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LETTER FROM THE PRESIDENT

2019 was a very good year for ISC. BIND 9’s engineers performed major refactoring work in 2019, leading to much faster performance in version 9.16. ISC’s Kea DHCP continues to be well accepted in the marketplace; we now have more Kea support customers than ISC DHCP customers, and Kea support revenue more than doubled from January to December 2019. We continue to have a high rate of repeat support subscribers, with many more customers joining (24) than leaving (nine).

As I write this in April 2020, we are the midst of a global pandemic which we expect will shake things up for years. Given the cyclical nature of recessions, ISC has been bracing for a downturn; thanks to some preparation and fortunate timing, we expect to weather the coming lean times relatively well. We were finally priced out of our Silicon Valley headquarters; we are in the process of the long-anticipated transition to a completely “virtual” company, with new headquarters in Newmarket, New Hampshire. Between the cost savings from leaving the building, our judicious hiring decisions, and the cuts in travel expenses due to the pandemic, we should be able to handle the expected shortfalls in revenues. ISC showed a paper loss in 2019, which balances out the profits from 2018 and keeps the tax burden on our for-profit subsidiary at a minimum.

In 2019, we added team members in Romania, Austria, Denmark, and Brazil, in addition to existing staff in seven US states, the UK, France, Poland, the Czech Republic, Australia, and the Netherlands. ISC is truly a global company.

We are grateful to our support customers, sponsors, and contributors as they help us continue to develop and support open source software, and operate and maintain the DNS root server, F-Root.

It has been another good year at ISC and we look forward to many more.

Regards,

Jeff Osborn
April 2020
ISC AND OPEN SOURCE

We believe that open source in general, and ISC’s software in particular, protects the Internet from being overtaken by businesses or governments who may not have the world’s interests at heart. It’s essential for individuals and organizations to have options for their critical Internet functions that don’t require them to purchase services from vendors that are looking to profit from their weakness.

ISC has no stockholders who are pressuring for big ROI numbers; we are a 501(c)3 non-profit dedicated solely to the interests of the Internet community.

Open source software offers the best of both worlds: high-quality, rigorously vetted code with professional support for your mission-critical Internet infrastructure, but at a lower cost – both in terms of your money and your privacy – than commercial vendors.
LOOKING BACK AT 2019

Highlights

At ISC, 2019 was a solid year of serving our open source users and the Internet community. We continued our engagement with the Internet infrastructure community through work with ICANN, IETF, DNS-OARC, ISOC, UKNOF, NANOG, APNIC and other fora. We joined with our colleagues in other DNS organizations to drive the first “DNS Flag Day” to clean up some lingering technical debt in the DNS system.

We retired ISC’s long-running Domain Survey, which was becoming irrelevant with the adoption of IPv6, and ended the legacy SNS-PB service. SNS-PB was a free network service that ISC provided for over a decade to non-profits and smaller TLDs. Now that secondary name services are now widely available from other providers, we would rather focus our network resources on managing F-Root.

Speaking of F-Root, with the retirement of Brian Reid as Director of Network Operations, we reorganized our F-Root and Technical Operations staff. Ray Bellis took over as acting director, and we added a network engineer, Elmar Bins, who works from Austria.

As an open source provider ourselves, we are always looking for opportunities to contribute to other open source work. We are a long-time user of the open source Etherpad software, and ISC’s Ray Bellis worked in 2019 on a major refactoring of the code base which formed the bulk of the 1.8.0 release. Ray also published an open source framework for a RADIUS server in Node.JS, at https://www.isc.org/blogs/radius-framework/.
LOOKING AHEAD TO 2020

Headquarters Move

ISC is moving out of our long-time headquarters at an old warehouse at 950 Charter Street in Redwood City, California. Most of our staff already work remotely, but vacating the HQ means relocating our remaining network facilities, records, and business systems elsewhere. We are primarily a “virtual” company, with contributors in 11 countries and seven US states, but are now headquartered in the New England region of the US, in an old mill building. The physical address is 53 Main Street, Newmarket, New Hampshire, and our new mailing address is PO Box 360, Newmarket, NH 03857.

