

CCIRN Meeting Minutes
6/08/01
Stockholm, Sweden

I. Meeting Attendees

Asia-Pacific delegation:

Kilnam Chon (Co-Chair)	KAIST	KR	chon@cosmos.kaist.ac.kr
Shigeki Goto	Waseda Univ./ APAN	JP	goto@goto.info.waseda.ac.jp
Yasuichi Kitamura	APAN	JP	kita@jp.apan.net
Xing Li	CERNET	CN	xing@cernet.edu.cn
Yong-Jin Park	APAN	KR	park@nclab.hyu.ac.kr

European delegation:

Kees Neggers (Co-Chair)	SURFnet	NL	kees.neggers@surfnet.nl
Karel Vietsch (Info. Coord.)	TERENA	EU	vietsch@terena.nl
Claudio Allocchio	GARR	IT	claudio.allocchio@garr.it
Lajos Balint	Hungarnet-NIIFI	HU	H48BAL@ELLA.HU
Daniel Karrenberg	RIPE NCC	EU	daniel.karrenberg@ripe.net
Peter Villemoes	NORDUnet	EU	Peter.Villemoes@nordu.net
Vesna Vrga	CARNET	HR	vesna.vrga@carnet.hr

North-American delegation:

George Strawn (Co-Chair)	NSF	US	gstrawn@nsf.gov
Grant Miller (Info.Coord.)	NCO	US	miller@ccic.gov
Heather Boyles	Internet2	US	heather@internet2.edu
Ted Hanss	Internet2	US	ted@internet2.edu
David Macneil	Canarie	CA	David.Macneil@canarie.ca
Joe Mambretti	NWU/MREN.	US	j.mambretti@nwu.edu
James Williams	Internet2	US	williams@iu.edu

Latin America and the Caribbean delegation:

Saul Hahn	OAS	--	shahn@oas.org
-----------	-----	----	---------------

Meeting Co-Chairs: Kilnam Chon (Asia-Pacific), Kees Neggers (Europe), and George Strawn (North America)

II. Proceedings

1. Opening

The meeting was co-chaired by the attending Continental Co-Chairs, Kilnam Chon, Asian-Pacific Co-Chair, Kees Neggers, European Co-Chair, and George Strawn, North-American Co-Chair. The attendees introduced themselves. A review of the minutes of the year 2000 Yokohama CCIRN resulted in their approval.

2. Working Group Reports

Digital Video Working Group (DVWG)

Joe Mambretti reported on the activities of the Digital Video Working Group (DVWG). This WG demonstrated the Global Digital Grid Network at IGRID2000. They used DiffServ internationally to demonstrate that it is ready for wider deployment and use. The DVWG demonstrated Internet2 supported applications including:

- CSpan broadcast
- Broadcast from the Field Museum in Chicago of an environmental rescue sponsored by NASA

The DVWG also supported an Urologist's meeting in Seattle, Washington on June 6, 2001.

The general program of the DVWG is to support events by identifying measurements and capabilities required and by providing QoS, DiffServ, and monitoring. The DVWG is looking for participation from South America, which is now connected at high bandwidths by Global Crossing. The first South American connection is expected this week. REUNA (Chile) will be connected to Miami under the AmPath project. RNP2 in Brazil is expected to be the second country connected followed by RETINA in Argentina

Joe Mambretti is setting up a Digital Video Portal. This portal will establish channels and metadata. Users will only need to supply data and material. The portal provides QoS and DiffServ to reduce packet loss and jitter to provide performance under real conditions.

Measurement Working Group (MWG)

Yasuichi Kitamura described the activities of the MWG. It did not hold meetings during the IETF. There had been a BoF at the Asia-Pacific Advanced Networks meeting in Hawaii. At that meeting area reports were provided and there was a discussion of "one-way delay protocol", an Internet2 capability. Additional MWG activities included:

- Discussion of measurements, experimentation, and collaboration at the AI3 Meeting in Manila
- A BOF session at the NGI Workshop in Korea.
- Discussion of Route Reporter and a new Skitter at the CAMIS meeting in San Diego
- Discussion of DOS attack detection and dynamic routing graphing at Arbor Networks
- Discussion of collaboration with Latin and South America at the AmPath meetings, particularly measurement and QoS for sending telescopic data from Puerto Rico.

