NETNOD NEWS

NETNOD NEWS – ISSUE 3 – 2014

Over to you – US to cede IANA stewardship role

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NO FREAKING PAPER,
I WANT IT ON MY SMARTPHONE.

The European Peering Forum in beautiful Croatia

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All you ever wanted to know about the DNS root name servers

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Word from the CEO

In 1991, i.root-servers.net (or nic.nordu.net, as it was originally called) became the first root name server outside the US. From that time, Netnod and its predecessors have been custodians for i.root-servers.net, and have also been deeply involved in the development of DNS technology and operations. Netnod staff have contributed to numerous DNS standards and actively participated in the discussions of the IETF and other DNS-related forums.

In 2003, Netnod took a major step in advancing our DNS services as we started building our anycast presence. Up until then, we had operated i.root-servers.net from a single host in Stockholm, as well as some of the DNS secondaries for .SE located at our IXPs in Sweden. The anycast cloud (or network, as the older among us would say) was originally planned to consist of 30 locations, and we decided early that we wanted to deploy our nodes primarily at IXPs around the world. As a non-profit, Netnod only had its own cash reserves to pay for the build out and, since we do not get paid by anyone for operating i.root-servers.net, Netnod initially decided to fund the build out from IX revenue. This strategy was both consistent with our goal "Do good for the Internet" and a way of strengthening Netnod's service.

"We believe in working with partners in the Internet community, to provide common shared services for the community we serve, locally and globally."

At the same time, we decided we needed a long term financing model for the operations of the i.root-servers.net and our work on DNS in general. So we took our non-profit model from the IX world and adopted it for our anycast cloud. Using this, we started offering TLDs anycast services from the same platform and charging the TLDs a fee based on the cost of operations, just as we do for our IX services. Our anycast service has since grown and today we have 54 locations all around the world with approximately 40 TLDs using the anycast service and contributing to the cost of running i.root-servers.net.

We have also built out new sites with the help of regional partners such as APNIC in Asia, who have helped fund several of the i.root-servers.net sites. This is another example of how we have worked together with the community to support the Internet community, locally and globally. And it's very much what Netnod is about: to provide common shared services for the community we serve.

Netnod today serves two different communities; however, the services we provide to each are not that well known to the other. I am happy that we, through the Netnod Newsletter, get the chance to make these services better known to our entire community. The IX services and DNS services are equally important to us, and we believe both depend on each other. An IX creates more value for its members by connecting them directly with more content and critical infrastructure, and a DNS anycast service adds more value as it increases the numbers of destinations you reach locally. In line with this, Netnod has also worked actively in deploying anycast nodes and building IXPs in developing countries or otherwise underserved regions. We believe this also adds value to both of our service communities and to the services we provide.

At Netnod, we are proud to serve the communities that have put trust in us for their services, and we work every day on providing the best services for our communities. In this issue we will see how we work for the i.root-servers.net and DNS anycast services to do this.

CEO, Kurt Erik Lindqvist, Netnod

New IXP networks

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Prostor Telecom (AS21418)
Prostor Telecom is an integrated telecommunications and Internet service provider serving customers all over the Russian Federation.
Contact: *admin@ptl.ru*

Solido (AS59469)
Solido Networks ApS is an ISP and a consulting firm based in Denmark that helps customers build fast and efficient infrastructures, as well as securing them against Internet attacks. Solido has a high speed network and delivers Internet connections at data centres in Interxion Ballerup Denmark and LuxConnect in Bettembourg Luxembourg. It also delivers fibre connections to other locations in Denmark through its providers.
Contact: *noc@solido.net*

Atrato (AS5580)
Contact: *peering@atrato.com*

Teleservice Bredband Skåne (AS34244)
Teleservice is an IT company that supplies infrastructure and technical know-how in the Southern region of Sweden. With a staff of 90 people and three major divisions, Teleservice's business areas include broadband, IT outsourcing, and radio communications. Teleservice has a yearly turnover of 140 MSEK and has headquarters in Sjöbo, Sweden.
Contact: *peering@teleservice.net*

DFRI (AS198093)
DFRI is a non-profit organisation that works to promote digital freedom and rights.
Contact: *peering@dfri.net*

Net Sat (AS62020)
Contact: *peering@netsat.se*

IPvision (AS48564)
IPvision is a telecommunications company in Denmark
Contact: *peering@ipvision.dk*

Hofnetz (AS50324)
Contact: *peering@hofnetz.de*

GoDaddy (AS26496)
With more than 57 million domain names under management and 12 million customers worldwide, GoDaddy is the world's largest domain name registrar and Web hosting provider. Due to the nature of its business, GoDaddy's traffic is mostly outbound. GoDaddy has an open peering policy and is actively seeking peers worldwide.
Contact: *peering@godaddy.com*

EasySpeedy (AS30736)
Established in 2001, Easyspeedy Denmark is a dedicated server hosting company which provides services to customers in more than 80 countries.
Contact: *peering@easyspeedy.com*

NetClient (AS16186)
The IP Group network is operated by NetClient which is based in Norway and provides managed services and hosting, cloud services, VPS and fibre.
Contact: *noc@ipgroup.no*

Sveriges Radio (AS47708)
Sveriges Radio is a non-commercial, independent public service radio broadcaster that provides a comprehensive range of programming for the Swedish public.
Contact: *hostmaster@sr.se*

Spotify (AS8403)
Spotify brings you the right music for every moment – on your computer, your mobile, your tablet, your home entertainment system and more. Soundtrack your life with Spotify.
Contact: *peering@spotify.com*

31173 Services (AS39351)
31173 Services AB is a fibre infrastructure project management and consultancy company, and an ISP and colocation provider with a wholly owned and operated data centre in Malmö, Sweden, where they create tailor-made solutions for customers with unusual requirements for bandwidth and electrical power.
Contact: *peering@31173.se*

IXP member upgrades

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- **Akamai (AS20940)**
  peering@akamai.com
- **Videoplaza (AS197541)**
  noc@videoplaza.com
- **Justin.tv (AS46489)**
  peering@twitch.tv
  (two upgrades)
- **RIPE NCC (AS197000)**
  peerings@ripe.net
- **Limelight Networks (AS22822)**
  peering-team@llnw.com
- **Hurricane Electric (AS6939)**
  peering@he.net
- **Golden Telecom (AS3216)**
  peering@gldn.net
- **Hurricane Electric (AS12552)**
  peering@ip-only.net
  (COMIX)
- **Hi3G (AS44034)**
  daniel.wiberg@tre.se
  (COMIX)
- **AT&T (AS2686)**
  peering@attglobal.net
- **Elisa (AS6667)**
  peering@elisaip.net
- **Hi3G (AS44034)**
  daniel.wiberg@tre.se

NETNOD SUMMER SOCIAL

– Netnod welcomed summer with sunshine and bubbly!

Perhaps it was the fantastic summer weather, perhaps people just needed a break from work – this year's Netnod summer drink on 11 June, had a great turnout! It was fantastic to see so many people join us for the drink and several people flying in to enjoy the lovely summer evening together with the Netnod team. We enjoyed stunning views over Stockholm from our favourite venue "Himlen" (Heaven) with a glass of bubbly in our hand. We overheard talks about infrastructure development, Internet development strategy, summer holiday plans, troubleshooting of network problems, and reviews of cocktails. All in all, a fabulous night!

