RedCLARA Compendium of Latin American National Research and Education Networks 2011

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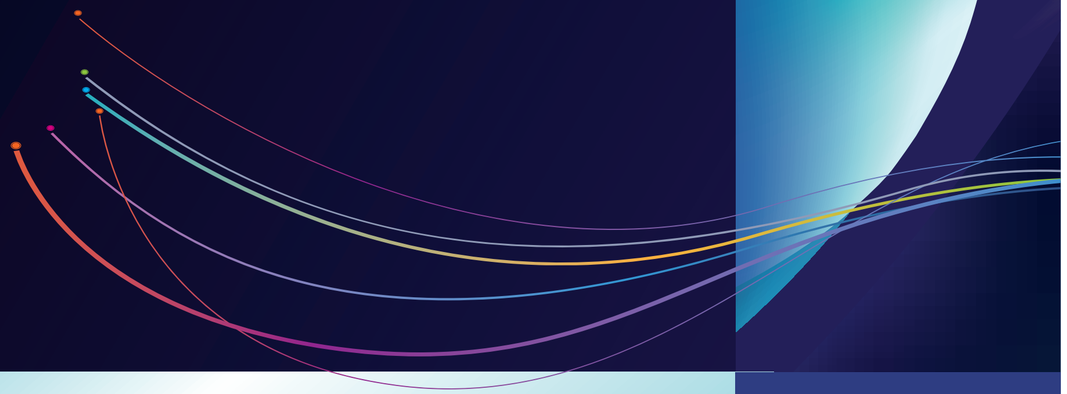

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«The European Union is constituted by 27 member states which have decided to progressively join their practical knowledge, their resources and their destinies. Over an expansion period of 50 years, together they have built a stability, democracy and sustainable development zone, and have also preser ved cultural diversity, tolerance and individual liber ties. The European Union is committed to sharing its achievements and values with countries and peoples which are beyond its borders».

The European Commission is the executive body of the European Union.

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Contents

Introduction

The third edition of the **Compendium of Latin American National Research and Education Networks**, addresses with greater accuracy network-related issues –in terms of infrastructure- and the services which operate over it.

For the creation of this Compendium we developed an online system which facilitated the completion of the questionnaire by the leaders of each National Research and Education Network (NREN) across the continental space covered by RedCLARA's layout. The questionnaire was available to be answered from mid January to the end of March 2012.

The aim was to get further insights into issues which characterise the networks' relationship with their users and to introduce a more efficient sample of the reality within each network that is part of RedCLARA and of the ALICE2 project.

The results obtained through the questionnaire have been shown almost entirely in the study; the tendencies have been summarised in the chapter called "Key factors summary".

We hope that the third edition of the **Compendium of Latin American National Research and Education Networks** can be a useful instrument for decision-makers, leaders, technicians and users from the NRENs across the region and from other parts of the world. As usual, we are looking forward to receiving your suggestions, contributions and opinions.

María José López Pourailly
Communications and Public Relations Manager
RedCLARA

Key factors summary

Legal status and relationship with the government

Nine out of the 14 NRENs which took part in the RedCLARA Compendium of Latin American National Research and Education Networks 2011 have been granted an independent legal status. Two of these networks are a government agency or part of a ministry.

Major changes in the NRENs

For three of the four NRENs which reported the major changes they experienced in 2011, the incorporation of new members was the greatest landmark. Furthermore, for Brazil, the year herein reported will be remembered as the year in which its backbone's capacity was increased by 280%, and for Costa Rica as the year when they started off on their way to its consolidation.

Policies

50% of the networks do not have a Connection Policy and of the remaining 50% which does have one, 29% does not require a formal acceptance of these policies. Four NRENs have an Acceptable Use Policy (AUP) and only two networks have a Security Policy.

Users

In general terms, the largest number of connected institutions (762, according to the figures given by the NRENs) can be found in the university sector. This is followed by research institutes (172), institutes of further education (103, although this figure represents only Mexico) and state agencies (79). The connectivity level for these institutions does not feature variations in relation to 2010. In fact, typical connectivity is still within the range of 10 Mb/s or more but less than 100 Mb/s, and only Brazil, Chile and Ecuador report connections measured in Gb/s. Certainly, the main access to the network for the institutions connected to the NRENs, is carried out through the IP protocol.

In terms of type of connection, the main connection alternative is carried out through a PoP (Point of Presence) and secondly through a MAN (Metropolitan Area Network) or RAN (Regional Area Network) run by the NREN.

Network and connection services

Eleven of the NRENs which answered the questionnaire used for the elaboration of the Compendium have a NOC (Network Operations Centre); nine of these networks own their NOC and two of them outsource it from another company. All NOCs cater for all their members, and this shows in most cases a national coverage of the service.

As for the number of PoPS, in 2009 the whole set of NRENs totalled 76 points of presence. This number increased to 103 in 2010, but went down to 79 in 2011. Numbers show, though, that networks tend to remain stable in their size, except in Mexico, which features great variations from one year to the following, and Chile, which added five PoPs over the last year. Of the established networks, only CEDIA and RAAP do not offer optical connectivity in any of their PoPs, and RAU still does not administer circuits. All networks administer at least one piece of routing equipment.

As for backbones' capacity, in 2011 Colombia and Ecuador joined the group of NRENs which have a core capacity that can be measured in Gbps, a group that until 2010 was made up of RNP, REUNA, CUDI, RAU and CENIT.

In relation to dark fibre, in 2010 only Argentina and Uruguay reported having a minimal percentage of their network in dark fibre; in 2011 this group was joined by the academic networks in Brazil, Chile and Guatemala. Brazil and México currently have CBF (Cross–Border Fibre), the first with Argentina and the second with the USA; Venezuela plans to have it.

RNP, REUNA, CEDIA and CUDI offer on-demand bandwidth through manual processes run by the NOC.

Finally, in general terms, expectations about future changes focus on the growth of the network, of the bandwidth and of the number of members connected.

Traffic

The chapter begins with information on the flow of traffic recorded by four NRENs in 2011. Why only four? Because the other ten networks which answered the questionnaire refrained from giving information on this subject, and although the sample is too small to make conclusions, it is equally true that it is evident that the flow of data from country to country is absolutely different in each category. Not enough information on the subject of congestion was provided; however, it is worth mentioning the peak consumption rates in the following networks in 2011: REUNA (330 Mbps), RNP (1 Gbps), RENATA (92 Mbps) and RAU (108 Mbps). Although they took place in specific moments, such peak rates were found in nearly 80% of the national network's access capacity.

As regards the monitoring and management of network performance, only one network has a Performance Enhancement & Response Team (PERT) and one other network has included it in its future plans. Six NRENs indicated they have other tools to monitor or solve their networks' problems.

Eight out of the fourteen NRENs which took part in this edition of the Compendium received an added total of 111 requests for IPv4 prefixes. Only three NRENs foresee a lack of IPv4 addresses for their networks and two for their clients. 198 IPv6 prefixes have been allocated and eight networks provide native services of the Internet Protocol 6. In general terms, the networks provide IPv4 services and dual IPv4/IPv6. Only Brazil's network features institutions connected already using IPv6.

Other services

Two NRENs (14%) indicated they offered Premium QoS in their networks (one less than in 2010); only one NREN features the Less than Best Effort - IP level, and eight NRENs marked the Best Effort – IP.

In terms of security services, three NRENs use a structured format to exchange information on computer incidents; five NRENs use network equipment to respond to security threats; five NRENs have taken measures to reduce junk email reception, and two NRENs have developed traps for those who try to breach their networks' security. The same seven NRENs that in 2010 offered responses to computer security incidents (CSIRT) continued to do so in 2011.

The networks in Brazil, Mexico and Venezuela declare to provide an Authorisation and Authentication Infrastructure (AAI), and only the first two give their users access to a web federation with single sign-on access, operated by the same NREN. The only NREN that declares inter-federation is Brazil's, and it does it through EduGAIN; under the name CAFe, this federation has an estimated number of one hundred thousand users.

The services for hosting commercial content servers in the NREN's network and those of dedicated/special connectivity to provide high levels of connectivity to commercial content servers captured just a little attention from the NRENs; in fact, none of them features any of these services, and only one of them has plans to implement the first, and 3 to implement the latter.

Five NRENs have multimedia servers and four of them have video servers to be used by their sites; these are the services which capture the greatest attention from the academic networks in the region, followed by distributed storage for grid users, which is already provided by one NREN and is planned to be used by eight NRENs. Two networks offer content mirroring from outside their networks and five networks intend to implement this service in the future. None of the countries has a national storage service.

Brazil and Venezuela, within the countries connected to RedCLARA, and Bolivia, from the group of countries soon to be connected, offer the Voice over IP (VoIP) service.

Brazil, Chile, Colombia, Ecuador, Mexico and Venezuela provide a centrally-managed videoconference service; Chile, Colombia and Ecuador also provide desktop videoconference.

RNP, REUNA, RENATA and CUDI offer a platform or a set of collaboration services for their work groups; CEDIA is planning to implement them; in this point all networks consider mailing lists; four of them include document storage, the calendar and activity planning, and three networks include wikis.

Bolivia, Ecuador and Mexico have plans to offer the multimedia content repositories service, which is already deployed by the NRENs of Brazil, Chile and Colombia.

Argentina, Brazil and Ecuador have a national computing service; Chile, Mexico and Venezuela are planning to implement it.

Until 2010 only REUNA (Chile) declared to offer grid services to the community it caters for; in 2011 it was followed by CEDIA (Ecuador) and nine networks stated to have plans to implement them in the future. As for clouds, only RNP (Brazil) and CENIT (Venezuela) have plans for the service's future implementation; none of the NRENs declared to offer it.

Only the NRENs from Colombia, Ecuador and Venezuela offer e-Learning services.

Funding and staffing

All NRENs –except Ecuador's- manage their budget based on the calendar year. The information collected regarding annual funds shows meagre budget scenarios.

Most NRENs identified their users and clients as their main source of funding, while two NRENs identified their governments (or public agencies) in the same role.

As regards the modality for charging their members/users, it is not possible to identify a tendency among the NREN.

Except in the case of Brazil, Chile and Venezuela, which have a significant amount of staff working directly in the NREN activities, the number of people who actually constitute the staff of the Latin American networks is reduced.

1 Basic information

1.1 NRENs that answered the questionnaire

The 2011 edition of the RedCLARA Compendium of Latin American National Research and Education Networks was produced with the results obtained from the questionnaire, developed online thanks to the support from the IADB-RPG project called "Strengthening of Regional Advanced Academic Networks through CLARA as a Regional Public Asset", and applied between January 11 and March 25, 2012 to the NRENs from those countries in the region which are members of the ALICE2 project and members of RedCLARA. Twelve of the thirteen national networks currently connected to RedCLARA answered the questionnaire (as in 2010, REDCYT refrained from doing so); the Paraguayan NREN, ARANDU, and the Bolivian NREN, RIAB-ADSIB, both in the process of getting connected, also participated.

In most tables and graphs, in order to identify each NREN we used the acronyms that abbreviate their names; furthermore, the order in which each NREN is presented in these tables follows the alphabetical order of the countries that were invited to answer the survey.

It is worth mentioning that those texts from the comments made by those who answered the questionnaire were NOT edited in order to maintain their originality and not to alter the sense intended by the person who answered.

Table 1.1.1: NRENs that completed the questionnaire and number of answers given

Country	NREN	Website	Answers given
ARGENTINA	Innova|Red	http://www.innova-red.net	163
BOLIVIA	RIAB-ADSIB	http://www.adsib.gob.bo http://www.ran.edu.bo	140
BRAZIL	RNP	http://www.rnp.br/	211
CHILE	REUNA	http://www.reuna.cl	194
COLOMBIA	RENATA	http://www.renata.edu.co	192
COSTA RICA	RedCONARE	http://www.cenat.ac.cr/index.php?option=com_content&view=article&id=77&Itemid=128	107
ECUADOR	CEDIA	http://www.cedia.org.ec	167
EL SALVADOR	RAICES	http://www.raices.org.sv	151
GUATEMALA	RAGIE	http://www.ragie.org.gt	127
MEXICO	CUDI	http://www.cudi.edu.mx/	229
PANAMA(*)	REDCYT	Does not have a website	90
PARAGUAY	ARANDU	Inactive site	68
PERU	RAAP	http://www.raap.pe	94
URUGUAY	RAU	http://www.rau.edu.uy	100
VENEZUELA	CENIT	http://www.cenit.gob.ve/	175

Table 1.1.1 legend:
(*) Did not complete the questionnaire
Connected to RedCLARA
Not connected to RedCLARA

Table 1.1.2: Basic information about the Latin American NRENs in the Compendium

Country	Full name of the NREN in its original language	Full name of the NREN in English	Abbreviation	Website	Address	Telephone	Generic email
ARGENTINA	Innova|Red	Innova|Red	I|R	http://www.innova-red.net	Esmeralda 339 - 2do Cuerpo y 3er piso	(+54) 011 432 284 88	+info@innova-red.net masinfo@innova-red.net
BOLIVIA	Agencia para el Desarrollo de la Sociedad de la Información en Bolivia	Red de Integración Académica Boliviana	RIAB - ADSIB	http://www.adsib.gob.bo http://www.ran.edu.bo	Calle Ayacucho esq. Mercado No. 308 - Edif. Vicepresidencia del Estado piso 3	(+591) 2 212 200 772	mmercado@adsib.gob.bo
BRASIL	Rede Nacional de Ensino e Pesquisa	Red Nacional de Enseñanza e Investigación		http://www.rnp.br/	RNP - Rio de Janeiro Rua Lauro Muller nº 116 sala 1103 22.290-906 Rio de Janeiro, RJ - Brasil RNP - Campinas Prédio da Embrapa/Unicamp Av. André Tosello, nº 209 Cidade Universitária Zeferino Vaz 13.083-886 Campinas, SP - Brasil RNP - Brasília SAS, quadra 5, lote 6, bloco H, 7° andar, Edifício IBICT 70.070-914 Brasília, DF - Brasil	(+55) 21 210 296 60	info@rnp.br
CHILE	Red Universitaria Nacional	Red Universitaria Nacional	REUNA	http://www.reuna.cl	Canadá 239, Providencia, Santiago	(+56) 2 337 03 00 (+56) 2 337 03 40 (+56) 2 337 03 50	direccion.ejecutiva@reuna.cl
COLOMBIA	Red Nacional Académica de Tecnología Avanzada	Red Nacional Académica de Tecnología Avanzada	RENATA	http://www.renata.edu.co	Carrera 18 No. 79 - 47 Oficina 201 Edificio Ofilago, Bogotá D.C.	(+57) 1 530 26 04	direccion@renata.edu.co
COSTA RICA	Red Nacional de Investigación y Educación en Redes Avanzadas del Consejo Nacional de Rectores	Red Nacional de Investigación y Educación en Redes Avanzadas del Consejo Nacional de Rectores	RedCONARE	http://www.cenat.ac.cr/index.php?option=com_content&view=article&id=77&Itemid=128	CONARE, Edificio "Dr. Franklin Chang Díaz", de la Embajada de los Estados Unidos de América, 1,3 kms al Norte. Pavas, San José, Costa Rica	(+506) 2 519 58 39 (+506) 2 519 57 99	cnca@cenat.ac.cr admin@redconare.ac.cr

