

## **LEGAL ASPECTS OF IPV4 DEPLETION**

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### **Abstract in original language**

Depletion of non-allocated IPv4 addresses in the pools of regional Internet registries, which occurred in the first half of 2011, was solved by American and European RIRs by the creation of new method of allocation by agreements between two local Internet registries like service providers. The numerical label assigned to each device in computer network became thereby transferable on the controlled 'secondary market'. This paper covers legal aspects of transfers in this post-exhaustion phase.

### **Key words in original language**

Internet, IP address, IANA, ARIN, RIPE NCC

On 31th January of 2011 an event occurred that can be surely compared to the Y2K problem at the end of 1999. At that day high officials of International Assigned Numbers Authority (IANA) announced the exhaustion of the central IANA pool of IPv4 addresses, when this body delegated two of the last seven unused blocks of those number resources. The blocks were allocated to the organization managing resources for the Asian and Pacific countries named APNIC (Asia Pacific Network Information Centre), which assigned all of them to 15th of April<sup>1</sup>. According to the rules of IANA remaining five blocks were assigned on 3rd of February to each of five regional address organizations. After that day the major authority responsible for the global coordination of the IP addressing has been fully deprived of any power enabling to control the way to whom those addresses are being assigned. Total allocation of the pools in disposal of an international organization created a new market phenomenon, which has never happened before and may cause vital legal problems. Therefore the existence of the secondary market of IPv4 addresses and the legal objections to character those numerical labels owned by Internet providers or IT companies before their assignation to the specific devices as a 'property' or a 'matter of legal relation' become the main issues in the post-exhaustion phase.

IP address is one of the most important objects of the economy based on knowledge and technology. This number fulfills the need to identify every device, which is used to connect to the Internet, as computer, mobile phone

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<sup>1</sup> <http://www.tgdaily.com/networking-brief/55404-dont-have-any-ipv4-address> [visited on 21<sup>st</sup> of April 2011]

or even gadgets in cars and household. However an assignation of Internet Protocol addresses is strictly regulated by international, fully independent organizations, which were created to ensure political neutrality of Internet<sup>2</sup>. The most important of them (IANA) managed until the beginning of 2011 the IP address allocation in the whole world and was able to allocate unused blocks, when demand was increased. The free block was transferred to the regional Internet registries (RIR), which had strict policy of processing the claims from service providers. Each of the latter was able to file a motion to the RIR containing a number of IP addresses requested and was obliged to justify why acquisition of this pool is necessary and reasonable<sup>3</sup>. At its discretion regional registry could change the number assigning more or few IP addresses, nevertheless the policy became increasingly rigorous as the global pool of them became depreciating<sup>4</sup>.

An architecture of IP addresses is nowadays based on the fourth, 32-bit version of this number, which is known in short as IPv4<sup>5</sup>. However in 90s and at the beginning of this millennium IP addresses were extremely ineffectively allocated, which caused e.g. creation the numbers that could be used only in the local area networks (LAN). To bypass existing restrictions, in 1995 Internet Engineering Task Force (IETF) developed a new form of addressing, using not 32-bit, but 128-bit code, which theoretically enlarges the pool from 4 billion of devices to 2 raised to the exponent of 128 (3,4 undecillion)<sup>6</sup>. This enormous pool will probably fulfill human demand for the next century, nevertheless the adjustment of devices is much more complicated. These two systems of addressing are interoperative, which forced IT developers and technicians to create transition mechanisms to enable co-operations of IPv6 hosts with IPv4 services and to allow IPv4 infrastructure (in recent studies this infrastructure still constitute 97-98 percent of devices reaching the Internet services) to reach IPv6 networks. The most common form of transition used today is dual IP stack

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<sup>2</sup> Mueller M.L., *Networks and States: The Global Politics of Internet Governance*, Cambridge: MIT Press 2010, p. 210, ISBN 9780262014595.