YOU ARE CORDIALLY INVITED TO THE NETNOD AUTUMN MEETING

1-2 October 2014, Stockholm, Sweden

We have a great line up of speakers for you this year, with presentations on IPv6, DDoS, RPKI, Layer2 encryption, I-root and the NTIA transition of the IANA functions.

We are very excited to have this year's social at the hip and fabulous Fotografiska – the photographic museum in Stockholm with beautiful views of the water. Apart from enjoying each other's company, we will also be able to check out the great exhibitions at the museum.

The meeting will take place at Piperska muren in Stockholm.

See you in October!

Nurani Nimpuno
Head of Outreach and Communications

Capacity building in Mongolia

In a joint capacity building effort with NSRC, Netnod organises a technical workshop for the Mongolian ISP community.

As part of Netnod's "Good of the Internet" work, Netnod engages in a number of capacity building and knowledge sharing efforts around the world. In August this year, Kurt Erik (Kurtis) Lindqvist and Philip Smith from NSRC, travelled to Ulaanbaatar in Mongolia to deliver an intense four-day workshop for the Mongolian Internet community, covering routing, BGP, IPv6, IXPs and peering.

"As one of the oldest IXPs in Europe, we see it as natural that we share our experience and knowledge," said Kurtis. "We know that imparting knowledge locally can have a tremendous effect for development and we are proud to contribute to NSRC's fantastic work in this area."

They also met with local ISPs, the Mongolian regulator CRC, and the IXP to explore how to grow the Internet community and peering landscape in Mongolia.

Hopefully, we will see the fruits of this capacity building effort in the years to come in terms of a blossoming Internet interconnection scene in the region.

Kurt Erik Lindqvist
Chief Executive Officer

Finally, Netnod adds unicycling to staff competence list

Jörgen Thun joins Netnod as a datacentre engineer. Jörgen will be busy installing, maintaining, and developing infrastructure in our datacentres and other sites. So who is Jörgen?

Tell us a little bit about yourself!
I was born in Hässelby outside of Stockholm, and I now live in Gamla Stan – in the heart of Stockholm – with my wife and our three beautiful daughters. Computers have been the consistent thread throughout my life. When I was working for OMX, I got the chance to work in their datacentre (subsequently bought by Verizon). I've worked with datacentres for almost 8 years now!

What's so interesting about data centres?
Datacentres are always challenging. Airflow – specifically, separating hot and cold airstreams – is very important for efficient cooling. That's something that really keeps you on your toes.

So how do you keep all those cables tidy? What's your secret tip?
I'm well organized and like to give all my installations 110 percent. Good preparation saves so much time in the long run. Secret tip? To always use the right length of cable at all times. OK, maybe that's not a secret, but it's a great discipline!

How do you like to spend your free time?
I have always loved fixing things, and there are always millions of things to fix in this world. This summer, I renovated an old barn, built two extra bedrooms and a chicken coup.

What's your favourite gadget?
My motorcycle! A good long ride can clear your mind. It's all about the journey, not the destination.

Something you might not know about me is...
... that I ride a unicycle and used it in the big Verizon datacentre I worked in. It became an issue once, when I was picked up by surveillance in Frankfurt. But anyway to spread joy is great if you ask me.

Over to you

– US TO CEDE IANA STEWARDSHIP ROLE

The US government has announced it plans to hand over its IANA oversight role to the global multistakeholder community. What does this mean for the DNS and the bigger picture of Internet governance. And where does Netnod stand?

The winds of change are blowing once again across the plains of Internet governance. Like so many iGov milestones, the proposed change will be historic, significant, and – if done right – of little interest or consequence to the average Internet user.

Although much of the Internet's early development happened in the American academic and defence establishments, today's Internet is a genuinely global, decentralised platform, administered and operated within a complex, diverse ecosystem of governance structures and processes. Even in the early days, the US government maintained a generally hands-off approach. Individuals and organisations with the relevant skills, resources, and motivation took on the various operational and administrative roles needed to keep the network going. Generally speaking, those who created part of the Internet – be it hardware, software, or information – assumed and still retain responsibility for their contribution.

But now, even the final vestige of US government oversight could soon be a thing of the past.

In March 2014, the National Telecommunications and Information Administration (NTIA), an agency within the United States Department of Commerce (DoC), announced that it is seeking to end its role as the oversight body for the Internet naming and numbering functions managed by IANA.

Within fringe sections of the American media, the NTIA's announcement was greeted with conspiratorial outrage, regarded as a ceding of American sovereignty to tyrannical foreign interests. But in reality, although the NTIA's remaining role is modest, its proposed transfer to "the global multistakeholder community" represents a significant vote of confidence in the existing models of inclusive engagement and decision making.

"Today's Internet is a genuinely global, decentralised platform, administered and operated within a complex, diverse ecosystem of governance structures and processes."

Likewise, despite speculation about the timing of the announcement, it has been a long time coming. At the time ICANN was formed in 1998, the US government flagged its desire for private sector leadership in DNS management. In the intervening years, ICANN and other Internet bodies have worked hard to build institutional confidence and accountability, and the Internet Governance Forum (IGF) has emerged as major venue for multistakeholder engagement and dialogue.

Then, in December 2012, ahead of the World Conference on International Telecommunications (WCIT), representatives of the NTIA, the Federal Communications Commission (FCC), and the State Department issued a joint letter, affirming the US government's commitment to the multistakeholder approach to Internet governance. Dismissing suggestions that the US controls the Internet, they wrote: "The Internet is a decentralized network of networks and there is no one party – government or industry – that controls the Internet today. And that's a good thing."

Their letter praised the multistakeholder model, noting that the broad inclusion of experts and governments, from all fields and all parts of the world, results in "broader and more creative problem solving," and that the Internet "thrives through the cooperation of many different parties".

“The Internet is a decentralized network of networks and there is no one party – government or industry – that controls the Internet today. And that’s a good thing.”

“Our commitment to the multistakeholder model is based on the fact that transparency, inclusion and participation are the 21st century standards governing discussions related to modern communications,” they added.

So what is happening now?
If the language about the state of Internet governance seems grand, the language of the NTIA/IANA stewardship transition is considerable more procedural.

See the sidebar on page 8 for more detail, but in brief, ICANN administers the IANA functions, which relate to the DNS root zone, IP addresses, protocol parameters, and a few other services, for example those related to the ARPA and INT top-level domains. In the current system, ICANN coordinates the processes by which changes are proposed (for instance, the addition of new top level domains) and submits recommendations to the NTIA. The NTIA checks that ICANN has followed correct procedures, conducted appropriate due diligence, and acted in accordance with policy. The NTIA then authorises the change, which in the case of DNS issues, Verisign implements as the root zone maintainer.

The announcement in March called for a transition only of the NTIA’s stewardship role over the IANA functions, not the IANA functions themselves. To make this happen, the NTIA tasked ICANN to coordinate a process for interested stakeholders to develop a transition proposal.

