



SCinet at SC22 and a look forward to SC23

JET Meeting - February 21, 2023
Scott Kohlert, SC23 SCinet Research Director

The International Conference for High Performance Computing, Networking, Storage, and Analysis - SC22/SC23



- SC22 in Dallas by the numbers:
 - 11,830 Attendees
 - 1,300 Virtual
 - 361 exhibitors
 - 200+ Technical Sessions, Workshops, and Birds of a Feather sessions
 - 735 total Volunteers SC22 wide
- SC23 returning to Denver
 - <https://sc23.supercomputing.org/>
 - Colorado Convention Center - November 12-17

What is SCinet?

2 temporary networks

- Production network providing all wired and wireless internet access for attendees and exhibitors
 - Also provides bandwidth for live streaming of many sessions and workshops
- Research network in support of the Networked Research Exhibition (NRE) and SCinet's Experimental network projects (XNET).



What is SCinet? Part 2



1+ years to plan (virtually and in person), ~2 weeks to build, 4 days to operate, 1 ½ days to tear down.

29 experiments on the show floor at SC22.

175 volunteers

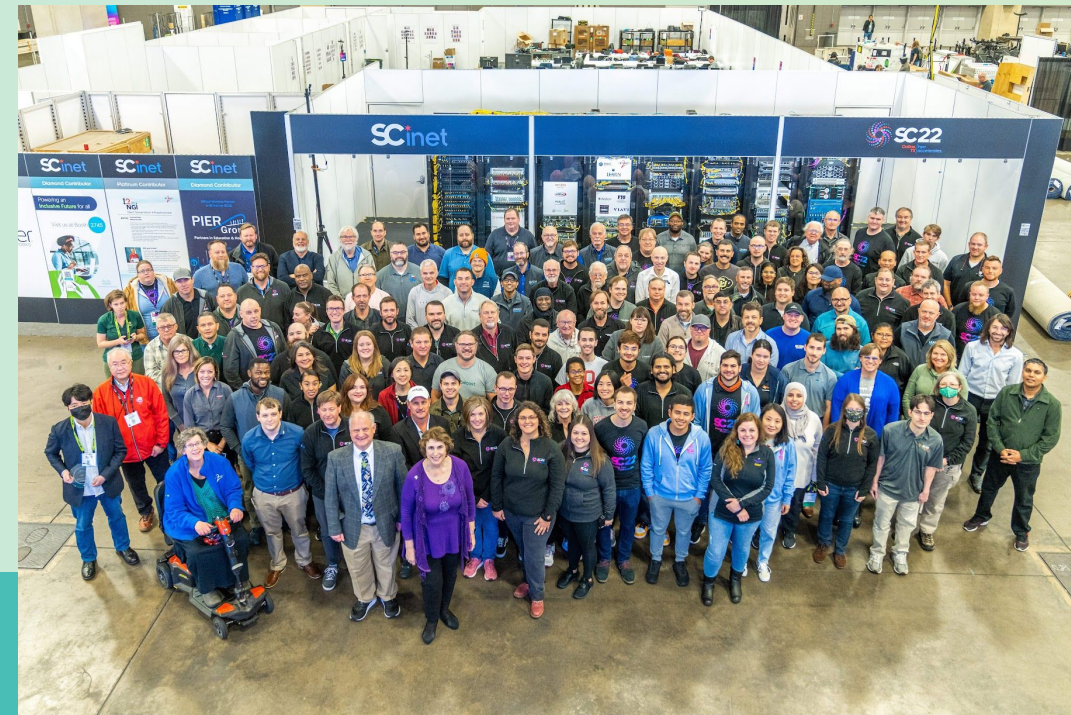
29 contributors loaning \$70M hardware, software, and services