<sup>3</sup> Edelman B., *Running Out of Numbers: Scarcity of IP Addresses and What to Do about It*, in: Das S., Ostrovsky M., Pennock D., Szymanski B. (ed.), *Auctions, Market Mechanisms and Their Applications: First International ICST Conference, AMMA 2009, Boston, MA, USA, May 2009, Revised Selected Papers*, Berlin – Heidelberg: Springer-Verlag 2009, p. 96, ISSN 1867-8211, ISBN 9783642038204.

<sup>4</sup> The estimation and assessment of optimal pool of addresses is clearly covered and explained in: Rooney T., *IP Address Management: Principles and Practice*, Hoboken: IEEE Press/Wiley 2011, pp. 38-44, ISBN 9780470585870.

<sup>5</sup> Miller P.M., *TCP/IP – The Ultimate Protocol Guide: vol. 1 – Data Delivery and Routing*, Boca Raton: BrownWalker Press 2009, pp. 97-100, ISBN 9781599424910.

<sup>6</sup> Airamo O., Virtanen T., *Enterprise IPv6 Firewalling*, in: Remenyi D. (ed.), *Proceedings of the 5<sup>th</sup> European Conference on Information Welfare and Security. National Defence College, Helsinki, Finland, 1-2 June 2006*, Reading: Academic Conferences Limited 2006, p. 1, ISBN 1905305206.

implementations, which permit the device to communicate with the Internet using both systems of addressing<sup>7</sup>. Other ideas as tunnelling (creation of isolated transport of packets within IPv4 infrastructure) or proxy translation nowadays are less popular, however this second option may be useful for crucial devices manufactured several years ago, which because of many reasons still have to be connected to the Internet and cannot be supersede. For those devices few Internet companies and many Internet providers are planning to create special website or domain, which will automatically translate all Internet communication, similarly as ‘anonymizers’ used to block trackers and browse the Internet without leaving privacy unprotected. Though problem with non-interoperative devices is marginal. Current expectations related to the ‘IPv6 day’ (which is scheduled for 8th June) suggests that only 0,05% of all devices connected to the Internet will not be able to use IPv6 services during this global test flight of new standard<sup>8</sup>.

Therefore the creation of secondary market of IP addresses became vital and it corresponds with numerous suggestions in the last few years<sup>9</sup>. However first estimations of depletion indicated this problem will occur approximately in year 2012<sup>10</sup>. Also costs of transitions had substantial influence to refrain many Internet providers (especially in the growing markets in Asia, Africa and South America) to modify their technological structure for the IPv6 addressing. Even some authors had implied that shortage of unused IP addresses may have similar economical effect as the gasoline deficiency in 1970s<sup>11</sup>. The official reports regarding the last years of the past decade had unearthed the existence of such dangerous phenomenon, as the ‘black market’ of IPv4 addresses. Some IP owners even tried to put sell them on eBay (one of the auctions took place in June 2008), but the pool was quite small (user put on sale one block with 256 addresses). The opposing actions as ‘returning back’ unused addresses to RIRs is still rare and not very effective – 16,7 millions of IP addresses transferred to

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<sup>7</sup> Chowdhury D.D., *Unified IP Internetworking*, Berlin: Springer 2001, pp. 64-65, ISBN 9783540673705.

<sup>8</sup> <http://warrendvdb.me/2011/03/world-ipv6-day-trial/> [visited on 13<sup>th</sup> of April 2011].

<sup>9</sup> One of the most important event was the OECD Ministerial Meeting on the Future of the Internet Economy in Seoul (17-18<sup>th</sup> of June 2008). Text of the official report presented during the conference is available at: <http://www.oecd.org/dataoecd/7/1/40605942.pdf> [visited on 13<sup>th</sup> of April 2011].

<sup>10</sup> Grossetete P., Popoviciu C., Wettling F., *Global IPv6 strategies: from business analysis to operational planning*, Indianapolis: Cisco Press 2008, p. 37, ISBN 9781587057823; Rooney, T., op. cit., p. 348.

<sup>11</sup> Hofmann J., *Before the sky falls down: a ‘constitutional dialogue’ over the depletion of internet addresses*, in: Hutter B.M., *Anticipating Risks and Organising Risk Regularion*, Cambridge – New York: Cambridge University Press 2010, p. 46, ISBN 9780521193092.