Quality of Service Working Group (QoSWG)

Karel Vietsch reported that the QoSWG still does not have a chair and there has been no activity by this working group. Adjacent to the San Diego IETF meeting, TERENA and Internet2 had organized on December 14, 2000 a meeting of US and European QoS experts. The discussions included Internet2 premium services and scavenger services (less than best effort). Tiziana Ferrari of Italy had presented the work-plan of TERENA's Task Force on Next Generation Networking (TF-NGN) on QoS. DANTE offered 5 Mbps service to New York City to support premium service. A mailing list was established to continue exchange of information.

Ben Teitelbaum (Internet2) is collaborating with Mauro Campanula of TF-NGN on Premium IP

service. Jim Williams of Indiana University is working on Qbone Scavenger service. He is working with Yasuichi Kitamura on QoS. A Tokyo to Korea video experiment was demonstrated at only 10 frames per second due to path asymmetries. This experiment indicated that end-to-end path measurement is critical. It was proposed that the name of the working group be changed to End-to-End Performance Measurement Working Group and that it should engage the physics community and other science communities interested in performance and QoS.

AI: Karel Vietsch and Claudio Allochio will work to find a chair for the QoSWG.

Network Storage Working Group (NSWG)

The NSWG had no activities since the last CCIRN meeting. It was pointed out that network storage is no longer a leading network research area. It is proposed to disband the NSWG.

3. Performance Measurement Activities in the Various Continents

RIPE measurement activities in Europe

Daniel Karrenberg reported on RIPE performance measurement activities. PING is an important measurement tool because it is ubiquitous. Every host implements PING to measure round trip time and delay. However one-way times and delays are important measurements that PING does not implement. The one-way trip times and delays require implementing test boxes near the border routers and time-stamping traffic. RIPE has implemented 56 Surveyor boxes at ISPs, research networks and other sites, including a few sites outside of Europe. They provide a full mesh of approximately 1900 paths. This capability is useful for identifying performance, providing trouble-shooting, and for planning. The Surveyor boxes provide delay, loss, and traceroute plots. This allows alarms to be implemented and trends analysis to be performed. New, planned activities include:

- Implementing scores, i.e., a simplified metric for users to easily identify trends in their performance
- Additional metrics: delay variations and throughput
- Implementing TRINO and other measurement tools
- Extending the performance measurement net to 150 boxes by the fourth quarter of 2001

RIPE installed a new clock card in October 2000. They are using Cat-5 cable instead of co-ax cable for runs of over 300 meters.

Researchers at Delft University are working on algorithms for performance measurement, e.g., if you measure performance from A to B, and B to C, what is the performance from A to C? They are providing for measurement of packet delay, number of hops, and packets arrived or lost.

AI: Anyone interested in participating in the RIPE performance measurement activities should send email to tmm@ripe.net.

The European physics community is developing a Grid utilizing performance measurement from the start. They intend to correlate network performance with applications performance.

Measurement Activities in the Asia-Pacific

Yasuichi Kitamura described performance measurement activities in Japan. At the Tokyo Exchange Point they have enabled OC3Mon, BGP session viewer, RTT graph, Skitter, Surveyor, and Network Weather Map. They are using both IPv4 and IPv6 monitoring so they can differentiate between those networks.

China has implemented a network Weather Map.

Australian performance measurement activities are described at <http://noc.aanet.au>. On the AI3 network they are providing monitoring to detect outages.

Korea has implemented passive performance measurement capabilities including MRTG, Mantra, and CINERA (Cisco capability). Korea has also implemented active performance measurement

capabilities that look like Surveyor plus Skitter, to measure one-way traffic and to identify multicast flows.

