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SCIC Digital Divide Workshops and Panels

An effective way to raise awareness of problems, and discuss approaches and opportunities for sol'ns with national and regional communities, and gov't officials

- □ ICFA Digital Divide Workshops: <u>Rio 2/2004</u>; Daegu 5/2005
- CERN & I2 Workshops on R&E Networks in Africa
- **World Summit on the Information Society**
- ♦ <u>In 2006</u>
- February: CHEP06 Mumbai: Digital Divide Panel, Network Demos, & Workshop [SCIC, TIFR, CDAC, Internet2, Caltech] "Moving India into the Global Community Through Advanced Networking"
- **May-June: US-India Summit (at UCSD)**
- Contraction Contractic Co
- April 14-17 2007 at APS: "Bridging the Digital Divide" Sessions Sponsored by Forum for International Physics

First ICFA Digital Divide Workshop UERJ, Rio de Janeiro, Feb. 16-20 2004

NEWS: Bulletin: <u>ONE</u> <u>TWO</u> WELCOME BULLETIN General Information Registration Travel Information Hotel Registration

Tutorials

 C++
 Grid Technologies
 Grid-Enabled Analysis
 Networks
 Collaborative Systems Theme: Global Collaborations, Grids and Their Relationship to the Digital Divide For the past years the SCIC has focused on understanding and seeking the means of reducing or eliminating the Digital Divide, and proposed to ICFA that these issues, as they affect our field of High Energy Physics, be brought to our community for discussion. This led to ICFA's approval of the first Digital Divide and HEP Grid Workshop. More Information: http://www.lishep.uerj.br

UERJ



CLAF CNPQ

HEPGRID AND DIGITAL

DIVIDE WORKSHOP



FAPERJ

Sessions & Tutorials Available (w/Video) on the Web







SPRACE: São Paulo Regional Analysis Center 🖗

*1st Phase:

ICFA

1 Server + 288 GB SCSI

22 Nodes + 792 GB SCSI

1 Server + 4 TB RAID

★2nd Phase:

Add 32 Nodes

*****3rd Phase:

Add 32 Nodes + 1 Server



Networks and Grids for HEP and eScience: T2 HEPGrid in Brazil





Harvey B. Newman California Institute of Technology HEPGrid T2 Inauguration, UERJ December 20, 2004



Harvey Newman





DISUN: Data Intensive Sciences Univ. Network UERJ & SPRACE Tier2s in the Int'l CMS Grid





possible a new Science era in this region

of the world:

	Subject	Argentina	Brazil	Chile	Colombia	Costa Rica	Equator	Mexico
	Astrophysics							
	e-VLBI							
	High Energy Physics							
	Geosciences							
	Marine sciences							
	Health and Biomedical applications							
Dec	Environmenta I studies			A.Santo	ro			17

SC2004 Demonstration: 2.93 (1.95 + 0.98) Gbps Sao Paulo – Miami – Pittsburgh (Via Abilene, CHEPREO, ANSP+RNP)



SC2009: 8.6 Gbps Between **South and North Hemispheres**

STADO

UERJ

to **HEPGrid** in **Production**





Source: Bandwidth Challenge committee



HEPGRID (CMS) in Brazil

ICFA

 HEPGRID-CMS/BRAZIL a project to build a Grid that
 At International Level will be integrated with CMS Grid based at CERN; focal points include Grid3/OSG and bilateral projects with Caltech Group





Closing the Digital Divide: R&E Networks in/to Latin America

RedCLARA (EU): 155 Mbps Ring Interconnects 18 Latin American NRENs; 622 Mbps to Europe

u Upgrade in 2009: 10G Santiago – Buenos Aires for Auger; Extension to Brazil under study

ANSP & WHREN/LILA (NSF)

622 Mbps Sao Paulo – Miami from 2004

➡ to 1.2 Gbps in 2005

➡ to 2.5 Gbps from 10/2006

<u>1H 2009: RNP + ANSP Collaborating</u> on 2 X 10G Sao Paulo – Miami

Connections to Atlantic Wave & Internet2 (US), and onward to Fermilab and CERN



Brazil in 2011: Next-Generation "Ipê" 10G + 3G Core Network





29,000 km of fiber to RNP; +Free OPEX → 29 10G or 3G Waves Connect 24 of 27 state capitals by 2011 Hydroelectric power lines, and optical fibers will reach the 3 northern capitals by 2013

Cross Border Dark Fiber Initiative Underway: to Argentina, Chile, **Uruguay, Paraguay**



RNP: "Do It Yourself" Metro Fiber Networks in 27 Brazilian State Capitals



The "DIY" Spirit

Form a consortium
Build a user-owned fiber network
Light it up and go !

<u>Costs: \$500K + \$80k/Yr.</u>

- Build out the fiber using poles from the electric company: \$ 8,000/km
- Monthly rental: 40 poles/km at \$ 1/month each
- Equipment costs include operation and maintenance
- Recover investment in 3 yrs. Versus traditional telecom solution: \$ 240k/Year for 1000X less capacity.