ARIN by Interop in 20th October 2010 only postponed depletion of unused pools by one month<sup>12</sup>.

All the aforementioned events allow to draw a conclusion that change of allocation policy of address blocks will become a major problem for all RIRs and IANA. This problem has stirred out at the end of March, when Microsoft bought 666.642 addresses for 7,5 million USD from the insolvent Canadian telecommunication company – Nortel<sup>13</sup>. In agreement both corporations accepted to transfer 470 thousand of IP addresses immediately and the rest after the end of bankruptcy proceedings. Till this time ARIN and other RIRs explicitly stood on the position that IP addresses cannot be the matter of ‘ownership’ as they are granted only for the use to the companies and ‘return back’ if redundant<sup>14</sup>. Furthermore, any other entities were not able to dispose those specific numbers, as they lack the legal base and authority to administer IPv4 addresses without the knowledge and consent of regional registries. Thus from the point of view of RIRs, such a transfer would thereby be illegal and the emptor or acquirer could have right to use those addresses<sup>15</sup>.

However as IANA disposed all of its IP pools, problem emerged in a much greater scale. The most important conclusion from the Microsoft – Nortel deal is that according to the ARIN policy the agreement between parties is not be the sole condition to transfer those addresses. In case of the bankruptcy or insolvency of the IP addresses owner, this entity is obliged to transfer the addresses back to the RIR, which has a sole authority to allocate them again to any LIR (Local Internet Registry) filing a reasonable and justified demand. Some commentators suggested that Microsoft will be forced to file similar motion to ARIN and justify its demands. Furthermore the application would be by no means binding, so American registry organization could stand against the transfer according to the agreement signed by those two companies. This procedure was stated in Section 8 of the Number Resource Policy Manual (NRPM), which manages the policy section of ARIN. According to this provision ‘number resources are nontransferable and are non assignable to any organization unless ARIN has expressly and in writing approved a request for transfer’<sup>16</sup>. Moreover, ARIN

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<sup>12</sup> <https://www.arin.net/announcements/2010/20101020.html> [visited on 13<sup>th</sup> of April 2011].

<sup>13</sup> <http://www.pcmag.com/article2/0,2817,2382616,00.asp> [visited on 13<sup>th</sup> of April 2011].

<sup>14</sup> The specific form of ‘ownership’ or ‘first option’ was stipulated for the Defence Department of the United States of America. This provision covers: Muller M.L., *Ruling the Root: Internet Governance and the Taming of Cyberspace*, Cambridge: MIT Press 2002, p. 137, ISBN 9780262280303.

<sup>15</sup> DeNardis L., *Protocol Politics: The Globalization of Internet Governance*, Cambridge: MIT Press 2009, pp. 181-182, ISBN 9780262042574.

<sup>16</sup> <https://www.arin.net/resources/transfers/index.html> and <https://www.arin.net/policy/nrpm.html> [visited on 2<sup>nd</sup> of April 2011].

officially claimed that allocation of IP addresses is not a sale, but other kind of assignment<sup>17</sup>.

Nevertheless further provision of this Section allow to make some agreements between companies to transfer IP addresses between them, but the emptor cannot acquire an assurance to become the sole owner of the IP address. In Section 8.2 of the manual ARIN has been gained force to affirm all proprietary transformations as mergers, acquisitions and reorganizations. Also Section 8.3 allows each entity to transfer the number to the specified recipient, that is obliged to justify the need as well. Similar policies were adopted by other RIRs, in particular in 2008 by RIPE NCC (RIPE Network Coordination Centre), which service region consists of Europe, the Middle East and Central Asia<sup>18</sup>. However the modification of a market transfer policy adopted at the beginning of the last year allows to change allocation of IP addresses for limited demands. According to the policy of RIPE, each entity called LIR (local Internet registry as service providers, enterprises or academic institutions) is obliged to file a motion to acquire new IP addresses. However, each motion allows only request for a transfer the pool of specified demand limited by a period of up to nine months<sup>19</sup>. This policy changed with the 1st of January 2011 as demands where restricted to the six months period and the next modification will come into force as of 1st of July, when entities will be able only to achieve blocks of IP addresses for the three months demand.

