

NRO response to TSB ‘Questionnaire on IPv6 address allocation and encouraging the deployment of IPv6’

On 27 March 2009, the Telecommunication Standardization Bureau (TSB) issued a ‘*Questionnaire on IPv6 address allocation and encouraging the deployment of IPv6*’ to all Member States of the Union, to be returned by 12 June 2009.

The results of the questionnaire will then form part of the study evaluating a request by some developing countries for the TSB to become an additional registry for IP addresses. The final report will be submitted to the closed ITU Council meeting in Geneva, 20-30 October 2009.

The Asia Pacific Network Information Centre (APNIC), an ITU-D sector member, has provided a public response to assist Member States with data that may help in completing the questionnaire. The Latin American and Caribbean Internet Addresses Registry (LACNIC) has also provided data to CITEC (Inter-American Telecommunication Commission) to assist Latin American countries complete the survey.

Due to the interest expressed by many in the data, the NRO has produced this extended set of data for use by Member States and by the ITU TSB.

About the Number Resource Organization (NRO)

The NRO exists to protect the pool of unallocated Internet numbers (IP addresses and AS numbers) and serves as a coordinating mechanism for the five RIRs to act collectively on matters relating to the interests of RIRs.

<http://www.nro.net>

NRO invites Member States to make use of the NRO as a single point of contact for all five RIRs and to contact the NRO if they are unsure which RIR is allocating address space to networks in their economy.

nro@nro.net

About the Regional Internet Registries (RIRs)

Regional Internet Registries (RIRs) are independent, not-for-profit membership organisations that support the infrastructure of the Internet through technical coordination. There are five RIRs in the world today. Currently, the Internet Assigned Numbers Association (IANA) allocates blocks of IP addresses and ASNs, known collectively as Internet number resources, to the RIRs, who

then distribute them to their members within their own specific service regions. RIR members include Internet Service Providers (ISPs), telecommunications organisations, large corporations, governments, academic institutions, and industry stakeholders, including end users.

The RIR model of open, transparent participation has proven successful at responding to the rapidly changing Internet environment. Each RIR holds one to two open meetings per year, as well as facilitating online discussion by the community, to allow the open exchange of ideas from the technical community, the business sector, civil society, and government regulators.

The RIRs are an important part of the global Internet community and have strong relationships with local, regional and global organizations. These organizations work together within a model of enhanced cooperation and multistakeholder coordination to ensure the continued stability and security of the Internet.

About the Regional Internet Registries (RIRs)

Regional Internet Registries (RIRs) are independent, not-for-profit membership organisations that support the infrastructure of the Internet through technical coordination. There are five RIRs in the world today. Currently, the Internet Assigned Numbers Association (IANA) allocates blocks of IP addresses and ASNs, known collectively as Internet number resources, to the RIRs, who then distribute them to their members within their own specific service regions. RIR members include Internet Service Providers (ISPs), telecommunications organisations, large corporations, governments, academic institutions, and industry stakeholders, including end users.

The RIR model of open, transparent participation has proven successful at responding to the rapidly changing Internet environment. Each RIR holds one to two open meetings per year, as well as facilitating online discussion by the community, to allow the open exchange of ideas from the technical community, the business sector, civil society, and government regulators.

The RIRs are an important part of the global Internet community and have strong relationships with local, regional and global organizations. These organizations work together within a model of enhanced cooperation and multistakeholder coordination to ensure the continued stability and security of the Internet.

Each RIR performs a range of critical functions including:

- The reliable and stable allocation of Internet number resources (IPv4, IPv6 and AS Number resources)
- The responsible storage and maintenance of this registration data
- The provision of an open, publicly accessible database where this data can be accessed
- A range of technical and coordination services for the Internet community



Together, the five RIRs provide Internet number resource services to every economy in the world.

AfriNIC	Africa region	http://www.afrinic.net
APNIC	Asia and Pacific region	http://www.apnic.net
ARIN	Canada, many Caribbean and North Atlantic islands, and the United States	http://www.arin.net
LACNIC	Latin America and parts of the Caribbean	http://www.lacnic.net
RIPE NCC	Europe, Parts of Asia and the Middle East	http://www.ripe.net

Summary of IP resources by economy

The five Regional Internet Registries (RIRs) provide publicly accessible, daily updated statistical reports on IPv4 and IPv6 address delegations by economy. The reports are available from: <http://www.nro.net/statistics>

Another source of important data on IP delegations is the whois database. Each RIR maintains a public whois database that contains information on IP addresses delegated to organizations, as well as assignments made by those organizations to their customers. The RIRs also maintain data on the organizations that have IP address delegations registered in each RIR database.

The TSB survey included a number of questions on IP resource distribution by economy. The questions were:

- 1) What is the number (absolute number, for example 10'000) of IPv4 addresses currently available and used in your country?
- 2) What is the number (absolute number, for example 10'000) of IPv6 addresses currently available and used in your country?
- 3) What is the number (absolute number, for example 100) of organizations in your country that currently have been allocated an IPv4 addresses block from one of the Regional Internet Registries (RIRs)?
- 4) What is the number (absolute number, for example 100) of organizations in your country that currently have been allocated an IPv6 addresses block from one of the Regional Internet Registries (RIRs)?

For ease of access, the NRO has grouped data responding to these questions into a single easily accessible table on the following pages. Allocations made on a specific regional basis are shown in the last rows of the table, beneath the economy-based allocations.

Information to assist in interpreting the table on the following pages

To make best use of the data, the NRO recommends that you read the notes below in conjunction with the data.

Economy	<p>ISO 3166-1 currently recognizes 246 different economies. The RIRs use this list for registering allocations and assignments in their whois databases.</p> <p>In addition to the officially recognized codes, the RIRs also use 2 regional designations: Asia Pacific and European Union.</p> <p>The data in this table shows the economy to which IPv4 addresses were originally delegated. It does not show any subsequent change to the economy of IP address delegations that may occur after original delegations have been made. For example, while Serbia and Montenegro now exist as separate economies, the earlier designation as a single economy still appears in the table. Delegations made after Serbia and Montenegro were split into two economies will appear as separate entries under Serbia and, separately, Montenegro.</p> <p>Another implication of this preservation of original delegation information means that some economies appear to have no IP addresses when they in fact do. For instance, in the case of Martinique, the table below shows the economy as having no IPv4 addresses delegated directly by an RIR; however, Martinique does have address space assigned to its ISPs from RIR-delegated address ranges allocated to ISPs in the Netherlands Antilles and France. The addresses in this case, are therefore recorded in the table below as being delegated to the Netherlands Antilles and France.</p>
----------------	--

IPv4	Absolute number of addresses allocated	<p>Due to the routing architecture of the Internet and international reach of many businesses and networks, there are also addresses delegated to organizations that operate in more than one economy. Allocations made on a specific regional basis are shown in the last row of the table, beneath the economy-based allocations. Some of the apparently economy-based allocations listed in the table below may also contain elements of cross-border use. Only individual organizations using the addresses can specify definitively whether all their addresses are used within the same economy.</p> <p>It is important to note that, due to the hierarchical nature of addressing, not all IP addresses that are delegated to a network can, in fact, be used. Nor is it practical for a Member State to track the number of private IP addresses—often deployed for their perceived security advantages—that are in active use on networks.</p>
	/8s allocated	<p>Because of the very large numbers of IPv4 addresses possible in some cases, the table includes a column showing the number of addresses using the standard Internet technical equivalent of a total number of /8s (a “slash 8” represents 224 IP addresses, or what was known historically as a “Class A” address block).</p>
	Organizations with IPv4 addresses from RIR pools	<p>The TSB survey requested information about the number of organizations with IPv4 addresses from RIR pools, so this is the information shown in the table. It is important to keep in mind, however, that the true number of organizations receiving services from RIRs also includes those who received IPv4 before the RIR system began.</p>
IPv6	/64s allocated	<p>Because of the very large scale of numbers allocated in the IPv6 address space, we have not included absolute numbers of individual IP addresses, but have used /64 (or 264 addresses) notation. A single /64 is used to address a single IPv6 subnet where auto-configuration of host addresses is desired. The table also includes a column to show the number of addresses using the standard Internet technical equivalent of a total number of /32s (which represent 296 IP addresses, the standard minimum address block allocated to a network).</p> <p>It is important to note that, due to the hierarchical nature of addressing, not all IP addresses that are delegated to a network can, in fact be used. This is particularly relevant to networks using IPv6, as the protocol’s addressing scheme is designed to facilitate more efficient network management and routing rather than efficient use of individual addresses.</p>
	/32s allocated	<p>A /32 (or 296 addresses) is the current minimum allocation size given to a Local Internet Registry for distribution to its downstream customers.</p>
	Organizations with IPv6 addresses from RIR pools	<p>The NRO suggests using caution when analysing IPv6 distribution by economy as the total number of IPv6 addresses made to regionally based networks forms a significant proportion of IPv6 allocations made to date.</p>

