordinator for Lakes County. "It's a tremendous opportunity for them to learn about and experience this technology, which might not otherwise be available—whether they get a job in networking or not."

A can-do attitude took the Networking Academies program from possibility to reality quickly.

"There are lots of reasons you could find not to do something like this," Vogt says. "The attitude of the schools was that they were willing to do what it takes because they felt it was that important. Local Academies found a teacher that they could spare, and they managed to fit the class into their curriculum—some after school, some before school. Some of the teachers even donated time to come for training."

As a major plus, Vogt points to the fact that the curriculum is designed "to industry standards," giving students the real-world networking know-how that institutions need most today.

"The instructional method is at the forefront of technology," he says. "There aren't textbooks that have to be changed all the time. The networked multimedia curriculum shows what's possible with a properly designed network. The exchange of information between Academy instructors, facilitated by Internet connectivity, builds a sense of community and allows the best ideas for teaching the curriculum to be shared nationwide."

"I think it's an exciting program, and the teachers have said the same thing," Vogt reports. "Everybody sees great possibilities."

### Close-Up: New Hanover County Schools, Wilmington, North Carolina

For students of New Hanover County Schools in Wilmington, North Carolina, the Networking Academies program is both college and career prep.

"There's an immediate benefit for students who just want to go out and get jobs," says Kevin Johnston, a technology instructor at New Hanover High School, who also does double duty as his area's Regional mentor. "They've got a sought-after skill. The second benefit is for students who plan on going to college."

Within Raleigh, North Carolina, is Research Triangle Park, a hotbed for technology companies and home to several universities that welcome Hanover students each year.

"Even if they're going into accounting, Networking Academies students can get better part-time jobs in the summer," he says. "They've got a really good background to start with."

The students also become a "home-grown resource" for designing, building, and maintaining the networks for Hanover itself, Johnston said. On NetDay, the Academy students will fan out across the district to help install networks in middle schools and elementary schools.

Technology-enabled learning is a familiar concept at Hanover, which receives federal funding to participate in the national "virtual school" program for distance learning and Internet communications. Becoming part of the Cisco Networking Academies program was an easy "next step."

For further information on the Cisco Networking Academies program or Cisco support for education networks, visit: www.cisco.com/edu.


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