The coordination group, which met for the first time in July 2014 in London, is working towards an initial deadline of September 2015, which is when the current IANA functions contract expires. To guide this effort, the NTIA has specified that the proposal must:
• support and enhance the multistakeholder model
• maintain the security, stability, and resiliency of the Internet DNS
• meet the needs and expectation of the global customers and partners of the IANA services, and
• maintain the openness of the Internet.

Crucially, the NTIA has also made it clear that it “will not accept a proposal that replaces the NTIA role with a government-led or an inter-governmental organization solution.”

Netnod’s role and position
As the operator of the i-root server and a provider of DNS services, Netnod is an active and visible member of the DNS community. Furthermore, Netnod’s Head of Research and Development, Patrik Fältström, chair of ICANN’s Security and Stability Advisory Committee (SSAC), and Lars-Johan Liman, co-chair of ICANN’s Root Server System Advisory Committee (RSSAC), have both been appointed to the transition coordination group.

“Netnod welcomes the NTIA’s decision to open this question for discussion, and supports the limited role of the multistakeholder coordination group, which is to coordinate the proposals developed in the various communities,” said Fältström.

“Right now it’s vital that we focus on a clear and proper process to develop the best solution,” said Liman. “From an RSSAC perspective, representing the view of the root server operators, a primary objective is for ICANN to reach a solution that is as widely accepted as practical and which does not in any way reduce the security and stability of the Internet. Security and stability are paramount.”

The NTIA’s current role is modest in scope, being neither policy-making nor operational in nature. It’s there as a sanity check on the implementation of ICANN decisions, to verify and authorise the performance of IANA functions. But beyond the direct issue of the IANA function, Netnod is acutely aware of the broader implications of the transition.

“Although we – hopefully – will see a solution that makes very little operational impact, there is no doubt that this policy shift is significant. The process and outcome of the transition will affect the nature of the open decision making that shapes Internet infrastructure,” said Liman.

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Why is this so important?
The NTIA's role is largely that of a rubber stamp, but in a good way. In 2005, it was widely reported that forces within the White House exerted pressure on ICANN to head off the proposed .XXX domain[1]. Notwithstanding that highly contentious incident – which undermined the US's own public positions on Internet governance – the NTIA itself has never prevented ICANN from implementing its recommendations.

Whether that's due to impeccable principles or simply institutional inertia, the result has been stable, predictable operations. But legacy systems tend to have a body of unwritten operational practices and boundaries. Replacing such a system entails carefully codifying and entrenching those practices in formal rules and guidelines.

At this point, it is worth noting that the NTIA's role may not be filled by a single new body or mechanism. Without pre-empting the outcome of the transition process, many stakeholders – including Netnod – would favour a system where the communities responsible for developing policy inputs to IANA each assume oversight roles for their respective functional areas. In other words, rather than a single oversight body, there would be multiple, specialised oversight mechanisms, each backed by a pre-existing policy development process.

From Netnod's perspective, an outcome based on those principles could provide necessary operational continuity from the current regime, but would boost the legitimacy of IANA oversight by relying on transparent, bottom-up, community-based processes.

And legitimacy will be critical. Whatever the shape of the new mechanisms, simply by virtue of being new they will inevitably be under more intense scrutiny than the NTIA has been during its tenure.

As Verisign stated recently: "The accountability regime that replaces the NTIA's stewardship should ensure enforceable and auditable transparency and accountability mechanisms. The DNS community and the global business and user communities deserve no less as such mechanisms are critical to the functioning of an open and secure Internet for everyone".

Any slip-ups in the new oversight mechanisms will be used as ammunition by those who would rather see a greater role for governments in Internet governance.

It's a fine balance that needs to be struck and the coordination group will have its work cut out for it to shepherd in a well-calibrated and publicly acceptable proposal by the 2015 deadline. The NTIA has left the door open for an extension of the deadline, but given the potential for US domestic politicisation of this issue, it may be safer to wrap it up before the next election cycle.

"To maintain stability and security in such a politically charged atmosphere, we cannot underestimate the importance of properly defining and delimiting the new IANA stewardhip arrangements," said Liman. "It's vital that whatever proposal the community develops must ensure the appropriate level of separation between the oversight, policy making, and operational functions and establish effective checks and balances at each stage."

To track the progress of the transition or have your say in the shape of the new IANA stewardship mechanisms, be sure to visit ICANN's dedicated microsite at https://www.icann.org/stewardship.

The IANA Functions

IANA is not an organisation, but rather a set of technical and administrative functions necessary for several aspects of Internet operation. These functions were first conducted on a voluntary basis by the late Internet pioneer Jon Postel, but over time became increasingly formalised and subject to greater US government scrutiny. Since ICANN was created in 1998, it has performed the "IANA functions" under contract to the DoC.

The IANA functions comprise:
- coordinating the assignment of technical Internet protocol parameters
- processing change requests to the DNS root zone file and managing the root key signing key (KSK)
- allocating Internet numbering resources, and
- other services related to the management of the .ARPA and .INT op-level domains (TLDs)

In addition to the IANA function, Verisign also holds a contract to perform other related root zone management functions, namely:
- implementing changes to the root zone file
- distributing the root zone file, and
- managing the root zone signing key (ZSK)

Patrik Fältström
Head of Research and Development

[1] **Thus ensuring that the Internet continued to remain free of pornography.**

Netnod appoints four new board members

Netnod welcomes Karen Rose, Christian Kaufman, Mathieu Weil, and Dennis Davidsson to its board.

Netnod's board plays a key role, setting strategies and long term goals for the organisation. That expertise was boosted with the expansion of the board to ten members and the appointment in June of four new board members: Karen Rose, Christian Kaufman, Mathieu Weill, and Dennis Davidsson.

"These four new appointments bring a broader industry perspective to the board and extensive management experience. Their involvement will further strengthen the board," said Maria Häll, chair of the TU Foundation board, the owner of Netnod.

Davidsson steps into the role as chair of the Netnod board, bringing nearly four decades' expertise in data communications technology, and strategic business development acumen honed at the highest levels of the Internet industry; Rose has a strong international track record in policy and technical development, including a strong focus on the impact of IXP deployments; Kaufmann is a peering expert with deep connections throughout the IX community; and Weill is one of Europe's leading experts in DNS business and services.

"Netnod is in a period of strong growth, and these appointments really strengthen our team. They are all visionaries and leaders in the industry, and I look forward to working with them," said Netnod CEO Kurt Erik Lindqvist.

More on the Netnod board at: http://www.netnod.se/about/organisation/board

Nurani Nimpuno
Head of Outreach and Communications

Under the skin of ...?

Do you have a favourite destination?
Maseru, Lesotho, also known as "the mountain kingdom". It is the most scenic country – a beautiful landscape of rocky mountains, streams, and winding roads. In the countryside you see locals on horseback, just like a scene from a Clint Eastwood western.

What's your favourite drink?
Masala tea with milk. It is tea leaves boiled in a pot, mixed with whole milk, ginger, cinnamon, and cardamom. The perfect way to start the day.

Favourite gadget?
My laptop, aka "Jedi". Together we take on many challenges, travel the world, and reach out to new people, all for the good of the Internet.

Hidden talent?
Ah! This is a tricky one. I believe it's cooking. As a first born, I had to learn to cook for my siblings and perfected making stews to the point that my mum would persuade me cook them for visitors. My wife's figured this out too!