U.S. Performance Measurement Activities

U.S. performance measurement activities are intended to provide end-to-end performance for support of applications. Fault isolation is often difficult, particularly in isolating whether a fault is in an application or the network. Common tools include PING, Traceroute, active and passive measurement instrumentation, and visualization techniques.

NLANR implemented an Active Measurement Project (AMP) in 1998. It currently supports 10,000 device pairs and provides 3D visualization tools. NLANR also has a Passive Measurement Activity (PMA) implementing OC3Mon and other tools.

Performance measurement must support applications end-to-end to determine if an application can run between the two end points and to isolate bottlenecks between the end points to provide a basis for increasing the performance.

The National Science Foundation (NSF), in conjunction with the High Performance International Internet Service (HPIIS), is holding a workshop August 23-24 in San Diego, California to characterize international traffic.

AI: Anyone interested in the NSF/HPIIS Workshop on International network traffic on August 23-24, 2001 should contact Heather Boyles at heather@internet2.edu

The U.S. physics community is implementing the Grid Physics Network (GriPhyN). They have identified that, in implementing end-to-end performance, the local network is often the bottleneck. A tool is needed to identify the explicit location of bottlenecks to bring them to the attention of the providers responsible for that part of the network.

Opportunities for intercontinental collaboration

AI: Daniel Karrenberg will consider organizing a workshop to bring together the physics community (and other large-scale network communities) with the network measurement community.

4. Lambda Networking

STAR-Light (The Optical STAR-TAP)

The Science, Technology And Research-Transit Access Point (STAR TAP) provides engineering, outreach and advanced applications support for high performance international research network connectivity. STAR-Light is an advanced optical infrastructure to provide network services for advanced applications. It is located on the Northwestern University Campus at 710 North Lakeshore Drive in Chicago, Illinois. First light on the network is projected to be July 1, 2001 at 2 x OC12c service using Cisco routers. The first connection partner is expected to be SURFnet. By September 2001 STAR-Light is implementing lambda service. CA*net3/4 is planning to connect to STAR-Light with Gigabit Ethernet service 2.4 Gbps service. The State of Illinois Iwire funded dark fiber Gigabit Ethernet and is planning to connect to STAR-Light. Other potential participants include the NSF Distributed Terascale Facility (DTF) that uses a 40 Gbps service, Earthscope, the Network Earthquake Engineering Facility, the National Ecological Observatory Network and the Atacoma Large Array.

STAR-Light can potentially provide lambda service to Asia, CERN, CA*net4, SURFnet and others. A large range of network applications is expected on STAR-Light such as ultra DWDM. A description of STAR-Light is available at www.startap.net.

International Lambda Service

SURFnet will have its own lambda to STAR-Light from September. This is initially an experimental phase, and everyone is welcome to connect either in Chicago or in Amsterdam.

TERENA, in collaboration with STAR-Light, Canarie, Internet2 and SURFnet, is organizing a workshop for September 12-13 in Amsterdam on International lambda service. It is aimed at potential users, i.e. managers of research networks and communities such as the physics and astronomy communities, and Grid. It is a limited participation workshop intended to provide users with information on how to approach lambda networking. Details of the workshop are available at www.terena.nl.

NORDUnet now has 2.5 Gbps over lambda currently. They are planning for 10 Gbps lambda service.

Japan, China, Korea and other Asian nations are working on lambda networking. A Japan to Korea connection next year will provide 1 Gbps. They are planning to use lambda networking at the next general APAN conference.

5. Regional Updates

North America (George Strawn)

George Strawn described the U.S. Federal agency strategic planning for FY2001 and the workshop held by the Federal agencies on New Visions for Large Scale Networks: Research and Applications. The Large Scale Networking Coordinating Group provides coordination of advanced networking research activities across all U.S. Federal agencies. Their research program emphasizes three goals:

- Research
- Applications
- Testbeds

The LSN research program provides for agile optical networking, wireless technology, scaling, security and privacy, network management, network modeling and simulation, and understanding the global-scale network infrastructure. The goal of the applications research is to develop capabilities for

- Data intensive computing
- Collaboration technology
- Computational steering
- Distance visualization
- Workflow management and collaborative problem solving
- Remote instrumentation operation
- Management of large-scale, multi-institutional systems, e.g. Grids

The goal of testbeds is to develop cooperation between Federal, industry, and university researchers to transition from fundamental research to commercial applications and to develop standards in a realistic environment.