The interpretation of Section 5.5 of the aforementioned act clarifies that the rules of allocation are more flexible than transfer according to the policy of the American organization<sup>20</sup>. Similarities between policies occur in the process of notification to the RIR concerning the change of the entity using IP addresses. In North America at this stage an explicit approval of ARIN is necessary, likewise in Europe where an acceptance of RIPE is required to reflect the re-allocation the database of pools. The problem of transfer of

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<sup>17</sup> As stated in Section 8.1: 'It should be understood that number resources are not 'sold' under ARIN administration. Rather, number resources are assigned to an organization for its exclusive use for the purpose stated in the request'. Technical analysis of allocation by ARIN according to this section was conduct by: Karpilovsky, E., Gerber, A., Pei, D., Rexford, J., Shaikh, A., *Quantifying the Extent of IPv6 Deployment*, in: Moon, S.B., Teixeira R., Uhlig S., *Passive and Active Network Measurement: 10<sup>th</sup> International Conference, Pam 2009, Seoul, Korea, April 1-3, 2009: Proceedings*, Berlin: Springer 2009, pp. 15-18, ISSN 0302-9743, ISBN 0783642009747.

<sup>18</sup> RIPE NCC became the first regional Internet registry to adopt such policy late in 2008. ARIN followed this idea in early 2009. Following: Mueller M.L., *Networks...*, p. 223.

<sup>19</sup> Section 5.0 of IPv4 Address Allocation and Assignment Policies for the RIPE NCC Service Region available at <http://www.ripe.net/ripe/docs/ripe-509> [visited on 2<sup>nd</sup> of April 2011].

<sup>20</sup> Comparison of technical aspects of RIR allocation policy summary was published in: Rooney, T., op. cit., p. 60.

allocations appears also in responsibility of LIRs during the transition process. The previous holder of the IP blocks is fully responsible for the use of its addresses until transfer is completed, similarly to the whole process of re-allocation, which must be performed in accordance with the agreement prior signed by LIR and RIPE. When the migration is finished, new holder is obliged to apply the same rules and provisions as the first legal entity.

During the last years the legal situation of LIRs was labeled by the authors as similar to a loaner as other holders of IP addresses were called 'custodians'<sup>21</sup>. The proposals of relaxing the rules and policies of IP distribution between LIRs were stated in 2007 and 2008, when it still expected that introduction of IPv6 will be performed smoothly and will solve the problem. Though lack of technological customization by service providers has uncovered that many organizations may consider appropriation of IP addresses not directly from the RIRs, but from 'black market'<sup>22</sup>. Allocations which were not reflected in bases of regional or global Internet registries, seems insecure as each IP address may be 'sold' more than once, what could cause at least disability of one device to connect to the Internet. That situation is impossible, when one independent organization has the authority to allocate IP addresses, but is high probable when the administration of IP addresses will fall outside the authority of regional address registries. To prevent this, RIRs had to adopt new policy of management of IPv4 addresses, which will surely cover IPv6. The introduction of changed rules of allocation and creation of the controlled secondary market can in my opinion be clearly explained by the method how works Specified Transfer Listing Service (STLS), published by ARIN to maintain control between entities interested in allocation of IP addresses.

The agreement between Microsoft and Nortel unearthed that during the last year Canadian company has found approximately 80 companies interested in 'purchase' of IP addresses and probably Microsoft was one of the greatest and most known. Several of those entities had already signed preliminary agreements or contracts relating to offers, what was positively acknowledged by the creditors of Nortel. To prevent an emergence of signing of similar contracts, ARIN generated mentioned above listing service, stated as a 'back-up' for companies, fully independent from the acquiring IP addresses by the allocation process. As American registry

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<sup>21</sup> Hofmann J., op. cit., p. 52; DeNardis, L., op. cit., p. 156; Edelman, B., op. cit., p. 97. One of the first authors pointing the correspondence between managers of number resources and custodians were: Rekhter Y., Li T., *An Architecture for IP Address Allocation with CIDR*, RFC 1518, September 1993 (available online at: <http://www.faqs.org/rfcs/rfc1518.html> [visited on 13<sup>th</sup> of April 2011]).

