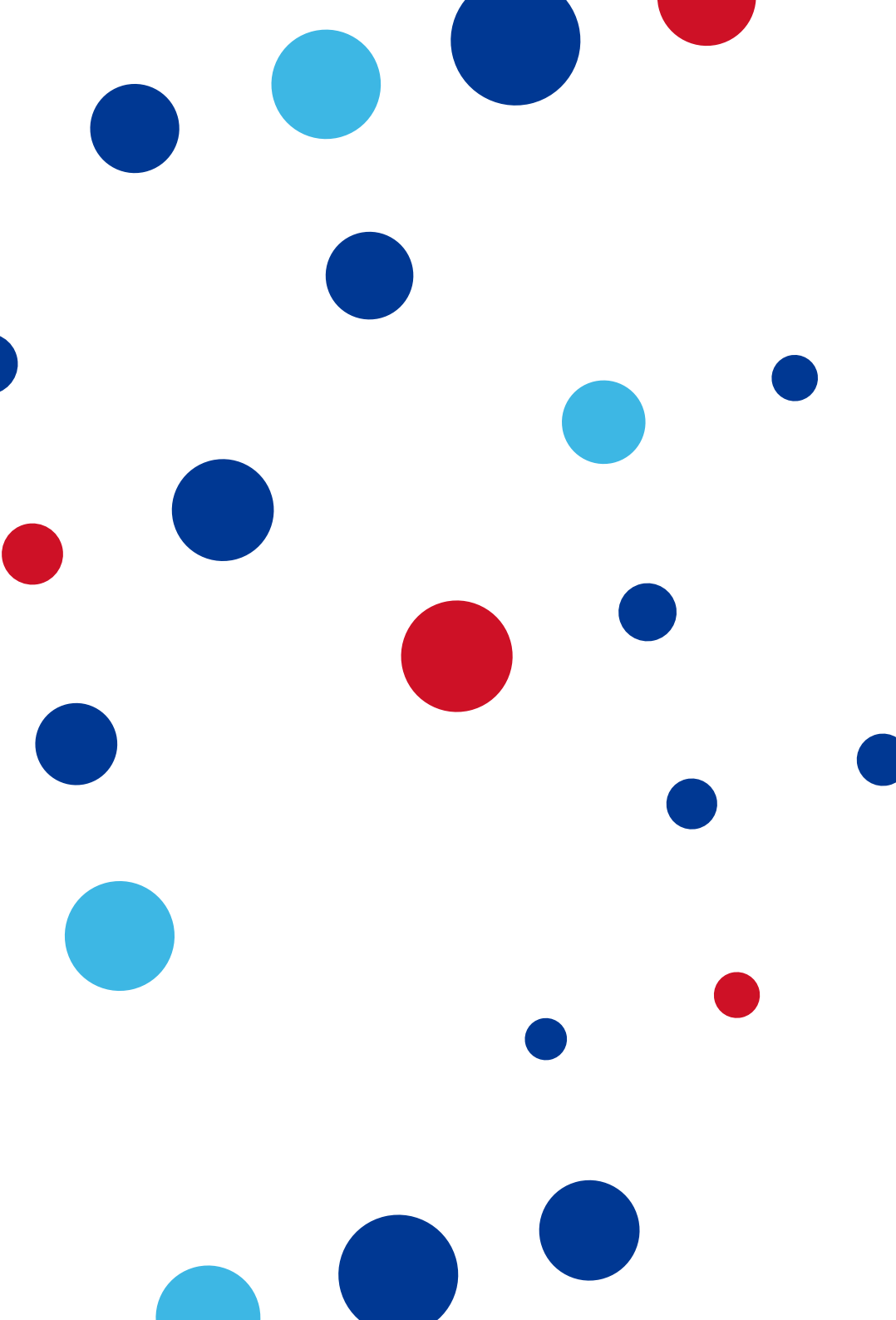


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1 Profile of the association



CZ.NIC is a special-interest association of legal entities, an open and independent organisation whose main activity is the administration of the register of the top-level national .CZ domain, as well as securing its operation. The association's activities in the field of security are also very important, involving both the Czech National CSIRT.CZ Security Team and other security projects, such as the powerful Turris router ecosystem.

In addition to these activities, the association is dedicated to research, development and education in the field of the internet, internet protocols, network traffic and new technologies in general. The CZ.NIC Association ranks the support and development of the internet community both in the Czech Republic and abroad among its long-term goals.

The CZ.NIC Association was established in May 1998 as a result of the growing importance of the internet and, thus, the number of its users and those interested in registering domain names in ccTLD .CZ. At the end of 2020, the association had 119 members divided into three chambers.

At present, the association represents a stable and trustworthy entity, capable of ensuring the reliable operation of the Czech national domain .CZ. Since 2013, CZ.NIC has been the holder of the ISO 27001 certification, confirming the safe handling of information, including setting appropriate rules and procedures.

For domain name holders, registrars and also other entities that use the internet for their work and leisure time, the association is a reliable partner that not only provides domain name administration but also safeguards internet security and is involved in socially beneficial activities - in the form of both projects and education.

2 Foreword from the Chair of the Board of Directors

We manage the administration of the national .CZ domain excellently

Ladies and Gentlemen,

Let me present the Annual Report of our association for 2020.

Our entire country has been hit hard by the Covid-19 viral pandemic. We are one of the worst affected countries in terms of deaths per million inhabitants, children have missed almost a year of full-time schooling, and the damage to the economy is enormous, as is the national budget deficit. Nevertheless, thanks to the dedicated work of our staff, our association has managed to keep all the services of the association in faultless condition and, despite various constraints on the possibilities of work, we have managed to meet the financial plan and the plan of activities for the year.

The main focus of our activities is the **administration of the national .CZ domain**, which we manage excellently, and I believe it will continue to be so. In the past year, we saw an increase in the number of domains by almost 3%, which is a surprising growth after the gradual fading of interest in domain registrations in the previous years. The unexpected increase is probably related to the viral pandemic, which has also resulted in increased use of the internet. We do not simply stay satisfied with what we have and operate, but are gradually improving the features and

security of the entire system in terms of both hardware and software and add new features and services.

- In addition to .CZ, our association also operates and develops internet infrastructure and services for the benefit of the local community. Among a large number of projects, I would like to mention at least the **Turris secure router** and the services based on it, the **mojeID authentication system**, the **BIRD routing daemon**, with its global spread, the **Knot DNS server** and the operation of **CSIRT.CZ** in the mode of the National CERT of the Czech Republic under the Cyber Security Act.

Many of our projects, especially in the area of cybersecurity, have been successful in obtaining grants and subsidies. I would like to mention at least the CTI, PROKI, RegelID, Safer Internet Center, CyberExchange and eIDAS projects. We are also active in the field of **education about internet technologies** and their security – we publish books in the CZ.NIC Editions, organise seminars and conferences (for example CSNOG, Internet and Technology), train people in our CZ.NIC Academy and participate in the creation of films and series [for example the film V síti (Caught in the Net) or the prestigious international Emmy Award-winning series #martyisdead].

Unfortunately, I also have some sad news. Last year, Jiří Kysela, a long-time member of the Board of Directors, who had been actively involved in the development of our association and whose activities had contributed to our successes, left us forever.

I would like to thank our more than four dozen registrars for the work they do for the end holders. And thanks must of course also go to our staff, whose efforts are reflected in the satisfaction of users with our services and the good reputation that our association enjoys.

All the relevant information about the association and its activities in 2020 is available to you in this Annual Report. I firmly believe that we will continue to be successful in our concept and that we will continue to be your reliable and trustworthy partner.

RNDr. Karel Taft, MBA - Chair of the Board of Directors



3 Foreword from the Managing Director

Our association has managed this year full of changes well

Ladies and Gentlemen,

2020 is perhaps the most striking example of the saying “Man proposes, God disposes”. The arrival of the Covid-19 disease pandemic has forced us all to change all our work habits from one day to the next. In January, we certainly did not expect to be closing our offices and that we would see many of our colleagues only through video calls for the rest of the year.

Many of our plans had to be significantly modified and some projects (such as the Academy or the conferences) had to be changed completely. Still, I hope I can proudly say that our association has handled this year full of changes well.

With the closure of our offices and much of the economy, we asked ourselves in March how we could help in the difficult situation. At the beginning, there was a lot of uncertainty about future development, and it was not clear how badly the epidemic would affect the Czech Republic, how much it would complicate people’s access to their data, and so on. That was why we quickly decided to extend for one month the functionality of domains whose holders had not managed to pay in time. Similarly, we temporarily waived our claim to flat-rate payments from registrars to help them in the current turbulent situation. We also postponed the shutdown of the old ODVRs, whose migration

had been scheduled for the very period when most of the nation were confined to their homes. Our next assistance was directed towards the health system. We printed face shields for medical staff using our, at the time unused, 3D printers from the Academy. We also offered free cybersecurity and HW Turrís consultations to healthcare entities in cooperation with the National Cyber and Information Security Agency.

Despite the complicated period, we continued developing our projects. Probably the biggest transformation was seen in the mojID service, which celebrated its tenth anniversary in the autumn. First, we introduced the option of using multiple means of FIDO2 two-factor authentication. Subsequently, the mojID service was accredited with this type of means to manage a qualified electronic identification system. In practice, this means that you can use mojID to access various public services such as the Citizen Portal, the Land Register and the ePortal of the Czech Social Security Administration. This step was foreseen in our concept and we will see how the mojID service will perform in comparison with BankID or state identification systems. In any case, I can say that the state continues to trust our association in the field of electronic identification because it has again entrusted us with the administration of the international eIDAS gateway.

We certainly did not waste our time in the field of the domain register and DNS servers, either. Because of the pandemic, there has been a strong growth in the number of domains compared to the original expectations. And the deepening dependence of our civilisation on the online environment has naturally motivated us in our efforts to improve our DNS system. In 2020, on the basis of data analysis, we built three new foreign DNS anycast nodes to increase availability and reduce DNS query response latency. They were, specifically, Bratislava, Seattle and Singapore.

The Turrus home router project is also developing very dynamically. This year, we came out with a new hardware version of Turrus Shield. This is aimed at less expert users who want to protect their networks.

Naturally, I cannot fail to mention the Global Emmy Award win for the web series #martyisdead, which our association co-produced. This is a truly historic achievement for the Czech Republic.

I usually end my foreword by stating that the past year was a success, but unfortunately I cannot do that this time. At the end of the year, we received a very sad piece of news. Jiří Kysela, who had participated for eighteen years as a member of the Board of Directors or Supervisory Board in the direction of our association, left us forever. He will be missed not only as an outstanding professional but also as a great person who brought calm, poise, wisdom and an inimitable kind of refinement to our work. His loss is very painful.

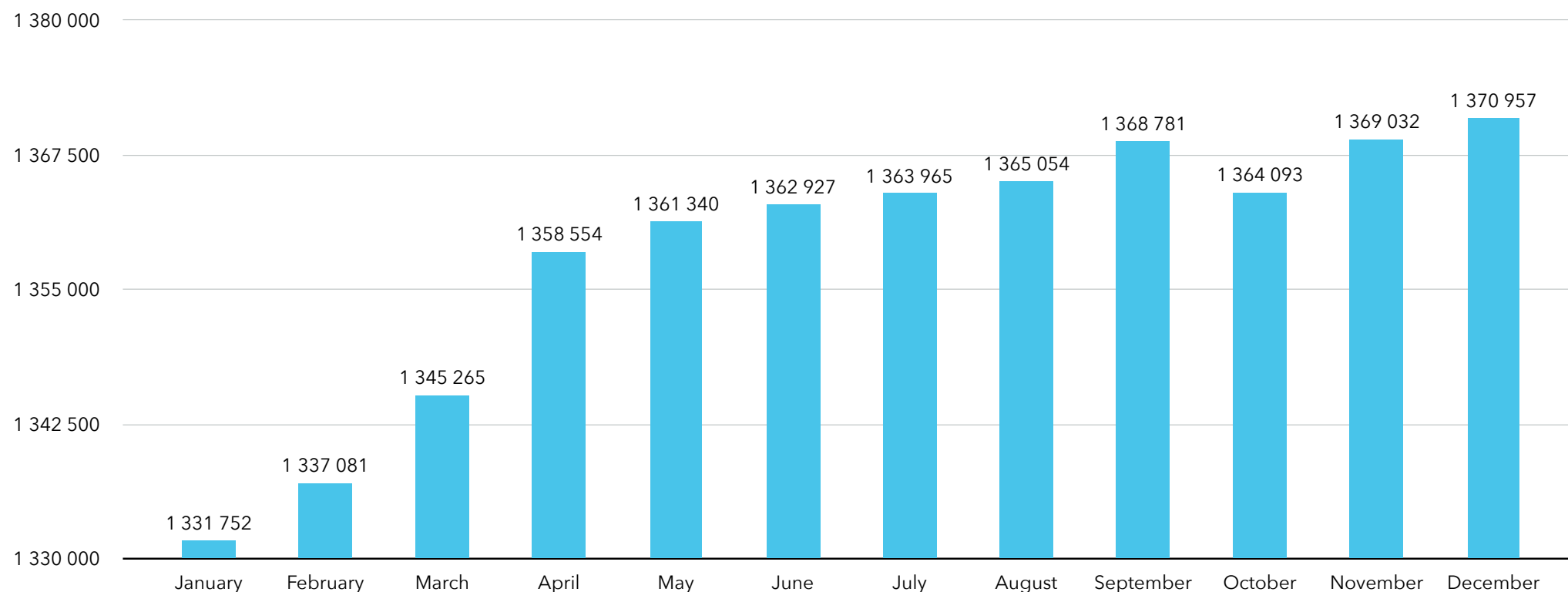
Despite this sad conclusion, please let me thank my colleagues for the great work they did during such a difficult period.