Why I work in networking...
After high school I chose between accounting and computing. Computing seemed far more interesting. Thus far it's been an incredible journey. I've learned a great deal from complete strangers! As a result, I can claim to have friends in more countries that I'd have ever imagined!

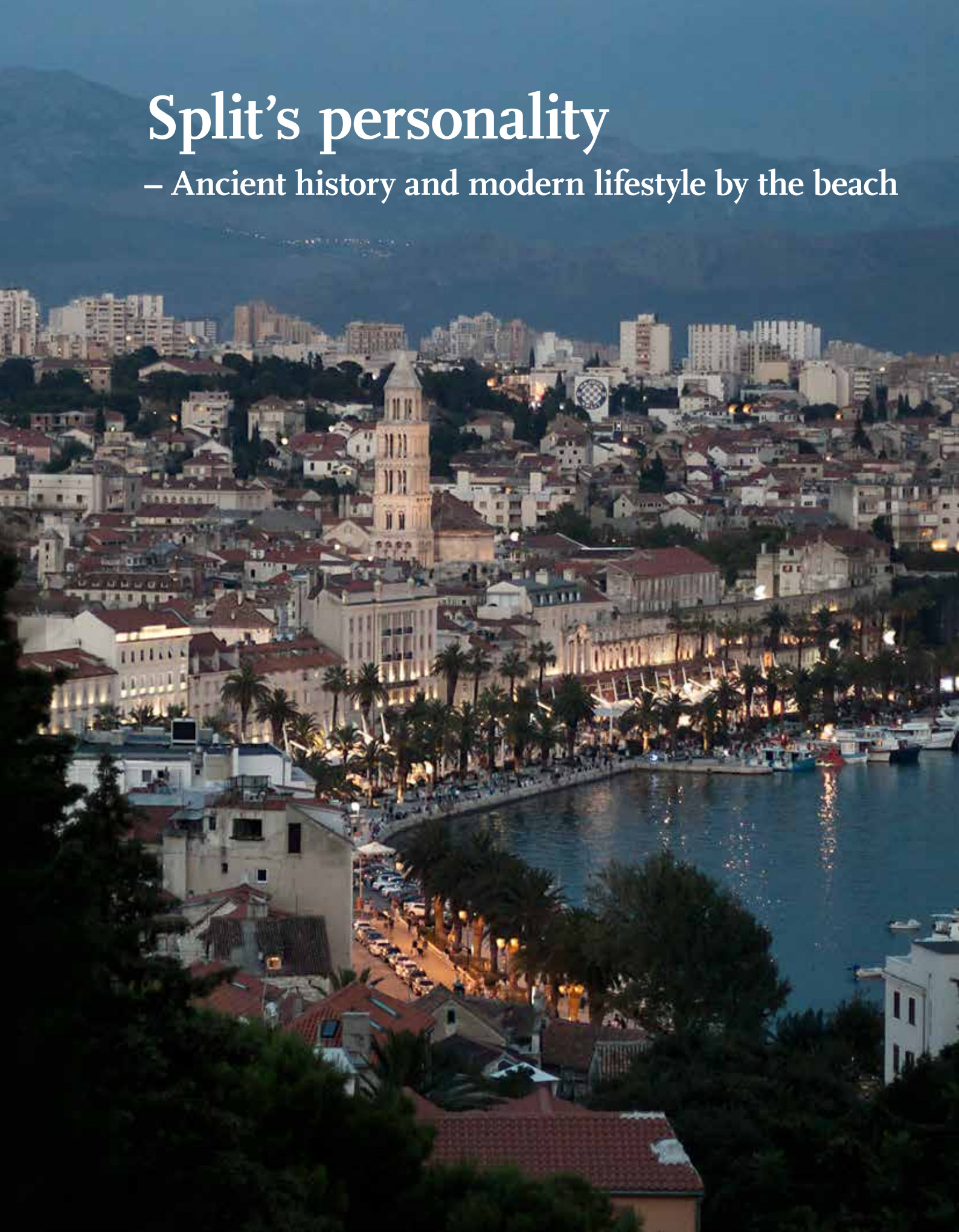
I am an excellent ...
... souvenir collector. I have something from most countries that I've been to. I try to place the souvenirs in my home. They bring life to the living space and make for good stories for visitors.

Something you might not know ...
I speak three languages and am learning a fourth.

Can't guess who I am? Scan the QR code or see page 19.

Split's personality

– Ancient history and modern lifestyle by the beach



Most people visiting Croatia will make it to Split. As a city with great air, bus, and ferry links it's an important gateway to the many gems of the Dalmatian coast. But Split is so much more than a travel hub. It's a spectacular city with immense charm, history, and character. We definitely recommend you take a few days off to explore this 1700 year-old town. And don't forget your best walking shoes – you will live in them, since walking is the best way to discover this coastal pearl.

Things you must do:

Visit Diocletian's Palace – the heart of Split
Why not start here to get the feeling of Split's ancient atmosphere? The palace today is not just part of history (built in 295 AD by Roman Emperor Diocletian); it remains a living place of labyrinthine streets packed with people, bars, shops, restaurants, and historical monuments. Get a great view over the city from the **St Dominus' Cathedral** and the **Bell Tower** – at 60 m high the tower looms over the city.

Check out the beaches
Split is well known for its beautiful crystal-blue coastline. Bačvice is the most popular and famous beach in Split, located in very center of the city (about 10 to 15 minutes' walk from Diocletian Palace). Grab a coffee or ice cream at one of the many cafés and restaurants. Watch the locals play **picigin**, an ancient tradition dating back centuries, which basically involves keeping a small rubber ball in the air as long as possible. It looks better than it sounds.

If you have time:
Stroll along
The best place for people watching is the famous waterfront **Riva Promenade** (known locally as Obala Hrvatskog Narodnog Preporoda). It's a great place to grab a coffee and watch the world go by, with a beautiful Adriatic backdrop. This pedestrian avenue is flanked by bars, cafés, and eateries. Make sure you check it out in the evening, as you can see the best sunsets accompanied by a pint of the local beer, such as Split's own Laško. Or, visit Veli Varos, one of the oldest parts of town – a charming, tourist-free sector of quiet streets and former fishermen's homes.

Be cultural:
Enjoy the artistic history
First, pick up a Splitcard from the tourist information office for free or heavily discounted entry to the city's many galleries. If you're staying for more than three days the card is free.
The **Meštrović Gallery** has almost 200 works from Ivan Meštrović, the 20th century Croatian sculptor. The beautiful gardens are an added bonus.

Address: Street Šetalište Ivana Meštrovića 46.
Opening hours: 9am-7pm Tue-Sun, May-Sep.

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The Gallery of Fine Arts (by Diocletian's Palace) houses a permanent exhibition of modern art from notable Croatian and other famous European artists.

Address: Kralja Tomislava 15
Telephone: +385 21 350 110
Opening hours: Oct-May 9am-2pm Mon, 9am-5pm Tue-Fri, 9am-1pm Sat.

Relax:
Coffee time
Café Gradska Kavana at Narodni Trg (which the locals call "Pjaca"), a pretty square overlooked by a Romanesque clock tower and Venetian-style city hall.