<sup>22</sup> Hofmann J., op. cit., p. 54; Edelman B., op. cit., p. 100;

*archive.apnic.net/meetings/26/program/policy/huston-ipv4-transfer.ppt* [access via Internet at 13<sup>th</sup> of April 2011].

organization clarified ‘the Specified Transfer Listing Service provides information which may assist organizations in planning for the period when ARIN will not be able to routinely satisfy IPv4 number resource requests’<sup>23</sup>. Thereby it seems that relaxing of policy may become a crucial issue to preserve control over transactions between companies. Usage of STLS is still bound with some restrains as registration, which is voluntary but necessary, if company desire to use transfer service to fulfill its needs for IP addresses. Participants of STLS are divided into groups, from which the one consists of entities having available IPv4 addresses and the second comprises of the organizations demonstrating need for the number resources. Data of organizations is shown to the participants from the other group to facilitate possible transactions and allows mutual communication<sup>24</sup>.

So even the name of this listing service shows many differences between those two methods of acquiring the IP address. In the main procedure of allocation the pool of numbers is administered by the ARIN, but the demand stated in the motion is limited only to specific period. In the second, by using STLS participants need only acceptance from ARIN to the demand stated by the entity, which is not limited by the period, but still needs to be justified and reasonable. In transactions based on the listing service ARIN has no force in matching entities making agreements and appear only as a regulator analyzing, if the agreement can be legally recognized. STLS is also characterized by ARIN as a mean to monetize non-allocated space, but in my opinion the process seems not to be fully reconsidered. For example, in the current post-IANA depletion period, the entity can still be granted to use free IP addresses from the RIR and then ‘sell’ them using STLS to another company or organization. Thus the main problem of existence of two concurrent methods created to acquire of IPv4 addresses lay in the process of analyzing whether the demand is justified.

Another difference between those means is connected with the object of transactions. By the first method ARIN makes a decision concerning allocation of IPv4 and IPv6 addresses. In the STLS LIRs can only transfer IPv4 addresses, because the depletion of IPv6 addresses still does not exist. Apart from being granted an authority to supervise possible transactions and manage pools of unused addresses, the American organization has also the right to check methods of estimation of the number of unused pool by the entities having resources available, called ‘Listers’. The Listers are one of three groups of LIRs that could be placed in the STLS. To acquire this status, the entity is obliged to register and inform about the amount of unused IP addresses in disposal using special form on the official ARIN website. After this process the regional Internet registry starts procedure of

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<sup>23</sup> <https://www.arin.net/resources/request/stls.html> [visited on 2<sup>nd</sup> of April 2011].

<sup>24</sup> ARIN published terms of service for STLS at:

[https://www.arin.net/resources/transfer\\_listing/tos.pdf](https://www.arin.net/resources/transfer_listing/tos.pdf) [visited on 13<sup>th</sup> of April 2011].

validation if data submitted by the potential Lister is credible. The officials of ARIN contact the potential Lister and then confirm address space available, it is a mandatory activity to publicize specific entry in the Specified Transfer Listing Service.

In case of two other groups of entities placed in STLS this procedure does not apply. 'Needers', which are organizations seeking IPv4 number resources, are obliged only to inform and justify their needs, which can be compared to the allocated space for these entities and to the method how efficient usage of IP addresses is executed. The latter group of entities allowed to be registered to STLS are 'Facilitators', which can exist as intermediary between Listers and Needers. Those companies or organizations may not be LIRs (or 'stakeholders in the resources', as officially are called participants in transfer service), but their role in the process of transaction is to assist in negotiations between both parties.