Country	Full name of the NREN in its original language	Full name of the NREN in English	Abbreviation	Website	Address	Telephone	Generic email
ECUADOR	Consorcio Ecuatoriano para el Desarrollo de Internet Avanzado	Ecuadorian Consortium for the Development of Advanced Internet	CEDIA	http://www.cedia.org.ec	Av. 12 de Abril y Agustín Cueva, Ciudadela Universitaria, Edificio Laboratorios Tecnológicos 3er Piso	(+593) 7 405 10 00 ext.: 4220	info@cedia.org.ec
EL SALVADOR	Red Avanzada de Investigación, Ciencia y Educación Salvadoreña	Salvadorian Advanced Research, Science and Education Network	RAICES	http://www.raices.org.sv	Universidad Centroamericana José Simeón Cañas, Dirección de Informática, Bulevar Los Próceres, Antiguo Cuscatlán, La Libertad, El Salvador	(+503) 2 210 66 36	ribarra@uca.edu.sv
GUATEMALA	Red Avanzada Guatemalteca para la Investigación y Educación	Guatemalan Advanced Network for Research and Education	RAGIE	http://www.ragie.org.gt	11 Avenida 32-35, zona 5	(+502) 2 362 06 80	info@ragie.org.gt
MEXICO	Corporación Universitaria para el Desarrollo de Internet A.C.	University Corporation for Internet Development A.C.	CUDI A.C.	http://www.cudi.edu.mx/	Parral # 32 , Colonia Condesa, México D.F.	(+52) 55 521 130 60	cudi@cudi.edu.mx
PERU	Red Académica Peruana	Peruvian Academic Network	RAAP	http://www.raap.pe	Av. San Luis 1771 - San Borja - Lima - Perú	(+51) 1 270 53 50	contacto@raap.pe
PARAGUAY	Red Avanzada para la Educación, Investigación e Innovación. ARANDU	Advanced Network for Education, Research and Innovation. ARANDU	ARANDU				
URUGUAY		Uruguayan Academic Network	RAU	http://www.rau.edu.uy	Colonia 2066, Montevideo, Uruguay	(+598) 2 408 39 01	noc@seciu.edu.uy
VENEZUELA	Fundación Centro Nacional de Innovación Tecnológica	National Technological Innovation Centre Foundation	CENIT	http://www.cenit.gob.ve/	Complejo Tecnológico "Simón Rodríguez". Base Aérea "Generalísimo Francisco de Miranda" Sector Noreste, La Carlota, Caracas, República Bolivariana de Venezuela	(+58) 212 555 81 00	atencion@cenit.gob.ve

1.2 The NRENs in Latin America have various legal forms

In this section we distinguish two parameters which, when put together, help to characterise the legal form they have:

- Whether they are separate legal entities in their own right; and
- The relationship with their country's government.

The different legal forms of Latin American NRENs and their relationship with their governments are illustrated on Map 1.2.1.

Legal form

Nine NRENs declare to be a separate legal entity in its own right. Three networks (Innova|Red, RedCONARE and CENIT) indicate they are either a separate legal entity or part of a larger organisation. RAU is the only network with a legal form which is not repeated in any of its peer networks; it indicates it is neither a separate legal entity nor part of a larger organisation, and declares to depend directly on a higher education institution: the Universidad de la República.

Relationship with the government

There are four different situations in this point, all of them displayed on Table 1.2.1:

- There isn't a formal relationship: this is the case of REUNA, RAICES, CUDI and RAAP.
- The NREN is a government agency or part of a ministry: Innova|Red and CENIT.
- The relationship is declared to be indirect: RedCONARE.
- The relationship is not indirect, but not fully direct either; a certain degree of relation can be seen, and it has to do with the participation of one or more ministries in the directive board or as network members (in Table 1.2.1, those in this situation marked their relationship with the government with the choice "Other").

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Map 1.2.1: Legal form and relationship with the government of NRENs

Table 1.2.1: Relationship with the government

Country	NREN	Relationship with the government	Comments / Parent Organisation
ARGENTINA	Innova|Red	We are a government agency or part of a ministry	Depends on Innova-T – CONICET Foundation
BOLIVIA	RIAB-ADSIB	Other	Depends on ADSIB. There will be officials from government agencies in its directing board.
BRAZIL	RNP	Other	Brazil's government, which represents more than 90% of RNPs' funds, indicates 40% of the members of the Administration Council
CHILE	REUNA	No formal relationship	
COLOMBIA	RENATA	Other	The Ministry of Information and Communication Technologies (MinTIC), the Ministry of National Education (MEN) and the Science, Technology and Innovation Administration Department Colciencias, plus 3 State institutions, are part of the Corporation's 11 member institutions.
COSTA RICA	RedCONARE	Indirect relationship	RedCONARE is a Project run by the National Council of University Vice-Chancellors. This is an autonomous public institution dealing with university issues, which coordinates the State University System
	CEDIA	Otro	Los miembros son Universidades en su gran mayoría del estado, así como se tiene miembros estratégicos del gobierno. Por otra parte el Ministerio de CyT es miembro del CEDIA
ECUADOR	CEDIA	Other	Members include Universities, most of them state-owned, as well as strategic members from the government. On the other hand, the Ministry of Science and Technology is a member of CEDIA
	RAGIE	Otro	A través del Consejo Nacional de Ciencia y Tecnología, que es una secretaría dependiente de la vicepresidencia de la República de Guatemala, RAGIE ha recibido reconocimiento como la organización que lidera el esfuerzo del país por establecer una red académica y de investigación. No hay, sin embargo, lazos formales
EL SALVADOR	RAICES	No formal relationship	
GUATEMALA	RAGIE	Other	Through the National Science and Technology Council, a secretariat dependent on the vice-presidency of the Republic of Guatemala, RAGIE has received recognition as the organisation that leads the country's effort to establish an academic and research network. There are no formal links, however.
MEXICO	CUDI	No formal relationship	
PERU	RAAP	No formal relationship	
URUGUAY	RAU	Other	Depends on the Universidad de la República
VENEZUELA	CENIT	We are a government agency or part of a ministry	CENIT

1.3 NRENs' history and organisational structure

Although the NRENs' history has been included in the 2009 and 2010 editions of the **RedCLARA Compendium of Latin American National Research and Education Networks**, when the leaders from RedCLARA's member institutions discussed the possibility of leaving this question out from the present edition, they decided to maintain it. Table summarises the history of each NREN that completed the questionnaire and answered the questions focusing on this topic, which include the year in which the first network operations started and the year in which the NREN was founded in its current form. It also features a link to the page on their websites where networks tell about their history.

Until 2010 the NRENs organisational structure was a sub-section within this chapter which focuses on presenting basic information about the networks in the Compendium. However, since these structures –related to the ways that have been developed by the networks for their governance and operation- have not experienced any changes, we thought it would be better if we provide general information through a link to the websites of these institutions. The information is presented on Table 1.3.1.

Tabla 1.3.1: Historia y estructura organizacional de las RNIE

Country	NREN	Beginning of network's operations	Year in which the network was founded in its current form	URL to see the organisation's history	URL to see the organisation's organisational structure
ARGENTINA	Innova|Red	1990 (as Retina)	2006 (as Innova|Red)	http://www.innova-red.net/node/14	http://www.innova-red.net/node/16
BOLIVIA	RIAB-ADSIB			Currently under construction	
BRAZIL	RNP	1992	2002	http://www.rnp.br/rnp/historico.html	http://www.rnp.br/_arquivo/asrnp/org0164b.pdf
CHILE	REUNA	1986	1991	http://reuna.cl/index.php/es/ique-es-reuna	http://reuna.cl/index.php/es/ique-es-reuna/organizacion/organigrama
COLOMBIA	RENATA	2006	2007	http://www.renata.edu.co/index.php/quienes-somos-identidad-y-objetivos-de-renata.html?showall=1	http://www.renata.edu.co/index.php/quienes-somos-identidad-y-objetivos-de-renata.html?showall=1
COSTA RICA	RedCONARE	2004	2009	http://www.cenat.ac.cr/index.php?option=com_content&view=article&id=77&Itemid=128	
ECUADOR	CEDIA	2007	2003	http://www.cedia.org.ec/index.php?option=com_content&task=view&id=17&Itemid=1	
EL SALVADOR	RAICES	2005	2005	http://www.raices.org.sv/iquienes-somos/historia.html	
GUATEMALA	RAGIE	1995	2004		
MEXICO	CUDI	1999	1999	http://www.cudi.edu.mx/antecedentes/antece00.html	http://www.cudi.edu.mx/organizacion/index.html
PERU	RAAP	2005	2003	http://www.raap.pe/site/historia.php	http://www.raap.pe/site/documentos.php
URUGUAY	RAU	1991	1991	http://www.rau.edu.uy/rau/historia.htm	
VENEZUELA	CENIT	1993	1994	http://portal.cenit.gob.ve/cenitcms/noticia_3_1.html	http://portal.cenit.gob.ve/cenitcms/noticia_4_1.html

1.4 Major changes

Only four NRENs provided a brief description of the major changes that marked their work in 2011; for three of them (RNP, REUNA and RAICES), changes had to do with the incorporation of new members, which expanded their client portfolio. RNP also experienced the greatest increase we have seen in a NREN's backbone in our region, we are talking about the increase by 280% of its data transfer capacities. For RedCONARE changes had to do with the intense work they are developing in order to consolidate themselves as an organisation and "evangelise" their users about the network's use.

Table 1.4.1 features the answers provided by RNP, REUNA, RedCONARE and RAICES.

Table 1.3.1: Major changes in the NRENs in 2011

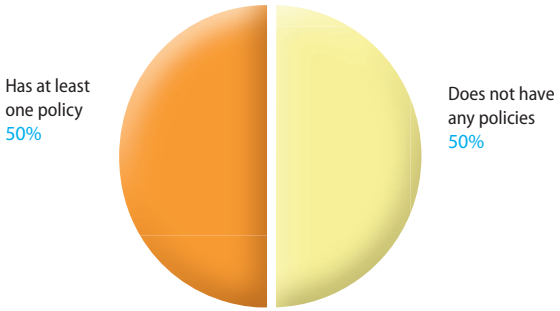
Country	NREN	Major changes
BRAZIL	RNP	In 2011, the Inter-ministerial Programme that funds RNP, which originally included the ministries of Science and Technology and Education, was expanded in order to include the Ministry of Culture, and this increased the number of clients. Additionally, RNP carried out an important expansion in its national backbone, increasing its capacity by 280%. At present, 24 of the 27 points of presence are connected with capacities ranging from 3 Gbps to 10 Gbps.
CHILE	REUNA	The Universidad Católica, the Universidad Santa María, INAPI, NAOJ and ESO were incorporated
COSTA RICA	RedCONARE	RedCONARE is starting its operations and is in the process of consolidating its organisation and implementing academic services for CONARE's member universities. In the technical area, the main offices of each of these universities were incorporated in 2011. In the near future we plan to deploy the physical network towards the other university facilities in the rest of the national territory. In the academic/executive area, we completed the development of an induction programme for the use and capitalisation of the advanced network, aimed at researchers. This programme's delivery begins on the first week in April 2012 for the four member universities. Additionally, two specific services which generate traffic in the advanced network have been installed, and we have started to publish a regular bulletin to provide the university community with information on the progress made in the network's development.
EL SALVADOR	RAICES	The Universidad Gerardo Barrios was incorporated as a new member

1.5 Policies

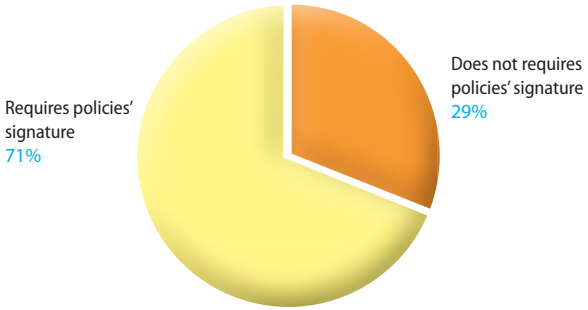
Connection Policy

In 2010 54% of the NRENs declared to have a Connection Policy, 8% more than in 2009. However, in 2011, 50% of the networks did not declare to have any kind of policy (see Graphic 1.5.1). Out of the 50% that declares to have some sort policy, 100% of them indicate the existence of a Connection Policy, although 29% of them does not require their signature (see Graphic 1.5.2, which shows the data only from those networks that have some sort of policy.

Graph 1.5.1: Existence of policies Acceptable Use Policy (AUP)



Graph 1.5.2: Requires policies' signature



In 2010 RNP, CEDIA, RAGIE and CUDI declared to have an AUP. In 2011 the scenario changed and from that group only RNP declares to have an AUP, a situation shared by Innova|Red, RENATA and CENIT. Of all these, the only one that reports having made a change in its AUP is CENIT (see Table 1.5.1).

Security policy

Colombia and Venezuela declare to have a Security policy, and only the first has published it in its website (see Table 1.5.1)

Environmental policy

Following a world tendency which has gained power over the last four years, networks were asked whether they have an environmental policy or have conducted any green audit. The answer to both questions given by the NRENs that completed the questionnaire on which this Compendium was based was No.