Covid-19 and Its Effects

The global pandemic that has affected everyone since early 2020 will surely have its effects on ISC as well. Fortunately, we have always been a very lean operation, so we are cautiously optimistic that we will not have to make any staff cuts. Our operations have been remote for years, and we are experts at videoconferencing; see our blog post at https://www.isc.org/blogs/remote_working_at_isc/ for more details on how we have made teleworking the norm.

Of course we, like everyone else, cannot predict how or when the pandemic will end. In the meantime, as the Internet becomes even more important for personal and business communications around the globe, we continue doing our important work of keeping the Internet infrastructure open and available to everyone. And we send our sincere thanks to those companies and organizations who recognize the importance of our open source work and who support it with their paid support contracts.
ISC’s revenues come primarily from support contracts for our software products. In 2019, 74% of our revenues came from our flagship product, BIND 9. Another 20% came from our DHCP offerings, ISC DHCP and Kea DHCP. Kea’s future is solid, with revenues beginning in 2017 and growing strongly in both 2018 and 2019.

We gained 24 new support contracts and lost only nine in 2019. As a result, ISC was able to add several new staff members: two BIND 9 programmers, one Kea team member, one support engineer, one quality-assurance engineer, and a development systems engineer. Although 2020 is sure to be a challenging year financially as a result of Covid-19 and its worldwide effects, ISC is on a steady footing.

At the end of 2019, we had 38 staff members in 11 countries (the US, Brazil, the UK, France, Austria, Denmark, Poland, Romania, Czechia, Australia, and the Netherlands, if you’re keeping score). There were 17 people working in Software Engineering and Quality Assurance; five in Support; six in Sales and Marketing; four in Finance, Facilities, and Executive Operations; and six in F-Root and Technical Operations.
Revenues

ISC receives revenue primarily from support services for our software products. In 2019, 74% of ISC’s total revenue came from BIND 9, ISC DHCP represented 8%, and Kea DHCP totaled 12%. While BIND 9 remains our flagship product, Kea DHCP has become an increasingly important revenue source for us over the past three years.

The remaining 6% of the company’s 2019 revenues came from F-Root, Hosted@ hosting services (discontinued in 2019), and donations.
Expenses

ISC’s staff are leaders in their fields and represent the majority of the company’s costs. Other than personnel, ISC’s expenses include bandwidth, facilities, network and equipment depreciation, travel, taxes, utilities, and maintenance – and very little else. We are proud of the efficiency and cost-effectiveness of our operations.

Nearly three-quarters of ISC’s staff are technical personnel in the software engineering, technical support, and network operations areas; the remaining employees fill sales, marketing, and general/administrative roles.

2019 Expenses by Service (Unaudited)
## 2019 FINANCIAL INFORMATION

### Unaudited Financial Data

<table>
<thead>
<tr>
<th>Numbers in thousands</th>
<th>2019 Q1</th>
<th>2019 Q2</th>
<th>2019 Q3</th>
<th>2019 Q4</th>
<th>2019 Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Actual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td>1,229</td>
<td>1,281</td>
<td>1,324</td>
<td>1,423</td>
<td>5,256</td>
</tr>
<tr>
<td>Expense</td>
<td>1,371</td>
<td>1,415</td>
<td>1,389</td>
<td>1,359</td>
<td>5,535</td>
</tr>
<tr>
<td>Net Income</td>
<td>(142)</td>
<td>(134)</td>
<td>(66)</td>
<td>64</td>
<td>(279)</td>
</tr>
<tr>
<td><strong>Budget</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td>1,351</td>
<td>1,360</td>
<td>1,389</td>
<td>1,448</td>
<td>5,549</td>
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<tr>
<td>Expense*</td>
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<td>1,430</td>
<td>1,344</td>
<td>1,355</td>
<td>5,489</td>
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<tr>
<td>Net Income</td>
<td>(9)</td>
<td>(69)</td>
<td>46</td>
<td>93</td>
<td>60</td>
</tr>
<tr>
<td><strong>Delta of Actuals to Budget</strong></td>
<td>(123)</td>
<td>(80)</td>
<td>(66)</td>
<td>(25)</td>
<td>(292)</td>
</tr>
<tr>
<td>Revenue</td>
<td>11</td>
<td>(15)</td>
<td>46</td>
<td>4</td>
<td>46</td>
</tr>
<tr>
<td>Expense</td>
<td>(133)</td>
<td>(65)</td>
<td>(111)</td>
<td>(29)</td>
<td>(338)</td>
</tr>
</tbody>
</table>