Mgr. Ondřej Filip, MBA - CEO

4 The .CZ domain

4.1 State and development of registration numbers

Total number of registered .CZ domain names in 2020



* The data in the chart is always as of the last day of the month; the increase in the number of domain names is calculated from 1 January to 31 December.

During 2020, the number of domains in the .CZ zone increased by 41,956 domain names to a **total of 1.37 million .CZ domains**. Compared to 2019, this is almost a sevenfold increase in the number of registrations.

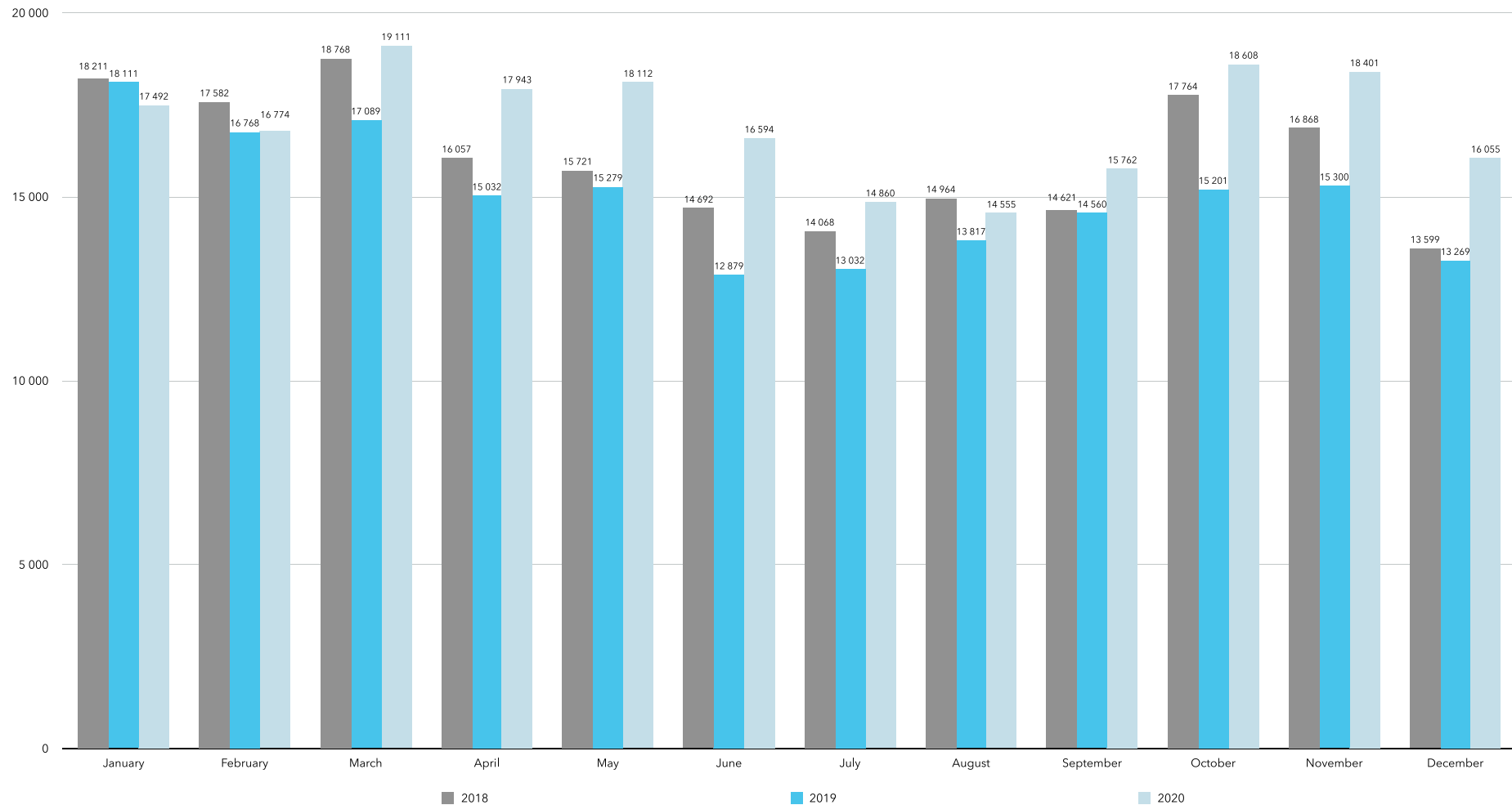
Such an increase was very surprising, as previous years had showed clear signs of saturation in the number of second-level domains under .CZ (annual growth of around 0.5%). Therefore, stagnation or even a decline in registrations was expected in 2020.

The increase in interest certainly reflects the situation with regard to Covid-19 in the Czech Republic. In the first quarter of 2020 alone, [1,209 new domains](#) related to Covid-19 were registered.

By the end of 2020, there were at least 2,500 domain names registered in that year that were probably directly linked to the pandemic because their names contained at least one of twelve selected Covid-19-related word strains – for example, *corona*, *Covid*, *virus* or *respirator*.

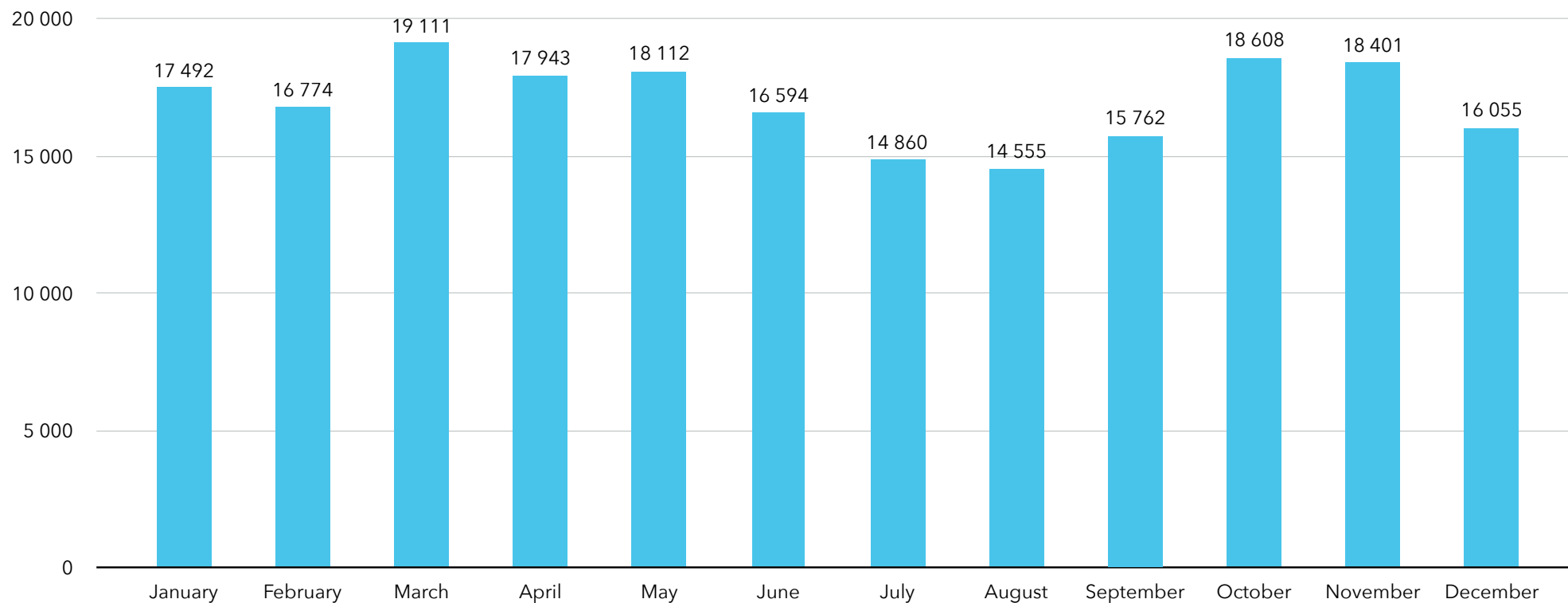
Number of domain registrations in 2018-2020

This is illustrated by the histogram below, which shows the monthly numbers of domain registrations over the last three years. The largest relative increases in 2020 can clearly be seen in the periods corresponding to the two waves of the pandemic: March–June and October–December.

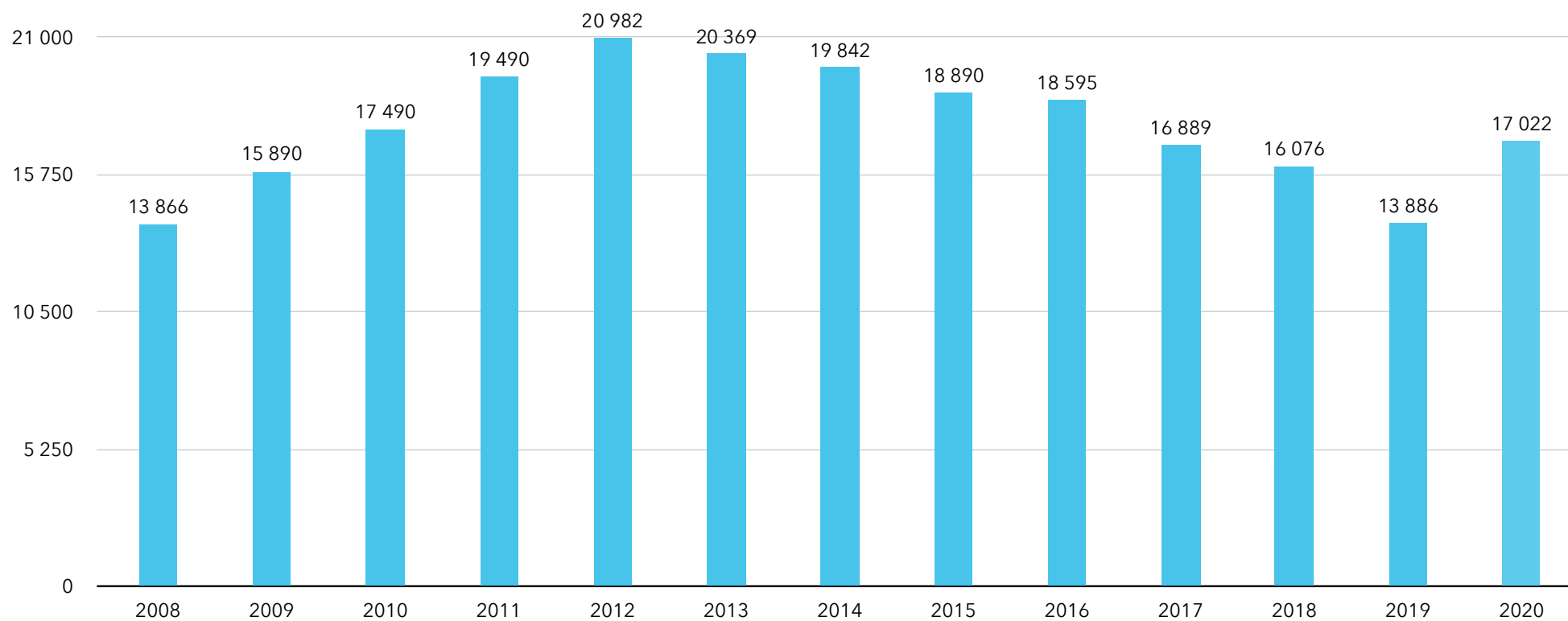


In 2020, an average of **17,022 new domain names** were registered **every month** - 3,136 more registrations than last year. A similarly large increase in registrations was recorded in 2010, while from 2012 to 2019 the trend in registrations was more of a slight decline.