Latin American NRENs have a pending job in this issue. Finding a way to reduce heat emissions from servers, computers and other machines which make it possible to keep academic networks alive has been the task that some networks in Europe and North America have started to work on. Latin America must find its way and do it soon, so as not to be left behind in a road, which for international networks is no longer a strange idea but a mandate.

Country	NREN	Policies' signature required	Connection Policy	Connection policy URL	Has AUP	AUP URL	Has Security Policy	Security Policy URL
ARGENTINA	Innova|Red	Yes	Yes	But it is not specified in any document	Yes	The document is not on the web; it is delivered upon the agreement's signature.	No	
BRAZIL	RNP	No	Si	http://www.rnp.br/_arquivo/conexao/doc0108d.pdf	Yes	https://www.rnp.br/_arquivo/conexao/doc0108d.pdf	No	
COLOMBIA	RENATA	Yes	Yes	http://www.renata.edu.co/index.php/instituciones-conectadas-a-renata.html?start=2	Yes	http://www.renata.edu.co/index.php/instituciones-conectadas-a-renata.html?start=2	Yes	http://www.renata.edu.co/index.php/instituciones-conectadas-a-renata.html?start=1
ECUADOR	CEDIA	Yes	Yes	http://www.cedia.org.ec	No		No	
MEXICO	CUDI	Yes	Yes	http://www.cudi.edu.mx/informacion_tecnica/conectividad/alternativas_conexion.html	No		No	
URUGUAY	RAU	No	Yes	http://www.rau.edu.uy/rau/objetivos.htm	No		No	
VENEZUELA	CENIT	Yes	Yes	Its is not published on the WEB	Yes	Not published	Yes	Not published

2. Users/Clients

Section 2.2 features the approximate number of users connected by NRENs in several categories. This gives us a clear view of the distribution of the academic networks market in Latin America. As opposed to previous years, for this edition we included in this chapter the bandwidths with which networks cater for their institutions (2.3), the shared connections (2.4) and types of connection (2.5); the connection technologies developed by NRENs are covered in section 2.6.

2.1 Overview

Most of the institutions connected to the Latin American NREN are in the university sector, followed by research centres, and the average connectivity level is around 10 Mb/s or more but less than 100 Mb/s. Primary access to the network for the institutions connected to the NRENs is conducted through the Internet Protocol (IP) and the main connection channel is through a PoP.

2.2 An overview of market shares

Table 2.2.1 gives an overview of the number of institutions that the NRENs have in each category, as well as an indication of the approximate percentage of users who are served by them (highlighted in a specific colour).

In general terms, the greatest number of institutions connected (762, according to the figured provided by the NRENs) is in the university sector, followed by research centres (172), further education colleges (103, although this whole group refers to Mexico) and government agencies (79).

Table 2.2.1: Categories and number of institutions served by the NRENs

Country	NREN	Universities	Further education colleges	Research institutes	Secondary schools	Primary schools	National libraries, museums, archives	Non-university hospitals	Government agencies	URL to the list of sites connected
ARGENTINA	Innova|Red	45		9			1		3	http://www.innova-red.net/node/26
BOLIVIA	RIAB-ADSIB	0								
BRAZIL	RNP	406	0	115	1	1	11	14	32	http://www.rnp.br/conexao/instituicoes.php
CHILE	REUNA	17		4					3	http://www.reuna.cl/index.php/es/ique-es-reuna/miembros
COLOMBIA	RENATA	121	0	6	0	0	2	14	0	http://www.renata.edu.co/index.php/nuestros-servicios.html
COSTA RICA	RedCONARE	4	0	1	0	0	0	0	0	http://www.cenat.ac.cr/index.php?option=com_content&view=article&id=77&Itemid=129#redConare_2
ECUADOR	CEDIA	24		1					1	http://www.cedia.org.ec/index.php?option=com_content&view=article&id=14&Itemid=21
EL SALVADOR	RAICES	6	0	0						www.raices.org.sv
GUATEMALA	RAGIE	4								http://www.ragie.org.gt
MEXICO	CUDI	111	103	28			2	5	18	http://www.cudi.edu.mx/members/miembros_cudi.pdf
PARAGUAY	ARANDU	4	0	0	0	0	0	0	0	
PERU	RAAP									
URUGUAY	RAU						1			
VENEZUELA	CENIT	20		8			1		22	www.reacciun.ve

Table's legend::

All of them or almost all
More than a half
Around a half
Less than a half
None or very few

2.3 Typical bandwidths

When comparing data on the type of institutions connected and the typical bandwidth provided by NRENs, the most common alternative is a connectivity level of 10 Mb/s or more but less than 100 Mb/s (this matches the data provided in the 2010 Compendium), as shown in Graph 2.3.1, which can seem visually misleading, as it shows the columns related to primary and secondary schools with a colour corresponding to a capacity of less than 10 Mb/s, when only three institutions declare to provide these connectivity levels, as shown in Table 2.3.1, which displays the data as provided by networks for the higher, lower and typical connection levels. There isn't any progress in this subject in relation to the previous year. In fact, there are still only three networks which feature connectivity levels that can be measured in Gb/s.

Graph 2.3.1: Most frequent level of typical connectivity per type of institution

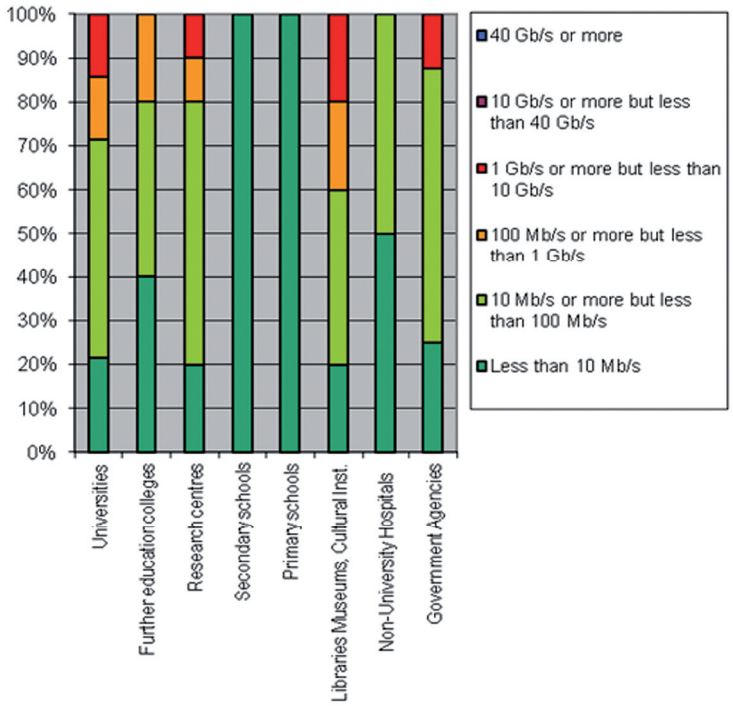


Table 2.3.1: Connectivity level by type of institution (universities, further education institutes and research institutes)

Country	NREN	Universities			Further Education Colleges			Research Institutes			Primary schools			Secondary schools			Libraries, Museums, Archives, Cultural Inst.			Non-university hospitals			Government agencies (national, regional, local)		
		Lower	Upper	Typical	Lower	Upper	Typical	Lower	Upper	Typical	Lower	Upper	Typical	Lower	Upper	Typical	Lower	Upper	Typical	Lower	Upper	Typical	Lower	Upper	Typical
ARGENTINA	Innova|Red																								
BOLIVIA	RIAB-ADSIB																								
BRAZIL	RNP																								
CHILE	REUNA																								
COLOMBIA	RENATA																								
COSTA RICA	RedCONARE																								
ECUADOR	CEDIA																								
EL SALVADOR	RAICES																								
GUATEMALA	RAGIE																								
MEXICO	CUDI																								
PARAGUAY	ARANDU																								
PERU	RAAP																								
URUGUAY	RAU																								
VENEZUELA	CENIT																								

Table's legend:

- Less than 10 Mb/s
- 10 Mb/s or more but less than 100 Mb/s
- 100 Mb/s or more but less than 1 Gb/s
- 1 Gb/s or more but less than 10 Gb/s
- 10 Gb/s or more but less than 40 Gb/s
- 40 Gb/s or more

2.4 Shared connections, unrouted connectivity

NRENs invariably connect their institutions through the Internet Protocol (IP) for their primary access to the network. Only Colombia declares to serve one or more institutions (exact number not provided) through non-IP connectivity, and only Brazil indicates it has four institutions –located in rural areas- authorised to share their connection.

2.5 Type of connection

In general terms, NRENs connect thier institutions mainly through a PoP (Point of Presence) in the national network's backbone, and in the second place through a MAN (Metropolitan Area Network) or RAN (Regional Area Network) run by the NREN. Table 2.5.1 shows this information.

Table 2.4.1: Institutions served through non-IP connectivity

Country	NREN	One or more institutions served through non-IP connectivity	Number of institutions connected and type of connection	Do they share their connection?	Number of institutions connected and type of connection
ARGENTINA	Innova|Red	No			
BOLIVIA	RIAB-ADSIB	No			
BRAZIL	RNP	No		Yes	Four institutions, located in rural areas are authorised to share their connection.
CHILE	REUNA	No		No	
COLOMBIA	RENATA	Yes		No	
COSTA RICA	RedCONARE	No		No	
ECUADOR	CEDIA	No		No	
EL SALVADOR	RAICES	No			
GUATEMALA	RAGIE	No			
MEXICO	CUDI	No		No	
PARAGUAY	ARANDU	No			
PERU	RAAP				
URUGUAY	RAU				
VENEZUELA	CENIT	No		No	

Table 2.5.1: Way in which sites are connected to each NREN's network

Country	NREN	Universities					Further Education Institutes					Research Institutes					Primary schools					Secondary schools					National libraries, museums and archives					Non-university hospitals					Government agencies				
		PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other	PoP in the NREN's backbone	MAN or RAN run by the NREN	MAN or RAN NOT run by the NREN	Through or behind another site	Other
ARGENTINA	Innova|Red																																							
BOLIVIA	RIAB-ADSIB																																							
BRAZIL	RNP																																							
CHILE	REUNA																																							
COLOMBIA	RENATA																																							
COSTA RICA	RedCONARE																																							
ECUADOR	CEDIA																																							
EL SALVADOR	RAICES																																							
GUATEMALA	RAGIE																																							
MEXICO	CUDI																																							
PARAGUAY	ARANDU																																							
PERU	RAAP																																							
URUGUAY	RAU																																							
VENEZUELA	CENIT																																							

Table's legend:

All or nearly all of them
More than a half
Around a half
1 Gb/s or more but less than 10 Gb/s
10 Gb/s or more but less than 40 Gb/s

2.6 Other technologies used by the NRENs

For the first time, for the RedCLARA Compendium of Latin American National Research and Education Networks each NREN was asked about the technologies they are deploying in their access networks or making available for end users. Not all networks answered this question, and those which did answer are shown in Table 2.6.1.

It is important to point out that it is clear that the questionnaire applied did not cover the whole range currently covered by these technologies, and that the question made was related to whether the technologies proposed (indicated below) are today being produced, planned or not planned at all. We asked about the following technologies:

- Fibre for homes / Fibre for the office: for example, making optical fibre technology available for end users in homes or offices.
- DSL: connecting users via A(DSL).
- WLAN: Wirelsss LAN.
- 3G – Mobile internet: 1) via mobile operator network, 2) through a virtual network operator, and 3) through satellite Access Point Name (APN).
- Campus WiFi through mobile operator network.
- Other licensed spectre.
- Other non-licensed spectre.

Only Venezuela declared to currently have other technologies for individual users: "dedicated access through clear channel circuits, frame relay, ATM and metroethernet".

Tabla 2.6.1: Tecnologías desplegadas a nivel del acceso de la red

Country	NREN	Fibre for homes / Fibre for the office	DSL	WLAN	3G – mobile operator network chosen	3G – mobile virtual network operator	3G – Satellite APN	Campus Wi-Fi through mobile operator network	Other licensed spectre	Other non-licensed spectre
ARGENTINA	Innova|Red	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned
BRAZIL	RNP	Production	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned
CHILE	REUNA	Production	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned
COLOMBIA	RENATA					Production				
ECUADOR	CEDIA	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned
GUATEMALA	RAGIE	Production	Production	Production	Not planned	Not planned	Not planned	Not planned	Not planned	Not planned
MEXICO	CUDI	Planned	Planned	Planned	Not planned	Not planned	Not planned	Planned		Planned
VENEZUELA	CENIT	Not planned	Planned	Production	Not planned	Not planned	Not planned	Not planned	Not planned	Production

3. Networks and Connectivity Services

In this chapter we take a look inside each network.

Section 3.1 provides information on the operations centre in each NREN, the NOC; section 3.2 deals with PoPs, circuits and sites managed by each network; section 3.3 is about the capacities of the same networks. Section 3.4 is aimed at learning about the external connections owned by Latin American national networks; sections 3.5 and 3.6 analyse the situation through dark fibre and cross border connections, respectively.

In section 3.7 the on-demand bandwidth offer is reviewed and section 3.8 puts an end to the chapter with the presentation of the changes that are expected to be implemented in the future in some NRENs.

But before going into the details about each network, it is important to know about their topologies and climate maps. This information is presented in Table 3.1.