The allowance of such entity as 'Facilitator' in the transfer policy clearly demonstrates how relaxed is ARIN policy nowadays. By this regulation, the organization created the process of transferring IP addresses closer to dealing of stocks or shares. However still the status of IP address is not explicitly described and probably far from the financial instruments available at the securities markets. Nevertheless, there are clear similarities between the IP addresses and stocks, that can be summarized as adoption of the idea that they may represent financial value and can be transferred after the agreement of registry organization. The creation of open market was suggested in 2007 as Nigel Titley and Remco van Mook proposed to modify the RIPP NCC Policy in a way mentioned before<sup>25</sup>. Those two officials called as moderately 'liberal' to the conception of marketing IP addresses were in 2010 elected to the executive board of the European region registry organization. Besides the primary focus of that modification was laid on more efficient utilization of the number space, it also allowed to create similar mechanisms as fully implemented in North America few months ago. As it was noticed, the American and European organizations are not mostly concerned to deal in the nearest future with the problem of depletion of IPv4 addresses. The possible crisis may affect especially Asia, where the growth of usage of the devices adapted to Internet is one of the highest<sup>26</sup>. Moreover, on this continent are located many of the world's computer equipment manufacturers. Finally the less-developed infrastructure in some regions of Asia, may become the reason of severe difficulties in access to

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<sup>25</sup> [http://meetings.ripe.net/ripe-55/presentations/van-mook-2007-08\\_reallocation\\_of\\_v4\\_resources.pdf](http://meetings.ripe.net/ripe-55/presentations/van-mook-2007-08_reallocation_of_v4_resources.pdf) [visited on 2nd of April 2011]; [www.itu.int/dms\\_pub/itu-t/oth/06/15/T061500000B0031PDFE.pdf](http://www.itu.int/dms_pub/itu-t/oth/06/15/T061500000B0031PDFE.pdf) [visited on 13<sup>th</sup> of April 2011].

<sup>26</sup> Grossetete P., Popoviciu C., Wettling F., op. cit., p. 99; Rooney T., *Introduction to IP Addresses Management*, Piscataway – Hoboken: John Wiley & Sons Inc. 2010, p. 156, ISBN 9780470585887.



the Internet if the growing demand for net-based devices will not accompanied with the implementation of more efficient allocation and modernization of telecommunication networks<sup>27</sup>.

The Asia Pacific region became to first to deal with the problem of inability to fulfill demand for the non-allocated IPv4 addresses. When high officials of APNIC stated, that the organization reached final block of addresses in its disposal, they also claimed that only one block of 16 million addresses will be distributed by a special procedure containing limit of 1024 numbers for each interested entity. However, by imposing such restriction, Internet providers were forced to accelerate an adaptation of IPv6 technology, as only those companies who effectively support transition to the new standard are able to obtain number resources from the last block of addresses. As stated Paul Wilson, director general of Asian Pacific organization, ‘from this day onwards, IPv6 is mandatory for building new Internet networks and services’<sup>28</sup>. To accomplish the plan, APNIC has created few ways to help the providers with transition, especially in less developed countries or remote territories. For example, special assistance was granted to the countries and regions located on Pacific Islands. During the special summit in Noumea on 10th of April 2011 the agreement was signed to endorse introduced changes and modifications by local Internet providers. The main idea of the agreement is to double effort by a method of ‘leapfrog jumps’ (idea having some historical background in the Pacific), which allow to skip some stages of technological improvements and focus on the newest technology available<sup>29</sup>.

Probably the next organization, which will have to deal with similar problem, will be RIPE NCC, as in April 2011 this RIR had only 65 million addresses non-allocated. The number of addresses is close to the amount distributed to the entities in the last year, so it is anticipated pool of IPv4 numbers will be exhausted by the end of the year<sup>30</sup>. The remaining organizations assign less IPv4 addresses per annum, so the threat of forthcoming depletion seems to be less important. Latin America and the Caribbean and African RIRs (called LACNIC and AfriNIC) may most likely deal with their pools of addresses about few years. Nevertheless local Internet registries operating in the member states of those organizations are

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<sup>27</sup> Suggestion to adopt special treatment of less-developed countries in the phase of transition was stated e.g. in: Weber R.H., Grosz M., Weber R., *Shaping Internet Governance: Regulatory Challenges*, Berlin - Heidelberg: Springer-Verlag 2010, p. 193, ISBN 9783642046209.