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Afghanistan	65,792	0.00392	10	0	0	0
Aland Islands	4,096	0.00024	1	0	0	0
Albania	150,784	0.00899	14	0	0	0

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Algeria	1,314,304	0.07834	25	4,294,967,296	1	1
American Samoa	4,096	0.00024	1	0	0	0
Andorra	24,576	0.00146	2	4,294,967,296	1	0
Angola	50,176	0.00299	20	4,294,967,296	1	1
Anguilla	4,096	0.00024	1	0	0	0
Antarctica	0	0	0	0	0	0
Antigua and Barbuda	47,104	0.00281	3	0	0	0
Argentina	7,397,120	0.4409	181	163,208,822,784	38.00002	17
Armenia	165,152	0.00984	25	17,179,869,184	4	1
Aruba	18,432	0.0011	2	0	0	0
Australia	37,517,056	2.23619	1028	35,403,953,078,272	8243.12518	56
Austria	7,358,432	0.4386	182	187,904,884,736	43.75002	13
Azerbaijan	237,568	0.01416	24	0	0	0
Bahamas	67,584	0.00403	4	4,294,967,296	1	1
Bahrain	233,984	0.01395	30	4,294,967,296	1	0
Bangladesh	580,864	0.03462	80	30,064,836,608	7.00002	8
Barbados	119,552	0.00713	3	0	0	0
Belarus	334,848	0.01996	22	0	0	0
Belgium	6,415,232	0.38238	129	91,805,188,096	21.37506	7
Belize	49,664	0.00296	4	0	0	0
Benin	17,408	0.00104	7	4,294,967,296	1	1
Bermuda	80,384	0.00479	6	4,294,967,296	1	1
Bhutan	22,528	0.00134	4	4,294,967,296	1	1
Bolivia	431,360	0.02571	18	12,884,901,888	3	3
Bosnia and Herzegovina	395,520	0.02357	40	8,589,934,592	2	1
Botswana	72,960	0.00435	8	0	0	0
Bouvet Island	0	0	0	0	0	0
Brazil	29,754,880	1.77353	476	282,299,610,431,488	65728	35
British Indian Ocean Territory	3,072	0.00018	1	0	0	0
Brunei Darussalam	191,232	0.0114	4	4,294,967,296	1	1
Bulgaria	3,347,200	0.19951	144	47,244,705,792	11.00002	5

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Burkina Faso	22,272	0.00133	8	0	0	0
Burundi	2,304	0.00014	2	0	0	0
Cambodia	131,584	0.00784	31	0	0	0
Cameroon	59,904	0.00357	14	4,294,967,296	1	1
Canada	59,418,368	3.54161	395	227,637,395,456	53.00096	61
Cape Verde	8,192	0.00049	2	0	0	0
Cayman Islands	31,744	0.00189	3	0	0	0
Central African Republic	3,328	0.0002	3	0	0	0
Chad	0	0	0	0	0	0
Chile	4,862,208	0.28981	192	47,244,705,792	11.00002	12
China	201,264,896	11.99632	278	244,813,266,944	57.00003	24
Christmas Island#	2560	0.0002	1	0	0	0
Cocos (Keeling) Islands	0	0	0	0	0	0
Colombia	4,527,616	0.26987	85	38,654,771,200	9.00002	10
Comoros	0	0	0	0	0	0
Congo, Dem. Rep.	14,848	0.00089	1	0	0	0
Congo	1,024	0.00006	7	0	0	0
Cook Islands	8,192	0.00049	1	4,294,967,296	1	0
Costa Rica	1,504,768	0.08969	15	25,769,869,312	6.00002	3
Cote D'Ivoire	112,896	0.00673	16	8,589,934,592	2	2
Croatia	1,623,648	0.09678	37	21,474,902,016	5.00002	2
Cuba	105,472	0.00629	12	17,179,869,184	4	4
Cyprus	521,248	0.03107	28	25,769,803,776		2
Czech Republic	6,102,912	0.36376	259	224,949,043,200	52.37503	18
Denmark	9,815,136	0.58503	161	100,394,926,080	23.37502	9
Djibouti	4,096	0.00024	1	4,294,967,296	1	1
Dominica	0	0	0	0	0	0
Dominican Republic	405,248	0.02415	15	12,884,901,888	3	3
Ecuador	936,192	0.0558	122	17,180,000,256	4.00003	6
Egypt	2,771,968	0.16522	90	21,474,836,480	5	5
El Salvador	406,528	0.02423	13	4,294,967,296	1	1

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Equatorial Guinea	2,048	0.00012	1	0	0	0
Eritrea	4,096	0.00024	1	0	0	0
Estonia	1,023,512	0.06101	45	35,970,482,176	8.37503	1
Ethiopia	16,384	0.00098	1	0	0	0
Faeroe Islands	33,792	0.00201	5	0	0	0
Falkland Islands (Malvinas)	0	0	0	0	0	0
Fiji	110,080	0.00656	9	12,884,967,424	3.00002	2
Finland	8,937,984	0.53275	184	66,572,124,160	15.50003	3
France	85,168,064	5.07641	367	35,764,729,872,384	8327.12508	19
French Guiana	2,048	0.00012	1	0	0	0
French Polynesia	39,424	0.00235	1	0	0	0
French Southern Territories	0	0	0	0	0	0
Gabon	155,136	0.00925	7	0	0	0
Gambia	11,264	0.00067	3	0	0	0
Georgia	557,568	0.03323	41	0	0	0
Germany	68,663,448	4.09266	767	41,867,341,922,304	9748.00017	69
Ghana	162,304	0.00967	33	4,294,967,296	1	1
Gibraltar	59,392	0.00354	7	4,294,967,296	1	1
Greece	3,867,392	0.23051	60	23,085,514,752	5.37502	2
Greenland	16,384	0.00098	1	0	0	0
Grenada	1,280	0.00008	1	0	0	0
Guadaloupe	8,192	0.00049	1	0	0	0
Guam	82,176	0.0049	7	0	0	0
Guatemala	489,472	0.02917	21	17,179,869,184	4	4
Guernsey	4,096	0.00024	2	0	0	0
Guinea	0	0	0	0	0	0
Guinea-Bissau	1,024	0.00006	1	0	0	0
Guyana	16,384	0.00098	1	0	0	0
Haiti	57,600	0.00343	6	4,295,032,832	1.00002	1
Heard & McDonald Islands	0	0	0	0	0	0

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Honduras	94,720	0.00565	16	0	0	0
Hong Kong	8,220,416	0.48997	163	81,604,444,161	19.00002	19
Hungary	3,716,480	0.22152	133	57,445,253,120	13.37502	6
Iceland	545,792	0.03253	30	30,064,836,608	7.00002	3
India	18,577,664	1.10732	260	94,489,346,048	22.00002	19
Indonesia	7,266,816	0.43314	216	90,194,575,360	21.00006	26
Iran	1,925,120	0.11475	90	60,129,542,144	14	3
Iraq	61,440	0.00366	8	0	0	0
Ireland	4,205,728	0.25068	110	97,710,637,056	22.75003	6
Isle of Man	16,384	0.00098	5	4,294,967,296	1	0
Israel	3,960,768	0.23608	51	25,769,869,312	6.00002	1
Italy	32,376,512	1.92979	455	17,863,306,051,584	4159.12505	22
Jamaica	138,240	0.00824	5	0	0	0
Japan	170,107,648	10.13921	345	35,782,983,811,074	8331.37515	128
Jersey	6,400	0.00038	2	0	0	0
Jordan	302,848	0.01805	31	4,294,967,296	1	0
Kazakhstan	873,472	0.05206	47	0	0	1
Kenya	267,520	0.01595	54	17,180,000,256	4.00003	6
Kiribati	3,072	0.00018	2	0	0	0
Korea, Democratic People's Rep.	0	0	0	0	0	0
Korea, Rep.	72,238,848	4.30577	158	22,333,830,004,737	5200.00002	49
Kuwait	782,080	0.04662	34	4,294,967,296	1	0
Kyrgyz Republic	129,024	0.00769	12	4,294,967,296	1	0
Lao People's Democratic Republic	41,216	0.00246	5	0	0	0
Latvia	1,404,928	0.08374	88	21,474,836,480	5	2
Lebanon	304,384	0.01814	27	0	0	0
Lesotho	12,544	0.00075	5	0	0	0
Liberia	1,024	0.00006	1	0	0	0
Libyan Arab Jamahiriya	294,912	0.01758	4	0	0	0
Liechtenstein	53,792	0.00321	9	8,589,934,592	2	2