Table 3.1: Topology and climate map

Country	NREN	Has a network topology map	URL for network topology	Has a climate map	URL for climate map
ARGENTINA	Innova|Red	Yes	Has restricted and password-protected access, only for entities connected through security policy. http://www.innova-red.net/node/4	No	
BOLIVIA	RIAB-ADSIB	No		No	
BRAZIL	RNP	Yes	http://www.rnp.br/backbone/index.php	Yes	http://www.rnp.br/ceo/trafego/panorama.php
CHILE	REUNA	Yes	http://www.reuna.cl/index.php/es/red/topologia-de-la-red	Yes	Access through a private site for REUNA's member institutions.
COLOMBIA	RENATA	Yes	http://www.renata.edu.co/index.php/instituciones-conectadas-a-renata.html?showall=1	No	
COSTA RICA	RedCONARE	No		No	
ECUADOR	CEDIA	Yes	http://www.cedia.org.ec/index.php?option=com_content&task=view&id=25&Itemid=38	Yes	http://monitoreo.cedia.org.ec
EL SALVADOR	RAICES	No		No	
GUATEMALA	RAGIE	No		No	
MEXICO	CUDI	Yes	http://www.noc.cudi.edu.mx/backbonemap/	No	
PARAGUAY	ARANDU	No		No	
PERU	RAAP	Yes	http://200.37.45.126	No	
URUGUAY	RAU	No		Yes	http://www.rau.edu.uy/uruguay/geografia/Uy_tiempo.htm
VENEZUELA	CENIT	No		No	

3.1 NOC

The job done by a Network Operations Centre (NOC) is the operation and monitoring of a NREN´s network and the services associated with it. Eleven of the NRENs that completed the questionnaire used for the elaboration of the Compendium have a NOC; nine of them own one, and two of them outsource it from another company.

NOCs are vital elements to provide a service that is regarded as a critical task for the functioning of networks, which involves dealing with a wide range of services including the physical infrastructure, the network's administration and its monitoring. All NOCs in the NRENs that declared to have one cater for all their members, and in most cases this shows us a national coverage of the service. They are responsible for national links and the links to RedCLARA (even though RedCLARA provides the service of NOC for the regional network), towards Internet points of exchange and towards commercial Internet.

Table 3.1.1: NRENs that have a NOC of their own

Country	NREN with a NOC of its own	NOC's generic email	URL of the NOC's website
ARGENTINA	Innova|Red	noc@innova-red.net	http://www.innova-red.net/node/4 accessed with a password
BRAZIL	RNP	noc@rnp.br	http://www.rnp.br/ceo/
CHILE	REUNA	noc@reuna.cl	It is a private site
COLOMBIA	RENATA	tencico@renata.edu.co	http://monitor.renata.edu.co/index.php?page=Login&SSemanagementID=e0o7jk17e8hqin0reaut324ke1
EL SALVADOR	RAICES	Does not exist. The contact person is Erick Flores eflores@udb.edu.sv	Does not exist
GUATEMALA	RAGIE	NOC@ragie.org.gt	
MEXICO	CUDI	noc@cudi.edu.mx	http://www.noc.cudi.edu.mx/
URUGUAY	RAU	noc@seciu.edu.uy	
VENEZUELA	CENIT	noc@reacciun.ve	http://www.reacciun.ve

Table 3.1.2: NRENs with an outsourced NOC

Country	NREN with an outsourced NOC	NOC's generic email	URL of the NOC's website
ECUADOR	CEDIA	standbyc@telconet.net	www.telconet.net
PERU	RAAP	contacto@raap.pe	

3.2 PoPs, routing and circuits

The number of PoPs in a network is an indicator of the number of resources that the NREN needs to run the network. A PoP is defined as a point in the network's backbone which can connect client networks or aggregations of client networks, such as MAN (Metropolitan Area Network) or external networks.

A PoP is constituted basically by two technologies: IP or optical. The first is the classical way of dealing with traffic, aggregating latency and processing conditions in resending information; the latter is the tendency that is being adopted by the networks that require a greater capacity in their backbones (2,5 Gbps or higher), since an optical node, apart from increasing capacity, significantly decreases traffic's processing time. The IP nodes are complemented, and the tendency is to optimise their deployment only where strictly necessary.

In order to obtain an idea about the size of academic networks in Latin America, we asked about the total number of PoPs and how many of these have IP connectivity, optical connectivity, with no-CPE routers (no-CPE: no Customer Premise Equipment: medium and large capacity equipment) in Layer3 and with routing in Layer3; this information is presented in Table 3.2.1, while Table 3.2.2 shows the evolution in the number of PoPs of the NRENs between 2009 and 2011.

Table 3.2.1: Number of PoPs and types routing

Country	NREN	Number of PoPs	Number of PoPs with optical connectivi ty	Number of PoPs with IP connectivity	Number of PoPs with no-CPE routers in Layer3	Number of PoPs with routing in Layer3
ARGENTINA	Innova|Red	6	2	6	2	2
BOLIVIA	RIAB-ADSIB	0	0	0	2	0
BRAZIL	RNP	27	24	27	0	27
CHILE	REUNA	15	4	11	3	3
COLOMBIA	RENATA	9	8	9	8	8
COSTA RICA	RedCONARE	1	1	0	1	1
ECUADOR	CEDIA	0	0	0	0	0
EL SALVADOR	RAICES	1	1	1	0	0
GUATEMALA	RAGIE	4	1	1	0	0
MEXICO	CUDI	8	2	8	8	2
PARAGUAY	ARANDU	1	1	1	0	1
PERU	RAAP	1	0	0	0	0
URUGUAY	RAU	5	1	0	1	1
VENEZUELA	CENIT	1	1	1	2	2

Table 3.2.2: Comparison of the number of PoPs between 2009 and 2011

Country	NREN	Number of PoPs 2009	Number of PoPs 2010	Number of PoPs 2011
ARGENTINA	Innova|Red	2	6	6
BOLIVIA				0
BRAZIL	RNP	27	27	27
CHILE	REUNA	10	10	15
COLOMBIA	RENATA	8	8	9
COSTA RICA	RedCONARE	1	1	1
ECUADOR	CEDIA	0	0	0
EL SALVADOR	RAICES	1	1	1
GUATEMALA	RAGIE	6	5	4
MEXICO	CUDI	18	39	8
PARAGUAY	ARANDU		0	1
PERU	RAAP		1	1
URUGUAY	RAU	3	5	5
VENEZUELA	CENIT		0	1

In the questionnaire applied for the elaboration of the present Compendium we asked about the number of circuits and sites managed; the first is related to the number of links which, as a NREN responsibility, conduct production traffic transport, while the second is the one in which the NREN manages the routing or switching equipment with which the client network gets connected to the PoP. This information is shown in Table 3.2.3.

Table 3.2.3: Number of circuits and sites managed

Country	NREN	Number of circuits managed	Number of sites managed
ARGENTINA	Innova|Red	27	2
BOLIVIA	RIAB-ADSIB	0	1
BRAZIL	RNP	40	27
CHILE	REUNA	72	32
COLOMBIA	RENATA	1	8
COSTA RICA	RedCONARE	1	1
ECUADOR	CEDIA	1	1
EL SALVADOR	RAICES	6	6
GUATEMALA	RAGIE	1	1
MEXICO	CUDI	10	8
PARAGUAY	ARANDU	1	1
PERU	RAAP	6	6
URUGUAY	RAU	0	41
VENEZUELA	CENIT	80	2

In relation to optical circuits, NRENs were asked if they offered lambdas (wavelength - λ) to their clients, and although none of them gave a positive answer, Colombia and Venezuela declared to have included this service in their plans; Brazil declared to have three dynamic lambdas and three static ones, active since October 2011, and Mexico features one active dynamic lambda for the same date.

3.3 Network's core capacity

The term "network's backbone useable core capacity" is used to describe the typical core capacity of the nodes (PoP) linked in the backbone. In 2011 Colombia and Ecuador joined the list of networks with capacities in Gbps. Table 3.3.1 presents this information.

Table 3.3.1: Network's backbone core capacity

Country	NREN	Backbone's typical usable core capacity (Gbps)
ARGENTINA	Innova|Red	100 Mbps
BRAZIL	RNP	10 Gbps
CHILE	REUNA	2,5Gbps a 155Mbps
COLOMBIA	RENATA	1,6 Gbps
COSTA RICA	RedCONARE	45 Mbps
ECUADOR	CEDIA	1 Gbps
EL SALVADOR	RAICES	10 Mbps
GUATEMALA	RAGIE	100 Mbps
MEXICO	CUDI	1 Gbps y 155Mbps
PERU	RAAP	10 Mbps
URUGUAY	RAU	1 Gbps
VENEZUELA	CENIT	1 Gbps

3.4 External links: total number of external links

NRENs were asked to make a list of all their IP connections until October 2011, excluding backup connections. Connections were classified as "External Operational IP Connections" in the following way:

- To RedCLARA
- To other research networks
- To Commercial Internet
- Others

Table 3.4.1 presents these data.

Table 3.4.1: External links

Country	NREN	External operational IP connections by the end of October 2011 measured in Mbps			
		To RedCLARA	To other research networks	To Commercial Internet	Others
ARGENTINA	Innova|Red	256		240	100
BOLIVIA	RIAB-ADSIB	0	0	1	
BRAZIL	RNP	1450	12622	5000	17000
CHILE	REUNA	1024	2048	1024	
COLOMBIA	RENATA	130		10	
COSTA RICA	RedCONARE	155	0	40	
ECUADOR	CEDIA	45		14 STM1	
EL SALVADOR	RAICES	10			
GUATEMALA	RAGIE	18			
MEXICO	CUDI	45	2000	0	
PERU	RAAP	10		2	
URUGUAY	RAU	155	-	100	
VENEZUELA	CENIT	90	50	205	

3.5 Dark fibre

In terms of dark fibre, Latin American NRENs have not presented significant advances since 2009 (when the elaboration of the annual Compendium first took place). However, there is a certain novelty in relation to last year, when only Innova|Red and RAU declared to have a percentage (though minimal) of their networks in dark fibre; in 2011, although RAU did not declare the

percentage –since it indicates it only has 2 Km in dark fibre-, Argentina was joined by the academic networks in Brazil, Chile (with 1167 Km. and 5,36%, and 160 Km. and 5%, respectively; both added a few Km. of fibre in 2011) and Guatemala (20 Km.).

Additionally, in order to know whether networks conduct traffic through DWDM networks although part of their network is not in dark fibre, they were asked whether they had equipment of this kind or if it was an outsourced service; seven networks declared to have outsourced equipment and two networks have own this equipment.

All the information mentioned here is presented in Table 3.5.1; it is necessary to point out that not all networks answered the questions which allowed us to collect these data. This is why not all of them are present in the Table.

Table 3.5.1: Dark fibre and DWDM equipment

Country	NREN	Length of dark fibre (in Km.)	% of the network in dark fibre	Km. added to the	Km. retirados de la red en 2011	Propiedad de Equipamiento DWDM
network in 2011	Km. removed from the network in 2011	Ownership of the equipment DWDM	1%			Externalizado
ARGENTINA	Innova|Red	11.0	1%			Outsourced
BRAZIL	RNP	1167.0	5.36%	273.9		Owned
CHILE	REUNA	160.0	5%	5.0		Owned
COLOMBIA	RENATA					Outsourced
ECUADOR	CEDIA					Outsourced
EL SALVADOR	RAICES					Owned
GUATEMALA	RAGIE	20.0				Outsourced
MEXICO	CUDI					Outsourced
PARAGUAY	ARANDU					Outsourced
URUGUAY	RAU	2.0				

3.6 Cross Border Fibre (CBF)

Brazil and México already have CBF and Venezuela plans to have it. CBF is dedicated optical fibre which goes through at least one international border. RNP has a test CBF between Porto Alegre and Uruguaiana (both in Brazil) with 2λ (two lambdas – wavelength) of 10 Gbps capacity since December 31, 2010, and one with the same characteristics, in production, between Porto Alegre (Brazil) and Buenos Aires (Argentina), since November 30, 2011.

CUDI (México) indicates it has a CBF in production with 1λ of 1 Gbps since 2006, and plans to have two with the same characteristics by 2013.

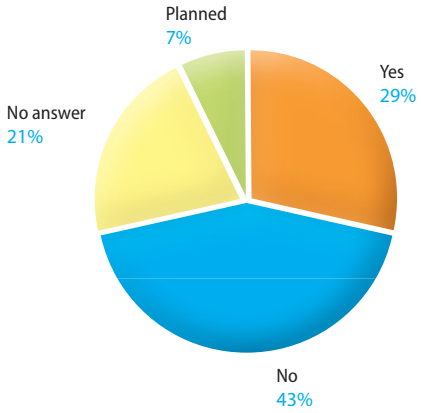
CENIT (Venezuela) plans to have 178 FCB end points with 1λ of 10 Gbps, also by 2013.

3.7 On-demand bandwidth

In the areas of science which require large bandwidth, dedicated channels are usually required for data transport between different points, at high transfer rates and with guaranteed service levels. IP networks provide a service that is always available for data transfer. However, they cannot guarantee the quality (for example the loss of packages in bottlenecks) or they are negatively affected by time constraints (which sometimes happens with the flow of large amounts of data from different locations towards a cluster where a correlation in real time of these data is tried to be developed). The on-demand bandwidth service efficiently corrects these problems.

Within the group of the 14 NRENs which completed the questionnaire used for the elaboration of this Compendium, four of them (RNP, REUNA, CEDIA and CUDI) offer this service through manual processes run by the NOC; six of them do not include it in the offer for their members and Bolivia has considered it in its plans for the next two years. Graph 3.7.1 shows this situation.

Graph 3.7.1: On-demand bandwidth offer



3.8 Major changes expected in the network

In 2010 only two networks refrained from providing information regarding the major changes they expected to implement the following year; in 2011, only five NRENs decided to share this information. Increasing the network's capacity, increasing the number of PoPs and of members, are the most common topics; all of them are presented in Table 3.8.1, while Figure 3.8.1 shows the Wordle created (in Spanish) after the information on the major changes expected that were provided by RNP, REUNA, RAICES, RAGIE and CUDI.

Figure 3.8.1: Major changes expected (Wordle chart)

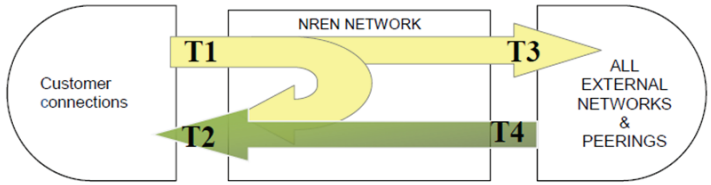
Table 3.8.1: Major changes expected in the network

Country	NREN	Initiative	Expected timeline	Certainty
BRAZIL	RNP	Increase of the amount of PoPs connected at 10 Gbps from 15 to 24	By the end of 2013	Quite certain
		Increase of the amount of PoPs connected at 10 Gbps from 24 to 27	between 2 and 3 years	Probable
		Increase of the total amount of circuits of 10 Gbps from 24 to 35	between 3 and 4 years	Probable
CHILE	REUNA	Expansion of the backbone in dark fibre	2015	Quite certain
		Expansion of the DWDM Network	2012	Quite certain
EL SALVADOR	RAICES	Increase of the number of members	Jun/2012	Probable
GUATEMALA	RAGIE	Connetion of other members	0	Quite certain
		Beginning of the expansion towards the country's interior	1	Quite certain
MEXICO	CUDI	10 Gb	12 months	Quite certain
		MCU	24 months	Quite certain
		NIBA network	8 months	Quite certain

4. Traffic

For the first time, NRENs were asked to report the flows of their annual traffic within the borders of their networks. The four flows they were asked to refer to are shown in Diagram 4.0.1.