* Excludes depreciation expense

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<th>2019</th>
<th>2019</th>
<th>2019</th>
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<tbody>
<tr>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td>Actual – Total</td>
<td>37</td>
<td>36</td>
<td>37</td>
</tr>
<tr>
<td>Budget – Total</td>
<td>35</td>
<td>35</td>
<td>35</td>
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</table>

** At end of quarter
THE ISC STORY

Since the company’s founding in 1994, ISC’s employees have pursued the mantra of “open source for an open Internet.”

That work continued in 2019 as we developed and distributed our three open source Internet networking software packages: BIND 9, ISC DHCP, and Kea DHCP. BIND 9, ISC’s Domain Name System (DNS) software program, is widely used on the Internet by enterprises and service providers, offering a robust and stable platform on top of which organizations can build distributed computing systems. ISC DHCP implements the Dynamic Host Configuration Protocol for connection to an IP network, offering a complete solution for implementing DHCP servers, relay agents, and clients. ISC DHCP is a mature program with many features, but it can be cumbersome for operators to maintain. Kea DHCP is ISC’s intended replacement for ISC DHCP, and is designed for dynamic reconfiguration.

All of our open source software is freely available on our website. ISC’s operations are supported by the sale of software support contracts to companies and organizations who see the value in free open source and who wish to ensure its maintenance and availability to everyone.

ISC’s staff contribute to various Internet governance and community initiatives, and ISC engineers have written or co-authored more than 85 of the technical standards (RFCs) that are essential to interoperability on the Internet.
OUR THANKS

Our greatest thanks go to the loyal open source users who continue to support ISC, many of whom have been paid customers of ours for more than a decade. These include some of the most capable independent operators and enterprises in the world.

We also owe a debt to all the wonderful open source users who have submitted feedback and patches, and the open source packagers who maintain distributions for our users. We regard many of these collaborators as our friends.

In 2019 we received generous unrestricted donations from Verisign and Craigslist, and Mozilla agreed to underwrite development of the DNS over HTTPS support in BIND 9. A few individuals have also made small financial contributions to ISC, via Patreon or directly.

In Memoriam

We sadly note the passing in 2019 of former ISC employee Kurt Lidl, who worked on BIND from ~2001-2003. Several of us worked with Kurt in other capacities, including at UUNET Technologies, and knew him as a dear friend and co-worker. He was a FreeBSD user and advocate of many years standing, and co-authored RFC2516 which put PPP over Ethernet. Kurt was smart, funny, and thoughtful, and we will miss him.
ISC SOFTWARE

BIND 9

Under the leadership of Ondřej Surý, Director of DNS Engineering, the BIND 9 team undertook projects both large and small for the betterment of both the code and the user experience. The engineers completed another year of BIND 9 maintenance and development, refactoring the network socket code, modernizing BIND’s DNSSEC support, and establishing both a new process for removing old features and a code of conduct.

The major refactoring project for 2019 was replacing the BIND 9 network socket code with the popular open source libuv library. This simplifies code paths, removes one factor limiting performance, and facilitates using other transport layers (including TCP and TLS) in the future.

We also implemented a new dnssec-policy key and signing policy (KASP) for zones, enabling automatic key regeneration and rollover.

We published a policy for gradually removing obsolete BIND 9 options, including community consultation for major changes, option deprecation, and eventual removal of an option. Please read https://kb.isc.org/docs/policy-for-removing-namedconf-options in our Knowledgebase for more details.

We updated ISC’s security vulnerability handling policy to reduce the number of minor security risks that result in a Common Vulnerability Exposure (CVE). Details are in a blog post at https://www.isc.org/blogs/vulnerability-policyupdate.