<sup>28</sup> <http://news.idg.no/cw/art.cfm?id=2F928B65-1A64-67EA-E4BC6825429F4FE2> [visited on 21<sup>st</sup> of April 2011].

<sup>29</sup> <http://solomontimes.com/news.aspx?nwID=6069> [visited on 21<sup>st</sup> of April 2011].

<sup>30</sup> <http://arstechnica.com/tech-policy/news/2011/04/no-more-addresses-asia-pacific-region-ipv4-well-runs-dry.ars> [visited on 21<sup>st</sup> of April 2011].

being encouraged to adapt the new form of addressing. Surprisingly, the problem affects at least North American entities as ARIN still administers 61 million regular addresses and 75 million assigned to this organization before creation of other RIRs. On the other hand, it is worth mentioning that body offered the widest range of transfer possibilities for its LIRs.

One of the trade forms especially created for relocating of IPv4 addresses is based on the commercial Internet service established on 15th of April 2011, said to be the first independent of regional authorities, which will possibly in the future allow to transfer addresses even between entities of different RIRs<sup>31</sup>. Emergence of such a company in my opinion seems to be a form of 'grey market', which was also foreseen by many experts before the post-exhaustion phase. The website owner declares itself to be a kind of 'facilitator' in the meaning of that definition used in STLS, but the transfer of IP addresses is only temporal. This form of leasing is authorised by almost every RIR without special provisions. The only organization that has not already accepted that form of trade is AfriNIC, but under the draft modification of policy number resources (called in this policy as 'legacy addresses') even this organization will permit transfers without additional restrictions, but only between members of this organization. However, none of this policy is in force nowadays, giving the holder right to transfer the IP addresses to the entity of located in the different RIR area. The reason of this situation is partially understood as the object of possible trade is defined differently in the acts of each regional registry. The usage of aforementioned Internet service to lease IP addresses between local registries is claimed to be a process not fully covered by the binding rules of different RIRs. In the FAQ stated on the site the entity is warned that 'such a deal may be in a gray zone', which may have an influence on potential responsibility of this company. Thus in my opinion provisions of the obliging policies gains no opportunity for the LIR to legally lease IP addresses to the entity registered in the other Internet region. To enable such transactions, the policies must be substantially changed to clearly express those forms of agreements, which will surely not happen in the forthcoming months. Also, having in mind rapid development of growing markets and economies of countries in Latin America and Africa, that amendments may have a negative impact of transition to IPv6 technology if the costs of lease will be comparable to the costs of expected network modifications.

The other form of transactions was developed according to the final decision in the Microsoft – Nortel case. At the first stage after signing of the agreement between companies ARIN stated that the transfer of rights will only occur next to acceptance of the RSA agreement by Microsoft. This contract allows the RIR to maintain full control of the way of use and future

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<sup>31</sup>[www.computerworld.com.au/article/383883/black\\_markets\\_sprout\\_ip\\_address\\_shortage/](http://www.computerworld.com.au/article/383883/black_markets_sprout_ip_address_shortage/) [visited on 21<sup>st</sup> of April 2011]; <http://tradeipv4.com/faq/> [visited on 21<sup>st</sup> of April 2011]