Diagram 4.0.1: Types of traffic flows



T1:	All the IP traffic from the clients' sites and from the NREN's sites
T2:	All the IP traffic towards the clients' sites and towards the NREN's sites
T3:	All the IP traffic towards external networks
T4:	All the IP traffic towards the NREN

External traffic: All the traffic towards RedCLARA, commercial Internet, Internet exchanges, etc. (constituted by T3 and T4).

Data transfer within networks is a critical topic and the different sections in this chapter are exclusively related to this. Section 4.1 features a revision of the information on traffic from 2011 provided by some NRENs; section 4.2 deals with network congestion, while performance monitoring and management are covered in section 4.3. The chapter finishes in section 4.4 with the transition from IPv4 to IPv6.

4.1 Traffic in 2011

The following Table displays the data about the traffic flow provided by the four NRENs that answered this question on the questionnaire on which this Compendium is based. Although it is true that four NRENs is a small number to make conclusions, the fact is that numbers show that the flow of data in each category are completely different from one network to another.

Table 4.1.1: Traffic flow from / towards the NREN

Country	NREN	Type of traffic	Total IP Traffic between October 2010 and October 2011 (Terabytes)	% total of IP traffic towards/from commercial Internet	% of NREN's traffic of commercial Internet that is exchanged thanks to free of charge peering agreements
BRAZIL	RNP	T1	18091	20%	20%
		T2	15940	25%	25%
		T3	6945	51%	51%
		T4	7367	54%	54%
CHILE	REUNA	T1	370	60%	60%
		T2	584	74%	74%
		T3	306	73%	73%
		T4	520	82%	82%
MEXICO	CUDI	T1	457.48		
		T2	391.34		
		T3	200.31		
		T4	250.24		
VENEZUELA	CENIT	T1	194.48	100%	100%
		T2	234.38	100%	100%
		T3	243.23	83%	83%
		T4	378.47	83%	83%

4.2 Network congestion

Following the trend of previous years, few NRENs provide information on their networks' congestion levels, and although it is true that we cannot see alarming congestion levels, it is equally true that for the development of collaboration in research, the ideal is to have no congestion at all. Table 4.2.1 shows the information collected.

Table 4.2.1: Network Congestion

Country	NREN	Campus LAN			Metropolitan / Regional Networks			Access network			NREN backbone			External links		
			😐	☹	☺	😐	☹	☺	😐	☹	☺	😐	☹	☺	😐	☹
ARGENTINA	Innova|Red															
BRAZIL	RNP															
CHILE	REUNA	45%	40%	15%												
COLOMBIA	RENATA	90%	0%	10%	90%	0%	10%				80%	10%	10%	20%	70%	10%
COSTA RICA	RedCONARE															
ECUADOR	CEDIA															
EL SALVADOR	RAICES															
GUATEMALA	RAGIE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
MEXICO	CUDI															
PARAGUAY	ARANDU															
PERU	RAAP	86%	14%					57%	14%	29%	57%	14%	29%	71%	0%	29%
URUGUAY	RAU	95%	5%		80%	10%	10%		20%	80%				20%	80%	
VENEZUELA	CENIT	98%	1%	1%	98%	1%	1%	38%	31%	31%	98%	1%	1%	98%	1%	1%

Table's legend

☺ % of congestion within the institution: none or very little

😐 % of congestion within the institution: some, but moderately

☹ % of congestion within the institution: serious

4.3 Performance monitoring and management

NRENs were asked if they have a Performance Enhancement & Response Team (PERT). Six networks indicated that they neither have one nor are planning to have it deployed; Bolivia indicated it plans to have it within one year and only Colombia declared to have the equipment; six networks did not provide information. Four of the networks that declared not to have plans to deploy PERT, and two of the ones that did not answer declared they have other tools to monitor or solve network problems. Four NRENs provided the URL where the traffic statistics of their networks can seen. La Table 4.3.1 presents this information.

Table 4.3.1: Performance monitoring and management

Country	NREN	Do you have a PERT?	Do you have other tools to monitor or solve network problems?	URL for traffic statistics on your website
ARGENTINA	Innova|Red	No and we have no plans for its deployment	Yes (not available online)	
BOLIVIA	RIAB-ADSIB	Planned to be deployed within one year	No	
BRAZIL	RNP	No and we have no plans for its deployment	No	http://www.rnp.br/ceo/trafego/index.php
CHILE	REUNA		No	
COLOMBIA	RENATA	Yes	No	http://monitor.renata.edu.co/index.php?page=Login&SSemanagementID=e0o7jk17e8hqin0reaut324ke1
COSTA RICA	RedCONARE		No	
ECUADOR	CEDIA		Cacti + threshold + monitor + weather map	monitoreo.cedia.org.ec
EL SALVADOR	RAICES	No and we have no plans for its deployment	No	
GUATEMALA	RAGIE	No and we have no plans for its deployment	Yes: http://lg.reacciun.ve http://speed.reacciun.ve (IPv4) htto://speed6.reacciun.ve (IPv6)	
MEXICO	CUDI	No and we have no plans for its deployment	Cisco Works	http://www.cudi.edu.mx/informacion_tecnica/estadisticas/estadisticas_noc.html
PARAGUAY	ARANDU		No	
PERU	RAAP		No	
URUGUAY	RAU		MRTG, Cacti, BB, NetFlow, NAM card connected in one of the border routers	
VENEZUELA	CENIT	No and we have no plans for its deployment	Yes: http://lg.reacciun.ve http://speed.reacciun.ve (IPv4) htto://speed6.reacciun.ve (IPv6)	

4.4 Transition to IPv6

While 87 requests for IPv4 were recorded in 2010, that number rose to 111 in 2011. Eight networks received these requests (See Table 4.4.1).

Table 4.4.1: NRENs that received IPv4 requests in 2011

Country	NREN	IPv4 requests in 2011
BRAZIL	RNP	92
CHILE	REUNA	4
COLOMBIA	RENATA	2
COSTA RICA	RedCONARE	1
ECUADOR	CEDIA	1
PERU	RAAP	2
URUGUAY	RAU	2
VENEZUELA	CENIT	7

In today's world, there are many reports about the limit of IPv4 addresses and the need to migrate to IPv6, but just as can be deduced from the information collected for the two previous editions of the Compendium, the fact is that the NRENs in Latin America still do not face a real urgency in this matter. This statement is ratified in Table 4.4.2, which shows that only

Colombia, Ecuador and Mexico foresee a lack of IPv4 addresses for their NRENs, while Chile and Ecuador foresee this lack for their networks' clients, although none of these two networks indicates that this lack is currently affecting the incorporation of new users. Furthermore, the proportion of requests and allocations of IPv4 versus IPv6 prefixes (see Table 4.4.3) and of traffic between each other is low (IPv6 features a higher proportion than IPv4; however, it is important to remind that IPv4 is measured annually, and IPv6 measures the total number of allocations since its implementation) and has not changed substantially over the last three years (echoing the situation in Europe).

Table 4.4.3: IPv4 versus IPv6

Country	NREN	IPv4 requests in 2011	IPv6 prefixes allocated
ARGENTINA	Innova|Red	0	32
BOLIVIA	RIAB-ADSIB	0	0
BRAZIL	RNP	92	74
CHILE	REUNA	4	3
COLOMBIA	RENATA	2	13
COSTA RICA	RedCONARE	1	0
ECUADOR	CEDIA	1	15
EL SALVADOR	RAICES	0	0
GUATEMALA	RAGIE	0	5
MEXICO	CUDI	0	2
PARAGUAY	ARANDU	0	0
PERU	RAAP	2	10
URUGUAY	RAU	2	41
VENEZUELA	CENIT	7	3

Table 4.4.2: Lack of IPv4

Country	NREN	Do you foresee a lack of IPv4 addresses for your NREN?	Do you foresee a lack of IPv4 addresses for your NREN's clients?	Is the a lack of IPv4 addresses affecting the incorporation of new clients?
ARGENTINA	Innova|Red	No	No	No
BOLIVIA	RIAB-ADSIB	No	No	No
BRAZIL	RNP	No	No	No
CHILE	REUNA	No	Yes: In order to face the growth of infrastructure of Universities and thus avoid their use of NAT to solve this lack.	No
COLOMBIA	RENATA	Yes: Depletion of the 190.15.0.0/16 belonging to RENATA	No	No
COSTA RICA	RedCONARE			
ECUADOR	CEDIA	Yes: To provide a lower range of IPs for new members compared to what was offered previously	Yes: Possibly a lower range of IPs will be provided for new institutions	No
EL SALVADOR	RAICES	No	No	No
GUATEMALA	RAGIE	No	No	No
MEXICO	CUDI	Yes: Each institution has its own Internet resources; as for IPv4 addresses, there might be a lack of them in less than 10 years	No: Not in the near future, but everything depends on the increase of nodes in our network. Since we have 2 blocks of IPv4, but also 2 blocks of IPv6, there isn't a lack of IPv4 addresses for the time being, but we are already implementing some services with IPv6 also, which still support IPv4.	No
PARAGUAY	ARANDU			
PERU	RAAP			
URUGUAY	RAU			
VENEZUELA	CENIT	No	No	No

Eight of the fourteen networks in the Compendium supports IPv6 native services and all of them introduced the service before 2011 (see Table 4.4.4).

In relation to the provision of IPv4 services versus dual IPv4/IPv6 or IPv6 services, IPv4 has a higher share, although the difference is not really so significant. What is clear is that the transition to IPv6 will take some time, since the percentage of dual services is high, while that of IPv6 is nonexistent (see Table 4.4.5).

63% of the networks (9 of them) make it a compulsory requirement that new network equipment purchased must support IPv6. 46% (6) of the NRENs wishes to migrate their network to IPv6; RNP represents the 8% that already has its network in this version of the Internet Protocol; all this information and the main inhibitors to carry out the migration are shown in Table 4.4.6.

Table 4.4.4: IPv6 native services

Country	NREN	Does the network support IPv6 native services?	Year in which it was introduced
ARGENTINA	Innova|Red	Yes	2004
BOLIVIA	RIAB-ADSIB	No	
BRAZIL	RNP	Yes	2005
CHILE	REUNA	Yes	2004
COLOMBIA	RENATA	Yes	2008
COSTA RICA	RedCONARE		
ECUADOR	CEDIA	Yes	2010
EL SALVADOR	RAICES	No	
GUATEMALA	RAGIE	Yes	2010
MEXICO	CUDI	Yes	2005
PARAGUAY	ARANDU		
PERU	RAAP		
URUGUAY	RAU		
VENEZUELA	CENIT	Yes	2005

Table 4.4.5: Percentage of IPv4, dual IPv4/IPv6 and IPv6 services

Country	NREN	% of IPv4 services	% of dual IPv4/IPv6 services	% of IPv6 services
ARGENTINA	Innova-Red	60%	40%	
BOLIVIA	ADSIB	100%		
BRAZIL	RNP	90%	10%	
CHILE	REUNA	100%	100%	
COLOMBIA	RENATA	100%	70%	
COSTA RICA	RedCONARE			
ECUADOR	CEDIA	40%	60%	
EL SALVADOR	RAICES	100%		
GUATEMALA	RAGIE	25%	75%	
MEXICO	CUDI	98%	2%	
PARAGUAY	ARANDU			
PERU	RAAP			
URUGUAY	RAU			
VENEZUELA	CENIT	90%	20%	

Table 4.4.6: NRENs which commented on migration to IPv6

Country	NREN	Is IPv6 support a compulsory requirement in the purchase of new network equipment?	Do you have any reason to migrate part of your network to IPv6?	Reasons for migration	Main inhibitors to migrate to IPv6
ARGENTINA	Innova|Red	Yes	No		The network's backbone supports native ipv6
BOLIVIA	ADSIB	No	No		We are still in the process of formalisation of the academic network
BRAZIL	RNP	Yes	Yes	The network is already IPv6	The main inhibitor is the adoption by users. They have to migrate their services to V6.
CHILE	REUNA	Yes	Yes		
COLOMBIA	RENATA	Yes	Yes	Mobility, services, capacity for growth and expansion	Capacity of equipment which supports Ipv6, LACK OF TRAINING ON SERVICES OVER THE PROTOCOL
COSTA RICA	RedCONARE	No	No		There hasn't been any demand
ECUADOR	CEDIA	Yes	Yes	To sustain the growth of the Internet and Advanced Networks it is necessary to use IPv6.	Lack of a *killer app* which forces us to deploy IPv6 towards the entire network.
EL SALVADOR	RAICES	Yes	No		Humans resources available
GUATEMALA	RAGIE	No	Yes	The depletion of IPv4 and the transition to IPv6 that must take place. As a research entity, RAGIE is seen as the institution which naturally must "call the shots" in the country	1. Lack of knowledge of some members. 2. Lack of implementation by ISPs
PARAGUAY	ARANDU	Yes	No		
PERU	RAAP	Yes	Yes	Lack of IPv4 numbers for allocation	Lack of applications and IPv6 native services
URUGUAY	RAU	No	No		Members
VENEZUELA	CENIT	Yes	Yes	To encourage the adoption of the IPv6 protocol, given its technical advantages and its economic and financial benefits in the long term.	Lack of trained human resources, both in REACCIUN and its member institutions.

5.1 Overview

Eleven NRENs have a NOC (Network Operation Centre); nine of them own it and two of them outsource it from another company. All NOCs cater for the needs of all their users.

