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October 18, 2010

Seven Days of Speed

by Linda Barney, Barney and Associates

100 people, 168 miles of fiber, and the world's fastest network

For a week in November, New Orleans will be home to one of the most advanced networks in the world. SCinet forms the data backbone of the annual SC conference: it takes months to build and connects to the world's most advanced data networks, but it is only active for seven days each year before it is torn down and planning starts for next year.

Each year the SCinet design team pushes the state-of-the-art in cutting edge networking technology, and 2010 is no different. This year SCinet includes a 100 Gbps circuit alongside other infrastructure capable of delivering 260 gigabits per second of aggregate data bandwidth for conference attendees and exhibitors -- that's enough data to allow the entire collection of books at the Library of Congress to be transferred in well under a minute.

Introducing SCinet

"SCinet is the fastest network in the world for the few days that it exists each year. The aggregate bandwidth in SCinet exceeds the bandwidth in all but a few countries of the world," according to Jamie Van Randwyk, manager, Informatics and Systems Assessments Department at Sandia National Laboratories and chair of SCinet.

But what is it?

"SCinet provides a high performance, production-quality network that enables attendees and exhibitors to connect to the Internet and research networks around the world," explains Van Randwyk. "During the conference SCinet powers everything from the mundane -- email and Google searches, for example -- to the extraordinary one-of-a-kind application demonstrations that can only happen in this kind of environment."

SCinet serves as the platform for exhibitors to demonstrate the advanced computing resources of their home institutions (and elsewhere) by supporting a wide variety of bandwidth-driven applications. At its core SCinet's capabilities are driven by multiple 10 Gbps wide area circuits and a 100 Gbps circuit that connect the exhibit floor to high performance production and research networks around the world. The infrastructure also provides the ability for exhibitors to use dynamically provisioned circuits to allow

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Short Takes

The Evolving Memory Market

Aug 28, 2013 | The market for computer memory is entering a period of punctuated evolution as a result of several forces, including the continued growth of mobile devices like smartphones and tablets, as well as growth in the cloud data centers and communication networks that

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dedicated capacity between their booths and other end points.

The SCinet architecture also includes an InfiniBand (IB) network to support distributed HPC application demonstrations. This year the InfiniBand fabric will consist of Quad Data Rate (QDR) 40, 80, and 120-gigabit per second (Gbps) circuits linking together various organizations and vendors with high-speed 120 Gbps circuits providing backbone connectivity through the SCinet InfiniBand switching infrastructure.

Collaborating to Build SCinet

But SCinet is not just about what happens on the show floor. What makes this effort even more remarkable is the partnerships that connect SC to the rest of the world. During SC10, SCinet will connect exhibitors and attendees to leading research and commercial networks around the world such as the Department of Energy's ESnet, Internet2, National LambdaRail, LONI (Louisiana Optical Network Initiative), and others.

"The story of SCinet is amazing -- building SCinet is truly a collaborative effort," states Jeff Boote, Internet2's assistant director of research and development and chair of SCinet for 2011. SCinet is built by a group of over 100 volunteers including scientists, engineers, and students. Participants are from the United States, Canada, and Europe and they work for universities, industry, government, and US national laboratories. Vendors have donated approximately $23 million in equipment to build SCinet this year. Planning begins more than a year in advance of each SC Conference and culminates with a high-intensity installation just seven days before the conference begins.

Pushing the Boundaries with the SCinet Sandbox

Beginning this year, SCinet is introducing the SCinet Research Sandbox (SRS). The SRS provides a unique opportunity for researchers to showcase emerging technologies in network monitoring, performance optimization, network security, and other areas on the forefront of communication systems research. SRS participants will demonstrate 100G networks for petascale computing, next-generation approaches to wide area file transfer, security analysis tools, and data-intensive computing.

"Whatever network research calipers you propose, SCinet offers an unprecedented sandbox for your exploration," says Van Randwyk.

SCinet Behind the Scenes: power, measurement, and more

The physical aspects of a network as vast and capable as SCinet are the first things about this effort that most people think of, but they only tell part of the story. Measurement, power planning, wireless communications, and more all play a pivotal role in ensuring that SCinet can successfully support the conference each year. And each area presents its own opportunities for researchers and planners to get a unique window into their area of study.