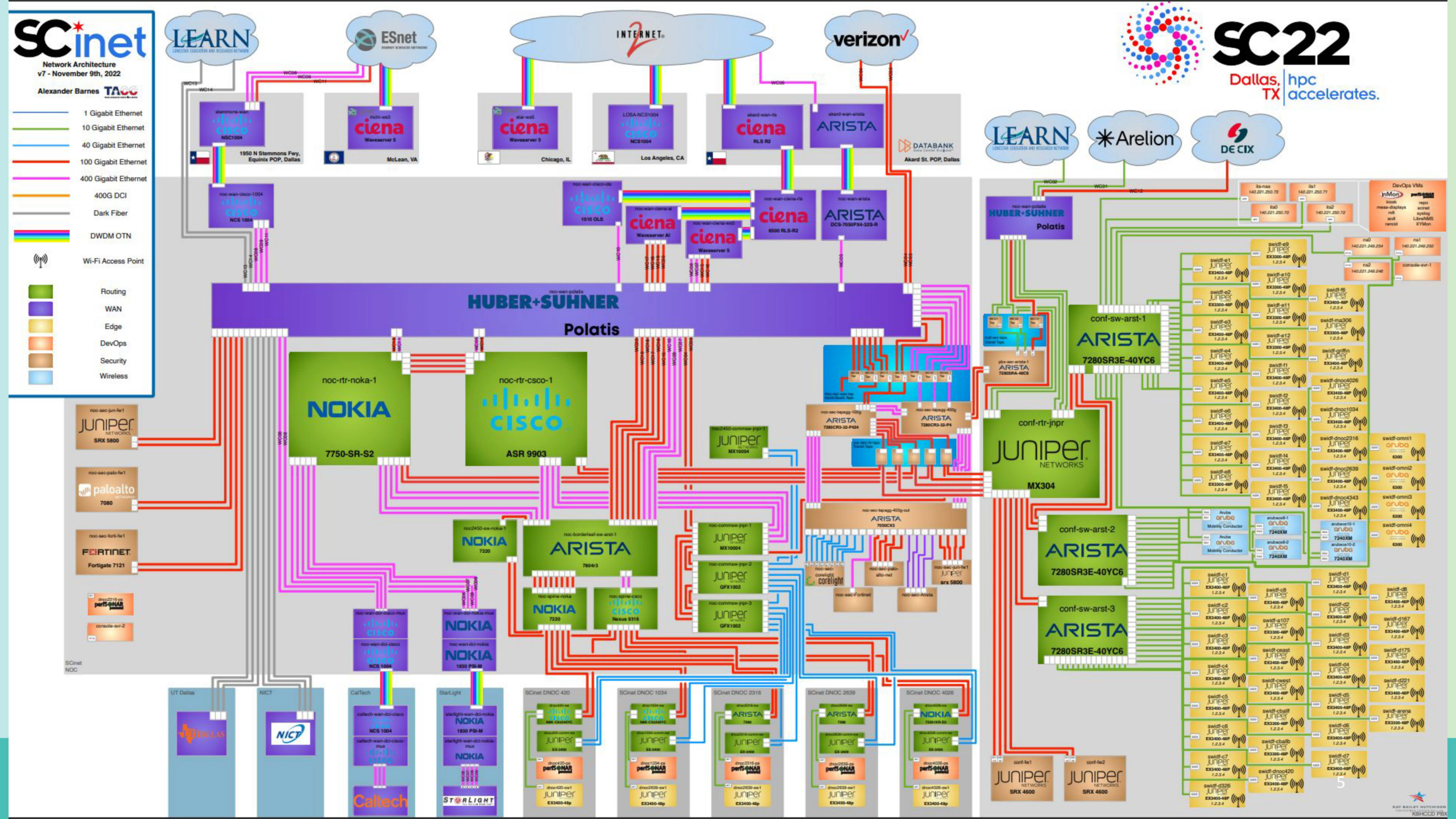
5.01Tbps of bandwidth delivered to the show floor.