Latin American NRENs feature 79 PoPs in 2011. CEDIA and RAAP do not feature optical connectivity in some of their PoPs, and RAU does not manage circuits. All networks manage at least one piece of routing equipment.

As regards backbone capacity, in 2011 Colombia and Ecuador joined the group of NRENs that have a core capacity which can be measured in Gbps.

Argentina and Uruguay declared to have a minimum percentage of their networks in dark fibre in 2010; in 2011 they were joined by the academic networks from Brazil, Chile and Guatemala. Brazil and México have FCB (Cross Border Fibre).

RNP, REUNA, CEDIA and CUDI offer on-demand bandwidth, through manual processes run by the NOC.

5.2 Quality of Service – QoS

The GN2 (GÉANT2) project established three levels of Quality of Service (QoS): "Premium", "IP Best Effort" and "IP Less than Best Efforts" (http://www.geant2.net/server/show/conWebDoc.1582); just as in the two previous editions of the Compendium, such parameters were used for the objectives of this Compendium: NRENs were asked what level of QoS they deliver, and what the main factor inhibiting this service's provision is if they do not deliver it.

In networks experiencing congestion, the implementation of QoS enables Premium traffic to move without any problems across those areas where traffic might be experiencing congestion problems.

Two NRENs (14%) indicated they offer Premium QoS in their network (one less than in 2010); just as in 2010, the category of IP Less than the best effort features only one NREN providing this level of QoS, and eight networks feature the IP Best Effort level, representing 58% of the NRENs in the Compendium. This information, and the reasons that the NRENs have for not providing these levels QoS are presented in Table 5.2.1.

Table 5.2.1: Do you offer QoS in your network?

Country	NREN	Best Effort	Premium	Less than Best Efforts	Reasons for not providing these Quality of Service levels	Comments
ARGENTINA	Innova|Red	Yes	No	No	Our NREN does not see any demand from users for these services	
BOLIVIA	RIAB-ADSIB	No			Another reason	We are in the process of formalising the academic network
BRAZIL	RNP	Yes	Planned	No	We prefer to over-provision the network	
CHILE	REUNA	Yes	Yes		Another reason	
COLOMBIA	RENATA	Yes	Yes	Yes		
COSTA RICA	RedCONARE	Planned	Planned	Planned	Another reason	
ECUADOR	CEDIA	Yes	Planned	No	We prefer to over-provision the network	
EL SALVADOR	RAICES	No	No	No	It is not financially feasible	
GUATEMALA	RAGIE	No	No	No	It is not financially feasible	We don't have the required human and equipment, all our work is done through volunteering
MEXICO	CUDI	Yes	No	No	Our NREN does not see any demand from users for these services	
PARAGUAY	ARANDU	Planned				
PERU	RAAP	Yes	No		Our NREN's hardware is currently not capable of supporting these levels	
URUGUAY	RAU	Planned			Another reason	In general there is overprovision, in some cases we are planning to implement it; we have already conducted tests with diffserv
VENEZUELA	CENIT	Yes			Another reason	It is necessary to update the operating system of the routing equipment of REACCIUN's CORE

5.3 Security Services

Nobody could deny at this stage that network security is a subject of crucial importance; until 2010 we only asked whether security incident responses were offered or not, but for the 2011 edition we added more questions.

Do NRENs use a structured format to exchange information on computer incidents? Three of them do and two of them have plans to do so. Five networks are already using network equipment to respond to security threats; there are also five networks which have taken measures to reduce the reception of spam and two of them have developed some sort of trap for those who try to violate their networks' security. All this information can be seen in Table 5.3.1.

Just as in 2010, seven NRENs (RNP, REUNA, RENATA, RedCONARE, CUDI, RAU and CENIT) gave a positive answer to the question about whether they offer computer security incident response teams (CSIRT), two NRENs indicated they have plans to do so and five networks said they do not offer this service (see Table 5.3.2).

Table 5.3.1: Security services

Country	NREN	Do you use a structured format to exchange information on computer incidents?	Do you use network equipment to respond to security threats?	Do you take measures to reduce the reception of spam?	Have you developed some sort of trap for those who try to violate your networks' security?
ARGENTINA	Innova|Red	No	No	Yes: SPF, temporarily disabled DNSBLs	No
BOLIVIA	RIAB-ADSIB	No	No	No	No
BRAZIL	RNP	Planned: IODEF - Incident Object Description and Exchange Format	Yes: Arbor Peakflow to identify and mitigate those threats which generate unusual traffic flows, such as denial of distributed service (DDoS), certain forms of malware, and policy	Yes: Notification to the institution responsible for the computers identified as the source of spam	Yes: Low interaction honeypots deployed, with the aim of detecting infected equipment. We are currently planning the deployment of high interaction honeypots to assess the behaviour of malware and identify botnets commands and controllers (C & C)
CHILE	REUNA	Yes: The format is related to the notification email that is sent to universities		Yes: For internal services a Symantec product is used	No
COLOMBIA	RENATA		Yes: Fortinet		Yes: ACL, DMZ
COSTA RICA	RedCONARE				
ECUADOR	CEDIA	We are currently developing it	No	Yes: SPF	No
EL SALVADOR	RAICES	No	No	No	No
GUATEMALA	RAGIE	No	Yes		
MEXICO	CUDI	Yes: Online form, with username and password	Yes: Perimeter security per server	No: We are not a commercial ISP	No
PARAGUAY	ARANDU				
PERU	RAAP				
URUGUAY	RAU				
VENEZUELA	CENIT	Yes: Collaboration agreement with the country's regulating agency (Electronic Certification Authority SUSCERTE)	Yes: Firewall in the main node web, services and placement	Yes: Anti-spam filters and applications	

Tabla 5.3.2: Respuesta a incidentes de seguridad informática (CSIRT)

Country	NREN	Does your NREN offer a computer security incident response team for your users community?	Is it provided by the NREN?	Is it provided by another NREN?	Has it been outsourced from another organisation?
ARGENTINA	Innova|Red	Planned			
BOLIVIA	RIAB-ADSIB	No			
BRAZIL	RNP	Yes	Yes	No	No
CHILE	REUNA	Yes	Yes		
COLOMBIA	RENATA	Yes	Yes		Yes
COSTA RICA	RedCONARE	Yes	Yes	No	No
ECUADOR	CEDIA	Planned			
EL SALVADOR	RAICES	No			
GUATEMALA	RAGIE	No			
MEXICO	CUDI	Yes	Yes	No	No
PARAGUAY	ARANDU				
PERU	RAAP	No			
URUGUAY	RAU	Yes	Yes	No	No
VENEZUELA	CENIT	Yes	Yes	No	No

For the 2011 edition of the Compendium, we also included for the first time issues related to DNSSEC, a security protocol of name servers. DNS extensions and security are a group of standards by the IETF (Internet Engineering Task Force) created to deal with vulnerabilities in the Domain Name System (DNS) and protect it from threats. The purpose of DNSSEC is to increase internet security as a whole by taking care of and trying to fix security weaknesses of DNS. Essentially, DNSSEC adds authentication to the DNS in order to make the system more secure. Out of the networks that completed the questionnaire which made the elaboration of this Compendium possible, only RNP (Brazil) declares to have some sort of activity related to DNSSEC, operating a defined zone for its NREN and those who constitute it.

5.4 Authorisation and Authentication infrastructures (AAI)

In 2009, none of the NRENs declared to have an Authorisation and Authentication infrastructures (AAI); in 2010, Brazil and Uruguay declared to provide the service and Colombia indicated it outsourced from another organisation. In 2011, the networks from Brazil, Mexico and Venezuela are the ones which declare to provide an infrastructure of this sort, and only the first two provide their users with access to a single sign-on web federation operated by the same NREN.

5.4.1 Identity Federations

Federated Academic Community (Comunidad Académica Federada - CAFe) is the name of the Brazilian federation, which inter-federates through EduGAIN; its Policy for Service Providers is available online at http://www.rnp.br/_arquivo/cafe/Politica_de_uso_CAFe_SP.pdf and its Policy for Identity Providers at http://www.rnp.br/_arquivo/cafe/Politica_de_uso_CAFe_IDP. 23 institutions belong to CAFe, with 20 identity providers and three service providers who offer the following types of services:

- CAPES Newspaper Portal: a virtual library that brings together and Brazil's education and research institutions and provides them with the best of the international scientific production.
- Dreamspark: Offers Microsoft systems for developers.
- Atlases: enables the visualisation of high resolution pathology images.

CAFe serves nearly 100,000 users, which include students, researchers and government agents.

Mexico's federation does not inter-federate, but it intends to do so in 2012 through EduGAIN.

Although the existence of a federation is not mentioned, Chile indicates it wishes to inter-federate in 2012.

5.4.2 Certification Authority

Since 2009, when the first RedCLARA Compendium of Latin American National Research and Education Networks was edited, only RNP and REUNA have Certification Authority (CA); without any variations, until 31 October 2011 RNP delivered six (6) CA certificates (the Brazilian NREN uses its certificates for authentication and authorisation).

Also until 31 October 2011, REUNA delivered 109 certificates for servers and 101 personal ones. The Chilean NREN's certificates are mostly for computer grids.

The CAs from BRAZIL and Chile son operated by the country's NREN (RNP and REUNA, respectively), the second is part of TAGPMA (The Americas Grid Policy Management Authority), and is not part of any PMA (Policy Management Authority).

5.5 Content Housing, Storage, Hosting and Delivery Services

NREN users require access to services which support their teaching, learning and research processes. An important service category is the one which includes content housing, storage, hosting and delivery services. But, which of these services do Latin American NRENs provide or intend to

provide for their users?; in order to answer this question, in the questionnaire used for the elaboration of the present Compendium NRENs were asked about the existence of services related to this issue ("Deployed") or, if they do not have them, their interest in having them deployed in the future ("Planned") or not ("No interest" or "Not planned"). We asked about the following services:

- National storage service
- Distributed Storage for grid users
- Distributed Storage for any NREN user
- Dedicated/special connectivity to provide high levels of connectivity to commercial content servers
- Hosting of commercial content servers in the NREN's network
- Commercial storage through an outsourced agreement
- Video servers for use by NREN sites
- Multimedia content servers for use by NREN sites
- Content mirroring from outside the network

Table 5.5.1 shows all the data provided by the Latin American NRENs on this subject.

Table 5.5.1 Content housing, storage, hosting and delivery services

Country	NREN	National storage service	Distributed Storage f or grid users	Distributed Storage for any NREN user	Dedicated/special connectivity to provide high levels of connectivity to commercial content servers	Hosting of commercial content servers in the NREN's network	Commercial storage through an outsourced agreement	Video servers for use by NREN sites	Multimedia content servers to be used by NREN sites	Content mirroring from outside the NREN's network	Comments
ARGENTINA	Innova|Red	No	No	No	No	No	No	No	Planned		
BOLIVIA	RIAB-ADSIB	No					No		No	No	
BRAZIL	RNP	Planned	Planned	Planned	No	No	No	Deployed	Deployed	Planned	We offer a "placement" service in the Internet Data Centre (IDC) of RNP, with the provision of a secure physical infrastructure, air conditioning, energy and logic with high availability for the servers and network devices of strategic clients in the field of science, technology, innovation, education and culture
CHILE	REUNA	No	Planned	Planned	No	No	No	Deployed	Deployed	No	
COLOMBIA	RENATA	Planned	Deployed	Deployed	Planned	No	No	Deployed	Deployed	Deployed	
COSTA RICA	RedCONARE										
ECUADOR	CEDIA	No	Planned				No	Planned	Deployed	Planned	
EL SALVADOR	RAICES	No	No	No	No	No	No	No	No	No	
GUATEMALA	RAGIE	No	No	No	No	No		Planned			
MEXICO	CUDI	No	Planned	Planned	Planned	No	No	Planned	Planned	No	
PARAGUAY	ARANDU		Planned	Planned	Planned	Planned		Planned			
PERU	RAAP		Planned	No	No	No		Planned			
URUGUAY	RAU		Planned	No	No	No		No			
VENEZUELA	CENIT	No	Planned	Planned	No	No	No	Deployed	Deployed	No	

5.6 Collaboration and Communication Tools

5.6.1 VoIP

Within the countries connected to RedCLARA, the Voice over IP (VoIP) service is provided by RNP (Brazil) and CENIT (Venezuela); although still not connected, RIAB-ADSIB declares to have this service deployed. Check the details on Table 5.6.1.1. It is important to point out that NRENs were asked if they offer mobile telephony for their users, but none of them gave a positive answer nor has considered this service in their future plans.