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Lithuania	2,009,216	0.11976	55	10,200,612,864	2.37502	1
Luxembourg	534,336	0.03185	42	48,855,318,528	11.37502	5
Macao	163,072	0.00972	4	8,589,934,592	2	2
Macedonia	528,128	0.03148	26	8,589,934,592	2	0
Madagascar	37,888	0.00226	5	4,294,967,296	1	1
Malawi	20,992	0.00125	9	4,294,967,296	1	0
Malaysia	4,212,992	0.25111	63	77,309,476,864	18.00002	18
Maldives	37,376	0.00223	4	0	0	0
Mali	24,576	0.00146	6	4,294,967,296	1	1
Malta	476,160	0.02838	33	17,179,869,184	4	0
Marshall Islands	2,048	0.00012	1	0	0	0
Martinique	0	0	0	0	0	0
Mauritania	24,576	0.00146	2	0	0	0
Mauritius	270,080	0.0161	24	17,179,869,184	4	4
Mayotte	0	0	0	0	0	0
Mexico	21,503,232	1.28169	476	68,719,607,808	16.00003	14
Micronesia	2,048	0.00012	1	4,294,967,296	1	0
Moldova	308,736	0.0184	25	8,589,934,592	2	0
Monaco	65,856	0.00393	5	8,589,934,592	2	1
Mongolia	109,312	0.00652	24	0	0	0
Montenegro	28,672	0.00171	7	0	0	0
Montserrat	1,280	0.00008	2	0	0	0
Morocco	881,920	0.05257	14	8,589,934,592	2	2
Mozambique	48,128	0.00287	14	4,294,967,296	1	1
Myanmar	12,288	0.00073	2	0	0	0
Namibia	148,480	0.00885	16	65,536	0.00002	1
Nauru	8,192	0.00049	1	0	0	0
Nepal	147,968	0.00882	18	4,294,967,296	1	1
Netherlands	21,257,512	1.26705	433	2,669,322,502,144	621.50008	34
Netherlands Antilles	211,968	0.01263	15	12,885,098,496	3.00005	5
New Caledonia	63,488	0.00378	6	0	0	0
New Zealand	6,124,288	0.36504	171	137,439,543,296	32.00014	35
Nicaragua	166,144	0.0099	12	8,589,934,592	2	2
Niger	9,216	0.00055	2	0	0	0

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Nigeria	462,336	0.02756	66	8,589,934,592	2	2
Niue	1,024	0.00006	1	0	0	0
Norfolk Island	1,536	0.00009	2	0	0	0
Northern Mariana Islands	12,288	0.00073	1	0	0	0
Norway	24,292,912	1.44797	220	1,255,741,194,240	292.37503	16
Oman	196,608	0.01172	3	4,294,967,296	1	0
Pakistan	1,651,968	0.09846	57	34,359,738,368	8	7
Palau	4,096	0.00024	1	4,294,967,296	1	1
Palestinian Territory	248,320	0.0148	14	0	0	0
Panama	1,130,240	0.06737	27	12,884,901,888	3	3
Papua New Guinea	38,656	0.0023	7	8,589,934,592	2	1
Paraguay	141,568	0.00844	12	4,294,967,296	1	1
Peru	1,715,968	0.10228	34	30,064,771,072	7	7
Philippines	4,081,920	0.2433	94	64,424,509,440	15	15
Pitcairn	0	0	0	0	0	0
Poland	13,915,656	0.82944	270	9,039,832,481,792	2104.75002	8
Portugal	4,473,952	0.26667	61	74,625,187,840	17.37503	4
Puerto Rico	732,672	0.04367	18	4,295,032,832	1.00002	2
Qatar	378,880	0.02258	8	4,294,967,296	1	0
Reunion	32,768	0.00195	1	0	0	0
Romania	9,169,408	0.54654	87	47,244,705,792	11.00002	3
Russian Federation	25,020,616	1.49134	1594	269,509,263,360	62.75002	33
Rwanda	154,624	0.00922	8	4,294,967,296	1	1
Samoa	13,568	0.00081	4	4,294,967,296	1	0
San Marino	22,528	0.00134	3	0	0	0
Sao Tome and Principe	0	0	0	0	0	0
Saudi Arabia	2,736,896	0.16313	73	30,064,771,072	7	0
Senegal	92,416	0.00551	14	4,294,967,296	1	1
Serbia	197,376	0.01176	59	8,589,934,592	2	6
Serbia and Montenegro	997,632	0.05946	0	21,474,836,480	5	0

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Seychelles	17,408	0.00104	9	4,294,967,296	1	1
Sierra Leone	15,360	0.00092	5	0	0	0
Singapore	4,419,328	0.26341	94	77,309,542,400	18.00003	17
Slovakia	1,644,288	0.09801	70	47,244,771,328	11.00003	2
Slovenia	1,294,336	0.07715	46	60,129,607,680	14.00002	5
Solomon Islands	8,704	0.00052	1	4,294,967,296	1	0
Somalia	0	0	0	0	0	0
South Africa	15,057,920	0.89752	802	68,720,394,240	16.00021	23
South Georgia and the South Sandwich Islands	0	0	0	0	0	0
Spain	22,067,360	1.31532	289	126,164,795,392	29.37503	6
Sri Lanka	436,736	0.02603	13	12,884,967,424	3.00002	4
St. Helena	0	0	0	0	0	0
St. Kitts and Nevis	5,120	0.00031	1	0	0	0
St. Lucia	256	0.00002	0	0	0	0
St. Pierre and Miquelon	4,096	0.00024	0	0	0	0
St. Vincent and the Grenadines	6,144	0.00037	1	0	0	0
Sudan	67,584	0.00403	8	4,294,967,296	1	1
Suriname	44,032	0.00262	2	0	0	0
Svalbard and Jan Mayen	0	0	0	0	0	0
Swaziland	25,344	0.00151	7	4,294,967,296	1	1
Sweden	19,008,160	1.13297	342	767,725,862,912	178.75011	16
Switzerland	25,162,472	1.4998	214	443,992,506,368	103.37506	32
Syrian Arab Republic	263,168	0.01569	14	0	0	0
Taiwan	24,680,704	1.47108	102	9,921,374,519,296	2310.00002	30
Tajikistan	34,816	0.00208	6	0	0	0
Tanzania	105,472	0.00629	32	12,884,967,424	3.00002	4
Thailand	5,071,616	0.30229	77	68,719,607,808	16.00003	18
Timor-Leste	0	0	0	0	0	0
Togo	12,288	0.00073	2	0	0	0

Summary of IP resources by economy (as of 15 May 2009)

Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Tokelau	0	0	0	0	0	0
Tonga	4,352	0.00026	2	0	0	0
Trinidad and Tobago	307,968	0.01836	11	8,589,934,592	2	2
Tunisia	632,064	0.03767	6	4,294,967,296	1	1
Turkey	10,581,696	0.63072	125	73,014,444,032	17	10
Turkmenistan	8,192	0.00049	2	0	0	0
Turks and Caicos Islands	7,168	0.00043	2	0	0	0
Tuvalu	8,192	0.00049	1	0	0	0
Uganda	142,592	0.0085	15	0	0	0
Ukraine	5,535,936	0.32997	180	68,719,476,736	16	10
United Arab Emirates	2,286,848	0.13631	16	12,884,901,888	3	2
United Kingdom	87,576,152	5.21995	977	5,194,763,665,409	1209.50017	37
United States Minor Outlying Islands	0	0	0	0	0	0
United States of America	1,458,625,280	86.94084	4,376	63,892,360,134,656		691
Uruguay	596,480	0.03555	13	81,604,640,768	19.00006	5
Uzbekistan	186,112	0.01109	15	4,294,967,296	1	0
Vanuatu	6,400	0.00038	2	0	0	0
Vatican City State	8,192	0.00049	1	4,294,967,296	1	1
Venezuela	3,693,056	0.22012	53	60,129,542,144	14	13
Viet Nam	6,708,480	0.39986	45	42,950,787,072	10.00026	26
Virgin Islands, British	2,048	0.00012	1	0	0	0
Virgin Islands, US	87,040	0.00519	4	4,294,967,296	1	1
Wallis and Futuna Islands	2,048	0.00012	0	0	0	0
Western Sahara	0	0	0	0	0	0
Yemen	24,576	0.00146	2	0	0	0
Zambia	36,096	0.00215	11	0	0	0
Zimbabwe	43,520	0.00259	11	4,294,967,296	1	1

Summary of IP resources by economy (as of 15 May 2009)						
Economy	IPv4			IPv6		
	Absolute number of addresses allocated	/8s allocated	Organizations with IPv4 addresses from RIR pools	/64s allocated	/32s allocated	Organizations with IPv6 addresses from RIR pools
Asia Pacific	556,544	0.03317	68	94,492,688,384	22.00079	13
European Union	113,840,544	6.78543	79	26,449,482,743,808	6158.25009	2

As Christmas Island is a territory of Australia, IPv4 addresses assigned to the island appear under the resources delegated to Australia in the daily statistics files produced by APNIC.