We also established a new Code of Conduct for the BIND 9 project, which applies to speech both on the bind-user mailing list and in our open Gitlab environment; the full CoC is at https://gitlab.isc.org/isc-projects/bind9/blob/master/CODE_OF_CONDUCT.md.
**BIND 9 Releases in 2019:**

- Development: 9.13.6, 9.13.7; 9.15.0 - 9.15.7 (10 releases)
- ESV: 9.11.6 - 9.11.14 (10 releases)

Some of the most significant feature changes in 2019 included:

- Addition of support for the new GeoIP2 geolocation API.
- Improvements for users resigning large zones, including spreading out the signing more evenly and adding new statistics on signing timing.
- Default disabling of NSEC aggressive use, formerly enabled by default, because it was found that it could take longer to assemble an answer from stored NSEC records than it took to re-query in some cases.
- Implementation of the new DNS Cookie algorithm, siphash24, to replace the old HMAC-SHA DNS Cookie algorithms.
- Addition of YAML output for dig, mdig, and delv.
- Deprecation of Windows 32-bit support and the DNSSEC Look-Aside Validator (DLV).
- Improvement of DNSSEC trust anchor configuration using the `trust-anchors` statement, permitting configuration of trust anchors in DS as well as DNSKEY format. (DNSSEC `managed-keys` was replaced with `trust-anchors plus initial-key`, and DNSSEC `trusted-keys` was replaced with `trust-anchors plus static-key`.)
- Addition of `validate-except` Permanent Negative trust anchors.
- Default enabling of DNSSEC validation.
- Final deprecation of the DLV (DNSSEC Look-Aside Validator) from BIND 9.


**DNS Flag Day 2019**

Mark Andrews has been working for several years to identify and alert operators with DNS systems that do not fully support the EDNS protocol. The open source development community adopted this campaign as the first target for a DNS-wide cleanup event, marketed as “DNS Flag Day” in 2019. This is almost ironic, as EDNS was designed as a feature that should never have required a “Flag Day” because it was backwards-compatible. Over a period of years, the DNS had added more features that relied on EDNS, and developers had added a forest of inefficient workarounds to adapt to non-compliant EDNS implementations. With the
community support of most of the open source developers and many of the largest hosted-service providers for removing those workarounds, DNS Flag Day 2019 snowballed into a fairly high-profile event by the time the February “deadline” came around.

ISC was surprised by how popular our hosted EDNS compliance checker became. After being available for several years online, it suddenly got hammered with traffic as the news about the Flag Day caught on in the technical press. We had to rate-limit use of the tool because some operators were testing every one of their zones in this very lightly provisioned online tool.

**DNS Over TLS (DoT)/DNS Over HTTP (DoH)**

The controversy over the deployment of open DNS resolvers running DNS over HTTP (DoH) accelerated the debate about the impact of DoH on the overall security of the DNS, and about a shift in control and access to end-user data to hosted providers. ISC joined the new Encrypted DNS initiative, which is beginning a discussion on work that needs to be done to promote and enable deployment of encrypted DNS.

We are excited to be adding TCP and TLS transports to BIND in 2020, to enable both leading options for encrypted DNS.

**The BIND 9 Team**

We added two new members to the BIND 9 team, Michal Nowak (based in Czechia) and Diego Fronza (in Brazil).

ISC staff authored three DNS-related IETF drafts that were approved as RFCs in 2019:

- **RFC8624**: Algorithm Implementation Requirements and Usage Guidance for DNSSEC, by P. Wouters, O. Surý;
- **RFC8482**: Providing Minimal-Sized Responses to DNS Queries That Have QTYPE=ANY, by J. Abley, O. Gudmundsson, M. Majkowski, E. Hunt; and
Common Vulnerability Exposures (CVEs)
ISC published nine BIND 9 security vulnerability notices in 2019; the full list is available in the BIND 9 Security Vulnerability Matrix at https://kb.isc.org/docs/aa-00913.

ISC DHCP
We continue to maintain ISC DHCP, while encouraging migration to Kea. We did not do any releases in 2019, but we did commit work in the open repository. ISC DHCP maintenance versions 4.1-ESV-R16 and 4.4.2 were posted in January 2020. We have gotten some new paid support customers for ISC DHCP software, and are satisfied to continue maintaining it for the foreseeable future.