450+ Wireless Access points deployed

Wifi 6E deployed for the first time last year

35+ miles of fiber optic cable installed



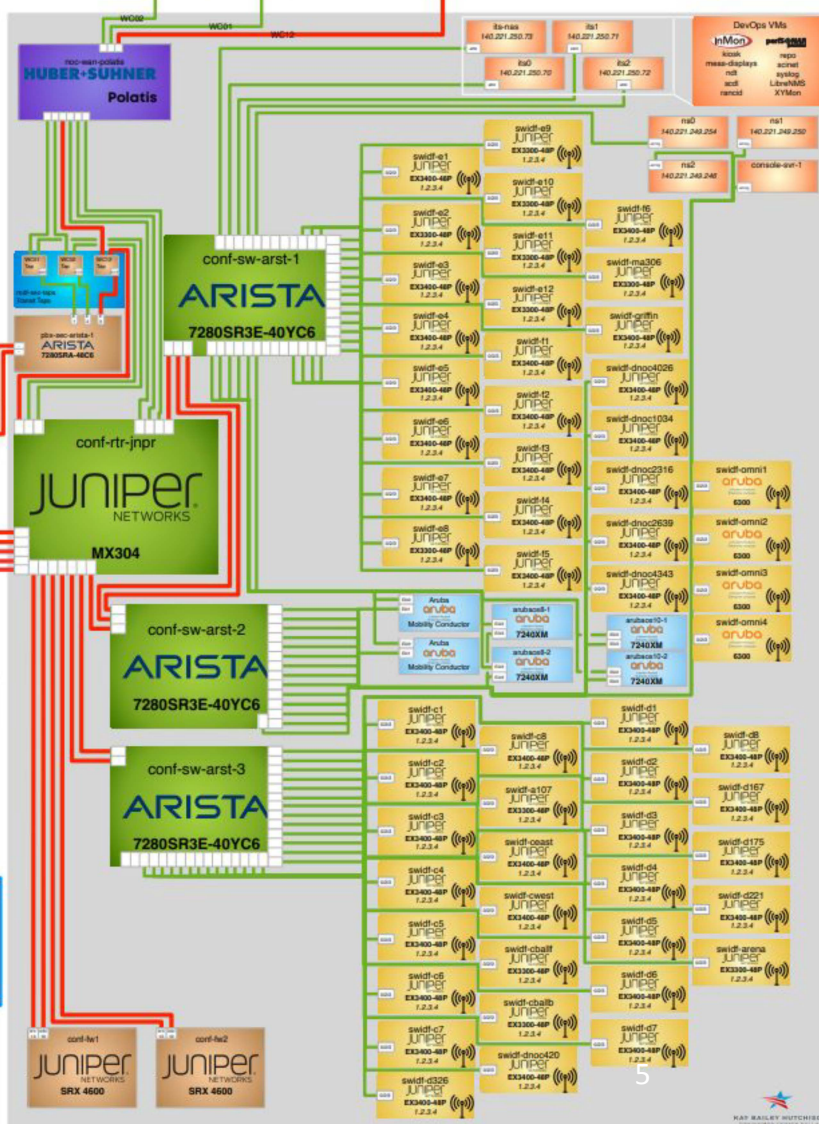


- 1 Gigabit Ethernet
 - 10 Gigabit Ethernet
 - 40 Gigabit Ethernet
 - 100 Gigabit Ethernet
 - 400 Gigabit Ethernet
 - 400G DCI
 - Dark Fiber
 - DWDM OTN
 - (W) Wi-Fi Access Point
-
- Routing
 - WAN
 - Edge
 - DevOps
 - Security
 - Wireless

- JUNIPER NETWORKS**
SRX 5800
- palobalto**
7080
- FORTINET**
Fortigate 7121
- peris@nlan**
dnc216-sw
- coracle-sw-2**

- UT Dallas**
- NICT**
- Calltech**
- StarLight**
- SCinet DNOG 420**
- SCinet DNOG 1034**
- SCinet DNOG 2316**
- SCinet DNOG 2639**
- SCinet DNOG 4026**

- LEARN**
- Arelion**
- DE CIX**



SCinet and InterOp testing



Contributing Hardware Vendors

- Ciena
- Juniper
- Cisco
- PIER Group / Aruba
- Arista
- Nokia
- Huber+Suhner
- PaloAlto
- EXFO
- FORTINET
- Viavi
- Cornelis Networks

Contributing Software / Services Vendors

- Corelight
- Gravwell
- inMon
- Tenable
- Chameleon

- Not an exhaustive list of all Contributors to SCinet

What do 175 people do?

- SCinet is made up of 14 different teams with diverse skills sets
 - Architecture
 - Communications
 - Contributor Relations and Logistics
 - DevOps
 - Wireless and Edge
 - Networked Research Exhibition (NRE)
 - Experimental Networks (XNET)
 - Fiber
 - Help Desk
 - Network Security
 - Power
 - Routing
 - Volunteer Services (Students)
 - WAN Transport