Table 5.6.1.1: VoIP

Country	NREN	Do you provide VoIP for your users?	Centrally managed	PSTN services	Inter-institutional VoIP	E.164 numbers are reachable in/through your VoIP network; published/disseminated in ENUM or NRENUM.ne	VoIP for individual users
ARGENTINA	Innova|Red	Planned					
BOLIVIA	RIAB-ADSIB	Deployed	Deployed	Deployed	Not planned	Not planned	Deployed
BRAZIL	RNP	Deployed	Deployed	Deployed	Deployed	Not planned	Not planned
CHILE	REUNA	Planned					
COLOMBIA	RENATA	Planned					
COSTA RICA	RedCONARE						
ECUADOR	CEDIA	Planned					
EL SALVADOR	RAICES	Planned					
GUATEMALA	RAGIE						
MEXICO	CUDI	Not planned					
PARAGUAY	ARANDU						
PERU	RAAP						
URUGUAY	RAU						
VENEZUELA	CENIT	Deployed	Deployed		Deployed		Not planned

5.6.2 Videoconference

The NRENs from Brazil, Chile, Colombia, Ecuador, México and Venezuela, representing 67% of the networks that participated in this Compendium, provide a centrally managed conference service, while those from Argentina and Bolivia (22%) consider this service in their plans (see Graph 5.6.2.1). The group of networks that currently provides this service answered a set on nine questions which enable us to better define the type of service they offer: all of them have MCU channels for standard videoconference service (SD), videoconference based on H.323 ITU-T and centrally provided support for users. Half of them have videoconference based on Session Initiation Protocol (SIP); one NREN has access to the Global Dialling System (GDS) H.323, and three of them have it in their plans. Three networks already have MCU channels for High Definition Services (HD) and the other three are planning to implement them; only one NREN allows members of communities outside its network to book channels on its MCU; the others have not considered it. Centrally provided conference archiving and streaming is a service provided by four networks in this group; the other two are working on that. Finally, four NRENs have an online booking system. All these data are displayed on Table 5.6.2.1

Graph 5.6.2.1: Centrally managed videoconference service

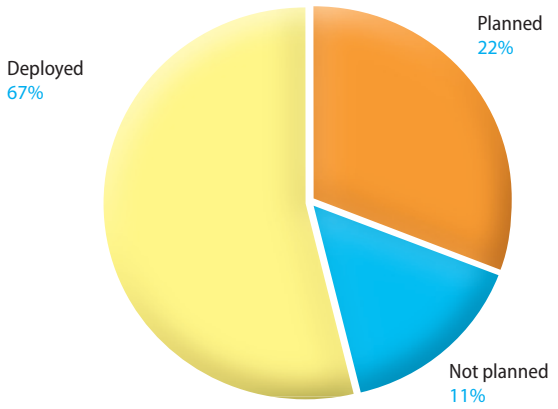


Tabla 5.6.2.1: Detalles del servicio de videoconferencia

Country	NREN	MCU channels for SD	H.323 ITU-T	Centrally provided support for users	SIP Videoconference	Access to GDS H.323	HD MCU channels	Members of communities outside the NREN can book channels on the NREN's MCU	Centrally provided conference archiving and streaming	Online booking system
BRAZIL	RNP	Deployed	Deployed	Deployed	Deployed	Planned	Deployed	Not planned	Deployed	Deployed
CHILE	REUNA	Deployed	Deployed	Deployed	Planned	Planned	Planned	Not planned	Deployed	Not planned
COLOMBIA	RENATA	Deployed	Deployed		Deployed	Deployed	Deployed	Deployed	Deployed	Deployed
ECUADOR	CEDIA	Deployed	Deployed	Deployed	Planned	Not planned	Deployed	Not planned	Deployed	Deployed
MEXICO	CUDI	Deployed	Deployed	Deployed	Deployed	Planned	Planned	Not planned	Planned	Deployed
VENEZUELA	CENIT	Deployed	Deployed	Deployed			Planned	Not planned	Planned	Planned

As regards the desktop videoconference service, three networks have it currently deployed and one has plans to have it; Table 5.6.2.2 shows this information. Mobile videoconference (for example, using Android or iPhone) is a service that RNP, REUNA, RENATA, CEDIA and CUDI want to explore.

Table 5.6.2.2: Desktop videoconference

Country	NREN	Centrally managed desktop videoconference	Platform
CHILE	REUNA	Deployed	EVO
COLOMBIA	RENATA	Deployed	Adobe Connect, Cisco, BBB, Vconf,
ECUADOR	CEDIA	Deployed	One EVO node within the NREN - One BigBlueButton server
MEXICO	CUDI	Planned	Cisco

5.6.3 Multicast

Four NRENs have the Multicast service already implemented; two networks have included it in their future plans and three of them have not considered it yet. This service sustains the situation from previous years: an interest not at all relevant in the implementation of this service (see Table 5.6.3.1).

Table 5.6.3.1: Multicast

Country	NREN	Multicast/Video IP Streaming
ARGENTINA	Innova|Red	Deployed
BOLIVIA	RIAB-ADSIB	Not planned
BRAZIL	RNP	Deployed
CHILE	REUNA	Planned
COLOMBIA	RENATA	Deployed
COSTA RICA	RedCONARE	
ECUADOR	CEDIA	Planned
EL SALVADOR	RAICES	Not planned
GUATEMALA	RAGIE	
MEXICO	CUDI	Not planned
PARAGUAY	ARANDU	
PERU	RAAP	
URUGUAY	RAU	
VENEZUELA	CENIT	Desplegado

5.6.4 Apoyo a la colaboración grupal

Los grupos de colaboración, a veces referidos como organizaciones virtuales, pueden servir a individuos de más de una institución base, así el grupo no se ve restringido a una única institución. Cuatro RNIE miembros de RedCLARA ofrecen actualmente una plataforma o un conjunto de servicios para los grupos de colaboración: RNP, REUNA, RENATA y CUDI. Aparte de ellos, CEDIA está planificando implementar estos servicios.

Dentro de este grupo, todas las redes consideran dentro de los servicios a las listas de correo; cuatro incluyen el almacenamiento de documentos, el calendario y la planificación de actividades y tres las wikis. Revise la información referida a esta materia en la Tabla 5.6.4.1.

Tabla 5.6.4.1: Services to support group collaboration

Country	NREN	Size of its target audience	Services that are or will be included in the platform						Are services federated or will they be federated?	What is/will be the model for charging for these services?	Description of the fees for these services
			Document storage	Calendar	Mailing lists	Activity/ appointment planner	Wiki	Others			
BRAZIL	RNP	Very large (more than 100 people)	Yes	Yes	Yes	Yes	Yes	Yes: Web conference	Yes	All costs are recovered	Services have their costs funded by the Ministries of Education; of Science, Technology and Innovation; of Culture; and of Health.
CHILE	REUNA				Yes				Yes		
COLOMBIA	RENATA	Large (up to 100 people)	Yes	Yes	Yes	Yes	No		Yes	Free of charge	
ECUADOR	CEDIA	Medium (up to 20 people)	Yes	Yes	Yes	Yes	Yes		No	Free of charge	Included in CEDIA's service
MÉXICO	CUDI	Very large (more than 100 people)	Yes	Yes	Yes	Yes	Yes	Yes: Forums, Blog, RSS, Chat, Group, Announcements, Statistics, Searches, Qualifications, Didactic Guidelines, web Content, Links to external applications, Evaluations, Exams, Forms, Glossary, Templates, Meetings, Messages, Surveys, Podcast, Portfolios, Statistics, Tasks	No	Free of charge	

5.6.5 Multimedia repositories

Bolivia, Ecuador and Mexico plan to offer the multimedia content repository service, which is already deployed in the NRENs of Brazil, Chile and Colombia. This is an area which has gained growing importance in the distribution of audio and video materials created by the community of users coming from the field of education and research, and across the world academic networks are already preparing their infrastructures to respond to these needs. Table 5.6.5.1 shows information related to this subject. Additionally, it is important to point out that the networks from Argentina, Brazil, Chile, Colombia and Ecuador offer live streaming (video flow) service.

Table 5.6.5.1: Multimedia repository service

Country	NREN	Do you offer multimedia content repository service?	URL for the multimedia content repository	Can users share/ upload videos to the repository?	Who can upload content in that repository?	Is it possible to exchange metadata with external content aggregators?	How many objects are stored in your repository?
BOLIVIA	RIAB-ADSIB	Planned					
BRAZIL	RNP	Deployed	http://video.rnp.br/	Deployed	A limited number of people per institution (for example multimedia managers)	Planned	900
CHILE	REUNA	Deployed	Accessible through REUNA's website	Not planned			190
COLOMBIA	RENATA	Deployed	http://www.renata.edu.co/index.php/renata-en-vivo.html	Planned			100
ECUADOR	CEDIA	Planned	http://cedia.media.uvigo.es/index.html The general service is being migrated to CEDIA's server http://envivo.cedia.org.ec/ The repository of unedited stored videoconferences can be found here.	Planned			20
MEXICO	CUDI	Planned					

5.7 Networked Computing Resources

5.7.1 National computing services

Argentina, Brazil and Ecuador have a national computing service, which only in the case of the latter is provided by the same NREN. Argentina indicates that the service is provided by another institution but does not give its name, and Brazil indicates that this task is done by the National Laboratory for Scientific Computing (LNCC - http://www.lncc.br/sinapad/index.php). Chile, México and Venezuela are currently planning to implement this service in the future.

5.7.2 Computer Grids

Until 2010 only REUNA (Chile) declared to offer grid services for the community it serves; in 2011 it was joined by CEDIA (Ecuador) and nine networks declare to have plans to implement them in the future.

Assuming that, since the reality faced by countries in terms of grids is related, in many cases, to the participation in grid projects funded by the European Commission's Framework Programmes in which Latin America has taken part, we asked NRENs about the disciplines in each of these projects that make use of the existing grid infrastructures in the region. As in previous years, in order to facilitate the answering process we included a field for those who could not identify any areas or who did not have any knowledge on the subject (no / I don't know) and the following areas were identified:

- High Energy Physics
- Other Physics
- Computational Chemistry
- Other Chemistries
- Biomedicine
- Astro-science
- Earth Science
- Climatology
- Arts and Humanities
- Other

When identifying each area, NRENs were asked to indicate if the grid is already being used (running), if its use is planned (planned) or if they do not consider it or have no knowledge about it (no / do not know). The answers to this question were compared with the results provided in the two previous years and the scarce variation can be seen on Table 5.7.2.2.

Table 5.7.2.1: Computer grids

Country	NREN	Do you offer storage facilities managed by the NREN?	Do you offer grid services?	Do you provide archives for grid users?	Do you provide dedicated point-to-point IP circuits?	Do you provide computing CPUs provided by the NREN?	Do you provide dedicated optical routes for grid users?
ARGENTINA	Innova|Red		Planned				
BOLIVIA	ADSIB						
BRAZIL	RNP		Planned		Planned		
CHILE	REUNA	Running	Running	Running	Running	Running	No interest
COLOMBIA	RENATA						
COSTA RICA	RedCONARE		Planned				
ECUADOR	CEDIA	Running	Running	Planned		Running	Running
EL SALVADOR	RAICES		No interest				
GUATEMALA	RAGIE		Planned				
MEXICO	CUDI		Planned				
PARAGUAY	ARANDU		Planned				
PERU	RAAP		Planned				
URUGUAY	RAU	Planned	Planned		Planned	Planned	No interest
VENEZUELA	CENIT	Planned	Planned	Planned		Planned	

Table 5.7.2.2: Disciplines that make use of grids in Latin American according to the NRENs' perception

Discipline	En ejecución			Planificado			No / no sabe		
		Running	Planned	No / do not know	2010	2011	2009	2010	2011
	2009	2010	2011	2009	2010	2011	2009	2010	2011
High Energy Physics	3	3		1	3	3	2	3	3
Other Physics			3	3	4	4	1	1	1
Computational Chemistry				2	3	3	1	2	1
Other Chemistry				1	1	1	1	2	2
Biomedicine		1	1	4	4	4		1	1
Astro-science	1	1		2	3	3	1	1	2
Earth Science	1			2	3	3	1	2	2
Climatology	3	2	2	3	3	3		1	1
Arts and Humanities		1	1	1	2	2	1	2	2
Others			1	3		1			

5.7.3 Cloud services

Cloud services are still not common in the world of research and education networks. However, they are clearly efficient and the worldwide tendency marks the road towards its implementation. In 2011, in the scene of Latin American academic networks, the NRENs from Brazil and Venezuela are the only ones that declare to have plans to deploy this service in the future.

5.8 e-Learning

Just as shown on Table 5.8.1, only the NRENs from Colombia, Ecuador and Venezuela offer e-Learning services.

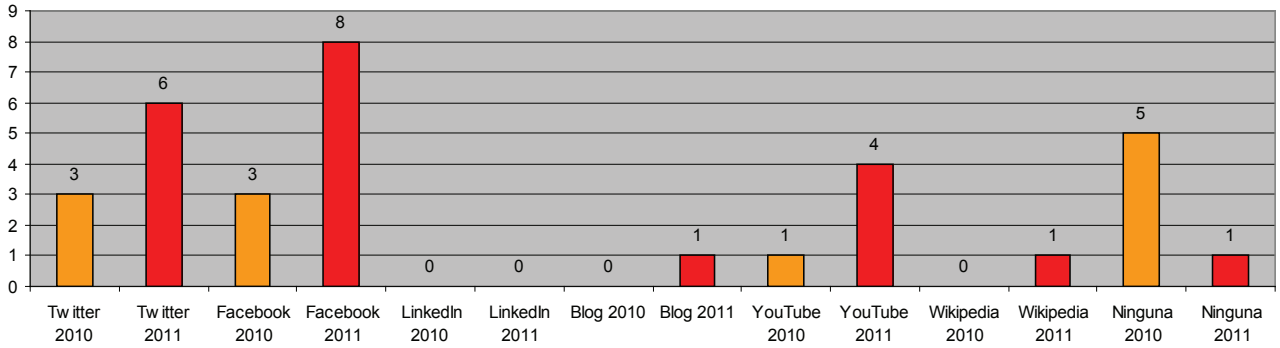
Table 5.8.1: e- Learning service

Country	NREN	e-Learning service	URL
ARGENTINA	Innova|Red	Not planned	
BOLIVIA	RIAB-ADSIB	Planned	
BRAZIL	RNP		
CHILE	REUNA	Not planned	
COLOMBIA	RENATA	Deployed	academia.renata.edu.co
COSTA RICA	RedCONARE		
ECUADOR	CEDIA	Deployed	http://cursos.cedia.org.ec
EL SALVADOR	RAICES	Not planned	
GUATEMALA	RAGIE		
MEXICO	CUDI	Planned	
PARAGUAY	ARANDU		
PERU	RAAP		
URUGUAY	RAU		
VENEZUELA	CENIT	Deployed	http://sigma.educacionvirtual.info.ve/

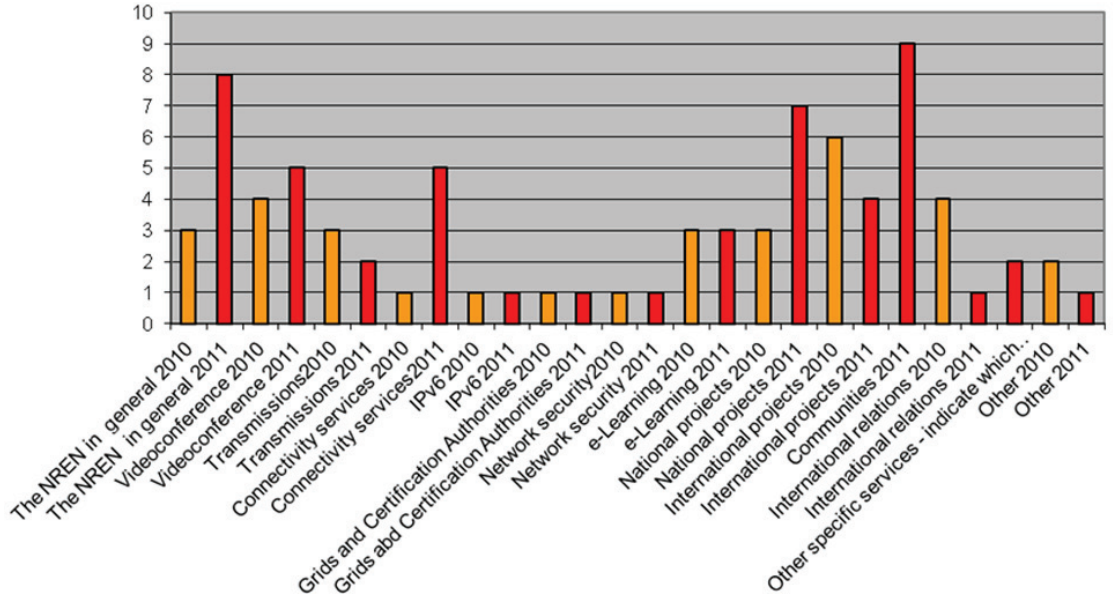
5.9 Interaction with users and communication

For the purpose of the present document, it is relevant to review the information on the priorities which define the NRENs' communications and public relations efforts and the information on the use of social media provided by the people responsible for developing these tasks in the region's academic networks.