ISC DHCP migrated to GitLab in 2019; it was the last ISC open source project to migrate. We now have integrated issue tracking and development in the open for all our projects.

We did not announce any ISC DHCP security vulnerabilities in 2019.

Kea DHCP
The major development efforts in Kea in 2019 involved providing a configuration database, enabling centralized control and reuse of complex configurations such as subnet definitions, and designing and developing Kea to evolve into a much higher-performance, multi-threaded application. Although DHCP performance is not a significant issue in the enterprise, we are seeing increased adoption of Kea among service providers, many of whom need to provide addresses for millions of devices.

A major update to Kea added a configuration backend, and we issued monthly development releases while supporting a growing Kea support customer base. Our newest Kea team member, Razvan Becheriu (Romania), was an external contributor on the Cassandra backend until we hired him to work on our next big Kea project, multithreading!
Major features added in Kea include:

- Addition of a configuration backend database in MySQL; read about it at [https://www.isc.org/blogs/kea-1-6/](https://www.isc.org/blogs/kea-1-6/).
- Implementation of the Client Classification “drop” class, which provides a way to discard unwanted queries.
- Addition of the max/min - lease-lifetime, a popular feature of ISC DHCP.
- Automatic calculation of renew/rebind timers.

We migrated our Kea Administrative Reference Manual (ARM) to the Sphinx system to offer users live online documentation for multiple software versions via Read The Docs, at [https://kea.readthedocs.io/en/latest/](https://kea.readthedocs.io/en/latest/).

We also announced and implemented a new Kea release model ([https://www.isc.org/blogs/kea-1-6/](https://www.isc.org/blogs/kea-1-6/)) with Kea 1.6.0, adding development point releases.

We continue to experiment with the best way of making our Kea open source accessible but also financially sustainable. In 2019 ISC added a Kea Basic subscription offering, which includes subscriber-only Kea premium software but not technical support. Our transition to a static website in 2019 allowed us to migrate to a different online store, which lets us sell low-cost subscription software products.

For 2020, the Kea team is already hard at work on enabling multi-threading, to take Kea performance to a new level.

**Kea DHCP Releases in 2019:**
Kea 1.6.0, 1.6.1, 1.7.0 - 1.7.3 (6 releases)

**Common Vulnerability Exposures (CVEs)**
ISC announced three Kea security vulnerabilities in 2019; the list is available in our Knowledgebase at [https://kb.isc.org](https://kb.isc.org), under Kea DHCP/Security Advisories.
Stork

In 2019, in response to customer requests for a graphical management dashboard for BIND 9 and Kea DHCP, we began a new open source project, Stork. Our first public release is expected in the first half of 2020, but anyone can follow the development on our GitLab at https://gitlab.isc.org/isc-projects/stork.

Our goal with Stork is to provide a more complete solution for DNS and DHCP, enabling more organizations to use the open source by relieving them of some of the burden of developing or integrating their own management solution. We are leveraging two very popular open source projects, Prometheus and Grafana, for Stork's time-series data store and data visualization, and using the modern Angular framework for the GUI.

Software Deployment

We created a new ISC Cloudsmith.io repository, where we are publishing package versions of both our open source and restricted-access software, including BIND 9 pre-release security fixes, the subscription edition of BIND, and Kea premium hooks library packages. By making ISC packages we ensure that the latest versions of our applications, and all of their dependencies, are available on the latest stable versions of the major operating systems. We will continue publishing BIND 9 open source packages on the Copr and Launchpad sites, where they are easier for open source BIND 9 users to find.
Our technical support business is stable and even growing modestly. We added 24 new customers in 2019 and only nine left us, for a total of 122 at the end of the year.

We added a new support engineer, Peter Davies, who has several decades of experience with both BIND 9 and DHCP. Although he lives in Copenhagen now, Peter’s first language is Welsh, bringing ISC’s total number of native languages spoken to eleven (English [American, British, AND Australian], Polish, Czech, French, Romanian, Welsh, German, Dutch, and Portuguese).