Number of newly registered .CZ domain names in 2020



New registrations 2008-2020 (monthly average)



4.2 Registrars

The system of .CZ domain administration is based on a distributed principle in which the registration of domain names is carried out by **contractual partners of the CZ.NIC Association - registrars**. CZ.NIC acts similarly as a wholesale partner towards them but provides the technical aspects and functionality of the .CZ top-level domain.

Terminated contracts in 2020:

- U.S. registrar Focus IP, Inc. – as of 31 July 2020.

New contracts in 2020:

- Czech registrar THINline, s.r.o. (Czech hosting) – as of 1 March 2020,
- Dutch registrar Hosting Concepts B.V. (REG-OPENPROVIDER) – as of 1 July 2020,
- German registrar DomainProfi GmbH – as of 1 November 2020.

As part of the market consolidation, GENERAL REGISTRY, s.r.o. merged with INTERNET CZ, a.s. in 2019-2020.

At the end of 2020, **a total of 44 companies**, 26 domestic and 18 foreign, had concluded a **registrar contract with the association**. This number of entities offers a broad choice for the end user and also provides sufficient competition.

4.2.1 Overview of .CZ domain name registrars

List of all accredited registrars as of 31 December 2020

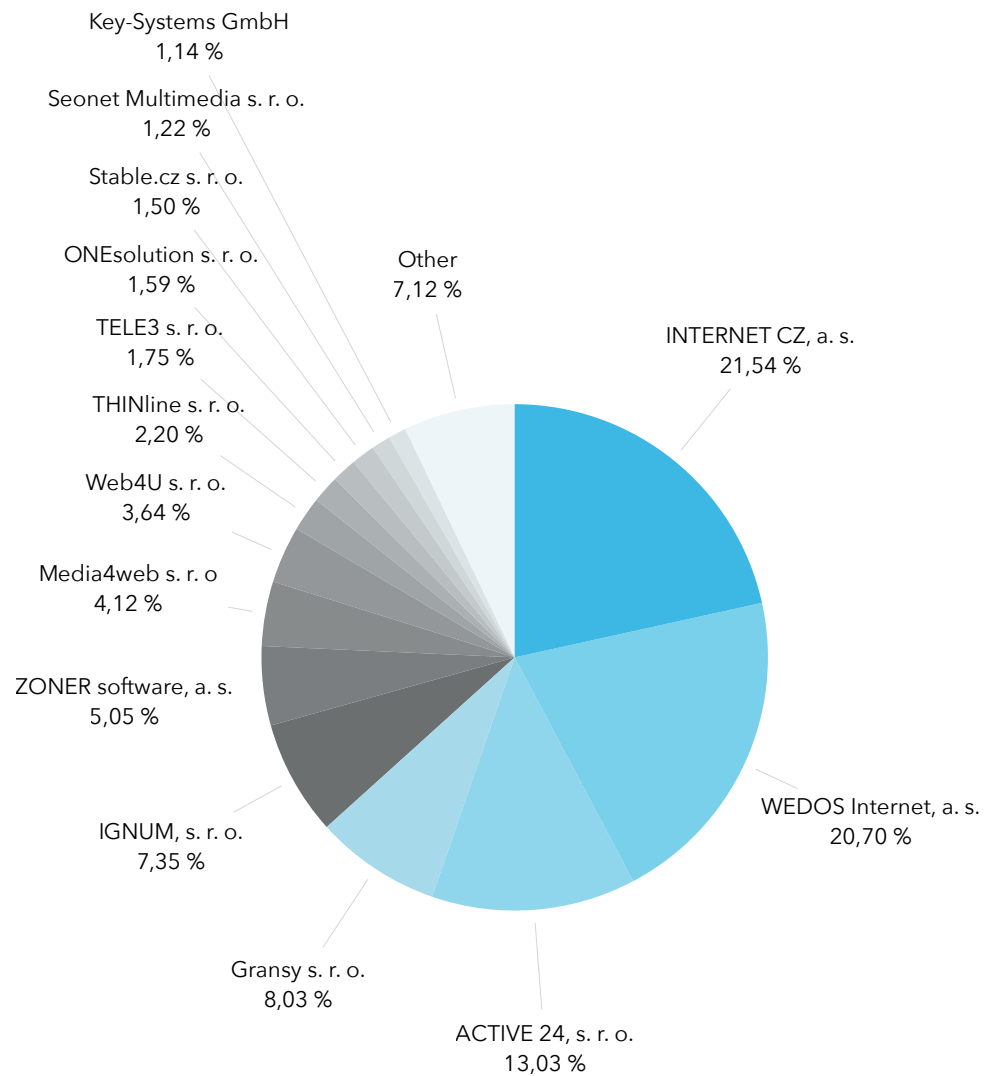
1API GmbH (DE)	MIRAMO spol. s.r.o.
ACTIVE 24, s.r.o.	NAMESHIELD SAS (FR)
AERO Trip PRO s.r.o.	nexum Trilog a.s.
Ascio Technologies, Corp.	Com Laude (UK)
Danmark (DK)	ONE.CZ s.r.o.
ASPone, s.r.o.	ONEsolution s.r.o.
e-BAAN Net s.r.o.	Hosting Concepts B.V. (NL)
CORE Association (ES)	OVH, Sas (FR)
O2 Czech Republic a.s.	PIPNI s.r.o.
Dial Telecom, a.s.	Safenames Ltd. (UK)
DomainProfi GmbH (DE)	Seonet Multimedia s.r.o.
Gandi SAS (FR)	Seznam.cz, a.s.
Gransy s.r.o.	Stable.cz s.r.o.
IGNUM, s.r.o.	TELE3 s.r.o.
Instra Corporation Pty Ltd (AU)	THINline s.r.o.
INTERNET CZ, a.s.	united-domains AG (DE)
InterNetX GmbH (DE)	Variomedia AG (DE)
Corporation Service Company (Singapore) Pte Ltd (SGP)	Web4U s.r.o.
Key-Systems GmbH (DE)	Websupport, s.r.o. (SK)
KRAXNET s.r.o.	WEDOS Internet, a.s.
MarkMonitor Inc. (US)	ProfiHOSTING s.r.o.
Media4web, s.r.o.	ZONER software, a.s.
	ZooControl s.r.o.

4.2.2 Major domain name registrars

The major registrar, according to the number of administered domains, was the same as last year: INTERNET.CZ, a.s., followed by WEDOS Internet, a.s., ACTIVE 24, s.r.o., Gransy, s.r.o. and IGNUM, s.r.o.

Number of domains by registrars

The chart shows registrars with a market share of over 1%.



4.2.3 Registrar certification

Launched in the middle of 2011, the certification project makes it easier for end users (parties interested in a new registration, as well as existing domain name holders) to find their way amongst the high number of registrars, particularly regarding portfolio and service quality. The certification method was prepared by the CZ.NIC Association in collaboration with registrars and APEK (Association of E-commerce).

Registrars who are interested in participating in the programme and meet the conditions may use the *Certified Registrar* logo for one year. At the start of the project in 2011, nine registrars were involved in voluntary certification, rising to eleven by the end of 2020, despite some registrars merging during the year. The number of registrars participating in voluntary certification is approximately a quarter of the total. Interestingly, they manage 77% of the registered domain names overall. By the end of 2020, this was exactly 1,056,871 domain names out of a total of 1,370,957.

Eight certified registrars met the most demanding criteria for receiving five stars. At the same time, there are no longer any certified registrars with three stars or fewer.

Service quality of registrars, reflected by the number of stars

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
*****	3	6	8	9	10	10	9	9	9	8
****	3	5	4	3	2	2	3	3	3	3
***	2	1								
**	1									

4.2.4 Cooperation with registrars

In accordance with its main activities and long-term objectives, the CZ.NIC Association aims to promote and support domain registration under the top-level .CZ domain. Given the distributed method used for the administration of the national domain, the CZ.NIC Association has limited options for addressing potential domain name holders through direct marketing.

Therefore, a **co-marketing programme** was established, under which CZ.NIC contributes to registrars who meet the prescribed conditions for the implementation of communication campaigns aimed at promoting domain name registrations in ccTLD .CZ. The amount of the contribution from CZ.NIC depends on the size of the registrar, volume of the campaign and compliance with other factors, such as the use of the mojID service or domain security through DNSSEC, all of which are used by CZ.NIC to motivate the registrars to expand these technologies.

Thanks to the co-marketing programme, the Czech national .CZ domain is popular among users and is well and often visible, for example, on

outdoor advertising. The high level of popularity of the programme is demonstrated by the number of registrars involved and the volume of funds used. In 2020, the programme included 14 registrars, to which CZ.NIC paid a total of CZK 9,768,591.

4.3 Register data improvement

The improvement of data held in the domain name holder register continued in 2020. As in the previous year, the CZ.NIC Association focused on:

- **merging multiple duplicate contacts** that have accumulated in the database over the years,
- **verification of the data of users**, not only for the purpose of increasing their security, where the correctness of the data determines the success of the contact by the association, for example when the cancellation of the domain name is imminent as a result of non-payment of the registration renewal fee, but also for the purpose of accessibility in the event of a dispute over the domain or other proceedings related to the domain.

The CZ.NIC Association carries out checks on the basis of internal and external initiatives and complaints. In the year under review, domain name holders themselves were motivated to update and verify their data by the **Help by Verification campaign**.

For several years now, domain name holders have had the option of obtaining a promotional item from the CZ.NIC Association in exchange for verifying their data. In 2020, there is a new option, to choose a reward and the possibility of donating the reward as a monetary contribution of

CZK 100 to charitable causes (ADRA, People in Need or Safety Line). A total of CZK 282,800 was collected for these organisations.

4.3.1 Resolving disputes over domain names in ccTLD .CZ

It takes about three years to resolve a dispute in general court, and that is only if there are no complications. In the internet environment, this is a long time, so the CZ.NIC Association tried to find an alternative option for resolving domain name disputes that could resolve disputes quickly and reliably.

In the summer of 2004, the **alternative dispute resolution** (ADR) system was established. Until 2015, it took the form of arbitration, in which it was possible to file a dispute concerning the domain name against its holder with the Arbitration Court, which is attached to the Czech Chamber of Commerce and the Agrarian Chamber of the Czech Republic. In the ten years of the existence of the alternative dispute resolution system, the Arbitration Court has heard more than a hundred disputes.

Following a decision by the Supreme Court at the end of 2013, there was a change. In March 2015, a new ADR method was introduced, the basic principles of which are essentially identical to those that have been and continue to be used successfully in disputes over generic TLDs (UDRP) or domain names registered in the .EU top-level domain. The platform where the disputes take place is administered by a trusted entity on the basis of a concluded memorandum. That entity is the Arbitration Court attached to the Czech Chamber of Commerce and the Agrarian Chamber

of the Czech Republic, which is one of the three permanent arbitration courts that exist in the Czech Republic. This permanent arbitration court has a strong authority and an undeniable advantage in that dispute resolution is conducted online through the Arbitration Court platform. This became especially important during the pandemic, when social contacts were limited.

However, the **ADR system** used since 2015 is **not an arbitration process** that complies with the arbitration law, a fact that is also reflected in the terminology used. **The system is based on contractual arrangements** and only a domain name transfer or cancellation (and no other claims, such as compensation for damage) can be claimed. The decision is not an execution order for the judgment; the ongoing dispute, according to the new ADR system, does not impede *lis pendens* (proceedings pending in the same matter) and a resolved dispute does not obstruct decided matters. The same claims can, therefore, be forwarded to a general court during the proceedings or afterwards.