5.9.1: Social network tools used by NRENs 2010 v/s 2011



Graph 5.9.2: Main focuses of attention of Communications and Public Relations in 2010 and 2011



5.9.1 Interaction

In comparison with 2010, in 2011 the organisation of conferences and training courses for users offered by the NRENs decreased, and the decrease was a significant one: it went down to a half in the organisation of conferences and to a little less than a third in the case of training courses. Table 5.9.1.1 displays this information.

Table 5.9.1.1: Interaction with users

Country	NREN	Do you organise national conferences for users?		Do you organise training courses?	
		2010	2011	2010	2011
ARGENTINA	Innova|Red	Yes	No	Yes	No
BOLIVIA	RIAB-ADSIB		No		No
BRAZIL	RNP	Yes	Yes	Yes	Yes
CHILE	REUNA	Yes	Yes	No	Yes
COLOMBIA	RENATA	Yes	Yes	Yes	Yes
COSTA RICA	RedCONARE	Yes		Yes	
ECUADOR	CEDIA	Yes	Yes		Yes
EL SALVADOR	RAICES	No	No	No	Yes
GUATEMALA	RAGIE	Yes		Yes	
MEXICO	CUDI	Yes	Yes	Yes	Yes
PARAGUAY	ARANDU	No		No	
PERU	RAAP	Yes		Yes	
URUGUAY	RAU	No		Yes	
VENEZUELA	CENIT	Yes	No	Yes	Yes

5.9.2 Support for users

In the direct relationship between NRENs and their users, there are important initiatives to provide them, who give infrastructures a real sense (by using them), with the support they require. This becomes evident in the information provided by Table 5.9.2.1.

Table 5.9.2.1: Support for users

Country	NREN	FAQ	Troubleshooting	Help Desk	Incidents and trouble tickets management	Support via e-mail	Support via chat
ARGENTINA	Innova|Red	No	Yes	Yes	Yes	Yes	No
BOLIVIA	RIAB-ADSIB	No	No	No	No	No	No
BRAZIL	RNP	No	Yes	Yes	Yes	Yes	No
CHILE	REUNA	No	No	No	No	No	No
COLOMBIA	RENATA	Yes	Yes	Yes	Yes	Yes	Yes
COSTA RICA	RedCONARE	No	Yes	Yes	No	Yes	Yes
ECUADOR	CEDIA	Yes	Yes	No	Yes	Yes	No
EL SALVADOR	RAICES	No	Yes	No	No	Yes	No
GUATEMALA	RAGIE	No	Yes	No	No	Yes	Yes
MEXICO	CUDI	Yes	Yes	Yes	Yes	Yes	Yes
PARAGUAY	ARANDU	No	No	Yes	No	No	No
PERU	RAAP	No	No	No	No	Yes	No
URUGUAY	RAU	No	Yes	Yes	Yes	Yes	No
VENEZUELA	CENIT	No	Yes	Yes	Yes	Yes	No

6 Funding and staffing

The present chapter provides information on the funding and staffing of the NRENs in the Compendium.

The NRENs budget is analysed in section 6.1, while section 6.2 is devoted to the staff working in the networks.

6.1 NRENs' budget

In terms of funding (see Table 6.1.1), the situation for 2011 is exactly the same as in 2010; surprisingly, there aren't any variations in the figures provided by networks and consequently it would be outlandish to suggest new interpretations; consulting that chapter in the 2010 Compendium is enough.

For the vast majority of NRENs, most their budget comes from users and/or clients, followed in the second place by government or public agencies. The expections are Brazil and Costa Rica, whose budget comes mainly from the latter (see Table 6.1.2)

Table 6.1.1: NRENs' budget

Country	NREN	Is your budget year equal to your calendar year?	What was your organisation's total budget for 2010 (or 2010/2011)? (use millions of euro €)	What is your organisation's total budget for 2011 (or 2011/2012)? (use millions of euro €)	How much of the 2011 (or 2011/2012) budget is dedicated directly to NREN activities? (use millions of euro €)	Is the NREN able to develop multiannual budgets or multi-annual plans?	Describe briefly how the organisation operates or the development of multi-annual budgets or plans in your NREN	Is your corporate strategy and/or business plan, available online?
ARGENTINA	Innova|Red	Yes	0.0	0.0	0.0	No		No
BOLIVIA	RIAB-ADSIB	Yes	0.01	0.015	0.02	No		No
BRAZIL	RNP	Yes	60.0	60.0	60.0	Yes	We have a set of activities called Advanced Internet Actions, which will be carried out over a four-year period. Every year, we expand these activities to accomplish new goals and we search for new resources if there are changes to the previous multi-annual plan.	No
CHILE	REUNA	Yes	1.14	1.12	1.12	No		No
COLOMBIA	RENATA	Yes	0.795942	0.795942	0.795942	No		No
COSTA RICA	RedCONARE	Yes	0.307	8.825	0.03	No	The executive area annually prepares the operational plan for the following year, which is aimed specifically at planning and coordinating activities, researcher training, communication and promotion of communities and collaboration projects. This plan is reviewed and approved by the Council of University Vice-Chancellors. The technical area receives specific funding to purchase equipment and for the technical staff.	No

Country	NREN	Is your budget year equal to your calendar year?	What was your organisation's total budget for 2010 (or 2010/2011)? (use millions of euro €)	What is your organisation's total budget for 2011 (or 2011/2012)? (use millions of euro €)	How much of the 2011 (or 2011/2012) budget is dedicated directly to NREN activities? (use millions of euro €)	Is the NREN able to develop multiannual budgets or multi-annual plans?	Describe briefly how the organisation operates or the development of multi-annual budgets or plans in your NREN	Is your corporate strategy and/ or business plan, available online?
ECUADOR	CEDIA	No	1.4	2.0	0.4	Yes	Mainly for the generation of an endowment fund which enables investment on our own network infrastructure	No
EL SALVADOR	RAICES	Yes	0.1	0.1	0.001	No		No
GUATEMALA	RAGIE	Yes	0.1	0.0	0.0	No		
MEXICO	CUDI	Yes	0.93	0.92	0.92	No		No
PARAGUAY	ARANDU	Yes	0.0	0.0	0.0	No		
PERU	RAAP	Yes	0.185	0.0	0.0	No		
URUGUAY	RAU	Yes	0.0	0.0	0.0	Yes		
VENEZUELA	CENIT	Yes	7.2	7.8	1.5	Yes	Multi-annual budgets are only applied for the implementation of projects, where only the portion planned to be spent in that year is charged to the fiscal exercise budget.	No

Table 6.1.2: Percentage estimate of the NRENs' source of income

Country	NREN	Estimate of the sources of income related to the NREN (for 2011 or 2010/2011)				
		Users /clients	Government/ public agencies	The EU (e.g. for Framework Programme projects)	IADB funds	Other sources
ARGENTINA	Innova|Red	50%	20%		30%	
BOLIVIA	RIAB-ADSIB	50%	50%			
BRAZIL	RNP		97%	3%		
CHILE	REUNA	97%				3%
COLOMBIA	RENATA	65%	35%			
COSTA RICA	RedCONARE		100%			
ECUADOR	CEDIA	100%				
EL SALVADOR	RAICES	95%			5%	
GUATEMALA	RAGIE	100%				
MEXICO	CUDI	100%				
PARAGUAY	ARANDU					
PERU	RAAP	100%				
URUGUAY	RAU	X	X			
VENEZUELA	CENIT	100%				

Table 6.1.3: Charges to NREN clients

Country	NREN	How does the NREN charge its customers?
ARGENTINA	Innova|Red	We charge a flat fee, based on bandwidth
BOLIVIA	RIAB-ADSIB	There is a proposal that has to be approved, once the network is formalised
BRAZIL	RNP	We do not charge them directly
CHILE	REUNA	We use a combination of flat fee and usage-based fee
COLOMBIA	RENATA	We do not charge them directly
COSTA RICA	RedCONARE	We do not charge them directly
ECUADOR	CEDIA	We use a combination of flat fee and usage-based fee
EL SALVADOR	RAICES	We charge the same fee to every member
GUATEMALA	RAGIE	Currently it is a flat fee based on the number of members. We are changing this for 2011 so that it is a combination based on the number of members and the bandwidth used
MEXICO	CUDI	A fixed annual fee is charged depending on the membership category, regardless of bandwidth
PARAGUAY	ARANDU	We do not charge them directly
PERU	RAAP	Some members contribute with a membership fee and others pay to access RAAP
URUGUAY	RAU	We charge a flat fee, based on bandwidth
VENEZUELA	CENIT	We charge a membership fee to cover the costs of the technological platform's functioning. It is based on the annual budget, number of projects and number of researchers/teachers of each member

6.2 Staffing

Except in the cases of Brazil, where RNP has a staff made up of a large number of hired and outsourced people, and of REUNA (Chile) and CENIT (Venezuela), which feature 23 members of staff working directly on the NREN activities, the number of people who actually constitute the staff of Latin American academic networks is very low, even reaching zero in the case of those networks which are maintained thanks to the volunteer work of certain people who have decided to bet on the incorporation of their countries and of their scientific and academic communities into advanced networks.

Table 6.2.1: NREN staff

Country	NREN	Number of members of staff involved in the NREN's activities	Number of members of staff as given in the previous question , but in full time equivalents (FTEs)	Average number of people (in FTE) working in the organisation outsourced or regularly outsourced (for NREN activities)
ARGENTINA	Innova|Red	6	5	1.0
BOLIVIA	RIAB-ADSIB	3	1	0.0
BRAZIL	RNP	198	0	198.0
CHILE	REUNA	23	0	0.0
COLOMBIA	RENATA	12	12	6.0
COSTA RICA	RedCONARE	6	1	0.5
ECUADOR	CEDIA	12	3	3.0
EL SALVADOR	RAICES	2	1	0.2
GUATEMALA	RAGIE	0	0	0.0
MEXICO	CUDI	16	16	0.0
PARAGUAY	ARANDU	0	0	0.0
PERU	RAAP	7	4	4.0
URUGUAY	RAU	11	6	0.0
VENEZUELA	CENIT	23	0	0.0

Appendixes

1 Alphabetical list of the Latin American National Research and Education Networks that took part in the present study

NREN Acronym	Full name of the NREN in its original language	Country
CEDIA	Consorcio Ecuatoriano para el Desarrollo de Internet Avanzado	Ecuador
CENIT	Centro Nacional de Innovación Tecnológica	Venezuela
CONARE	Consejo Nacional de Rectores	Costa Rica
CUDI	Corporación Universitaria para el Desarrollo de Internet	Mexico
Innova|Red	Innova|Red	Argentina
RAAP	Red Académica Peruana	Peru
RAGIE	Red Avanzada Guatemalteca para la Investigación y Educación	Guatemala
RAICES	Red Avanzada de Investigación, Ciencia y Educación Salvadoreña	El Salvador
RAU	Red Académica Uruguaya	Uruguay
RENATA	Red Nacional Académica de Tecnología Avanzada	Colombia
REUNA	Red Universitaria Nacional	Chile
RIAB-ADSIB	Red de Integración Académica Boliviana - Agencia para el Desarrollo de la Sociedad de la Información en Bolivia	
RNP	Rede Nacional de Ensino e Pesquisa	Brazil

NOTE: ARANDU (Paraguay) is not on the list since it is a Guarani name, not an acronym.

2 Glossary

ALICE	Latin America Interconnected With Europe (América Latina Interconectada Con Europa) – Initial project under which RedCLARA was created, implemented and established, among other relevant results
ALICE2	Latin America Interconnected With Europe 2 (América Latina Interconectada Con Europa 2) - Action's name: Expanding and Strengthening RedCLARA as an e-Infrastructure for Collaborative Research and Support to Development. Project jointly funded by the EC through the @LIS2 Programme
@LIS2	Alliance for the Information Society, phase 2, European Commission's cooperation programme
CE	European Commission
CLARA	Latin American Cooperation of Advanced Networks (Cooperación Latino Americana de Redes Avanzadas)
Gb/s	Gigabytes per second
GÉANT	Pan-European advanced network, managed by DANTE
HD	High Definition
IAA	Authorization and Authentication Infrastructure
IP	Internet Protocol
IPv4	Internet Protocol, version 4
IPv6	Internet Protocol, version 6
MAN	Metropolitan Area Network
Mb/s	Megabytes per second
MCU	Multi Conference Unit
NOC	Network Operation Centre
NREN	National Research and Education Network
PoP	Point of Presence
QoS	Quality of Service
RAN	Regional Area Network
RedCLARA	Advanced research and education network created by ALICE and managed by CLARA
SD	Standard Definition
TERENA	Trans-European Research and Education Networking Association
VoIP	Voice over Internet Protocol

To learn about RedCLARA, visit: http://www.redclara.net
To learn about the ALICE2 project, visit: http://alice2.redclara.net

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