Address: Narodni trg 1
Telephone: +385 21 317 835

At **Café Luxor** you can get coffee, pastries, and English newspapers. It's widely known for the aroma of its coffee, homemade delicacies (white chocolate cheese cake is a favorite), national slow food cuisine, and extensive wine list. The ambience is often complemented by piano and jazz nights.

Address: Kraj Sv. Ivana 11
Telephone: +385 (0) 21 341 082

Have lunch or dinner
Buffet Fife in the Veli Varos neighbourhood (the old fisherman's quarter) sources fish from the seafood market next door and the menu changes depending on the previous day's catch.

Address: Trumbićeva obala 11
Telephone: +385 21 345 223

Lunch in at **Zlatna Vrata** is set within a courtyard formed from the old palace walls. The wood-fired oven produces excellent pizzas. There are also filling salads and snacks.

Address: 7 Dioklecijanova
Telephone: +385 21 98 769 339

Enoteca Terra is a popular cellar wine bar, with a huge selection of Croatian wines and Dalmatian tapas, from "prsut" dried ham, to risottos and spicy sausages.

Address: 6 Prilaz brace Kaliterna

The **Bajamonti Café** is a hotspot for the city's aristocrats for coffee and cake. The restaurant above has a seasonal menu with classical and contemporary twist. Recently, Bajamonti has turned their focus on seafood and promise the freshest catch prepared with contemporary flair. The wine list is concise with great representations of Dalmatia and Croatia.

Address: Trg Republike 1, Prokurative Square
Telephone: +385(0)21 341 033

Nurani Nimpuno
Head of Outreach and Communications

Root server FAQ with Lars-Johan Liman

What are the root servers?
The root servers are the entry points to the Domain Name System (DNS), the distributed database which Internet applications use to look up the numerical IP addresses associated with text-based domain names.

Does the root zone contain all the DNS data?
No. The root servers serve the root zone, which contains information about what Top Level Domains (TLDs) exist, and the addresses of the authoritative DNS servers for each TLD. DNS clients and other servers query the root servers for the TLD information, then go to the appropriate server for details of the domains within that TLD.

Does all Internet traffic go through the root servers?
No. By design, the DNS uses local caching, so other parts of the DNS system query the root servers only periodically to update their caches. Anyway, this process is only about translating a domain name to an address. Once that's done the routing system – which is totally separate – does the rest.

Who are the root server operators?
They are a diverse group of organisations from the private enterprise, non-profit, education, and military sectors. Each of these operators assumed their role in the early days of the DNS (with the exception of the C-root, which passed to the company that acquired the network of the original operator). They are:

A VeriSign Global Registry Services
B University of Southern California, Information Sciences Institute
C Cogent Communications
D University of Maryland
E NASA Ames Research Center
F Internet Systems Consortium, Inc.
G US DoD Network Information Center

H US Army Research Lab
I Netnod
J VeriSign Global Registry Services
K RIPE NCC
L ICANN
M WIDE Project

Is it true that most of the root servers are based in the United States?
No – this is one of the biggest myths of the DNS. As a historical legacy of how the Internet developed and the pragmatism of early operational arrangements, nine of the 12 root server operators are based in the US. But there are many root servers responding to DNS queries spread all over the world. Which brings us to perhaps the biggest myth of the DNS...

Is it true that there are only 13 root servers?
No, not for a long time. The size of UDP data packets means that there's only room to include the IP addresses of 13 root servers in a single packet. Originally that meant a limit of 13 root server machines, and it gives us the root server names A-M. But thanks to the anycasting technique, each root server address can be mirrored on multiple physical servers in multiple diverse locations. By early August 2014, there were 372 root servers spread across the globe. You can check the up-to-date numbers and locations here: http://www.root-servers.org.

Do all root server operators have multiple servers?
Most do, but not all. It's entirely up to each operator whether to use anycast or not. Currently, there is only one instance of B, whereas there are 145 instances of L. Netnod operates 41 instances of I (i-root-servers.net).

OK, but A is the most important root server, isn't it?
Nope. The lettered names are entirely arbitrary. Every one of the 372 root servers contains and serves exactly the same root zone. That's the point. And they all get the root zone through a distribution infrastructure that is separate from the named root servers.

As a root server operator, can Netnod control the content of the root zone?
No. The content of the root zone is determined as part of the IANA function, subject to ICANN's policy development processes, and is currently maintained by Verisign. Furthermore, the root zone file is digitally signed (using DNSSEC).

What is the advantage of having a root server nearby?
Certain DNS activities may get a moderate performance boost if a root server is installed nearby. But remember, these are only a small subset of all online activities, and most of the heavy lifting in DNS takes place in local caches. Furthermore, despite the outraged comments you can find in countless ill-informed online discussions, a local root server does not give its host country any special preference in DNS policy making. The real benefit of installing more root servers in more places is that it makes the DNS overall more robust and resilient.

Are there any parts of the world that do not yet have good service?
It would be misleading to say that any country or region is underserved by the DNS. That said, there are few instances of the root servers in central and northern Africa, western China, and Russia. In general though, the number of root servers says more about physical infrastructure and national regulatory policies in the area than it does about the willingness of operators to set up new sites. Several operators – including Netnod – are always happy to discuss new sites when the local conditions are right.

What does Netnod get out of being a root server operator?
A warm glow... Like all the other root server operators, Netnod spends money to operate a root server (all operators have their own funding models). Of course, we've also built up a lot of unique expertise, which deeply informs our other services. But really, like all the other operators, we do this because we believe it is for the good of the Internet.

Do the root server operators work under contract to ICANN?
No, but the role is far from informal. The operators of F, K, M, and I have exchanged letters of understanding with ICANN (using the same language in the case of all but F). All the operators follow the IETF standards and are guided by common principles. And they coordinate closely, most notably through the RSSAC, which advises the ICANN community and board, and which has published a draft describing what service and performance the Internet community should expect of root server operators. But the specifics of how the operators provide that service are up to the discretion of each operator. A strength of this approach is that it allows for great operational diversity. That means, for example, that a single software or firmware bug cannot bring down the entire system.

What if a root server operator stops operating?
The question of succession is an open and important issue. For example, in 2002 Cogent took over the responsibility for the C-root server when it bought up the assets of the previous operator, PSINet. Despite that, there remains no defined process for how to replace an existing operator with a new one, and it's a question that the community does need to consider. But it is worth noting that, from a technical perspective, the disappearance of an entire operator is not a particularly big deal. For example, if F were to be completely turned off today, there would still be more than 300 other servers to carry the load.

This seems all very reassuring, but how transparent are root server operations?
For anyone's who's interested, a lot of public information is available at http://root-servers.org. Furthermore, operators participate in many public conferences and the RSSAC meets during ICANN meetings. Minutes of RSSAC meetings (including teleconferences) are publicly available on the ICANN website. Obviously there are some specific operational details that cannot be made public for security reasons, but apart from that, information about root servers and the DNS is very accessible.