The LSN Workshop was held March 12-14, 2001 to provide private sector inputs into Federal networking research programs. The participants identified a vision of societal transformations that can take place over the next 10-20 years using networks and their recommendations for Federal research programs in networking needed to enable those transformations. They identified that significant research is needed on:

- Adaptive, dynamic, smart networking
- Scalability, network management and network modeling
- Trust, security and privacy
- Networking applications
- Middleware
- Testbeds
- Collaborative environments
- Revolutionary research
- Revisiting network fundamentals, e.g. IP

Latin America Update (Saul Hahn)

In Chile REUNA is building a link from Chile to STAR-TAP.

In Brazil: ANSP and RNP2 are building OC3 (155 Mbps) connectivity to STAR-TAP through Miami.

The AmPath project, including Florida International University and Global Crossing, is providing a pathway for Research and Engineering networking for the Americas. Connectivity from Miami to STAR-TAP is provided by the Abilene International Transit Network (ITN) service.

In Mexico, CUDI is providing academic connectivity to the U.S. at OC3 speeds. They have connectivity through the University of California at San Diego, Supercomputer Center. Connectivity through El Paso, Texas is pending. CUDI has agreements with CENIC, Abilene and other networks.

An undersea cable, Maya1 connects Florida to Central and South America. Telmex and other Central American providers are building this link. Global Crossing is also building extensive cable infrastructure to Central and South America. Another provider is Energia, a Spanish company that is initially providing 40 Gbps. The Arcos project of New World Networks is also building undersea fiber. The Arcos project provides a second, independent path for South American connectivity allowing the avoidance of a single point of failure for South American connectivity.

AI: CCIRN should work to improve participation in CCIRN by Latin and South American networks

Internet2 update (Heather Boyles)

Internet2 is developing a wide range of applications such as digital video, health-care and involvement with the arts communities. In the area of middleware, Ken Klingenstein is working on publication of an EduPerson framework and a collaboration with IBM called Shibboleth. They are also emphasizing end-to-end performance. A draft publication is available on the Internet2 Website at: www.internet2.edu. A call for participation in a workshop at the end of the summer will be issued shortly. In network infrastructure, Internet2 is providing the ITN service for connecting to STAR-TAP and Canarie. A map of the ITN is available at www.internet2.edu/international. Connectivity includes AmPath, CUDI through El Paso, BELNET, JANET, TEN-155 and other networks. Internet2 is also working to extend Abilene beyond university organizations to sponsored groups of educational institutions such as K-20 state educational networks.

Abilene is beginning to consider its follow-on network architecture. The current Abilene consortium of Cisco, Nortel, Qwest and Indiana University is set to expire in April 2003. Discussions are ongoing about how to upgrade Abilene and how to continue the service after April 2003.

An atlas of research and education networks may be seen at www.arena.internet2.edu.

The next Internet2 Joint Techs meeting is expected to be in Arizona in January 2002.

Asia-Pacific Update (Kilnam Chon et al.)

A successful APAN workshop was held in Hawaii. It is planned to hold regular APAN meetings in the future. The APAN nations would also like to hold joint technical workshops. APAN used to have a STAR-TAP connection. Now Japan and Australia will be connected via Hawaii. West Coast landings in the U.S. for Asian networks include Seattle, Sunnyvale, California and Los Angeles.

India is not currently well connected to APAN or Europe. It is invited to the next APAN meeting. New Zealand is also not an APAN member.

Major projects of APAN include:

- APII: major intra-continental links including Korea and Singapore

- AI3: major intra-continental satellite links

In Korea the KOREN network is moving to optical technology. Korea is discussing a direct link from Korea to Europe, possibly at 45 Mbps. Plans are for implementation sometime in 2001.