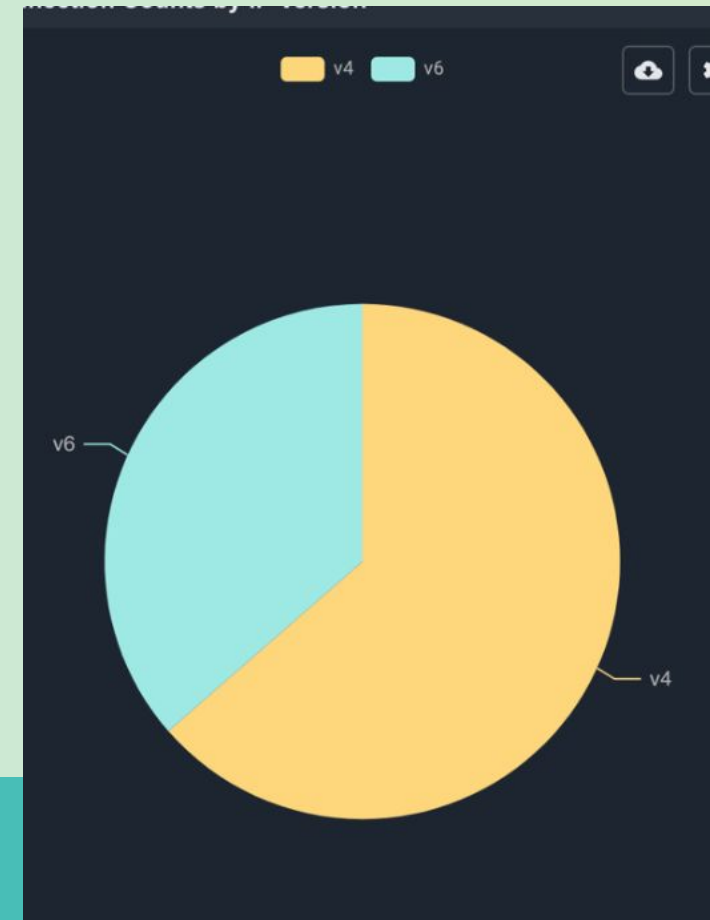
IPv6 at SC22

- First time turning IPv6 on for wireless clients at SC.
 - Dual Stack
- 5 IPv6 Peerings
 - Commercial: Arelion
 - R&E: LEARN, ESnet, Internet2 R&E and I2PX
- OSX, Android, iPhones just worked and seemed to default to v6 when available.
- Windows couldn't stateless autoconfig (sort of).

IPv6

- No complaints about connectivity during the conference.
- IPv6 connection counts hovered between 35-55% of total connections!
- Looks like many browsers and phones just used IPv6 by default.

Top IPv6 Services					
		proto	service	traffic	connections
	☆	tcp	ssl	1.52 TB	8619379
	☆	tcp	-	1.37 TB	3374174
	☆	udp	-	992.35 GB	5178624
	☆	tcp	http	391.56 GB	455116
	☆	udp	ayiya	252.69 GB	6574
	☆	tcp	dns	48.04 GB	839717
	☆	udp	dns	10.45 GB	48796427
	☆	udp	spicy_open vpn_udp	4.54 GB	18
	☆	tcp	ssh	3.76 GB	691



IPv6 just worked for Clients?

- Had to enable dhcpv6 for Windows hosts to use v6.
- Stateless autoconfig support not standard and can be hit or miss.
- Lots of IPv6 DNS queries sent out with no answer
- Applications still handle V6 and V4 differently.
 - Timeouts when V6 doesn't respond before failing over to v4
 - Some use RFC8305 (happy eyeballs) and send out queries at same time.
(<https://www.rfc-editor.org/rfc/rfc8305>)
- Need to remember your firewall rules for v4 AND v6.

IPv6 futures at SC23 and beyond

- v6 only SCinet management network.
- v6 for clients (wireless and wired) built into the SCinet Architecture.
- Better monitoring of what works and what doesn't (DNS, DHCP, etc).

XNET for SC23

- Some of the ideas currently being investigated
 - IPv6 focus on SCinet infrastructure
 - 5G on the show floor
 - Low earth orbit satellite communication integration
 - Fabric node in the NOC
 - Quantum networking
- Many more to be discussed during the SCinet March meeting in Indianapolis.

NRE for SC23

- Focus will remain on networking related research
- However, plan to extend NRE submissions to include other areas of research not directly tied to networking.
 - Research should still have a heavy reliance on HPC and R&E networks.
 - Networked Research Exhibition versus Network Research Exhibition
 - Subtle change, but opens the door to new participants and content.
- Return of the “SCinet Theater” stage.
 - Among other things will provide a platform for NRE participants to talk about their experiments to reach a wider audience.
- Call for submissions coming soon - stay tuned!

Interested in being a part of SCinet?



- All Volunteer group - funding comes from home organization.
- 2-3 week commitment on site.
- Email Hans with questions or interest: addlema@iu.edu



"Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Networking and Information Technology Research and Development Program."

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