Five years of use of the new ADR system show that this dispute resolution system has been accepted by the professional and general public and its popularity is growing:

Year	Number of disputes initiated in ADR
2015	7
2016	20
2017	22
2018	22
2019	29
2020	29

Of general courts, the Municipal Court in Prague is the one that most often decides disputes over domain names, especially in view of the fact that it is a specialised court for, *inter alia*, competition and intellectual property disputes, which are the most frequently violated rights in the case of domain disputes.

4.3.2 Customer support

24/7 customer support is an **integral part of the secure operation of the .CZ domain**.

The objective of customer support is to **provide the best possible care to domain name holders**, particularly in situations where a domain registration is to be cancelled or transferred, or where contact details change. Customer support also **validates and assists the users of the mojID service**.

Customer support prides itself on a proactive approach to domain name holders. It aims to eliminate the possibility of a domain name being excluded and forfeited as a result of, for example, an outdated contact or an omission of payment. Given the distributed .CZ domain administration system, customer support is the only case in which the CZ.NIC Association is in direct contact with domain name holders.

Customer support communicates with customers via standard emails sent automatically by the domain registration system – these alert them in particular to non-payment of the registration renewal fee for the next period. In addition, it has also manually checked nearly 240,000 domains before cancellation and contacted nearly 190,000 domain name holders who were at risk of cancellation by phone (until the end of 2017) or text message (from the second half of 2017).

Development of individual customer support actions

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Manual check of domain names before exclusion	-	8,916	15,176	18,586	21,598	20,512	20,894	21,834	21,437	20,867	19,947
Manual check of domain names before cancellation	-	4,314	11,061	14,378	16,666	16,041	16,529	16,864	17,000	16,869	15,814
Calls to holders (contacts) of domain names scheduled for cancellation	4,263	4,314	4,767	6,690	7,808	7,367	7,826	7,573	790	904	632*1
Text messages - information about upcoming domain name cancellation	-	-	-	-	-	-	-	8,139*2	8,948	9,859	8,946
Emails sent before exclusion	1,201	1,429	1,708	1,716	1,915	1,718	1,849	3,157	2,826	3,036	2,554
Responses to email inquiries	828	1,240	1,746	1,945	2,782	3,015	2,074	2,319	2,080	2,802	3,646
Responses to telephone inquiries	561	1,063	1,120	1,242	1,416	1,262	1,227	994	774	720	768
Requests (validation, blocking...)	145	180	248	315	455	405	701	776	559	363	246
Chat inquiries	-	-	-	-	-	166*3	132	114	168	262	460
Manual data accuracy check	-	-	-	-	1,073*4	875	953	1,372	1,628	1,170	1,701

The data represents the average number of the given actions per month

*1 Because of the limited operation of offices during the pandemic, the statistics take into account only a part of the calls made.

*2 Monthly average of sent text messages in the second half of 2017.

*3 Monthly average since April 2015, when the service was launched.

*4 Monthly average since July 2014, when the practice of manual data checking was introduced.

5 Infrastructure

5.1 Data centres

The DSDng central register system is fully redundant. All hardware and software is located in three mutually independent locations:

- the DC TOWER data centre of České Radiokomunikace in Prague 3,
- the CE Colo data centre in Prague 10,
- a non-public location outside Prague.

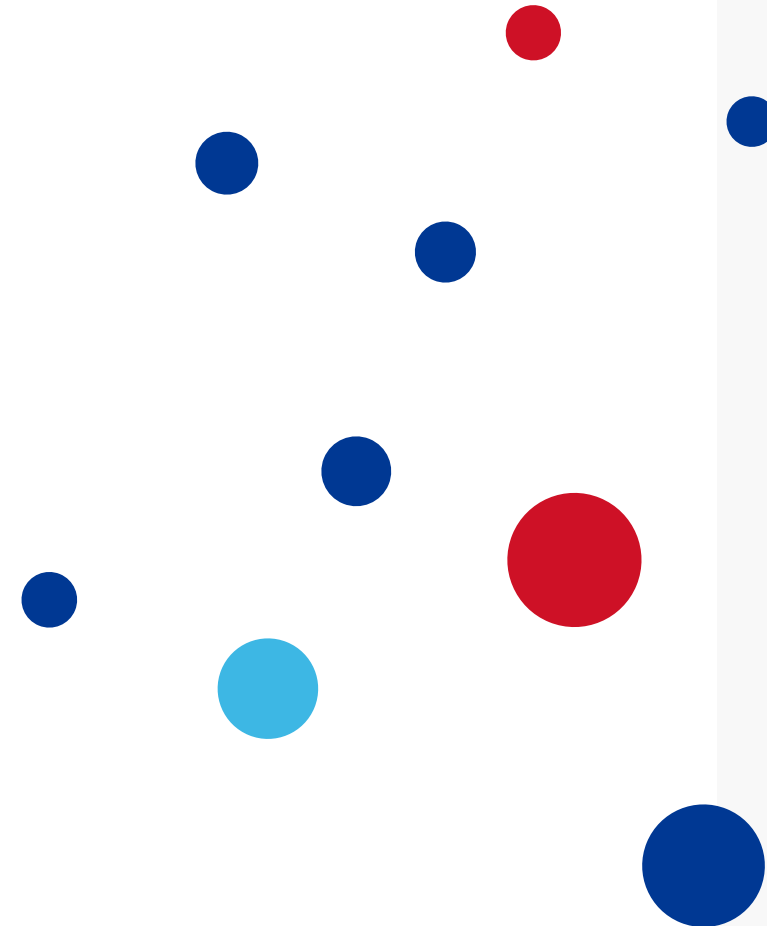
All these locations have their own internet connection and also a connection to the power grid. The DC TOWER data centre is connected to the distribution network from three independent transformer stations, while the CE Colo data centre and the location outside Prague are supplied from two transformer stations. A back-up power supply is available in all data centres via UPS and possible longer outages are bridged by power from diesel generators.

In 2020, the CZ.NIC Association completed the transfer of technology to a private hall within the DC TOWER of České Radiokomunikace. This completes the project to increase physical security, increase capacity and ensure the overall modernisation of the technologies used at the site, which began in 2019.

The association has followed this up with several significant improvements to the network infrastructure:

- increasing the capacity of the circuits between the Prague data centres to 2 × 100 Gbps using CWDM technology,
- replacing the switches in the CE Colo data centre and reconnecting the local register production servers to 10 Gbps,
- generational replacement of a router and two access switches in the non-public location outside Prague,

- central logging of all network elements as part of the review of existing monitoring.



5.2 Technical aspects of domain administration

The **infrastructure of the register** carefully follows the rules of diversity of hardware equipment so that a possible error of a particular hardware manufacturer affects only a part of the infrastructure and thus minimises the possibility of the failure of the central domain register as a whole. Therefore, technologies from different manufacturers are installed in every location. The same approach is used by the association for authoritative DNS (Domain Name System) software, which we operate on three different systems (Knot, Bind and NSD).

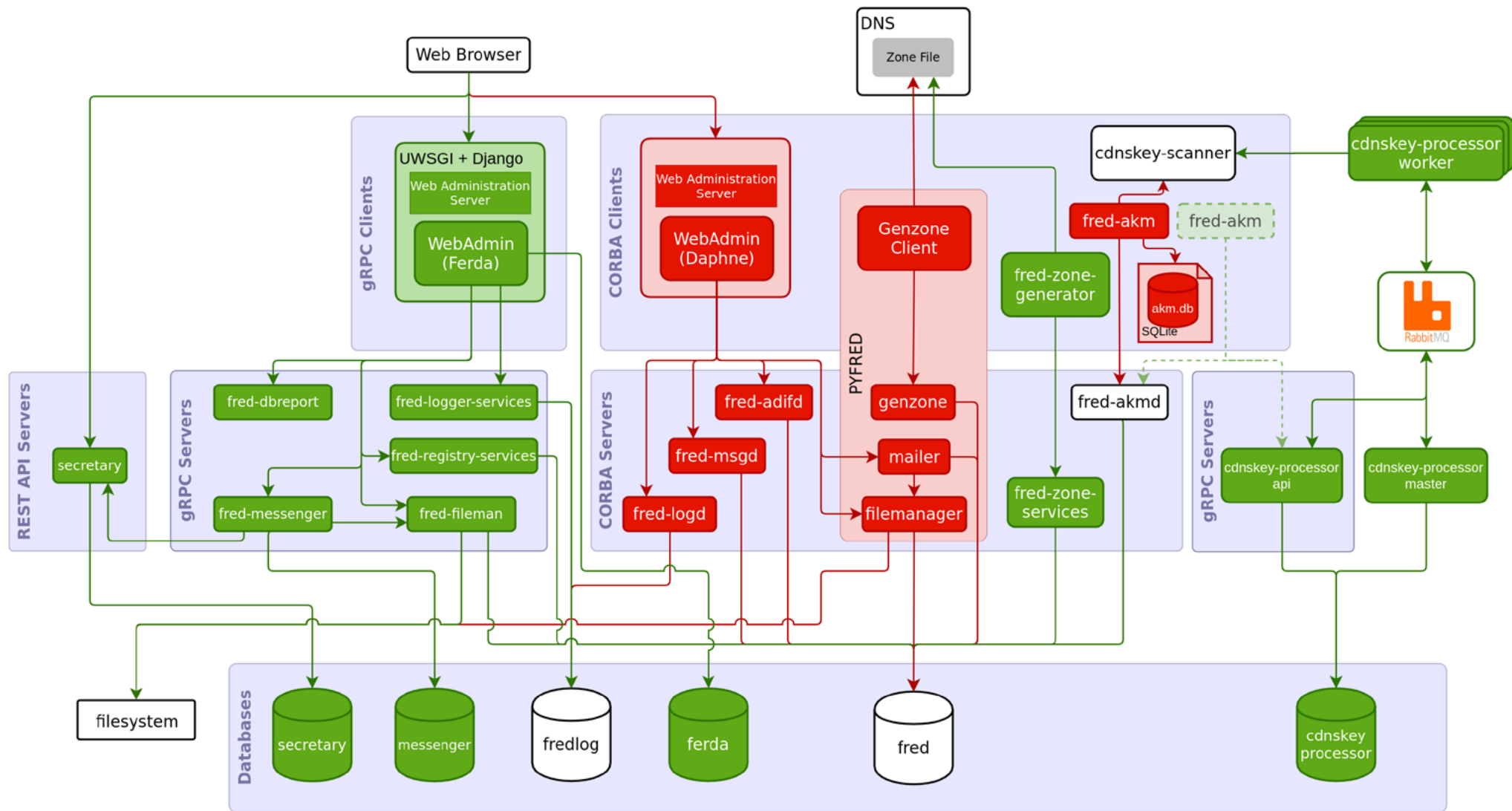
The actual **software of the central register** is designed in a way that ensures that any component of the architecture can be replaced by any copy that runs on the server in the other locations, at any time. A critical component is the PostgreSQL database, which is always being replicated to both of the other locations during standard operation. When the primary location is down, traffic can be redirected to the replicated database without any limitation or impact on functionality. Back-up systems are designed and operated in such a way that the operation of the register can be taken over by any components in a very short time.

The central register system is prepared for operation on IPv4 and IPv6 and its current implementation for the .CZ domain (as well as all DNS servers) is operated on both these protocols.

In 2020, the association continued to make extensive **changes to the FRED [system architecture](#)** to increase its modularity and configurability.

In connection with these changes, the association:

- started to redesign its messaging system,
- continued to replace the outdated CORBA framework with the more modern GRPC,
- redesigned the traffic statistics collector,
- gradually migrated to the new logging system.



The **development of the internal web application for data administration (FERDA)** also continued by adding the display of the complete object history, the implementation of two-factor authentication access and the administration of contacts of non-EU domain holder representatives.

In response to the Covid-19 pandemic, the option of setting a protection period for a domain after expiry as a runtime modifiable parameter was added. In the first wave of the pandemic, this made it possible to postpone the cancellation of domains from the usual 60 days after expiry to 90. In the middle of the year, the time limit was set to the original parameter.

During 2020, the tool for **mass domain migration** was used (transfer of domains from the registrar INTERNET CZ, a.s. to the registrar THINline, s.r.o.) and a **set of measures for security incidents** was implemented for the registrars Gransy, s.r.o., nexum Trilog, a.s. and AERO Trip PRO, s.r.o.