Nearly half of our customers opt for the Silver support level, which includes 24x7 response to critical issues and premium software for BIND 9 subscribers. Many open source users tell us that they need the option of premium software to justify paying for technical support.
BIND 9 support is our most popular product, but many of our customers opt for support for multiple open source systems. The strongest trend we saw in 2019 was an uptick in support contracts for the Kea DHCP server.

Most of our customers are Internet service providers, carriers, or large enterprises.
Support Issues and Trends

We saw a number of significant but intermittent issues with large zone updates (usually for RPZ or DNSSEC-signed authoritative zones), impacting BIND 9 performance.

We received several requests for more metrics and performance improvements for managing ongoing DNSSEC signing and zone propagation, especially for large zones.

DoH, DoT, and BIND 9 feature availability were frequent support topics.

The number of paid Kea support customers grew substantially in 2019, up to 25 from 18 at the end of 2018.

There were several requests for EDNS Client Subnet Identifier, often from users interested in using the feature creatively to enable some sort of customized response.

Questions about Kea high-availability mode, and how to test and monitor that the function is working when there is no failure, became more prevalent. Many new users are looking for advice on Kea operations and asking about best practices for scaling and provisioning.

We offered recommendations to a number of users who were interested in optimizing their performance for Kea or BIND 9.

Farsight released their RPZ Services module, which we were able to offer to BIND -S edition customers. This is a plug-in for BIND that works with the BIND RPZ Service interface.

Although ISC and others promoted it widely via conferences and blog posts, the 2019 Flag Day still took some of our users and customers by surprise. If and when the [2020 Flag Day](https://www.isc.org/flag-day) (to address IP packet fragmentation) happens, we resolve to do a better job of communicating about it to ISC support customers.

We restarted our Support customer newsletter, sending a quarterly email to our non-OEM support accounts. We hope this will strike the right balance between too much information and not enough, and will provide us with a vehicle for communicating about longer lead-time events and changes.
ISC is one of the twelve global Root Server Operators (RSOs). We operate a large number of F-Root instances worldwide and participate in global RSO coordination. (It is important that RSOs not be too coordinated; diversity is good.)

The number and location of all the F-Root servers can be seen at https://root-servers.org. We continued to upgrade our network of F-Root Anycast instances and also installed new nodes in Boston (US), New York (US), La Paz (Bolivia), and Hangzhou (China). When combined with the nodes operated in partnership with Cloudflare, our nodes now number in excess of 250. We consistently appear at or very near the top of the performance charts based on query latency, as reported by dnsperf.com.

ISC started a project to perform a complete refresh and modernization of the F-Root Operations and Management infrastructure.

The shutdown of the SNS-Public Benefit service was announced in 2019 and took effect on January 31, 2020. There are now many other organizations offering low-cost or free DNS secondary services to worthy non-profits, as we concentrate our resources on F-Root.

In the past, ISC provided Internet connectivity services to the City of Palo Alto and various other municipal sites in the Bay Area of California. This service has also now been discontinued as other options are available.

ISC joined the NLnog Ring, which gives us access to over 500 systems from which we can run network tests, in return for us provisioning a virtual machine on our own infrastructure for use by other ring members.

We took advantage of a Fastly offering for non-profits; we now host https://downloads.isc.org and https://www.isc.org on the Fastly network, to offer the best performance possible to our users worldwide.

We migrated from WordPress to a new static website, motivated by our desire to avoid possible security breaches and also to improve performance. In the process we also tried to remove all Google tracking tags, a privacy improvement we eventually had to reverse as our website virtually disappeared from Internet searches.
OUR PEOPLE

Internet Systems Consortium, Inc. is a US nonprofit 501(c)(3) corporation. ISC Inc. has Public Charity status 509(a)(1) and 170(b)(1) (A)(vi). Our US Federal EIN is 20-0141248.

Board of Directors

ISC’s Board of Directors is currently made up of four members, each with a long and important history of involvement with the Internet: Rick Adams (Chairman of the Board), Fred Baker (Director), David J. Farber (Director), and Stephen Wolff (Director).

Management

ISC is currently managed by Jeff Osborn (President), Ondřej Surý (Director of DNS Development), Tomek Mrugalski (Director of DHCP Development), Ray Bellis (Director of DNS Operations), Vicky Risk (Director of Marketing and Product Marketing), T. Marc Jones (Director of Sales), and Dave Hendershott (Director of Finance and Facilities).
Professional Affiliations

ISC staff continue to participate vigorously in DNS community events and organizations.