China has two research and education networks. The research network is moving to incorporate optical technology. CERNET (China Education and Research net) provides a backbone national network with 36 Points of Presence (PoPs). This network incorporates some dark fiber using DWDM. It employs two lambdas; one providing 45 Mbps, the second lambda uses Sonet technology. Major links of CERNET are OC48. Other links are OC3. CERNET charges incoming traffic by volume, which limits its use. Outbound traffic generally exceeds incoming traffic as a result of this charging model.

NSFCnet in China provides science institution connectivity. It provides a MAN in Beijing connecting six research institutions. One of its links is OC192 using Cisco routers with beta version software.

China has a 10 Mbps link to STAR-TAP, and an APAN, ATM link at 10 Mbps.

APAN-JP Update

APAN used to maintain a 45 Mbps link to Hawaii. APAN links now include a 2 x 155 Mbps link from Australia to Hawaii and a Japan to STAR-TAP link at OC3 (155 Mbps). Currently the link between Japan and Korea is approaching congestion. A demonstration of DifServe on this link worked well using premium service providing 30 Mbps for digital video. A TCP demonstration provided 35 Mbps throughput. NREN and NASDA cooperating on a multicast and QoS project. The network is moving from Cisco 7505 routers to Juniper M40 routers supporting DiffServ and IPv6.

Canarie Update (David Macneil)

CA*net3 has provided a cross-continent network from Newfoundland to British Columbia. Newfoundland is connected by 1500 km of fiber using Gigabit Ethernet. All GigaPoPs on this network are up and operational. Peer networks include six research networks in the US. Connectivity is to the STAR-TAP in the Chicago area. The follow-on CA*net4 is in the process of being designed. It is likely to provide a layer 3 aggregation service. Funding for CA*net4 is pending.

CA*net3 is developing a wide range of applications including distributed caching to remote schools and a multi-channel virtual studio.

JET Report (Grant Miller)

JET is a subgroup of the Large Scale Networking Coordinating Group that coordinates the advanced networking research and development programs across U.S. Federal agencies. The Joint Engineering Team (JET) has responsibility for architecting and implementing connectivity and transparency among the Federal research networks and commercial research networks such as Abilene. The JET has established three Next Generation Internet Exchange Points (NGIXs) at the University of Maryland on the East coast, at NGIX-Chicago, and at the Ames Research Center in Sunnyvale, California (NGIX-West). These three exchanges provide connectivity among the Federal research networks including NREN, ESnet, DREN, Supernet, and vBNS+. Peering arrangements are made between pairs of the Federal networks and Abilene.

The JET provides close coordination and cooperation with Abilene including connectivity and primary research programs such as IPv6, QoS, and multicast. JET also provides connectivity arrangements among Federal research networking organizations and to ISPs. Recent discussion identified that Abilene will provide international connectivity for Federal research laboratories not connected by Federal networks. Abilene will not provide exchange of routes between Federal networks and international networks.

The JET arranges specific connectivities and peering to implement demonstrations of advanced networking applications, e.g. for the annual SuperComputing Conferences.

The JET is coordinating the development of a software distribution to foster commonality of networking software, increased transparency, and the adoption of standards for software. This distribution is emphasizing open source software.

The JET coordinates extensive network performance measurement activities including the NLANR performance activities, and Web100 (software to automatically adapt an application to the network resources available, optimized for approximately 100 Mbps).

The JET is coordinating outreach to the physics and astronomy communities to increase network performance for their distributed collaborations.

In the Washington, DC area Qwest is providing a Qwestlink MAN service with OC48 service. This is expected to increase potentially to OC192 service and lambda service.

Europe (Peter Villemoes and Kees Neggers)

TEN-155 is currently the primary interconnection service for European research networking. It is ATM based.