Responses to the remainder of TSB survey questions

The remainder of the survey questions have been answered separately below.

Question 5. What would you expect your requirements to be in terms of the number (absolute number, for example 10'000) of IPv4 addresses in your country in the future?

The data published by the RIRs enables anyone to make projections of future address consumption based on past trends in address consumption. The NRO invites Member States to use the data summarized in the table below, which shows trends in address space consumption on a per-economy basis over the past four years.

It is important to note that future growth in IP allocations cannot simply be assessed by using projections based on past growth. New Internet applications and increased Internet penetration rates can result in exponential growth of allocations, while deployment of private IP addresses behind firewalls can result in slowed growth.

Information to assist in interpreting the table on the following pages

To make best use of the data, the NRO recommends that you read the notes below in conjunction with the data.

Economy	<p>ISO 3166-1 currently recognizes 246 different economies. The RIRs use this list for registering allocations and assignments in their whois databases. In addition to the officially recognized codes, the RIRs also use 2 regional designations: Asia Pacific and European Union.</p> <p>This table does not include a calculation for economies that received IP address space directly from the RIRs after 31 December 2008. For economies that have received address space from RIRs after this date, or for economies that have chosen to obtain address space from an upstream provider, please contact your local RIR for more information to help you calculate future IP address consumption trends.</p>
Total address holdings	This data includes the total number of IPv4 addresses (as /32s or individual IP addresses) that were delegated to each economy as appear in the daily statistics files produced by the RIRs by the cut-off dates shown.
% increase 2007-2008	<p>As there is not a full set of data available yet for the year 2009, the percentage increase looks at the increase over the previous two full years of data, 2007 and 2008.</p> <p>For economies that have experienced a change from no IPv4 addresses in 2007 to having IPv6 addresses in 2008, it is not possible to calculate a percentage increase. In such cases, the table below shows “NA” (not applicable).</p> <p>The NRO suggests that, as Internet penetration rates have been increasing more rapidly in the past few years, Member States should consider placing greater weight on the trends for the last year or two, rather than earlier data trends.</p>