Optical Fiber Through the Amazon: Porto Velho-Manaus



International ICFA Workshop on Digital Divide Issues



http://fismat.uia.mx/HEP/ICFADDW2007



2011: ALICE Tier1 Now Under Development at UNAM Support for the R&E Network of Mexico

Local Organizers S. Carrillo, UIA (Chair) A. Zepeda (Cinvestav) C. Casasus (CUDI I2) L. Nellen, UNAM G. Contreras, Cinvestav J. Martinez (Cinvestav)



> 100 Participants <u>70% from Latin America</u> Presentations: Latin Am. NRENs; <u>Aymar, Oddone, Barish</u> Tutorials on Advanced Tech.: EVO, Networks, Dynamic Circuits

Mexico City

October 24-27, 2007

Latin Am. Country	NREN Org- anization	Nat'l Connections [Access BW often Less than this]	External Capacity	A. Santoro M. Stanton		
Argentina	INNOVA-RED	256 Kbps – 34 Mbps	90 Mbps RedCLARA (temp. disconnected 12/2006-1/2007)			
Bolivia	ADSIB	64 – 128 Kbps	1.5 Mbps (commodity	')		
Brazil	RNP	up to 10 Gbps	2.5 Gbps to 2X10 Gbp	os (RNP+ANSP)		
Chile	REUNA	up to 310 Mbps [Access 10 Mbps]	90 Mbps RedCLARA			
Colombia	RENATA	10 Mbps	10 Mbps RedCLARA			
Costa Rica	CR2Net	32 – 512 Kbps	10 Mbps RedCLARA	(disconnected)		
Cuba	RedUniv	19.2 Kbps– 2Mbps	Not known (commodi	ty)		
Ecuador	CEDIA		10 Mbps RedCLARA			
El Salvador	RAICES		10 Mbps RedCLARA			
Guatemala	RAGIE		10 Mbps RedCLARA			
Honduras	HONDUnet		Not known (commodi	ty)		
Mexico	CUDI	155 Mbps [Access 2-34 Mbps]	1 Gbps-RedCLARA, 1 Gbps CENIC (PacW	ave)		
Nicaragua	RENIA	100 Mbps	10 Mbps RedCLARA			
Panama	RedCYT		45 Mbps RedCLARA			
Peru	RAAP	10 Mbps	45 Mbps RedCLARA			
Uruguay	RAU	64 Kbps to 1 Mbps	34 Mbps RedCLARA			
Venezuela	REACCIUN	155 Mbps & 34 Mbps	90 Mbps RedCLARA	and Ampath		

INSTITUTE OF ICHNOLO

Networking in the LHC Era



- The LHC experiments, with their distributed Computing Models and worldwide involvement in LHC physics, have brought a renewed focus on networks
- The performance and reliability of the networks in 1st year of running at 7 TeV has been highlighted as a major element in the LHC program's success
- This has given the experiment the confidence to seek more agile and effective Models of data distribution and/or remote access
 - □ To harness the efforts of physicists worldwide in pursuit of discoveries at the LHC, and to increase their competitiveness
 - Bringing new physics opportunities, and also new challenges to the worldwide network infrastructures supporting the LHC program

This also means we must continue to address the Digital Divide in many world regions, as the rate of progress in the developed world accelerates



O Single node Exchange Point **O** Distributed Exchange Point

ITU: Announces A World Broadband Plan 9/2010 Closing the New Digital Divide

http://www.broadbandcommission.org

Goal: 50% of World Population with Broadband by 2015





ICFA) The UbuntuNet Alliance www.ubuntunet.net

<u>UbuntuNet</u>

Alliance 13 Eastern and Southern Africa NRENs Eb@le (Rep. of Congo) **EthERNet** (Ethiopia) **KENET** (Kenya) **MAREN** (Malawi) **MoRENet (Mozambique) RENU (Uganda) RwEdNet (Rwanda)** SomaliREN (Somalia) SUIN (Sudan) **TENET (South Africa) TERNET (Tanzania) Xnet (Namibia)**





Key developments during Jan 2010 – Jan 2011 include

*****Growth of membership to 13 members, latest is Xnet, the Namibian NREN;

*Increasing the interconnections between the Alliance and GÉANT from 1 Gbps to 20 Gbps to cope with the growing traffic. This includes a 10Gbps point to point link to South Africa to enable high volume data transfers.

*Secured 15M Euro from the EU Commission, through the African Union Commission, for rolling out the regional network. 20% of this provided by the member NRENs of the Alliance.

* Implementation starts this quarter. *Increase in connections from member NRENs to the Alliance router in London from 64 STM-1s to 69 STM-1s.



Professor Alberto Santoro, UERJ Professor Roberto Salmeron Mr. Nelson Simoes, Professor Michael Stanton, RNP Dr. Luis Lopez, ANSP

Prof. Ricardo Vieiralves, Rector of UERJ Dr. Nilcéa Freire, Former Rector of UERJ and Minister of Womens' Affairs

Dr. Sergio Rezende, Minister of Science and Technology Dr. Luis Manuel Rebelo Fernandes, President of FINEP Dr. Ruy Garcia Marques and Dr. Jerson Lima Silva of FAPERJ Dr. Carlos Henrique de Brito Cruz, Scientific Director of FAPESP

Creating a Sustainable Cycle of Innovation

By meeting the challenges of globally distributed data, we are creating systems and tools with new levels of capability. We expect this will lead to new modes of research and learning.

By including students and young scientists from Brazil, and many countries, directly in this process, we aim to create a sustainable cycle wherein new generations of youth learn to cope with, adapt to, and exploit ongoing advances in information technologies; and most importantly to create new approaches themselves that lay the foundation for the next cycle of innovation, resulting in a level of capability, and knowledge, that grows exponentially over time.

It is this cycle that will also determine much of the ability of nations such as Brazil, to compete effectively in the global marketplace, in the Information Age. And it is the collaborative aspects of this process that will foster greater mutual understanding among peoples in different regions of the world.