How big is the root zone file, and does its growth affect DNS performance?
The root zone is still a small file, less than 1 MB. If you feel the need, you can always grab an up-to-date copy from IANA at: http://www.iana.org/domains/root/files. The biggest jump in size of the root zone was a one-off event that came with the introduction of DNSSEC. Perhaps a more important issue is the increasing churn – or rate of change – that comes from adding new TLDs. Of course, it is important to understand how DNS servers and clients will deal with growth and churn in the long term. So, to this end, the RSSAC has published a draft recommending the types of data that root server operators should gather and share to observe long term trends and monitor overall system health.

I want to learn more!
Daniel Karrenberg of RIPE NCC (operator of the K root server) has written two excellent documents, which are both available on the Internet Society site (links below). Karrenberg's documents are a few years old and some specific details are now out of date, but they still provide some of the most clearly explained and useful overviews of the DNS and root server system.

- http://www.internetsociety.org/dns-root-name-server-frequently-asked-questions
- http://www.internetsociety.org/internet-domain-name-system-explained-non-experts-daniel-karrenberg

Other good starting points:
- IANA's Root Zone Management Overview page: http://www.iana.org/domains/root
- ICANN's RSSAC page: https://www.icann.org/resources/pages/rssac-4c-2012-02-25-en
- Root Server Technical Operations site: http://www.root-servers.org

This is a condensed version of the root server FAQ available on the Netnod website: http://www.netnod.se/dns/iroot/faq

Lars-Johan Liman
Senior Systems Specialist

– What's been going on at the meetings you've missed?

RIPE 68
The RIPE 68 meeting saw the formation of the Connect Working Group – dealing with matters of interconnection and discussing operational deployment as well as policy aspects. A great initiative! There were vivid and constructive discussions on the hot topic of the NTIA IANA functions transition and what bottom-up processes should be applied to develop a proposal for new IANA functions arrangements.

Patrik Fältström and Nurani Nimpuno both spoke on the "Internet Governance Landscape 2014 panel", mapping out the current state of play in Internet governance.
https://ripe68.ripe.net

Stockholm Forum on Internet Freedom and Global Development
Stockholm Internet Forum (SIF), is a conference on freedom and openness on the Internet to promote economic and social development. Patrik attended this year's SIF which, had more than 50% of the participants from the so called "global south", and more than 40% women. This more balanced representation was noticeable in that many new perspectives and issues were heard.
http://www.stockholminternetforum.se/

RIPE NCC Regional meeting ENOG 7
Martin Eriksson and Kurtis Lindqvist attended the ENOG7 meeting in Moscow, Russia. Presentations ranged from Internet governance and network neutrality, to more technical topics such as IPv6, amplification attacks, and routing resilience.

Netnod's special, limited edition t-shirt with Netnod written in Cyrillic, created a great buzz.
http://www.enog.org/meetings/enog-7/

NANOG61
Mathias Wolkert, Martin, and Kurtis attended NANOG61 which as usual offered a wide range of different presentations relevant to the operators' community. One highlight was the "Who's Looking?" talk by Geoff Huston, which showed a bunch of frightening but fascinating statistics on stalking. T-mobile's presentation on running IPv6-only for all Android 4.3+ showed some of the real advantages with running IPv6 in production mobile networks. Netflix's "Fault Injection and Service Resilience" was another highlight where they, simply put, broke things one by one in their networks and then analysed the effects, to increase resilience.
https://www.nanog.org/meetings/nanog61/

ICANN 50
www.icann.org
The ICANN 50 meeting in London, attended by Lars-Johan Liman, Patrik, and Nurani, offered fantastic sunshine and lively discussions, including some about the .vin/.wine controversy that created headlines. There were also passionate discussions about ICANN accountability and how to handle the transition of the IANA functions in a representative, bottom-up, and transparent manner. Liman who is the co-chair of RSSAC and Patrik, chair of SSAC, both serve on the transition coordination group, a challenging and exciting role in this time of change and evolution of existing multistakeholder structures.
http://london50.icann.org/

IETF 90th
Johan Ihrén, Liman, and Henrik Levkowetz all attended the 90th IETF in Toronto, Canada, where three topics dominated the week: Security and Privacy, Internet of Things, and IANA.

ISOC held an interesting briefing panel on Internet security and privacy. There are also several efforts within various IETF working groups to provide better tools to protect against mass surveillance. At the Bits-and-Bites event, ten different organisations demonstrated Internet of Things solutions. The transition of the IANA functions discussions resulted in the "IANA plan working group", tasked with providing input on the transition to the IAB, from the broader IETF community.
http://www.ietf.org/meeting/90/

Nurani Nimpuno
Head of Outreach and Communications

Work meets pleasure:

Your travel guide to the upcoming industry events

Brisbane – APNIC38
9-19 September
Brisbane, the third largest city in Australia has it all; world-class shopping, restaurants, nightlife, culture, entertainment, and a great range of outdoor activities. We could make a very long list of things to see and do, but instead we'll give you three quick tips:

Bite into the breakfast scene. Australia is known for its great **breakfast** culture and fantastic coffee. If you like a milky coffee, try the **"flat white"** (smooth, strong, and delicious) or for espresso lovers, a **"short black"** is the way to go. You'll find the best breakfasts in the inner suburbs of New Farm, South Brisbane, West End, and Paddington (it is well worth a $8 cab trip to get there).

Check out the weird, and wonderful, and actually quite pleasant **Southbank beach** – an artificial beach in the middle of the city, with sand, water, lifeguards, and all! It's also surrounded by good restaurants, bars, and cafés.

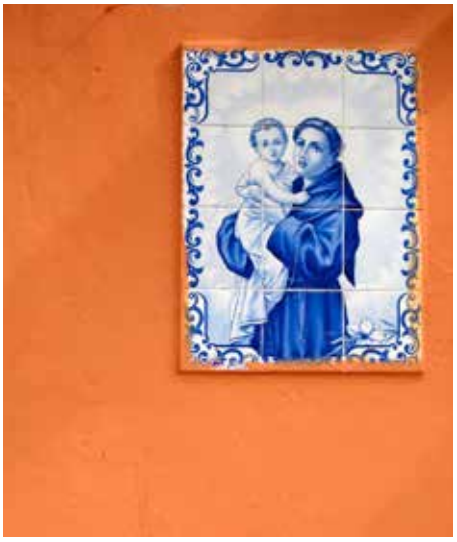
Cuddle a koala and feed a kangaroo at **Lone Pine koala sanctuary.**
http://www.koala.net

OK then, we'll give you one bonus tip too. Want to escape the city? Take the ferry out to **Stradbroke Island** to spot hump-back whales in a sub-tropical paradise only a couple of hours outside of the city.
http://stradbrokeisland.com

São Paulo – LACTLD Technical meeting
30 September - 2 October 2014
Brazil is football (at least it was until they met Germany) and you cannot experience Brazil without seeing a match. Catch one with the local **São Paulo Football Club**.

Museu do Futebol, the football museum is stunning, very modern, and well worth checking out. It's located at the Pacaembu stadium in São Paulo, the stadium that hosted the 1950 World Cup.

But if you're ready to forget the World Cup, instead take a memorable walk on **Avenida Paulista**, one of the most impressive boulevards in the world. The three kilometre avenue boasts huge skyscrapers, with fancy restaurants, banks, office buildings, and shops squeezed in everywhere. Seeing this, it is understandable that Brazil is on its way to become the world's fifth greatest economy.