In 2019, Ondřej Surý was re-elected to the Board of Directors of the DNS Operations, Analysis, and Research Center (DNS-OARC), of which ISC is a “Silver” member.

ISC participates in the Internet Corporation for Assigned Names and Numbers (ICANN) Root Server System Advisory Committee (RSSAC). Ondřej Surý is one of the seven Recovery Key Share Holders for Root Zone DNSSEC Keys, a member of The Registry Services Technical Evaluation Panel (RSTEP), and a member of the RSSAC. Jeff Osborn and Fred Baker have served on the RSSAC since 2017; Fred has been co-chair since 2018, and Jeff is a member of the RSSAC Caucus Membership Committee. Ondřej Surý and Ray Bellis are also members of the RSSAC Caucus.

The Internet Society (ISOC) promotes the open development, evolution, and use of the Internet for the benefit of all people throughout the world. The work is mainly focused on influencing policy and education, and ISOC is the umbrella organization for the IETF. In 2015, Jeff Osborn became the ISC delegate to the
Organization Members Advisory Council (OMAC) and continues in that role; David Farber, one of ISC’s directors, is a current trustee of the Internet Society.

ISC sends developers to every Internet Engineering Task Force (IETF) meeting and our engineers participate vigorously in the development of new standards. Tomek Mrugalski continues as co-chair of the DHC working group in the Internet Engineering Task Force (IETF), although active work in that group is winding down.

Réseaux IP Européens (RIPE, French for “European IP Networks”) is the RIR responsible for Europe and the Middle East. ISC staff members participate in various RIPE projects such as ATLAS, hosting equipment in Palo Alto. RIPE is also a Root System Operators peer, as they operate K-Root. ISC technical staff participate in the RIPE community meetings and Ondřej Surý is a RIPE Program Committee Member.

Cathy Almond continues her role as vice chair of the Programme Committee for the UK Network Operators Forum (UKNOF).

Public Presentations

ISC staff members gave 15 presentations at various conferences and webinars throughout 2019.
OUR CONTRIBUTORS

Many, many thanks to our code contributors!

BIND 9

- Tony Finch is again our most prolific external contributor, with five entries in the changelog for 2019.
- Petr Mensik made two contributions.
- Thomas Jach made 2 commits.
- Timothe Litt made 2 commits.
- Samuel Thibault and Sergei Trofimovich are new contributors for 2019, with one commit each.

ISC DHCP

- Jay Doran from Bluecat Networks suggested we add a ping-timeout knob.
- Jinmei Tatuya at Infoblox reported an issue which caused DDNS updates to be carried out over TCP rather than UDP.
- Fernando Soto from BlueCat Networks reported a dual-stack mixed-mode issue.
- Peter Nagy at Porion-Digital reported an issue that was causing the server, when running in DHCPv4 mode, to segfault when class lease limits were reached. He also submitted a patch.
- Brett Neumeier reported a minor issue with warnings when compiled with GCC 9.
- Tommy Smith updated the URL of IEEE oui.txt in contrib/dhcp-lease-list.pl.
- Joe LeVeque reported a problem with the define flags when using SO_BINDTODEVICE.
- Brad Smith at OpenBSD alerted us to a patch from OpenBSD to always set the scope ID of outbound DHCPv6 packets (which only applies when compiling under OpenBSD).
- Jay Doran at BlueCat Networks reported that the “d” domain name option format was incorrectly handled as text instead of RFC 1035 wire format.
- Charles Hedrick pointed out a syntax error in ldap.c which cropped up under Ubuntu 18.04.1/gcc 7.4.0.
Kea DHCP

- Franciszek Gorski was our top external contributor with 19 commits, mostly to improve Kea statistics.
- Jonatan Raudsepp submitted a fix for Alpine linux in Perfdhcp code.
- Kristoffer Larsen fixed a bug in Makefile.
- Brent Bloxam fixed a bug in kea-admin that assumed the PostgreSQL database was always local.