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Aaland Islands	0	4,096	4,096	4,096	0.00%
Afghanistan	32,768	38,912	61,440	63,744	3.75%
Albania	32,768	32,768	110,848	150,784	36.03%
Algeria	72,960	240,896	264,704	265,728	0.39%
American Samoa	4,096	4,096	4,096	4,096	0.00%
Andorra	16,384	24,576	24,576	24,576	0.00%
Angola	10,240	22,784	46,336	49,152	6.08%
Anguilla	2,048	4,096	4,096	4,096	0.00%
Antarctica	0	0	0	0	0.00%
Antigua and Barbuda	32,768	36,864	47,104	47,104	0.00%
Argentina	3,066,624	3,884,288	5,181,184	6,941,952	33.98%
Armenia	86,016	98,304	107,296	145,952	36.03%
Aruba	16,384	18,432	18,432	18,432	0.00%
Australia	26,377,984	30,228,992	32,959,232	36,064,256	9.42%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Austria	5,485,984	6,042,592	6,704,352	7,010,272	4.56%
Azerbaijan	96,256	133,120	141,312	221,184	56.52%
Bahamas	45,056	57,344	57,344	67,584	17.86%
Bahrain	71,680	104,448	153,600	233,984	52.33%
Bangladesh	183,808	257,536	359,936	580,352	61.24%
Barbados	54,016	70,400	99,072	119,552	20.67%
Belarus	123,904	152,576	158,720	328,704	107.10%
Belgium	4,279,040	5,031,040	5,454,208	6,297,216	15.46%
Belize	25,088	33,280	49,664	49,664	0.00%
Benin	5,120	6,144	6,144	17,408	183.33%
Bermuda	69,120	69,120	79,360	80,384	1.29%
Bhutan	10,240	12,288	22,528	22,528	0.00%
Bolivia	267,520	318,720	343,296	398,592	16.11%
Bosnia and Herzegovina	122,880	155,648	280,576	378,880	35.04%
Botswana	1,024	3,072	6,144	72,960	1087.50%
Bouvet Island	0	0	0	0	0.00%
Brazil	17,171,968	19,269,120	23,463,424	29,754,880	26.81%
British Indian Ocean Territory	1,024	3,072	3,072	3,072	0.00%
Brunei	172,544	172,544	174,592	191,232	9.53%
Bulgaria	1,483,776	1,899,520	2,487,808	3,264,256	31.21%
Burkina Faso	13,056	13,056	13,056	22,272	70.59%
Burundi	2,048	2,304	2,304	2,304	0.00%
Cambodia	34,816	53,248	96,768	120,064	24.07%
Cameroon	10,496	36,096	53,760	58,880	9.52%
Canada	45,796,096	47,670,784	52,122,112	55,399,424	6.29%
Cape Verde	0	0	4,096	8,192	100.00%
Cayman Islands	22,528	22,528	27,648	31,744	14.81%
Central African Rep.	0	2,048	3,072	3,328	8.33%
Chad	0	0	0	0	0.00%
Chile	3,096,320	3,600,640	4,168,960	4,626,688	10.98%
China	74,349,056	97,991,168	135,282,944	181,778,176	34.37%
Christmas Island	0	0	0	0	0.00%
Cocos (Keeling) Islands	0	0	0	0	0.00%
Colombia	1,108,992	1,805,312	3,097,856	4,154,880	34.12%
Comoros	0	0	0	0	0.00%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Congo	0	0	0	1,024	NA
Congo, Dem. Rep.	1,024	1,024	2,048	6,144	200.00%
Cook Islands	8,192	8,192	8,192	8,192	0.00%
Costa Rica	1,254,144	1,270,528	1,307,392	1,451,008	10.98%
Cote d'Ivoire	16,384	40,960	73,984	100,608	35.99%
Croatia	445,024	646,752	952,416	1,546,336	62.36%
Cuba	91,136	97,280	101,376	105,472	4.04%
Cyprus	267,552	352,288	430,112	520,736	21.07%
Czech Republic	3,088,640	4,264,320	4,901,760	5,898,624	20.34%
Denmark	6,769,088	7,366,144	7,867,232	9,177,184	16.65%
Djibouti	4,096	4,096	4,096	4,096	0.00%
Dominica	0	0	0	0	0.00%
Dominican Republic	147,200	196,352	265,984	405,248	52.36%
Ecuador	267,008	344,320	553,216	735,488	32.95%
Egypt	1,238,784	1,382,400	2,138,880	2,423,552	13.31%
El Salvador	156,672	300,032	336,896	406,528	20.67%
Equatorial Guinea	0	0	2,048	2,048	0.00%
Eritrea	4,096	4,096	4,096	4,096	0.00%
Estonia	695,040	937,984	973,824	1,002,520	2.95%
Ethiopia	16,384	16,384	16,384	16,384	0.00%
Falkland Islands	0	0	0	0	0.00%
Faroe Islands	20,480	33,792	33,792	33,792	0.00%
Fiji	88,832	90,880	91,392	110,080	20.45%
Finland	7,471,232	8,441,472	8,691,840	8,920,576	2.63%
France	57,798,784	70,816,672	84,190,240	84,813,760	0.74%
French Guiana	0	2,048	2,048	2,048	0.00%
French Polynesia	23,040	39,424	39,424	39,424	0.00%
French Southern and Antarctic Lands	0	0	0	0	0.00%
Gabon	6,656	23,040	24,064	155,136	544.68%
Gambia	10,240	10,240	10,240	11,264	10.00%
Georgia	147,456	192,512	243,712	485,888	99.37%
Germany	36,641,880	47,818,616	59,039,608	66,851,704	13.23%
Ghana	58,368	82,944	121,344	136,704	12.66%
Gibraltar	47,104	47,104	47,104	57,344	21.74%
Greece	1,750,272	2,344,704	3,124,992	3,735,808	19.55%
Greenland	16,384	16,384	16,384	16,384	0.00%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Grenada	256	256	256	256	0.00%
Guadeloupe	0	1,024	4,096	6,144	50.00%
Guam	51,456	67,840	73,984	82,176	11.07%
Guatemala	145,152	225,024	262,144	354,304	35.16%
Guernsey	0	0	2,048	4,096	100.00%
Guinea	0	0	0	0	0.00%
Guinea-Bissau	1,024	1,024	1,024	1,024	0.00%
Guyana	0	16,384	16,384	16,384	0.00%
Haiti	28,672	28,672	32,768	45,056	37.50%
Heard Island and McDonald Islands	0	0	0	0	0.00%
Honduras	8,448	45,312	61,696	94,464	53.11%
Hong Kong	6,080,256	6,564,352	7,148,032	7,901,440	10.54%
Hungary	2,265,984	2,928,000	3,330,688	3,613,824	8.50%
Iceland	440,320	516,096	528,384	545,280	3.20%
India	5,975,808	8,202,752	13,810,944	18,047,488	30.68%
Indonesia	1,628,416	1,891,328	2,718,208	6,877,952	153.03%
Iran	786,944	1,008,128	1,339,904	1,816,064	35.54%
Iraq	6,144	10,240	30,720	36,864	20.00%
Ireland	2,831,008	3,356,064	3,911,840	4,191,648	7.15%
Isle of Man	0	0	6,144	16,384	166.67%
Israel	2,636,736	3,050,176	3,604,416	3,921,600	8.80%
Italy	17,721,440	18,516,416	23,613,632	29,462,464	24.77%
Jamaica	68,608	101,376	105,472	125,952	19.42%
Japan	142,736,640	151,128,064	158,272,000	168,335,872	6.36%
Jersey	0	0	2,048	6,400	212.50%
Jordan	154,880	169,216	220,928	290,560	31.52%
Kazakhstan	288,768	341,504	580,608	873,216	50.40%
Kenya	94,208	136,192	190,976	253,184	32.57%
Kiribati	1,024	3,072	3,072	3,072	0.00%
Korea, Dem. People's Rep.	0	0	0	0	0.00%
Korea, Rep.	43,195,904	51,126,528	58,859,008	66,821,632	13.53%
Kuwait	285,696	433,920	529,920	772,352	45.75%
Kyrgyzstan	65,536	86,272	97,536	129,024	32.28%
Laos	20,736	22,784	22,784	41,216	80.90%
Latvia	879,168	1,024,320	1,241,152	1,361,920	9.73%
Lebanon	116,736	182,272	221,440	302,080	36.42%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Lesotho	6,144	6,400	6,400	12,544	96.00%
Liberia	0	0	0	0	0.00%
Libya	8,192	24,576	286,720	286,720	0.00%
Liechtenstein	49,184	53,280	53,280	53,792	0.96%
Lithuania	1,009,536	1,303,936	1,955,456	1,997,952	2.17%
Luxembourg	283,392	294,144	359,680	448,320	24.64%
Macau	144,640	144,640	146,688	163,072	11.17%
Macedonia	143,360	194,560	277,248	455,680	64.36%
Madagascar	4,096	20,480	20,480	37,888	85.00%
Malawi	3,072	3,072	8,704	19,968	129.41%
Malaysia	2,532,864	2,785,280	3,275,776	4,122,624	25.85%
Maldives	10,752	12,800	20,992	37,376	78.05%
Mali	16,384	16,384	20,480	24,576	20.00%
Malta	273,408	283,648	392,192	476,160	21.41%
Marshall Islands	0	0	2,048	2,048	0.00%
Martinique	0	0	0	0	0.00%
Mauritania	8,192	8,192	8,192	24,576	200.00%
Mauritius	51,968	159,488	202,496	204,544	1.01%
Mayotte	0	0	0	0	0.00%
Mexico	11,016,448	16,259,328	21,502,208	21,504,000	0.01%
Micronesia	0	2,048	2,048	2,048	0.00%
Moldova	79,872	137,472	170,752	253,952	48.73%
Monaco	63,488	64,576	64,576	65,856	1.98%
Mongolia	47,104	79,872	98,560	109,056	10.65%
Montenegro	0	0	16,384	28,672	75.00%
Montserrat	0	0	256	1,280	400.00%
Morocco	299,264	569,600	585,984	618,752	5.59%
Mozambique	14,336	26,624	34,816	44,032	26.47%
Myanmar	12,288	12,288	12,288	12,288	0.00%
Namibia	30,464	39,680	39,936	115,712	189.74%
Nauru	8,192	8,192	8,192	8,192	0.00%
Nepal	49,664	51,712	88,576	135,680	53.18%
Netherlands	16,354,472	18,079,144	19,947,816	20,860,712	4.58%
Netherlands Antilles	45,056	118,784	200,704	207,872	3.57%
New Caledonia	34,816	38,912	43,008	63,488	47.62%
New Zealand	4,426,496	4,932,608	5,414,656	6,100,736	12.67%
Nicaragua	89,600	89,856	124,928	166,144	32.99%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Niger	0	0	0	9,216	NA
Nigeria	144,640	185,600	272,896	450,816	65.20%
Niue	1,024	1,024	1,024	1,024	0.00%
Norfolk Island	1,280	1,280	1,280	1,536	20.00%
Northern Mariana Islands	8,192	12,288	12,288	12,288	0.00%
Norway	22,376,992	22,966,560	23,416,352	23,981,872	2.42%
Oman	163,840	163,840	163,840	163,840	0.00%
Pakistan	345,600	440,832	668,672	1,372,416	105.25%
Palau	4,096	4,096	4,096	4,096	0.00%
Palestine	174,080	241,664	241,664	245,760	1.69%
Panama	414,464	816,384	905,216	1,113,856	23.05%
Papua New Guinea	19,200	21,248	34,560	38,656	11.85%
Paraguay	47,104	63,488	69,632	135,168	94.12%
Peru	679,424	970,496	1,253,120	1,584,896	26.48%
Philippines	1,159,424	2,132,992	2,418,944	3,051,776	26.16%
Pitcairn	0	0	0	0	0.00%
Poland	7,420,768	10,171,336	12,214,248	13,466,728	10.25%
Portugal	2,573,888	3,233,856	3,515,712	4,170,848	18.63%
Puerto Rico	467,200	532,736	609,536	684,288	12.26%
Qatar	176,128	241,664	372,736	374,784	0.55%
Reunion	0	0	0	32,768	NA
Romania	3,820,672	4,591,488	6,703,232	8,183,296	22.08%
Russia	10,806,152	13,764,360	16,945,544	23,116,872	36.42%
Rwanda	8,192	12,288	77,824	154,624	98.68%
Samoa	8,448	8,448	11,520	12,544	8.89%
San Marino	8,192	16,384	20,480	22,528	10.00%
Sao Tome and Principe	0	0	0	0	0.00%
Saudi Arabia	991,232	1,374,720	1,658,880	2,168,320	30.71%
Senegal	2,304	2,304	2,304	2,304	0.00%
Serbia	0	16,384	53,504	86,272	61.24%
Serbia and Montenegro	409,856	615,168	757,760	964,096	27.23%
Seychelles	3,072	7,168	12,288	16,384	33.33%
Sierra Leone	0	12,288	13,312	14,336	7.69%
Singapore	2,839,296	3,071,488	3,982,080	4,365,568	9.63%
Slovakia	1,025,024	1,197,312	1,374,208	1,461,760	6.37%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Slovenia	704,896	968,064	1,058,176	1,226,240	15.88%
Solomon Islands	8,704	8,704	8,704	8,704	0.00%
Somalia	0	0	0	0	0.00%
South Africa	8,304,640	9,506,048	13,553,664	13,991,680	3.23%
South Georgia and the South Sandwich Islands	0	0	0	0	0.00%
Spain	16,172,320	18,548,256	20,357,792	21,659,040	6.39%
Sri Lanka	147,456	231,424	290,816	305,664	5.11%
St Helena	0	0	0	0	0.00%
St Kitts and Nevis	1,024	2,048	3,072	5,120	66.67%
St Lucia	256	256	256	256	0.00%
St Pierre & Miquelon	0	0	0	0	0.00%
St Vincent	0	0	2,048	6,144	200.00%
Sudan	40,960	57,344	66,560	66,560	0.00%
Suriname	7,168	11,264	19,456	44,032	126.32%
Svalbard and Jan Mayen	0	0	0	0	0.00%
Swaziland	4,864	13,056	21,248	25,344	19.28%
Sweden	12,350,080	15,228,960	17,289,312	17,749,920	2.66%
Switzerland	23,646,688	24,145,120	24,546,496	24,705,000	0.65%
Syria	25,600	115,712	128,000	177,152	38.40%
Taiwan	16,248,320	18,126,592	19,800,832	23,977,216	21.09%
Tajikistan	20,480	20,480	28,672	34,816	21.43%
Tanzania	31,744	54,272	70,144	75,520	7.66%
Thailand	2,826,240	3,305,472	3,911,936	4,431,872	13.29%
Timor-Leste	0	0	0	0	0.00%
Togo	4,096	12,288	12,288	12,288	0.00%
Tokelau	0	0	0	0	0.00%
Tonga	256	4,352	4,352	4,352	0.00%
Trinidad and Tobago	66,304	137,984	242,432	258,816	6.76%
Tunisia	106,752	631,040	631,040	632,064	0.16%
Turkey	5,577,408	5,717,952	8,338,112	10,028,224	20.27%
Turkmenistan	4,096	4,096	4,096	8,192	100.00%
Turks and Caicos Islands	0	0	4,096	4,096	0.00%
Tuvalu	8,192	8,192	8,192	8,192	0.00%
Uganda	73,728	80,896	114,944	124,160	8.02%