Moscow – Capacity Russia
6-7 October 2014
If you are on your way to Red Square, you have probably already visited one of the most spectacular tourist attractions in Moscow – that's right, the metro. The **Moscow metro** is considered by many to be the best and most beautiful in the world. Known as "the people's palace", many of the stations are architectural highlights. And listen carefully to the station announcements: you'll hear a woman's voice in one direction and a man's voice in the other.

Moscow is one of the most expensive cities to visit, but there are also a lot of things to do for free. For example, you can visit the historical buildings of **Red Square** and the **Kremlin**, grab a bite in **Gorky Park** (if the weather is good) or, if the winter comes early, go skating. Stroll around the outdoor kitsch market **Izmailovo** and have pirozkhis (savoury pies),

visit the art museums and galleries or, if you feel romantic, watch a ballet at the **Bolshoi theatre** (tickets for sale outside). For the cold or tired, a Russian sauna at the **Sandunovsky baths** (one of the oldest and most luxurious sauna places in Moscow) might be a better option.

Baltimore – NANOG62
6-8 October 2014
If it is not "Raining in Baltimore" (to quote the Counting Crows) you should tour the harbour for most of the tourist attractions. The waterfront is filled with restaurants, hotels, and shopping spots. If it is raining, a visit to one of the mandatory museums (such as **National Aquarium, Maryland Science Center,** and **American Visionary Arts**) is a great indoor option.

To get an even closer feeling of the water (if it is still not raining) jump on a water taxi and go to areas like **Fells Point** and **Little Italy**. There you can find charming historical buildings as well as the more fancy ones.

When it comes to the culinary arena, Baltimore's cuisine features a lot of seafood, especially crabs. Try steamed blue crabs with a local brew or the famous crab cakes.

Adventurous fans of **The Wire** might even consider a tour of Baltimore's more infamous corners. True dat.

Los Angeles – ICANN 51
12-7 October 2014
In Los Angeles there is something for everyone, as long as you like sun, celebrities, sports, shopping, and nature. Did we miss anything? No, that's probably all you need after some hectic days at the ICANN meeting.

Griffith Park is a vast nature reserve in the middle of Hollywood with the

Amsterdam

Hollywood sign itself at its centre. A hike in the mountains allows you to burn off some of the energy you accumulated at the meeting and gives you fantastic view of Los Angeles at your feet. Watch out for rattlesnakes and do not forget to take a selfie with the Hollywood sign in the background, then send it to us as proof you were there. OK?

If you need to burn even more energy, rent a bike in **Santa Monica** and cruise along the beach to Venice. Get a break and have lunch at **Perry's cafe** and watch the skaters in the huge park. **Malibu pier** is another fantastic place for a scenic lunch. If you prefer celebrity-watching, the best spotting place is **Chateau Marmont**, a classic hotel and restaurant.

Barneys is the place to be for those who love shopping (and have a fat wallet). Here you can mingle with the resident Beverly Hills shopping enthusiasts or pop around the corner to the "Pretty Woman" street, **Rodeo Drive**. Another kind of shopping awaits at the **Yamashiro farmers' market**, offering great food, music, and view.

Busan – ITU Plenipotentiary
20 October - 7 November 2014
Busan is Korea's second largest city, attracting many visitors every year to hike or to visit the Buddhist Temples deep within the region's mountains. The beautiful **Beomeosa Temple**, founded in 678 AD, is worth a visit if you get the chance.
http://www.beomeo.kr/index.php

If you're a seafood fan and you're in Busan, you simply must take a trip to a fish market. The **Jagalchi Market** is famous for its fantastic range. You can enjoy fresh raw fish in a bustling atmosphere, right at the market. Take Line 1 to Jagalchi, Exit 10.

Amsterdam – Capacity Europe
3-5 November 2014
Amsterdam is always Amsterdam. What can we tell you that you don't already know? Well, even if you've visited Amsterdam several times, you can't really call yourself an Amsterdam buff until you've **cycled through the city**. So rent yourself a bike and get local.
http://macbike.nl/en/

>>

A **boat trip** on the canals is the also a great way to experience this exciting city and a relaxing way to get to your next stop, which could be anything from the **Heineken brewery** to the **Anne Frank museum**.

London – RIPE 69
3-7 November 2014

This time we have two relaxing cultural suggestions for the London visitor.

At **Soho's Tea Room**, you get transported back to the 1940s. "Secretly" located above the famous pub Coach & Horses at 29 Greek St in West End, this vintage venue offers homemade scones and biscuits (please, not cookies) and no less than 16 different tea flavors. Enjoy your afternoon tea to the rhythm of jazz and swing, played on old LPs.

Staying over the weekend? On Sundays, the hippest market in London, **Brick Lane**, is worth spending some time at, especially if you would like to crank up your coolness-factor and check out the creations of some hot new designers. Cafés and restaurants abound, so take your time, hang out, and release your inner hipster. The market is open 9-17 (take the subway to Aldgate).

Honolulu – IETF 91
9-14 November 2014

Honolulu, capital of Pacific Ocean, offers beach paradises, surfing, and city life. It is also where Barack Obama grew up and where the schools have surfing as part of the curriculum.

Even if you are not a surfer, you can at least pretend to be one. Start your day with a healthy surf breakfast at **Boogarts** at the Kapiolani Park, containing a lot of fruits, berries, and BIG coffees in a great atmosphere. If you get inspired, try a surf lesson at **Queens's surf**, Waikiki, the best place for beginners. Finish with a lunch at **Burgers on the edge** and make your own healthy burger. When it is time for "after-beach", sip a Mai Tai or Hawaiian beer at **Duke's Canoe Club** at Waikiki to tell your new surf friends just how well you hit the waves. Hang loose!

At **Ocean House,** close to Aston Waikiki Beach hotel, you can get good crayfish. Other local dishes include Polynesian beef tenderloin and crab-stuffed mahi mahi. Yummy!

Bangkok – Capacity Asia 2014
8-20 November 2014

Bangkok is a city that never sleeps, full of contrasts and sensory overload.

For shopping, the **Paragon**, **Gaysorn**, and Emporium are the most impressive centres. If you prefer markets, the gigantic **Chatuchak Weekend** Market with over 6000 stands is a hit for both tourists and locals. Here you can find anything, even live animals!

Get spiritual in one of Bangkok's many temples, such as **Wat Pho** where the famous golden Buddha rests. An interesting way to get there is a boat trip on Chao Phraya. You can jump on anywhere, and it's also handy to many other sites, such as the **Grand Palace** and **Wat Arun**.

Above all else, Bangkok is a culinary delight at every turn. Don't miss **Yaowarat Road**, also known as Bangkok's Chinatown, for one of the best dim sum lunches in Southeast Asia. Try **Phahurat Road** for south Asian food; **Silom**, in the business district, for the lunch market of **Soi Lalais**; shellfish at the **Saladeng**; Indonesian food at **Convent Road**; Japanese at the **Soi Thaniya**; and of course traditional Thai food around **Soi Pipat**. Voted best Thai restaurant, ten years in a row, is **Baan Khanitha**, at 36/1 Soi 23, Sukhumvit Road.