5.2.1 FRED (Free Registry for ENUM and Domains)

The FRED software for the operation of the central register, developed and operated by the CZ.NIC Association, has been released as open and free under the GNU GPLv3+ licence in support of smaller registers. This way, smaller and newly-started registers can operate their domains on a system designed for the Czech domain environment, which is, however, prepared (thanks to its parameters and capacity) for a much higher number of domains than currently registered in ccTLD .CZ.

In 2020, the association started to place the main mirrors of the FRED repositories at gitlab.nic.cz/fred and increased the possibilities of collaboration by opening “issues” – a system for solving and discussing problems.

Besides the Czech Republic, in 2020 the FRED system was controlling the domain administration in nine more countries. It is used to administer the domains of Argentina (.AR), Costa Rica (.CR), Albania (.AL), North Macedonia (.MK), Tanzania (.TZ), Angola (.IT.AO and .CO.AO), Malawi (.MW), Lesotho (.LS) and Macao (.MO). The deployment in Argentina, with over 650,000 registered domains, is the second-largest instance of FRED.

The CZ.NIC Association offers support for the implementation and operation of the FRED system for other TLDs.



Countries where FRED is used for domain administration

5.2.2 Authoritative DNS server system for .CZ

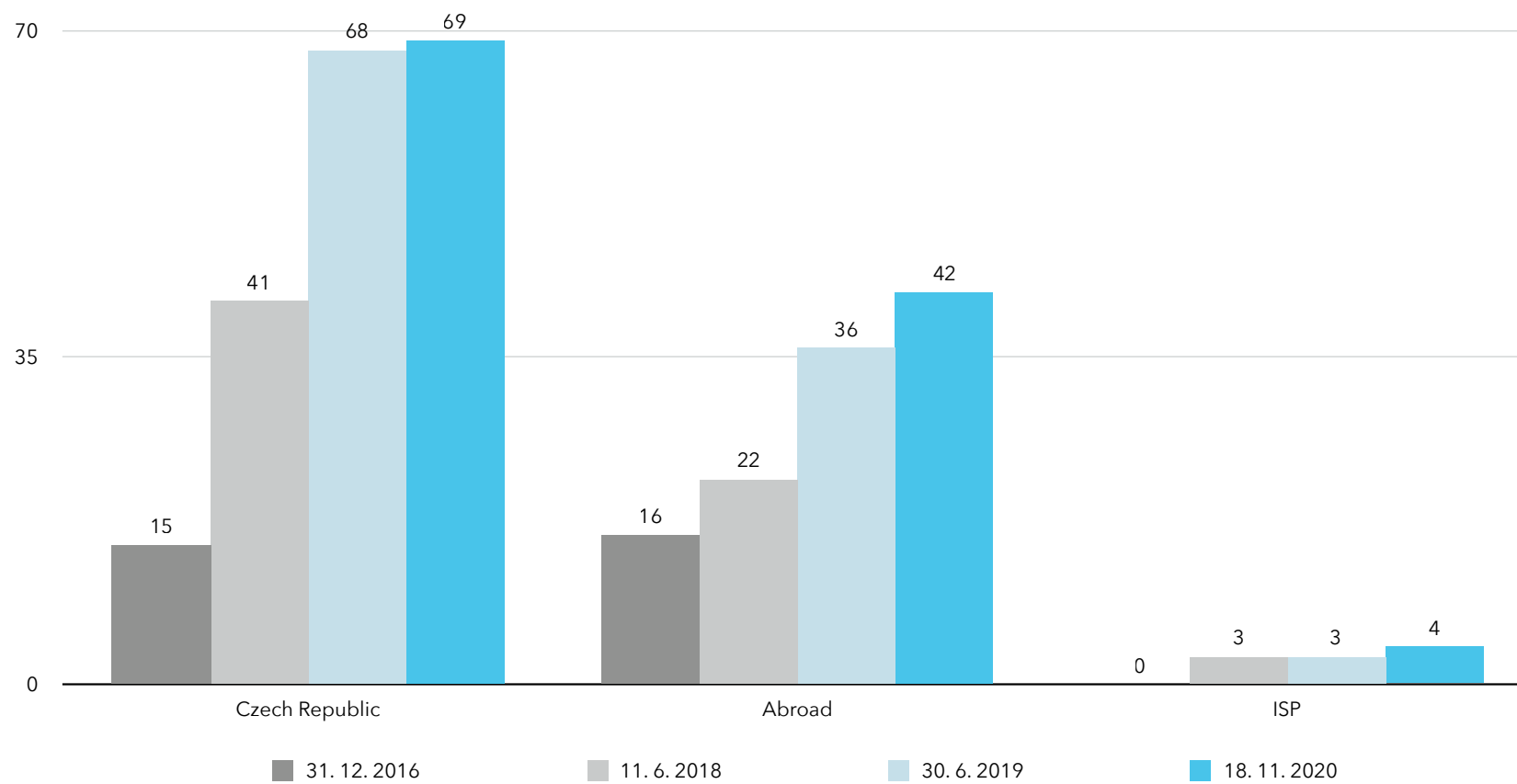
The .CZ domain management servers are operated by CZ.NIC in several locations around the world. In addition to the three sites in the Czech Republic (mentioned in Chapter 5.1 [Data centres](#)), additional servers are operated in 12 countries.

In Europe, the hubs are in Austria (Vienna), Germany (Frankfurt am Main), the United Kingdom (London), Sweden (Stockholm), Italy (Milan) and, since 2020, Slovakia (Bratislava). In the Americas, this includes the United States (Reston), Brazil (São Paulo), Chile (Santiago de Chile) and, since 2020, an additional hub in the United States (Seattle). In Asia, the association has long operated DNS servers in Japan (Tokyo) and since 2020 also in Singapore (Singapore).



Countries where servers managing records of .CZ domains are located

Number of physical .CZ DNS anycast servers



5.2.3 Authoritative DNS server system for .CZ

In 2020, the CZ.NIC Association continued **increasing the resilience of the .CZ DNS infrastructure against DoS attacks** and covering the needs for the continuous growth of operations. After massive investments in building 100 Gbps DNS stacks in the Czech Republic, where the operational requirements are the highest, the association focused more on increasing resilience and reducing latency in more remote regions in 2020:

- Frankfurt am Main (Interxion data centre) – hardware upgrade of DNS node and switching to 10Gbps to DE-CIX DN,
- Bratislava – new 10 Gbps DNS node,
- Singapore – new 10 Gbps DNS node,
- Seattle, USA – new 40 Gbps node (replacing the cancelled node in Redwood City, California).

In total, the DNS infrastructure for the .CZ domain at the end of 2020 had the unique capacity of 110+ physical servers and a connection capacity of 500+ Gbps distributed in twenty geographically remote locations in twelve countries on four continents.

A significant change to the DNS anycast infrastructure came in 2020 with the **introduction of support for XDP technology** offered by the association's Knot DNS. Thanks to this, the association will be able to multiply the performance of the existing DNS infrastructure or provide the same performance with significantly fewer servers.

All changes to the DNS anycast infrastructure are carefully planned and then evaluated by the association using the output of the [ADAM](#) project,

which collects and processes operational data from all DNS anycast nodes.

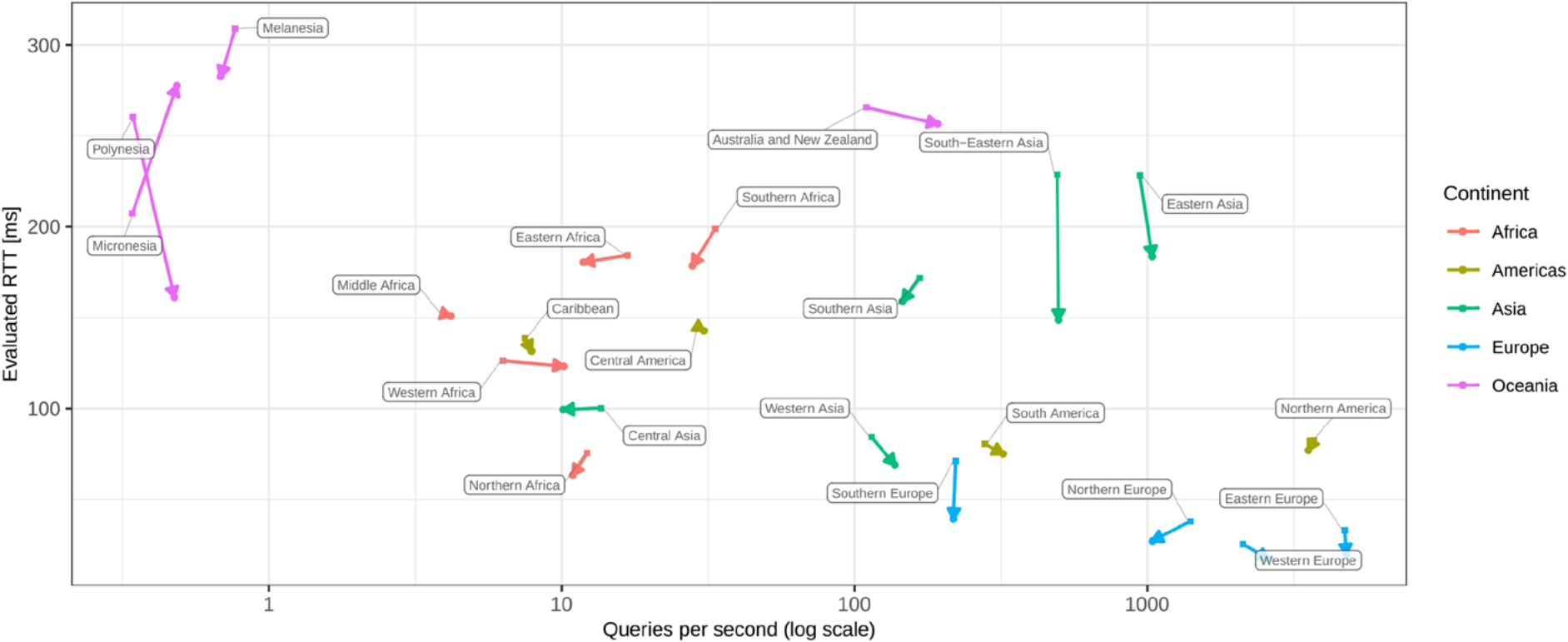
One of the most important DNS traffic parameters monitored by the ADAM project is RTT (round-trip-time) – the time required for communication between a DNS traffic source and an authoritative DNS server, or its weighted averages related to a specific DNS traffic source or geographical or network aggregation of these sources.

Thanks to this method, the association is able effectively to manage the quality of DNS traffic of the .CZ domain in relation to the size of traffic in individual regions of the world. Thus, all the investments in DNS infrastructure mentioned in this chapter were first confirmed by simulating traffic clearance using the planned DNS nodes and then evaluated by analysing the actual situation. As a result, the key RTT parameter improved in the SE Asia and Europe regions and was maintained in North America, as shown in the figure.