Trends in IPv4 allocations, 2005-2008					
Economy	Total address holdings				% increase 2007-2008
	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	
Ukraine	1,333,184	2,006,464	2,843,200	4,949,568	74.08%
United Arab Emirates	963,840	1,228,032	1,492,224	2,286,848	53.25%
United Kingdom	73,117,496	76,967,256	83,377,656	86,434,648	3.67%
United States	1,258,942,720	1,303,634,688	1,352,182,528	1,406,022,912	3.98%
Uruguay	222,976	366,848	441,088	663,808	50.49%
United States Minor Outlying Islands	0	512	512	512	0.00%
Uzbekistan	79,872	120,832	129,024	164,096	27.18%
Vanuatu	4,096	4,096	4,352	6,400	47.06%
Vatican City State	8,192	8,192	8,192	8,192	0.00%
Venezuela	1,794,048	2,417,152	3,551,744	3,635,712	2.36%
Vietnam	772,352	823,040	3,839,232	6,624,000	72.53%
Virgin Islands, British	1,024	1,024	1,024	1,024	0.00%
Virgin Islands, US	76,800	76,800	82,944	87,040	4.94%
Wallis and Futuna	0	0	2,048	2,048	0.00%
Western Sahara	0	0	0	0	0.00%
Yemen	16,384	24,576	24,576	24,576	0.00%
Zambia	10,240	12,544	13,568	35,072	158.49%
Zimbabwe	14,592	22,784	29,184	37,376	28.07%
Asia Pacific	406,784	437,504	437,504	521,728	19.25%
European Union	108,023,200	109,179,808	109,396,896	109,428,128	0.03%

Question 6. What would you expect your requirements to be in terms of the number (absolute number, for example 10'000) of IPv6 addresses in your country in the future?

The data published by the RIRs enables anyone to make projections of future address consumption based on past trends in address consumption. The NRO invites Member States to use the data summarized in the table below, which shows trends in address space consumption on a per-economy basis over the past four years.

The NRO notes that as IPv6 adoption has historically been slow, Member States may wish to base their projections on a synthesis of both IPv6 and IPv4 consumption trends.

It is also important to note that future growth in IP allocations cannot simply be assessed by using projections based on past growth. New Internet applications and increased Internet penetration rates can result in exponential growth of allocations, while deployment of private IP addresses behind firewalls can result in slowed growth.

Information to assist in interpreting the table on the following pages

To make best use of the data, the NRO recommends that you read the notes below in conjunction with the data.

Economy	<p>ISO 3166-1 currently recognizes 246 different economies. The RIRs use this list for registering allocations and assignments in their whois databases. In addition to the officially recognized codes, the RIRs also use 2 regional designations: Asia Pacific and European Union.</p> <p>This table does not include a calculation for economies that received IP address space directly from the RIRs after 31 December 2008. For economies that have received address space from RIRs after this date, or for economies that have chosen to obtain address space from an upstream provider, please contact your local RIR for more information to help you calculate future IP address consumption trends.</p>
Total address holdings	<p>This data includes the total number of IPv6 /64s that were delegated to each economy as appear in the daily statistics files produced by the RIRs by the cut-off dates shown.</p>
% increase 2007-2008	<p>As there is not a full set of data available yet for the year 2009, the percentage increase looks at the increase over the previous two full years of data, 2007 and 2008.</p> <p>For economies that have experienced a change from no IPv4 addresses in 2007 to having IPv6 addresses in 2008, it is not possible to calculate a percentage increase. In such cases, the table below shows “NA” (not applicable).</p> <p>The NRO suggests that, as Internet penetration rates have been increasing more rapidly in the past few years, Member States should consider placing greater weight on the trends for the last year or two, rather than earlier data trends.</p>

