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## Seven Days of Speed

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*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 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 120Gbps 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.

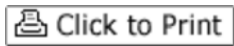
The LAN Routing team provides the essential connectivity services typical of a large, diverse production network against the backdrop of a high demand and essential reliability environment. The routing team offers all services above the Optical Layer and provides consulting, configuration, optimization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

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