GEANT is the name of the new backbone network that will be established towards the end of this year. Currently 11 sites around Europe are expected to connect at 2.5 Gbps. Costs of the network links is approximately the same as for the 155 Mbps links of the TEN-155 backbone, taking advantage of significant reductions in link costs in Europe. This network provides distributed access for intercontinental connectivity and primary international connectivity for the European research networks. Contracting for this network is pending with several providers to be chosen. While GEANT provides a major capacity for research connectivity, major European networks are likely to provide their own intercontinental links as well. For example, NORDUnet is connecting across the Atlantic at 2.5 Gbps and SURFnet has commissioned two Gigabit links to the U.S. as well as a lambda link from Amsterdam to Chicago.

6. IPv6

Under the RIPE framework, technical experts have been meeting in an IPv6 Working Group. Both commercial and research IPv6 services exist. All new networks being built are providing IPv6 as an integral service. The RIPE NCC serves as a consultant for any group wanting to implement IPv6.

Europe has many projects for IPv6. The European Commission has established policy on IPv6. The 6NET will be a project for a Europe-wide IPv6 testbed funded by the EC. Participants will include among others Cisco, the University of Brussels, DANTE, TERENA, IBM, UKERNA, SURFNET, NORDUNET, Siemens, and NTT. It is being implemented in a phased approach:

1. Install and build the network
2. Network operational
3. Test and evaluate
4. Define after-test activities

A wide range of projects was discussed at INET. TERENA's task force TF-NGN has a subgroup on IPv6, which also looks at implementing IPv6 on GEANT. GEANT will implement v6-capable routers. They will implement RIPE-assigned production addresses.

The WIDE project (Japan) and TERENA are holding a workshop in London in August that will include discussion of IPv6 for the Japan and European areas.

IPv6 in the Asian-Pacific Region

China supports the use of IPv6 and has joined the 6REN that provides connectivity to the U.S. Okia has funded IPv6 research with ten peers using IPv6 in Beijing. They are developing an internal broker to implement double stack dual capable routing.

Jun Murai (WIDE) is working on IPv6 in Japan. Korea also has IPv6 programs.

Internet2 IPv6

Internet2 is holding discussions with WIDE on IPv6. In the U.S., they are holding workshops on implementing IPv6 for campus providers. STAR-TAP and STAR-Light networks are both providing IPv6 native capable routers

7. CCIRN initiatives for 2001-2002

The CCIRN participants discussed new activities that CCIRN should be concerned with over the next year. They include:

- Distance learning: The APRUnet consortium is considering distance learning for the Asian-Pacific region. Europe should consider joining them.

AI: Kilnam Chon will request APRU to invite European participants.

AI: Distance learning should be placed on the agenda for the next CCIRN meeting.

- GRIDS: The Global Grid Forum (GGF) provides global cooperation on developing and using Grids. The next meeting GGF meeting will be in Washington, DC. They will have a BOF on networking. CCIRN should cooperate with them but not form a separate Grid working group.

8. Next CCIRN Meeting

The next INET is expected to be in the Washington, DC area from June 23-29, 2002. Its theme is policy. ISOC would like to coordinate other international meetings occurring in conjunction with the INET meeting. George Strawn will be the Acting CCIRN Co-Chair for the period until the next CCIRN meeting, and he and Grant Miller will organize and prepare that meeting.

AI: George Strawn and Grant Miller to coordinate with ISOC to schedule a time and place within INET for the next CCIRN meeting.

LIST OF ACTIONS RESULTING FROM THE MEETING

1. AI: Karel Vietsch and Claudio Allochio will work to find a chair for the QoSWG.
2. AI: Anyone interested in participating in the RIPE performance measurement activities should send
3. email to ttm@ripe.net.
4. AI: Anyone interested in the NSF/HPIIS Workshop on International network traffic on August 23-24, 2001 should contact Heather Boyles at heather@internet2.edu
5. AI: Daniel Karrenberg will consider organizing a workshop to bring together the physics community and other large-scale network communities) with the network measurement community.
6. AI: CCIRN should work to improve participation in CCIRN by Latin and South American networks
7. AI: Kilnam Chon will request APRU to invite European participants.

8. AI: Distance learning should be placed on the agenda for the next CCIRN meeting.
9. AI: George Strawn and Grant Miller to coordinate with ISOC to schedule a time and place within INET for the next CCIRN meeting.