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Aaland Islands	0	0	0	0	0.00%
Afghanistan	0	0	0	0	0.00%
Albania	0	0	0	0	0.00%
Algeria	0	0	0	4,294,967,296	NA
American Samoa	0	0	0	0	0.00%
Andorra	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Angola	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Anguilla	0	0	0	0	0.00%
Antarctica	0	0	0	0	0.00%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Antigua & Barbuda	0	0	0	0	0.00%
Argentina	120,259,084,288	128,849,018,880	146,028,953,600	163,208,822,784	11.76%
Armenia	8,589,934,592	8,589,934,592	8,589,934,592	12,884,901,888	50.00%
Aruba	0	0	0	0	0.00%
Australia	17,635,672,981,504	17,635,673,047,040	35,257,923,862,528	35,361,003,405,312	0.29%
Austria	84,825,669,632	97,710,571,520	110,595,473,408	166,430,048,256	50.49%
Azerbaijan	0	0	0	0	0.00%
Bahamas	0	0	4,294,967,296	4,294,967,296	0.00%
Bahrain	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Bangladesh	0	4,294,967,296	17,179,869,184	25,769,869,312	50.00%
Barbados	0	0	0	0	0.00%
Belarus	0	0	0	0	0.00%
Belgium	23,085,580,288	35,970,482,176	53,150,351,360	83,215,253,504	56.57%
Belize	0	0	0	0	0.00%
Benin	0	0	4,294,967,296	4,294,967,296	0.00%
Bermuda	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Bhutan	0	0	0	4,294,967,296	NA
Bolivia	4,294,967,296	8,589,934,592	8,589,934,592	8,589,934,592	0.00%
Bosnia and Herzegovina	0	0	4,294,967,296	8,589,934,592	100.00%
Botswana	0	0	0	0	0.00%
Bouvet Island	0	0	0	0	0.00%
Brazil	0	0	0		NA
British Indian Ocean Territory	0	0	0	0	0.00%
Brunei	0	0	0	0	0.00%
Bulgaria	12,884,967,424	12,884,967,424	21,474,902,016	42,949,738,496	100.00%
Burkina Faso	0	0	0	0	0.00%
Burundi	0	0	0	0	0.00%
Cambodia	0	0	0	0	0.00%
Cameroon	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Canada	81,604,378,624	98,785,034,240	154,621,247,488	201,867,526,144	30.56%
Cape Verde	0	0	0	0	0.00%
Cayman Islands	0	0	0	0	0.00%
Central African Rep.	0	0	0	0	0.00%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Chad	0	0	0	0	0.00%
Chile	12,884,901,888	12,884,901,888	30,064,771,072	38,654,771,200	28.57%
China	73,014,509,568	111,669,280,768	133,144,117,248	244,813,266,944	83.87%
Christmas Island	0	0	0	0	0.00%
Cocos (Keeling) Islands	0	0	0	0	0.00%
Colombia	0	8,589,934,592	21,474,902,016	34,359,803,904	60.00%
Comoros	0	0	0	0	0.00%
Congo	0	0	0	0	0.00%
Congo, Dem. Rep.	0	0	0	0	0.00%
Cook Islands	0	0	0	0	0.00%
Costa Rica	4,294,967,296	4,294,967,296	8,589,934,592	25,769,803,776	200.00%
Cote d'Ivoire	0	0	4,294,967,296	4,294,967,296	0.00%
Croatia	8,590,000,128	8,590,000,128	8,590,000,128	17,179,934,720	100.00%
Cuba	12,884,901,888	12,884,901,888	12,884,901,888	17,179,869,184	33.33%
Cyprus	8,589,934,592	8,589,934,592	8,589,934,592	17,179,869,184	100.00%
Czech Republic	53,150,285,824	61,740,285,952	91,805,057,024	169,114,468,352	84.21%
Denmark	27,380,482,048	27,380,482,048	48,855,318,528	87,510,024,192	79.12%
Djibouti	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Dominica	0	0	0	0	0.00%
Dominican Republic	12,884,901,888	12,884,901,888	12,884,901,888	12,884,901,888	0.00%
East Timor	0	0	0	0	0.00%
Ecuador	0	4,294,967,296	8,589,934,592	12,884,967,424	50.00%
Egypt	4,294,967,296	12,884,901,888	17,179,869,184	21,474,836,480	25.00%
El Salvador	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Equatorial Guinea	0	0	0	0	0.00%
Eritrea	0	0	0	0	0.00%
Estonia	18,790,547,456	31,675,514,880	31,675,514,880	35,970,482,176	13.56%
Ethiopia	0	0	0	0	0.00%
Falkland Islands	0	0	0	0	0.00%
Faroe Islands	0	0	0	0	0.00%
Fiji	0	0	4,295,032,832	4,295,032,832	0.00%
Finland	49,392,254,976	53,687,222,272	53,687,222,272	66,572,124,160	24.00%
France	35,300,873,273,344	35,335,233,011,712	35,369,592,750,080	35,721,780,199,424	1.00%
French Guiana	0	0	0	0	0.00%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
French Polynesia	0	0	0	0	0.00%
French Southern and Antarctic Lands	0	0	0	0	0.00%
Gabon	0	0	0	0	0.00%
Gambia	0	0	0	0	0.00%
Georgia	0	0	0	0	0.00%
Germany	39,921,721,344,000	41,068,477,743,104	41,446,434,996,224	41,742,787,805,184	0.72%
Ghana	0	0	4,294,967,296	4,294,967,296	0.00%
Gibraltar	0	0	0	4,294,967,296	NA
Greece	1,610,612,736	1,610,612,736	10,200,547,328	18,790,547,456	84.21%
Greenland	0	0	0	0	0.00%
Grenada	0	0	0	0	0.00%
Guadeloupe	0	0	0	0	0.00%
Guam	0	0	0	0	0.00%
Guatemala	4,294,967,296	8,589,934,592	17,179,869,184	17,179,869,184	0.00%
Guernsey	0	0	0	0	0.00%
Guinea	0	0	0	0	0.00%
Guinea-Bissau	0	0	0	0	0.00%
Guyana	0	0	0	0	0.00%
Haiti	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Heard Island and McDonald Islands	0	0	0	0	0.00%
Honduras	0	0	0	0	0.00%
Hong Kong	21,474,836,481	30,064,771,073	38,654,705,665	64,424,574,977	66.67%
Hungary	10,200,612,864	18,790,547,456	27,380,482,048	53,150,285,824	94.12%
Iceland	4,294,967,296	4,294,967,296	12,884,901,888	25,769,803,776	100.00%
India	47,244,640,256	60,129,542,144	60,129,607,680	85,899,411,456	42.86%
Indonesia	25,769,934,848	51,539,738,624	68,719,607,808	85,899,542,528	25.00%
Iran, Islamic Rep.	25,769,803,776	25,769,803,776	34,359,738,368	47,244,640,256	37.50%
Iraq	0	0	0	0	0.00%
Ireland	24,696,127,488	54,760,898,560	71,940,767,744	97,710,571,520	35.82%
Isle of Man	0	0	4,294,967,296	4,294,967,296	0.00%
Israel	17,179,869,184	17,179,869,184	17,179,934,720	21,474,902,016	25.00%
Italy	120,796,151,808	17,717,277,163,520	17,743,046,967,296	17,837,536,247,808	0.53%
Jamaica	0	0	0	0	0.00%
Japan	31,204,548,083,714	31,217,432,985,602	35,636,954,398,722	35,735,738,974,210	0.28%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Jersey	0	0	0	0	0.00%
Jordan	0	0	0	0	0.00%
Kazakhstan	0	0	0	0	0.00%
Kenya	0	4,294,967,296	4,295,032,832	17,180,000,256	300.00%
Kiribati	0	0	0	0	0.00%
Korea, Dem. People's Rep.	0	0	0	0	0.00%
Korea, Rep.	17,802,639,507,457	22,269,405,495,297	22,295,175,299,073	22,325,240,070,145	0.13%
Kuwait	0	0	0	0	0.00%
Kyrgyzstan	0	0	0	4,294,967,296	NA
Laos	0	0	0	0	0.00%
Latvia	4,294,967,296	4,294,967,296	12,884,901,888	21,474,836,480	66.67%
Lebanon	0	0	0	0	0.00%
Lesotho	0	0	0	0	0.00%
Liberia	0	0	0	0	0.00%
Libya	0	0	0	0	0.00%
Liechtenstein	0	0	0	8,589,934,592	NA
Lithuania	5,905,580,032	5,905,580,032	5,905,580,032	10,200,612,864	72.73%
Luxembourg	18,790,547,456	18,790,547,456	27,380,482,048	48,855,318,528	78.43%
Macau	8,589,934,592	8,589,934,592	8,589,934,592	8,589,934,592	0.00%
Macedonia	0	0	4,294,967,296	4,294,967,296	0.00%
Madagascar	0	0	0	4,294,967,296	NA
Malawi	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Malaysia	34,359,738,368	47,244,640,256	60,129,542,144	73,014,509,568	21.43%
Maldives	0	0	0	0	0.00%
Mali	0	0	4,294,967,296	4,294,967,296	0.00%
Malta	4,294,967,296	12,884,901,888	12,884,901,888	12,884,901,888	0.00%
Marshall Islands	0	0	0	0	0.00%
Martinique	0	0	0	0	0.00%
Mauritania	0	0	0	0	0.00%
Mauritius	0	8,589,934,592	8,589,934,592	17,179,869,184	100.00%
Mayotte	0	0	0	0	0.00%
Mexico	38,654,705,664	47,244,640,256	47,244,640,256	55,834,574,848	18.18%
Micronesia	0	0	0	0	0.00%
Moldova	0	0	4,294,967,296	4,294,967,296	0.00%
Monaco	4,294,967,296	4,294,967,296	4,294,967,296	8,589,934,592	100.00%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Mongolia	0	0	0	0	0.00%
Montenegro	0	0	0	0	0.00%
Montserrat	0	0	0	0	0.00%
Morocco	4,294,967,296	8,589,934,592	8,589,934,592	8,589,934,592	0.00%
Mozambique	0	0	0	4,294,967,296	NA
Myanmar	0	0	0	0	0.00%
Namibia	0	0	0	65,536	NA
Nauru	0	0	0	0	0.00%
Nepal	0	0	0	4,294,967,296	NA
Netherlands	2,385,854,595,072	2,394,444,529,664	2,437,394,202,624	2,583,423,156,224	5.99%
Netherlands Antilles	0	4,294,967,296	4,294,967,296	12,885,098,496	200.00%
New Caledonia	0	0	0	0	0.00%
New Zealand	34,359,869,440	55,834,705,920	73,014,837,248	124,554,575,872	70.59%
Nicaragua	4,294,967,296	4,294,967,296	4,294,967,296	8,589,934,592	100.00%
Niger	0	0	0	0	0.00%
Nigeria	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Niue	0	0	0	0	0.00%
Norfolk Island	0	0	0	0	0.00%
Northern Mariana Islands	0	0	0	0	0.00%
Norway	1,139,777,011,712	1,144,071,979,008	1,165,546,815,488	1,234,266,357,760	5.90%
Oman	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Pakistan	4,294,967,296	17,179,869,184	21,474,836,480	30,064,771,072	40.00%
Palau	0	0	0	4,294,967,296	NA
Palestine	0	0	0	0	0.00%
Panama	4,294,967,296	12,884,901,888	12,884,901,888	12,884,901,888	0.00%
Papua New Guinea	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Paraguay	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Peru	21,474,836,480	21,474,836,480	25,769,803,776	30,064,771,072	16.67%
Philippines	21,474,836,480	30,064,771,072	34,359,738,368	51,539,607,552	50.00%
Pitcairn	0	0	0	0	0.00%
Poland	84,825,604,096	8,889,508,560,896	8,966,817,972,224	9,001,177,776,128	0.38%
Portugal	35,970,482,176	44,560,416,768	44,560,416,768	61,740,285,952	38.55%
Puerto Rico	0	65,536	65,536	65,536	0.00%
Qatar	4,294,967,296	4,294,967,296	4,294,967,296	4,294,967,296	0.00%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Reunion	0	0	0	0	0.00%
Romania	21,474,836,480	21,474,836,480	21,474,836,480	34,359,738,368	60.00%
Russia	24,696,127,488	33,286,062,080	80,530,702,336	222,264,623,104	176.00%
Rwanda	0	0	4,294,967,296	4,294,967,296	0.00%
Samoa	0	0	0	0	0.00%
San Marino	0	0	0	0	0.00%
Sao Tome and Principe	0	0	0	0	0.00%
Saudi Arabia	8,589,934,592	8,589,934,592	8,589,934,592	8,589,934,592	0.00%
Senegal	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Serbia	0	0	0	4,294,967,296	NA
Serbia and Montenegro	12,884,901,888	12,884,901,888	12,884,901,888	17,179,869,184	33.33%
Seychelles	0	0	4,294,967,296	4,294,967,296	0.00%
Sierra Leone	0	0	0	0	0.00%
Singapore	25,769,803,776	25,769,803,776	30,064,771,072	64,424,640,512	114.29%
Slovakia	8,590,000,128	17,179,934,720	25,769,934,848	34,359,869,440	33.33%
Slovenia	12,884,901,888	17,179,869,184	17,179,869,184	38,654,771,200	125.00%
Solomon Islands	0	0	0	0	0.00%
Somalia	0	0	0	0	0.00%
South Africa	8,589,934,592	30,064,771,072	55,834,836,992	64,425,361,408	15.39%
South Georgia and the South Sandwich Islands	0	0	0	0	0.00%
Spain	61,740,285,952	83,215,122,432	83,215,122,432	108,984,926,208	30.97%
Sri Lanka	0	0	4,294,967,296	8,590,000,128	100.00%
St Helena	0	0	0	0	0.00%
St Kitts & Nevis	0	0	0	0	0.00%
St Lucia	0	0	0	0	0.00%
St Pierre and Miquelon	0	0	0	0	0.00%
St Vincent	0	0	0	0	0.00%
Sudan	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Suriname	0	0	0	0	0.00%
Svalbard and Jan Mayen	0	0	0	0	0.00%
Swaziland	0	0	0	4,294,967,296	NA