DNS infrastructure upgrade

Change in QPS vs evaluated RTT by region

For DNS traffic captured on 1–14 October 2019 and 13–16 November 2020

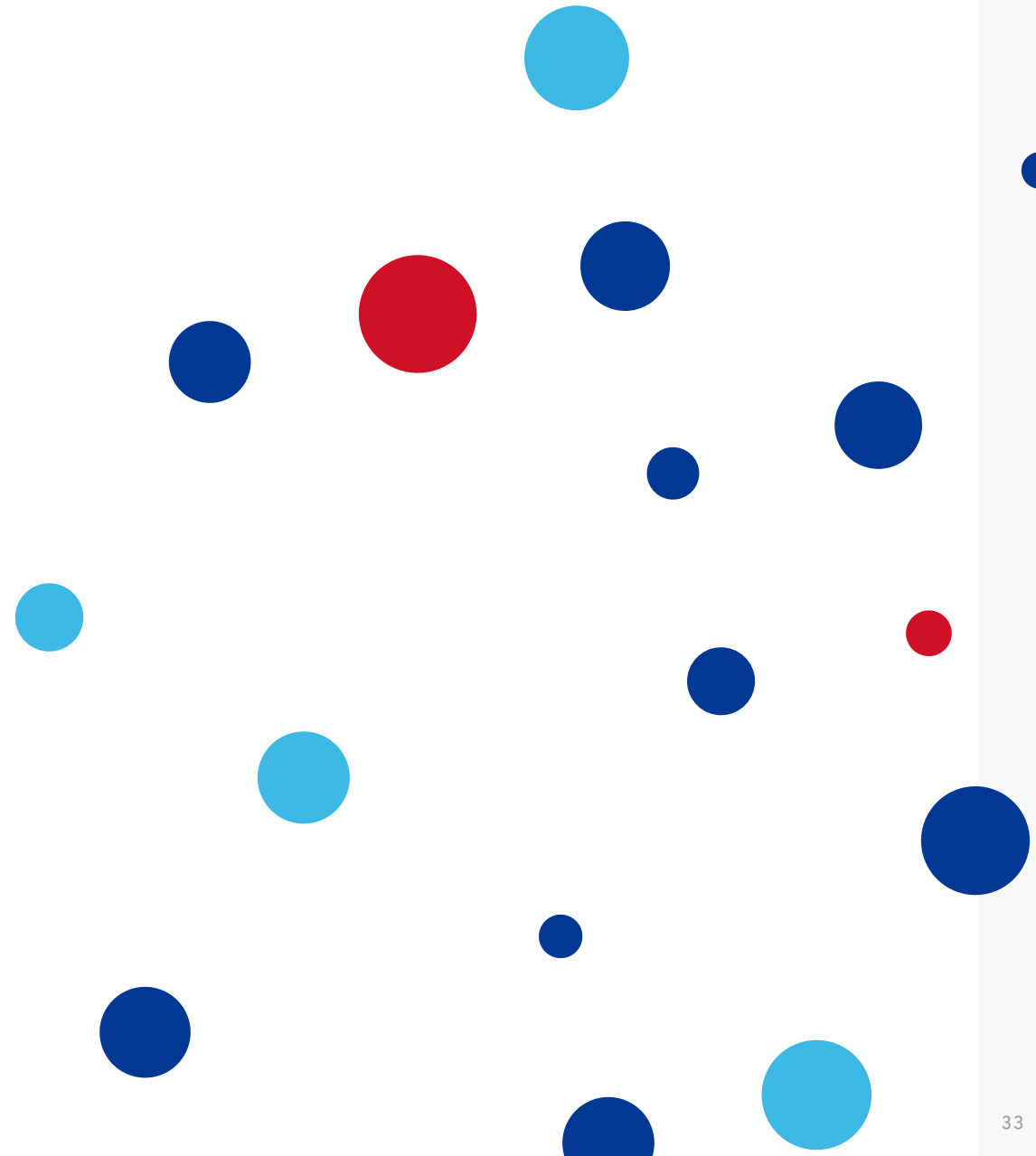


For major internet service providers, CZ.NIC operates mirrors of .CZ DNS anycast nodes – ISP DNS stacks, in the networks of those providers. The main advantage of this service is the full availability of services in the .CZ domain in the event of an attack against the authoritative DNS servers of CZ.NIC. Customers of companies with the ISP DNS stack will not be affected by any attack and the internet services in the .CZ domain will remain fully available to them. Another advantage is the acceleration of their responses in the provider's network with the ISP DNS Stack. The first companies to join the CZ.NIC Association in this activity are Seznam.cz, a.s. and Vodafone Czech Republic. In 2020, the association began operating another such DNS mirror in the CESNET network.

5.2.4 Utilisation of .CZ DNS infrastructure

Since 2018, the association has been operating a part of the secondary DNS servers of .CA – domains of the Canadian Internet Registration Authority (CIRA) – on a commercial basis. This cooperation continued successfully in 2020.

The Canadian register counts more than three million domains and is, therefore, approximately twice the size of its Czech counterpart. From a technical point of view, it shares the capacity of DNS servers that are primarily intended for the .CZ domain with another entity. As a result of significant upgrades in recent years, this capacity is dimensioned many times higher than the real utilisation and therefore it is useful and beneficial to use it for other projects as well.



5.3 Support for internet infrastructure

5.3.1 IPv6 support

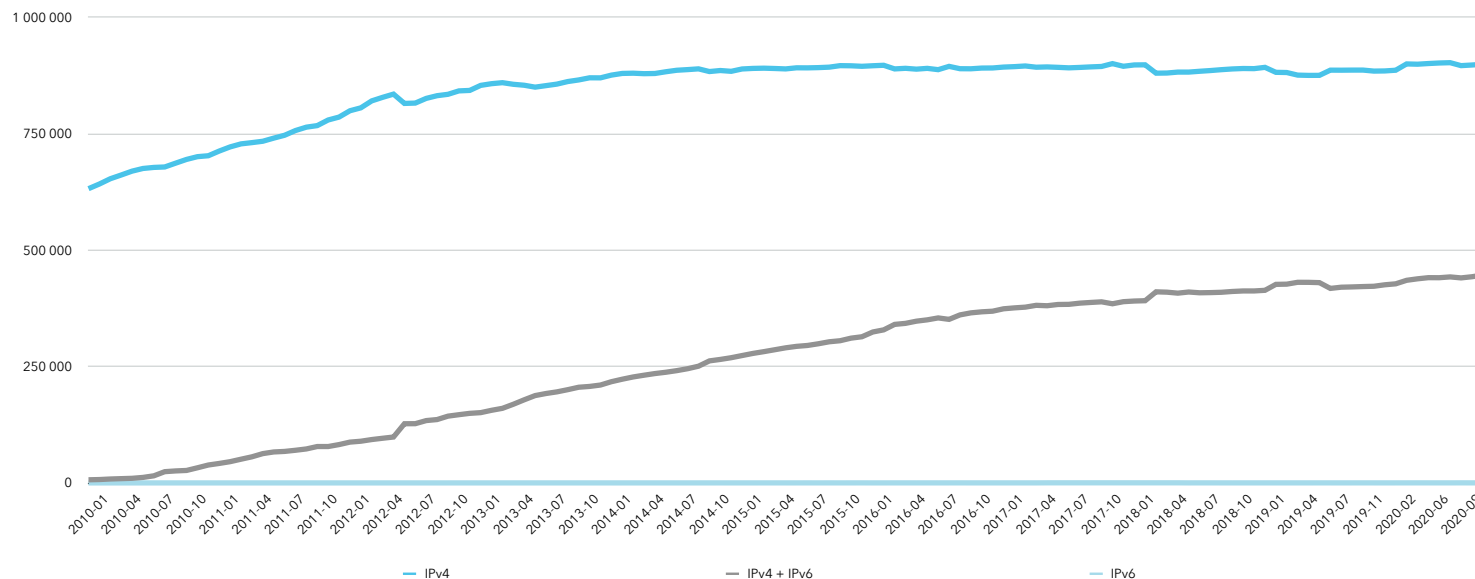
IP addresses, similarly to DNS, are the basic building blocks of the internet. Without IP addresses, it is not possible to connect to the global network, which also prevents mutual recognition and interconnecting computers. The current space of IP addresses of the version 4 (IPv4) internet protocol has essentially been exhausted. The new version IPv6

internet protocol is the response to the lack of IPv4 addresses, as it offers a much bigger bank of addresses and also new options.

The long-term goals of the association include **supporting the deployment of the IPv6 technology** at all levels, i.e. content, networks and end devices. CZ.NIC also cooperates with registrars, who often provide web hosting, so it can seek support for IPv6 on the side of web, email and DNS servers. The association also participates in promoting IPv6 in the state administration.

Also thanks to the above activities, IPv6 support in the Czech Republic is on the rise, as illustrated by the chart below, which displays IPv6 support within name servers using .CZ domains. Its classification is based on the version(s) of the IP addresses of the DNS servers of each second-level domain. Almost one-third of .CZ domains use both IPv4 and IPv6 in this sense.

Development of the number of .CZ domains supporting IPv6 (according to the version of IP addresses of DNS servers)



5.3.2 DNSSEC support

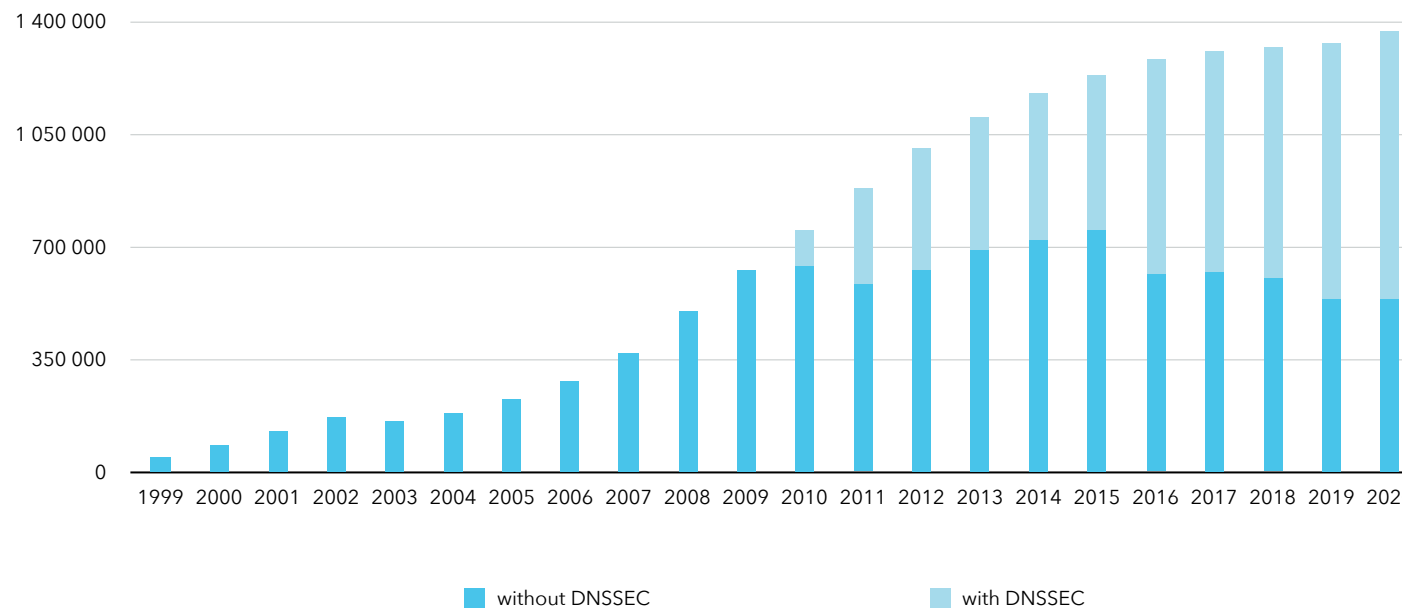
DNSSEC is a DNS extension that increases its security through asymmetric cryptography.

The DNSSEC technology gives the users the certainty that the information they obtained from DNS was provided from a correct source, that it is complete and that its integrity was not compromised during the transfer. The DNSSEC technology has been available since 2008 within the Czech national domain .CZ. The .CZ domain was thus one of the first top-level domains where this technology could be used.

The number of domains secured by DNSSEC has been growing steadily since then, to which cooperation with registrars also contributes. **At the end of 2020, the DNSSEC support rate for .CZ exceeded 60%.** With its share of signed domains, the Czech Republic clearly ranks among the world leaders.

The Managing Director of the association, Ondřej Filip, has been a member of the prestigious Trusted Community Representatives (TCR) group since 2019. The TCR Group was established within the international organisation IANA in an effort to increase DNS security using DNSSEC technology.