The Measurement team provides planning, performance, and network utilization tools and metrics and enables attendees to view real time network traffic stats across the infrastructure. The SCinet security teams is there to help protect SCinet assets from external hackers and malicious access, and in the process of protecting collects extensive statistics on SC network usage patterns. On-site access to these high-speed taps offers researchers a unique sample of extremely diverse security data.

The SCinet Wide Area Network (WAN) team provides national and international connectivity for exhibitor communications to external storage, compute or remote national research and education networks. SCinet's WAN is one of the fastest networks on the planet, exceeding a peak bandwidth of 260 Gigabytes per second. This capability is used by Scientists to support e-science initiatives, but is also available to both regular exhibitors and Sandbox participants interested in technologies to advance computer communications.

The LAN Routing team provides the essential connectivity services typical of a large, diverse production network against the backdrop of a high demand and essential reliability environment. The routing team offers all services above the Optical Layer and

serve data to mobile users. HPC workloads also play a part in the changing memory landscape.
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One Step Closer to Fusion Energy
Aug 27, 2013 | Fusion science, which seeks to recreate the energy of the stars for use on Earth, has long been the holy grail of energy researchers. A recent experiment at Lawrence Livermore's National Ignition Facility puts fusion energy one step closer.
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The Benefits of Bare-Metal Clouds
Aug 27, 2013 | Cloud computing promises numerous benefits to businesses – among these are agility, scalability, and reduced cost – but the virtualization layer inherent in most public clouds has been somewhat of an anathema to the HPC community. Are bare metal clouds the answer?
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Big Rig Redesign Still Going Strong
Aug 26, 2013 | In 2011, South Carolina-based BMI Corp. worked with researchers at Oak Ridge National Laboratory (ORNL) to develop a technology that improves the aerodynamics of long haul tractor trailers, thereby boosting fuel efficiency. Two years later, the company and the partnership are still going strong.
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Preparing for Solar Storms
Aug 26, 2013 | It may not be possible to prevent devastating space-weather events like solar storms from reaching the earth's surface, but with enough warning, we can prepare for them. Scientists believe that mapping the earth's magnetosphere – the magnetic shield that stops most but not all of these storms – is the first step.
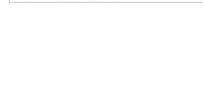
provides consulting, configuration, optimization and trouble-shooting services for all connected exhibitors and demonstrations. Researchers interested in exploring network optimization, novel protocols or tools can propose to collaborate with this team and leverage the power and diversity of the SCinet infrastructure.

About the Author

Linda Barney owns Barney and Associates, a technical, marketing writing and Web firm in Beaverton, Oregon, that provides writing and Web content for the high tech, government, medical and scientific communities. Readers can reach her at linda@barneyassoc.com.

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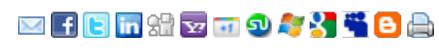
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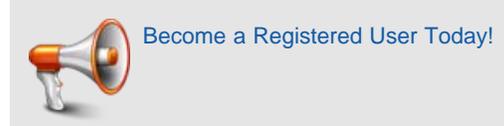
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07/30/2013 | **IBM** | This white paper examines various means of adapting technical computing tools to accelerate product and services innovation across a range of commercial industries such as manufacturing, financial services, energy, healthcare, entertainment and retail. No longer is technically advanced computing limited to the confines of big government labs and academic centers. Today it is available to a wide range of organizations seeking a competitive edge.

The UberCloud HPC Experiment: Compendium of Case Studies
06/25/2013 | **Intel** | The UberCloud HPC Experiment has achieved the volunteer participation of 500 organizations and individuals from 48 countries with the aim of exploring the end-to-end process employed by digital manufacturing engineers to access and use remote computing resources in HPC centers and in the cloud. This Compendium of 25 case studies is an invaluable resource for engineers, managers and executives who believe in the strategic importance of applying advanced technologies to help drive their organization's productivity to perceptible new levels.

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Xyratex, presents ClusterStor at the Vendor Showdown at ISC13
Ken Claffey, SVP and General Manager at Xyratex, presents ClusterStor at the Vendor Showdown at ISC13 in Leipzig, Germany.

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HPCwire Live! Atlanta's Big Data Kick Off Week Meets HPC

Join HPCwire Editor Nicole Hemsoth and Dr. David Bader from Georgia Tech as they take center stage on opening night at Atlanta's first Big Data Kick Off Week, filmed in front of a live audience. Nicole and David look at the evolution of HPC, today's big data challenges, discuss real world solutions, and reveal their predictions. Exactly what does the future holds for HPC?

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