Refresh at **Banyan Trees Skybar**, **Vertigo/ Blue Moon bar**, or **The Dome at Lebua**.

When it comes to sports, many tourists visit a Thai boxing match at **Lumphini Boxing Stadium** or **Ratchadamnoen Stadium**.

Nurani Nimpuno
Head of Outreach and Communications

Where to meet up with Netnod

SEPTEMBER – DECEMBER 2014

IGF 2014
1 – 5 September 2014
Istanbul, Turkey
http://www.intgovforum.org

EPF9
21 – 24 September 2014
Split, Croatia
http://www.peering-forum.eu

LACTLD Technical Workshop
30 September – 2 October 2014
Sao Paulo, Brazil
http://www.lactld.org

NANOG 62
6 – 8 October 2014
Baltimore, USA
https://www.nanog.org

Capacity Russia
6 – 7 October 2014
Moscow, Russia
http://www.capacityconferences.com

ICANN 51
12 – 17 October 2014
Los Angeles, USA
http://la51.icann.org

ITU Plenipotentiary Conference (PP-14)
20 October – 7 November 2014
Busan, Republic of Korea
http://www.itu.int

8TH CENTR Security workshop
27 October 2014
Dublin, Ireland
https://centr.org

25th Euro-IX Forum
16 – 28 October 2014
Bucharest, Romania
https://www.euro-ix.net/

RIPE 69
3 – 7 November 2014
London, U.K.
https://ripe69.ripe.net/

Capacity Europe
2 – 5 November 2014
Amsterdam, The Netherlands
http://www.capacityconferences.com

IETF 91
9 – 14 November 2014
Honolulu, Hawaii
http://www.ietf.org/meeting/91/

Capacity Asia
18 – 20 November 2014
Bangkok, Thailand
http://www.capacityconferences.com

Internetdagarna
24 – 25 November 2014
Stockholm, Sweden
http://internetdagarna.se/

MSK-IX Peering Forum
December 2014
Moscow, Russia
http://www.msk-ix.ru/eng/

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1. CUSTOMER SUBMITS SIGNED CONTRACT

2. NETNOD COUNTERSIGNS CONTRACT
INITIATION OF CONNECTION PROCESS

3. FIBRE CONNECTION / DWDM
(DEPENDING ON LOCATION)

4. CONNECTION OF CUSTOMER
PUBLIC ANNOUNCEMENT

netnod REACH

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IX Reach
enquiries@ixreach.com

COMCOR – AKADO Telecom
info@akado-telecom.ru

netnod

Contact details

Post address:
Box 30194
SE-104 25 Stockholm, Sweden

Phone: +46 (0)8 562 860 00

www.netnod.se

Email

General: info@netnod.se

Technical: noc@netnod.se

Feeling inspired?
Have an article or some great photos you want published in the next Netnod newsletter? Get in touch!

newsletter@netnod.se

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facebook.com/netnodix

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"Under the skin of ...?" Answer: Michuki Mwangi

Who we are


Emelie


Henrik


Håkan


Johan


Jörgen


Kaj


Kurtis


Liman


Martin


Mathias


Mem

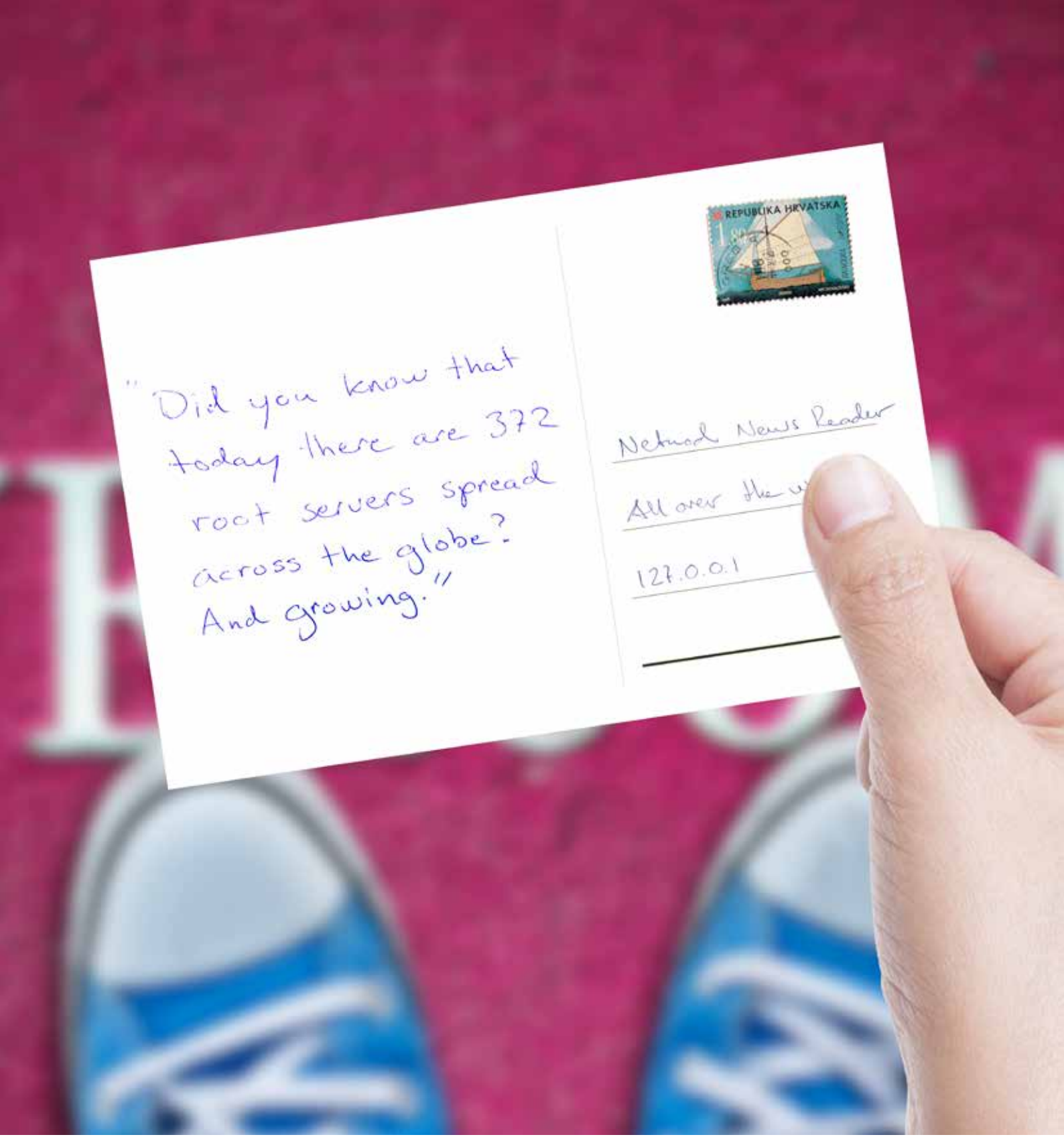

Nico


Nurani


Patrik


Pierre


Sarah



netnod

Netnod manages Internet exchange points (IXPs) in Sweden and Denmark, offers DNS anycast & unicast slave services to TLDs, and is the operator of i.root-servers.net, one of 13 logical DNS root name servers.