Development of the number of .CZ domains with/without DNSSEC



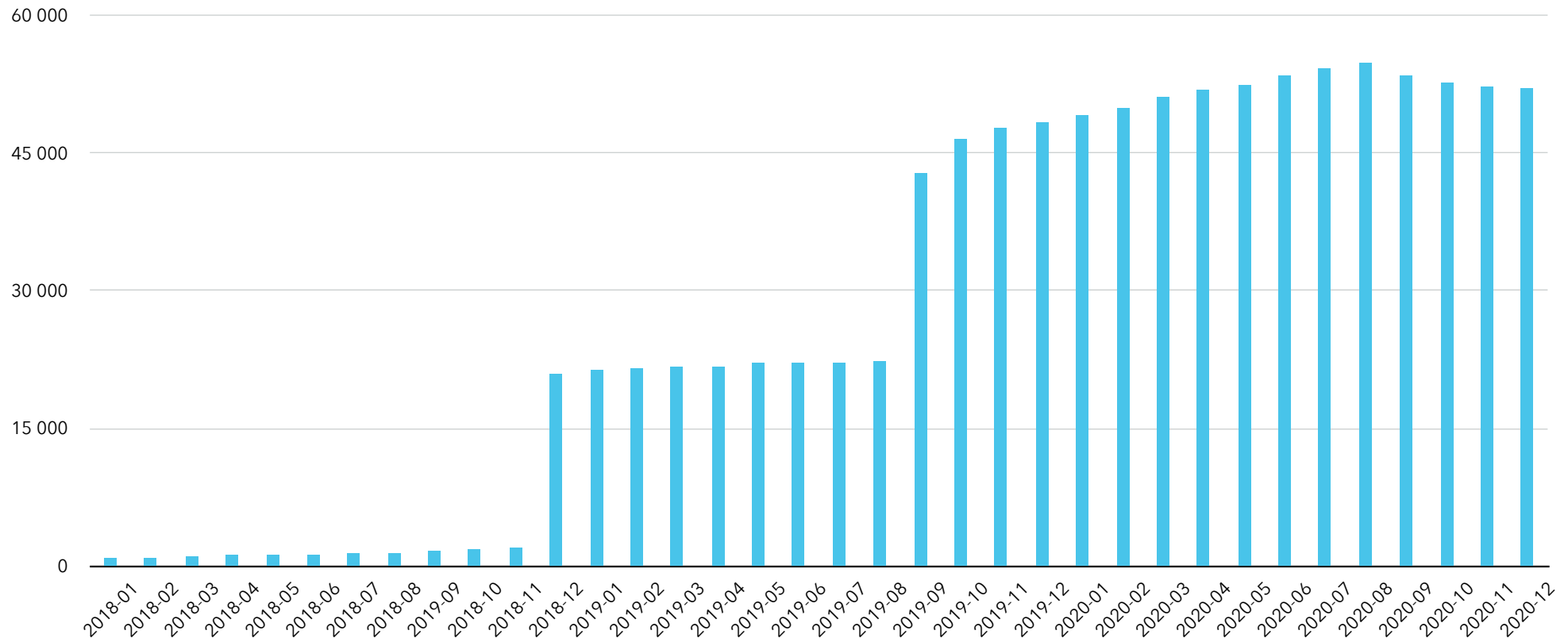
In addition to support from registrars, the main ISPs in the Czech Republic are gradually introducing DNSSEC technology. This makes the system fully functional for most regular internet users.

The high level of support for DNSSEC for the .CZ domain is, among other things, **aided by the support of the DNSSEC key automation management**, which CZ.NIC introduced in 2017, the first in the world to do so. This was made possible by introducing support for the new [RFC 7344](#) and [RFC 8078](#) standards in the FRED domain administration system. These extensions are thus available to all TLD administrators who use the FRED system. Administrators of authoritative DNS servers will

then be assisted in the implementation of this simplification via Knot DNS, which is also compatible with these standards.

DNSSEC can now be easily deployed for those domains where it was not previously possible (e.g. for domains that the DNSSEC registrar does not support), or for domains that are administered by someone other than the registrar.

Development of the number of domains under the system of DNSSEC key automation management



5.4 Support for basic internet infrastructure

Operation of root servers

In 2020, the CZ.NIC Association continued to operate mirrors on the root servers F, K and L. Therefore, CZ.NIC runs mirrors on three of a total of thirteen root name servers that are the basis of the Internet Domain Names System (DNS). Their operation improves not only the security and stability of the root server system on a global scale, but also their availability in the European region.

In 2020, the association upgraded the infrastructure of the root servers L.

Support for evolving registers

Besides these root servers, the association uses its infrastructure to support growing registers through secondary name servers for their ccTLD. Angola, Malawi, North Macedonia, Tanzania and, since 2020, Guatemala have been using this option to manage their national domains. Also in 2020, the association operated in its data centres the infrastructure for the operation of the DNS register of Brazil's domains and the association of Latin American ccTLD LacTLD.

Hosting DNS zones and servers

On the basis of mutual knowledge sharing and long-term cooperation, the association also offered DNS zone hosting to the Czech neutral peering node NIX.CZ.

Another form of support aimed at the local internet community is hosting the servers of some non-profit organisations – such as the Jeden svět na školách (One World in Schools) project server of the People in Need organisation, or operating a server with a mirror of popular Linux distributions – Ubuntu, Debian, Fedora, etc.

Open DNSSEC Validating Resolvers (ODVR)

Since 2010, the association has operated Open DNSSEC Validating Resolvers (ODVR), which are free to use instead of DNS resolvers. These are usually offered to their users by internet connection providers. In 2020, the transition to a new infrastructure dedicated only to the operation of this service was completed. This separated it from the anycast infrastructure for the .CZ domain (from the point of view of sharing hardware as well as IP addresses) and the security of both services was thus increased.

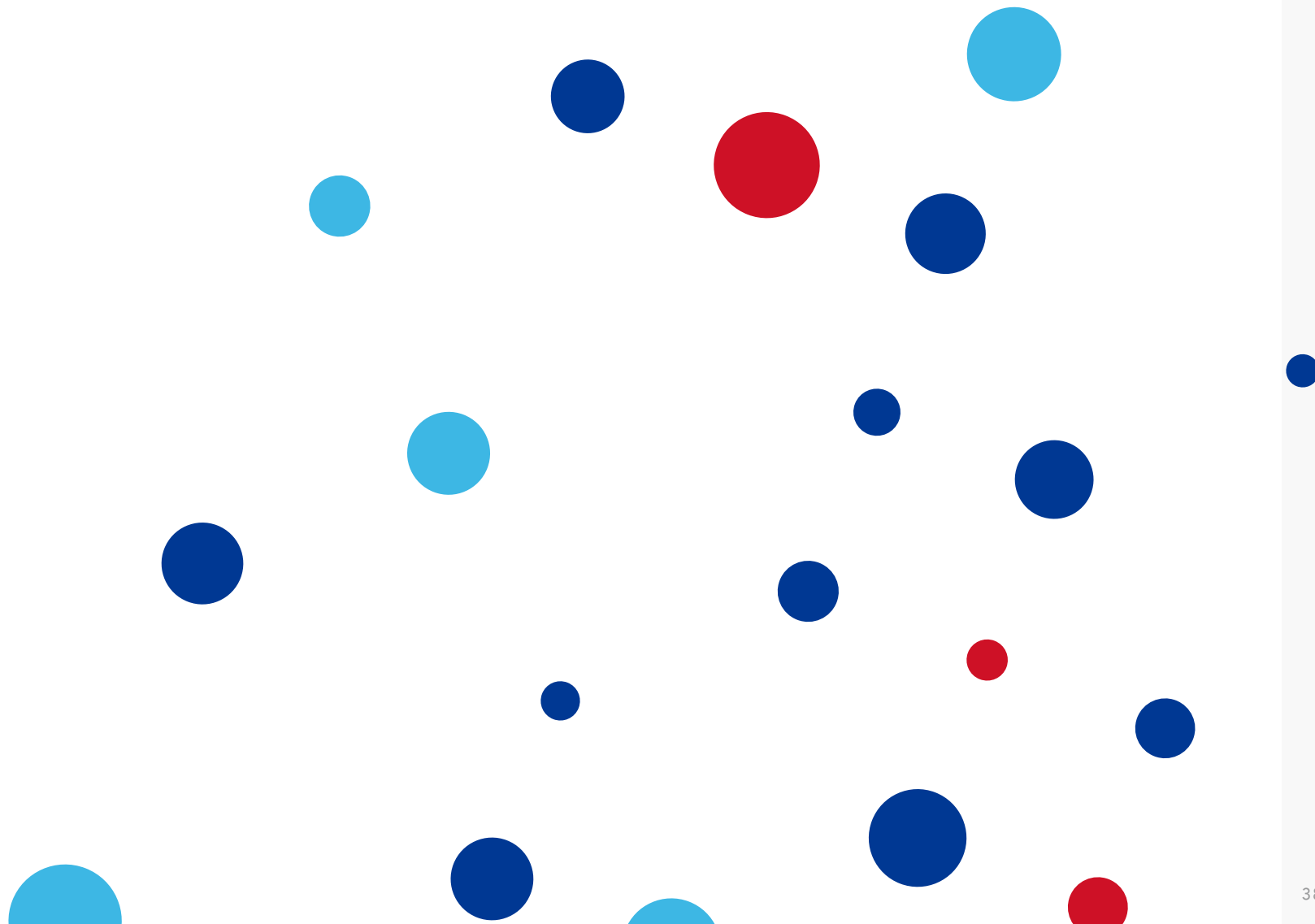
The ODVR service (also because it is operated on the association-developed Knot Resolver) supports encrypted DNS communication using DNS-over-HTTPS (DoH) and DNS-over-TLS (DoT). Since 2020, the option of using this encrypted DNS communication has been incorporated in the user interface of the Google Chrome browser (from version 87 on Windows and Android OS).

RIPE Atlas Anchor hosting

The CZ.NIC Association is actively involved in the RIPE Atlas global monitoring network project and supports this project by hosting fixed monitoring points called RIPE Atlas Anchor.

Hosting a public NTP server

One of the key operating conditions of many computer systems is correct time synchronisation. Systems connected to the internet for this purpose use the NTP Internet Protocol. In the long term, CZ.NIC hosts a public top-level NTP server (stratum 1) controlled by GPS and fitted with a high-quality oscillator of the OCXO DHQ type.



6 The CSIRT security team

The growing importance of the internet and the rising number of its users are accompanied by a growing number of security incidents such as misuse of PC, a network element or network for illegal activities – e.g. spam, copyright breaches, phishing or tapping of data. The severity of these incidents is also increasing. It is therefore necessary to create, formalise and streamline defences against these attacks; CSIRTs (Computer Security Incident Response Teams) are being created for this purpose.

CZ.NIC has long-term experience with projects in the field of internet infrastructure, and therefore it is involved in **supporting the activities of security teams** at the national and academic level.

The association also has its own **CZ.NIC-CSIRT team**, responsible for dealing with incidents within AS25192, as well as incidents that affect the name servers for the .CZ domain and 0.2.4.e164.arpa.

The association has received numerous awards for its activities and projects in the field of cybersecurity. In 2019, the association's director Ondřej Filip received an award for his contribution to cybersecurity in the Czech Republic. Ondřej Filip entered the Cybersecurity Hall of Fame on the occasion of the 20th *IS2 - Information Security Summit* conference.

6.1 CSIRT.CZ - National CERT Team of the Czech Republic

The [CSIRT.CZ](#) security team is the **official national security team of the Czech Republic** and is operated in accordance with Act No. 181/2014 Coll., on cybersecurity, and the public contract concluded on 18 December 2015 with the National Security Authority (NSA).

As of 1 August 2017, the newly established National Cyber and Information Security Agency (NÚKIB) took over the position of the NSA and thus became the manager of cybersecurity issues and the national authority for this area.

The mission of the CSIRT.CZ team is to **deal with incidents** connected with **cybersecurity in networks operated in the Czech Republic**.

In addition, it also focuses on **prevention, research and education**.

CSIRT.CZ collects and evaluates information on reported incidents and forwards such incidents to the persons responsible for the network or services that are the source of the incident and/or provides help with coordination.

The team cooperates with a number of entities with which it exchanges information on individual incidents and their solutions on the basis of mutual trust.

Cooperation of CSIRT.CZ

The team develops cooperation with entities:

- **at the national level** – mainly with NÚKIB and the Police of the Czech Republic, academic CSIRTs, internet service providers (ISPs), banks and others,
- **at the international level** – national CSIRTs of other countries, the European Network and Information Security Agency (ENISA), EUROPOL and others.

In 2020, the CSIRT.CZ security team participated in a number of **grant projects**:

- The **PROKI** (Prediction and Protection from Cyber Incidents) project was aided by the Security Research Programme of the Czech Republic 2015-2020.
- Continued cooperation on the **SIC CZ** (Safer Internet Centre) project was implemented by the CZ.NIC Association under the brand *Safe on the Net*.
- Cooperation in the operation of the **STOPonline.cz hotline**, which is designed to report illegal online content and to raise awareness and educate children and parents.
- On the other hand, because of measures related to the spread of the novel coronavirus, the **Cyber Exchange** project, which CSIRT.CZ had successfully joined in 2019, was temporarily suspended. Its essence is the technical and administrative exchange of experts across the national and governmental security teams of the EU Member States involved in the project.
- During 2020, CSIRT.CZ also participated in the **international SPARTA project**, which seeks to address the issue of negative influences on democratic elections through the use of information technology.