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Sweden	71,940,898,816	84,825,931,776	114,890,768,384	729,071,157,248	534.58%
Switzerland	233,539,043,328	255,013,945,344	280,783,749,120	418,222,702,592	48.95%
Syria	0	0	0	0	0.00%
Taiwan	485,331,369,984	9,637,906,677,760	9,917,079,552,000	9,917,079,552,000	0.00%
Tajikistan	0	0	0	0	0.00%
Tanzania	0	8,589,934,592	8,590,000,128	12,884,967,424	50.00%
Thailand	30,064,771,072	38,654,705,664	55,834,640,384	68,719,607,808	23.08%
Timor-Leste	0	0	0	0	0.00%
Togo	0	0	0	0	0.00%
Tokelau	0	0	0	0	0.00%
Tonga	0	0	0	0	0.00%
Trinidad and Tobago	0	4,294,967,296	8,589,934,592	8,589,934,592	0.00%
Tunisia	0	0	0	4,294,967,296	NA
Turkey	12,884,901,888	17,179,869,184	30,064,771,072	73,014,444,032	142.86%
Turkmenistan	0	0	0	0	0.00%
Turks and Caicos Is	0	0	0	0	0.00%
Tuvalu	0	0	0	0	0.00%
Uganda	0	0	0	0	0.00%
Ukraine	0	4,294,967,296	8,589,934,592	51,539,607,552	500.00%
United Arab Emirates	4,294,967,296	4,294,967,296	4,294,967,296	12,884,901,888	200.00%
United Kingdom	362,925,326,337	423,054,868,481	4,932,770,660,353	5,091,684,450,305	3.22%
United States	627,068,370,944	837,523,734,528	1,378,733,654,016	63,561,341,272,064	
Uruguay	8,589,934,592	8,589,934,592	77,309,411,328	81,604,640,768	5.56%
US Minor Outlying Islands	0	0	0	0	0.00%
Uzbekistan	0	0	0	0	0.00%
Vanuatu	0	0	0	0	0.00%
Vatican City	0	4,294,967,296	4,294,967,296	4,294,967,296	0.00%
Venezuela	17,179,869,184	25,769,803,776	55,834,574,848	60,129,542,144	7.69%
Vietnam	8,590,000,128	8,590,000,128	17,179,934,720	42,950,787,072	150.01%
Virgin Islands, British	0	0	0	0	0.00%
Virgin Islands, US	0	0	0	0	0.00%
Wallis & Futuna	0	0	0	0	0.00%

Trends in IPv6 allocations, 2005-2008					
Total address holdings (measured in units of /64)					
Economy	31 Dec 2005	31 Dec 2006	31 Dec 2007	31 Dec 2008	% increase 2007-2008
Western Sahara	0	0	0	0	0.00%
Yemen	0	0	0	0	0.00%
Zambia	0	0	0	0	0.00%
Zimbabwe	0	0	4,294,967,296	4,294,967,296	0.00%
Asia Pacific	0	68,719,476,736	77,309,411,328	90,196,672,512	16.67%
European Union	26,419,417,841,664	26,423,712,874,496	26,436,597,841,920	26,445,187,776,512	0.03%

Question 7. What, if any, facilities are present in your country, to encourage IPv6 deployment?

The NRO finds this to be an ambiguous question that is therefore difficult to answer. The NRO invites Member States to ask TSB to clarify what it intends Member States to interpret as “facilities”.

Question 8. What would you expect requirements to be in your country in terms of equipment necessary for the transition from IPv4 to IPv6?

The NRO would like to clarify that because the transition from IPv4 to IPv6 will take up to 20 years to complete, there will be a long period where both IPv4-only and IPv4/IPv6 networks will continue to exist. Timelines for the migration to IPv6 will vary significantly depending on the strategy network operators in each economy find most appropriate for their circumstances. Therefore, there will be a continuous scale of requirements, from networks that do not need to make any equipment changes now, to networks choosing to make those changes now, to networks that can simply buy IPv6-compatible equipment as part of the natural replacement cycle.

Question 9. What would you expect the cost to be of that equipment?

As noted above, this will be a very difficult question for Member States to answer as it depends on the strategy, or combination of strategies, best suited for the networks in their economy.

Question 10. Do you consider that you have adequate information on IP address allocation and registration policies and mechanisms?

All RIRs provide free and unfettered access to all IP address allocation and registration policies from their websites. Documents are also often available in multiple languages. The RIRs have a long and consistent history of engaging governments to help them understand how IP address management systems work and how stakeholders can participate in the open and transparent policy

making processes that develop the allocation policies. The NRO invites Member States to visit the RIR websites linked from the NRO website at:

<http://www.nro.net>

The NRO also invites Member States to make use of the NRO as a single point of contact for all five RIRs and to contact the NRO if they are unsure which RIR is allocating address space to networks in their economy.

nro@nro.net

Question 11. If you answered “no” to question 10 above, indicate what additional information would be useful for you:

Given the transparency of the RIR system and the RIRs’ engagement with Member States through not only the RIR system, but also through other forums such as the ITU, the IGF and the OECD, the RIRs are confident that any Member State with an interest in IP address distribution has ample opportunity to find any information it needs on allocation, registration, and associated IP addressing issues.

5) What are, to the best of your knowledge, the real or perceived barriers to IPv6 uptake, (for example, institutional barriers, cost of equipment, cost of training, current allocation policy, etc)?

In 2008, ARIN conducted a worldwide survey on IPv6 that asked a very similar question. The responses received to that survey have been summarized below. The full survey by ARIN and CAIDA can be found at:

http://www.getipv6.info/index.php/IPv6_Penetration_Survey_Results

Barrier	% response
Dual support for IPv4 and IPv6 at the application level	49.4%
Cost of new hardware	27.0%
Vendor support – routers	26.8%
Vendor support – firewalls	23.5%
Vendor support – OS	14.4%
Vendor support - host applications	16.7%
Vendor support - server applications	21.9%
Problems with legacy network system	25.2%
Problems with legacy applications	28.1%
Lack of support from transit providers	36.0%
Lack of support from end users	29.6%
Multi-home problems	14.7%
Lack of IPv6 expertise	44.8%
Other	8.6%

6) What specific information would you expect to find on the ITU web site that will be created pursuant to WTSA Resolution 64?

It would be useful for the ITU website to contain links to existing good sources of IPv6 information, such as RIR and ISOC websites. Links to IPv6 resources in languages other than English would also be valuable. The ITU website should also contain links to information on IPv6 activities by economy, to assist Member States benchmark activities that are conducive to IPv6 adoption.

7) If you have any additional comments, please write them in below, or in an additional page.

In January and February this year, APNIC conducted a survey of IPv6 readiness of organizations in the Asia Pacific. Member states from the Asia Pacific may find it useful to review the results on pages 36-45 of:

http://www.apnic.net/__data/assets/pdf_file/0014/6026/2009-survey-report.pdf

ISOC has also conducted a recent survey on IPv6 deployment experiences, the results of which are documented in this summary:

<http://www.isoc.org/pubs/2009-IPv6-OrgMember-Report.pdf>

The Number Resource Organization (NRO)

Formed by the Regional Internet Registries (RIRs) to formalise their cooperative efforts, the NRO exists to protect the unallocated Number Resource pool, to promote and protect the bottom-up policy development process, and to act as a focal point for Internet community input into the RIR system.