disposal of IP addresses. However due the prolonged negotiations, one of the greatest world IT companies signed LRSA (Legacy RSA), which reduces most of circumstances whilst ARIN is able to withdraw right to use allocated IP addresses from the holder<sup>32</sup>. As North American organization has stated on its website, the main aim of signing the LRSA is the limitation of uses concerning IP addresses by the other party and lower costs of fees charged by the RIR. On the other hand, it is quite obvious that inability of ARIN to force Microsoft to sign the RSA Agreement or block the transaction between the Canadian provider and American company shows weakened position of that authority in the post-exhaustion period. The last modifications of policy used by ARIN seems to give the Seller more rights than it was stated before as to improve utilization of IP number resources. To the existing rights of the holder, f.e. right to be exclusive registrant, right to transfer addresses to another party and to update registration information, ARIN has added right to manage provisions of almost entire transaction by the acceptance of the deal, which was naturally not performed by the prior needs assessment procedure. This situation is evidently in opposition to the aforementioned rules of the North American organization and caused some negative comments directed to the board of ARIN, that the body treats LIRs unequally. Some form of response was the statement published on 20th of April 2011 on the organization website, that the authority finally permitted entities to make transactions concerning rights to IP addresses without the process of needs verification. Ipso facto the lack of constant stance has again weakened role of the body, as it approved the third form of acquiring number resources almost entirely out of scopes of this organization<sup>33</sup>. In my opinion it seems the announcement that 'transfer requests may take longer than expected and/or not be completed at all' if entities used the latter method without signing Legacy RSA or RSA, is only a mere endeavour to influence LIRs and suggest using other means, giving more power of control to ARIN.

To sum up, changes in policy of administering the number resources introduced by ARIN may become a temporary solution to the problem of free IPv4 depletion. However, the adaptation to the IPv6 system of addressing is inevitable. The question, which probably many Internet users may ask themselves, is who will finally be paying costs of secondary market of IPv4 addresses and accommodation of networks to the more efficient method used in IPv6 addressing. The legal problem is also extremely important as nowadays we have a possibility to witness new form of 'product', which is an intangible asset, but can be 'sold' from one entity to another with the acceptance of regional regulator. The approved conception of control the transfer may become crucial for reduction of the 'black

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<sup>32</sup> [http://blog.internetgovernance.org/blog/\\_archives/2011/4/15/4796200.html](http://blog.internetgovernance.org/blog/_archives/2011/4/15/4796200.html) [visited on 21<sup>st</sup> of April 2011]; <https://www.arin.net/resources/legacy/> [visited on 21<sup>st</sup> of April 2011]

<sup>33</sup> <https://www.arin.net/announcements/2011/20110420.html> [visited on 21<sup>st</sup> of April 2011]

market' and appearance of easy to find offers in Internet, in which many entities claim interest in buying or selling the IP addresses. The existence of market non-controlled by RIRs may be also hazardous as this situation lacks many regulations concerning privacy of end users like consumers. It may also cause obstructions in identifying the Internet crimes as financial frauds, media piracy and sources of spam or viruses. So despite all legal doubts connected with the character of IP address, modifications in policies of the regional Internet registries shall be deemed as a step in the right direction to not only bypass depletion of number resources, but also to preserve rights of Internet users. As the European Parliament committees stated out in several papers and proposals, the IP number shall be the part of personal data. Similar judgments were also taken in the Member States, e.g. Poland<sup>34</sup>. Having such rulings in mind, secure transfers of IP addresses shall be thereby concerned as an important factor of maintaining rights of the Internet users.

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<sup>34</sup> Details of the persons using a particular IP address at a particular time are personal data according to the Article 2(a) of Directive 95/46. IP addresses are additionally 'traffic data' as defined in e-privacy Directive 58/2002. Similar opinion is shared by courts in Germany, Austria and Poland (vide: Provincial Administrative Court in Warsaw, ruling II SA/Wa 1589/09). However in 2010 Cour d'Appel de Paris stated out in the verdict, that sole IP address cannot identify an individual. Based on: Büllesbach A., Gijrath S., Pouillet Y., Prins C., *Concise European IT Law*, Alphen aan den Rijn: Kluwer Law International 2006, p. 34, ISBN 9789041123794; Smith G.J.H., *Internet Law and Regulation*, 4<sup>th</sup> edition, London, Sweet & Maxwell 2007, p. 696, ISBN 9780421909908; Stamatoudi I.A., *Copyright Enforcement and the Internet*, Alphen aan den Rijn: Kluwer Law International 2010, p. 202, ISBN 9789041133465.

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