6.1.1 Traffic statistics

In 2020, CSIRT.CZ handled **1,267 security incidents**.

At the same time, the number of responses related to the resolution of those incidents increased again. A total of **17,423 emails were sent**, i.e., 3,540 more compared to the previous year. Up to dozens of emails sent can be associated with a single incident because of the complexity of the attacks (botnets, vulnerable devices, compromised accounts, etc.).

In 2020, CSIRT.CZ performed a comprehensive **upgrade of the OTRS system**. This is where all information related to individual incidents is collected in the incident handling process. It was necessary to:

- modify other existing tools to maintain their compatibility with the new OTRS,
- transfer all the settings used in the original system.

The upgrade was planned and distributed in such a way as not to affect the operation of the CSIRT.CZ security team. At the same time, the team focused on simplifying future upgrades so that switching between different versions of OTRS would not require complex modifications to downstream systems. This is a very important step that will increase the security of the entire incident handling process, as it will be possible to quickly apply any security patches to the OTRS system.

Number of incidents addressed

	2017	2018	2019	2020
Sensor Network*	13,858	18,435	14,911	16,217
Phishing	409	518	483	738
Spam	121	144	128	216
Malware	99	135	85	109
Other	200	58	85	86
Probe	26	171	141	68
Trojan	94	0	0	0
DOS	14	7	16	16
Botnet	29	20	4	2
Virus	0	0	0	0
Portscan	13	16	3	29
Pharming	3	10	9	3
Total	1,008	1,079	954	1,267

* Sensor Network is not included in the total number

The incident resolution process also includes the distribution of information in the case of vulnerable systems.

In 2020, the number of **phishing** attacks **increased** significantly. We attribute the increased activity of attackers to the emergency situation surrounding the pandemic, in which employee isolation and working outside the normal work environment may make users more vulnerable to this type of attack.

In addition to phishing, the **number of spam complaints has also increased** in the past year.

6.1.2 Awareness and educational activities

During 2020, despite the unfavourable situation caused by the spread of the novel coronavirus and the related measures taken by the competent authorities, CSIRT.CZ managed to maintain the continuity of its awareness-raising and educational activities from previous years. The team was involved in the following activities:

Appearances at CyberCon 2020, Internet and Technology 2020

Commenting on what is happening in the mass media

Training for employees of Nestlé Česko s.r.o.

Online course in Internet Security and Privacy

Publication activities - publication of awareness-raising and educational articles:

- Security Insights - 26 episodes of a series published on Root.cz
- Thematic posts on the [CZ.NIC blog](#)

6.1.3 National and international cooperation

The **strategic partners** in the area of national cooperation are the **National Cyber and Information Security Agency (NÚKIB)** and the Governmental CERT of the Czech Republic (**GovCERT**).

CSIRT.CZ cooperates with these entities in the field of legislation, cyber exercises, the formulation of common positions within the CSIRT Network and other projects. The National CERT and GovCERT meet several times a year on various occasions, providing sufficient scope for regular information provision on the work of individual teams and their possible coordination. In addition, both organisations regularly participate in meetings within the TF-CSIRT or [CSIRT Network](#).

At the national level, there was significant cooperation with the **Police of the Czech Republic** in 2020. There were dozens of incidents involving fake e-shops, fraudulent investment sites, fraudulent Facebook ads and more. In the spring of 2020, at the time of the attacks on hospitals, CSIRT.CZ played a mediating role in the cooperation between the **National Centre against Organised Crime (NCOZ)** and the [FÉNIX](#) project.

National and international cooperation also includes support for teams wishing to join TF-CSIRT and FIRST. For some types of membership, this includes an *on-site visit*, which involves checking the functionality and compliance with requirements for applicants who want to join these organisations.

6.1.4 Preventive activities

CSIRT.CZ also devoted the year 2020 to the area of prevention, primarily by continuing to **extract information from the honeypots in operation and by running the PROKI project**.

In 2020, the security team **discovered and analysed a malicious browser add-on - Video Downloader for Facebook** - that compromised more than 200 thousand users. The CSIRT.CZ team reported it to the Chrome Web Store and the antivirus company Avast as malicious. This helped identify the large-scale Cache Flow campaign, which reached three million browser installs.

As part of prevention, CSIRT.CZ informed companies in the Czech Republic affected by **the leak of login credentials** (including plaintext passwords) **to FortiGate VPN**. The actual leak of the passwords occurred through the CVE-2018-13379 vulnerability. Among the institutions affected were hospitals and institutions covered by the Cyber Security Act. Therefore, CSIRT.CZ also coordinated its actions with the National Cyber and Information Security Agency.

Web scanner

The [web scanner](#) is one of the **preventive security services** launched by CZ.NIC in 2013. The service is intended for website providers and administrators, especially non-profit organisations and the public administration, whom it helps to reveal the potential vulnerability of their internet presentations.

A vulnerability analysis is performed in two phases:

1. the web is tested using automated tools and then manually by an experienced tester. Among other things, it evaluates the vulnerabilities found in the context of the entire web and proposes appropriate solutions.
2. The party that ordered the test is sent a final report containing detected vulnerabilities, their classification, based on their level of gravity, and also proposals for possible solutions.

In analysing potential vulnerabilities, the service is based on its own measurements, the security team's experience and on a list of the general top ten most serious security risks according to the Open Web Application Security Project (OWASP).

In total, **41 domains were tested** in 2020 on the basis of 14 orders, of which 22 were domains of major entities and three as part of the Safer Internet Centre project.

Penetration testing

In 2019, CSIRT.CZ launched pilot operation of a new commercial penetration testing service. The first party interested in using this service was the Vysočina Region. **More than 20 domains were tested.** Also on the basis of positive feedback from the client, a decision was made to start providing the service in full during 2020.

The launch of the service went according to plan and, by the end of 2020, the team had completed several contracts. The service is provided on a commercial basis but, within the focus on preventive action, CSIRT.CZ provides significant discounts to selected types of entities.

6.2 CZ.NIC-CSIRT

The CZ.NIC-CSIRT team is responsible for **handling incidents that affect name servers for the .CZ domain, 0.2.4.e164.arpa and AS 25192.**

On the basis of the [Rules of Registration](#), CZ.NIC is entitled to cancel the delegation of a domain name if it is used in such a way that national or international computer security is threatened. This can happen, for example, by distributing harmful content (viruses, malware) or by faking the content of another service (phishing) through the domain name or services available through it.

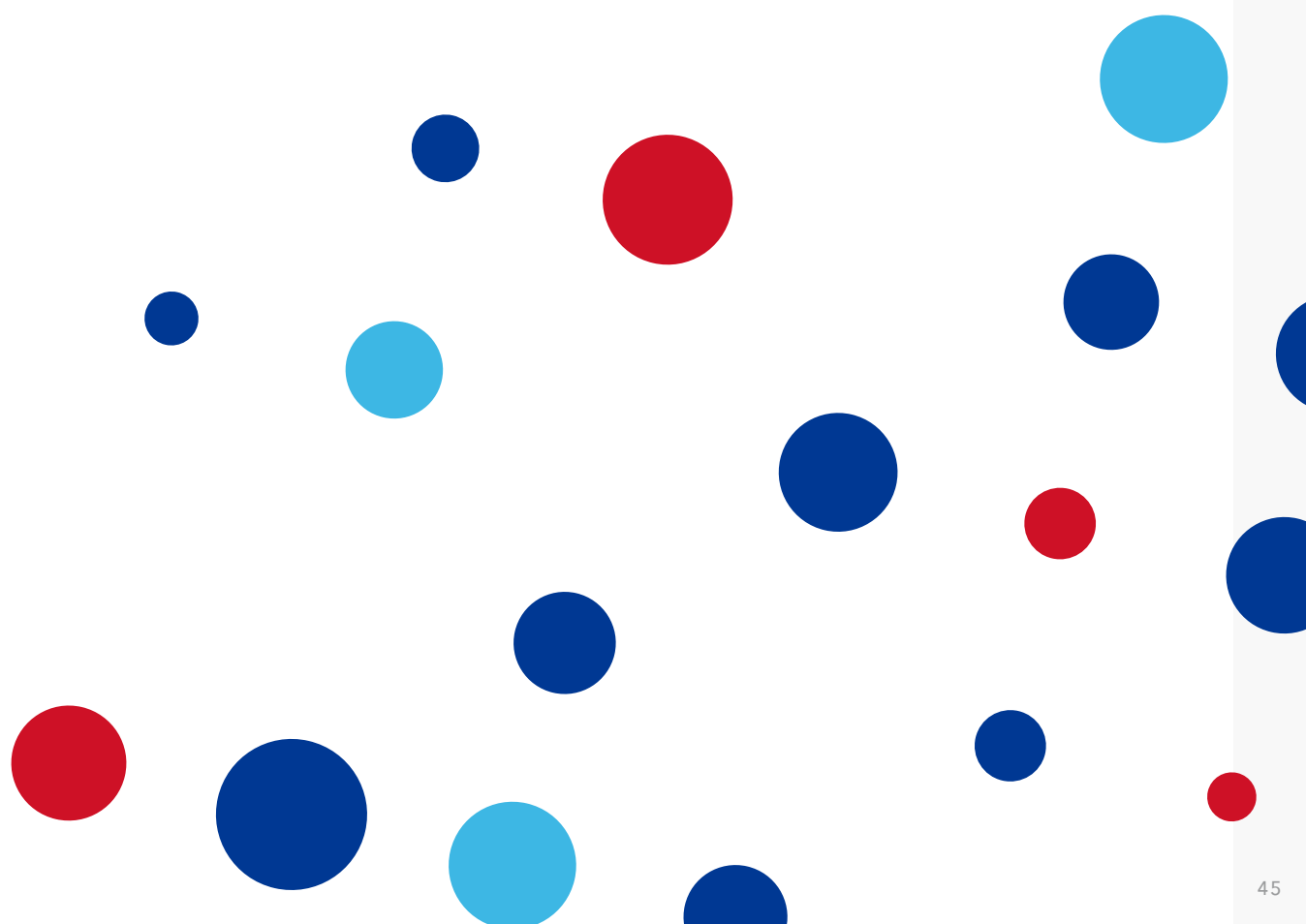
The CZ.NIC-CSIRT team can also cancel the domain name when the server available through the domain name is the control centre of networked hardware which distributes malign content (botnet).

Activities of CZ.NIC-CSIRT in 2020

Within the activities of CZ.NIC-CSIRT, the association operates its **own system used for searching websites** with .CZ (MDM) domains that have been attacked. In the CZ.NIC Association, the CZ.NIC-CSIRT team implements internationally accepted information security management systems (ISMS) in compliance with the ISO 27001 standard. An **external audit** took place in 2020 to confirm that CZ.NIC continues to meet all the requirements of that standard.

In addition to the above, CZ.NIC-CSIRT also focused on the cooperation necessary to meet all the conditions for **the granting of accreditation by the Ministry of the Interior of the Czech Republic for access to the National Identification and Authentication Point (NIA) and the gradual implementation of the requirements of the Cyber Security Act.**

In the context of the Covid-19 pandemic, the security team **dealt with the internal requirements of the association** - as a precautionary measure, it secured the necessary permits for free movement for key employees of the association and solved problems with the electronic security system (ESS) related to the interruption of continuous operation and the transition of most employees to work from home.



7 MojelD

[MojelD](#) is a unique service thanks to which internet users in the Czech Republic can use **the same identification data for logging in to various internet services**.

The service, operated by the CZ.NIC Association, celebrated its **tenth anniversary** in 2020.

An internet user who uses mojelD does not have to create a separate account for each new service and go through a lengthy registration process. They enter their registration data only once, in mojelD. There, the data is verified and then used to log in to various internet services. Operators implementing mojelD will increase their users' comfort in using their service and also get verified information about their visitors and clients, to whom they can subsequently provide additional benefits.

In 2020, users could link their mojelD account to the National Identification and Authentication Point (NIA) to **log in to e-government services**. In 2021, the association expects increased interest in the implementation of the mojelD service following this option.

Attention was also focused on **improving security and user comfort**. Users must now authorise via text message when changing their password, and they can now also use a security key with the FIDO 2 standard for authentication. Account verification has been simplified by a new free option for validating the mojelD account by providing consent to transfer data to a third party at Czech POINT sites. In 2020, the operation of mojelD validation sites was substantially reduced in view of the pandemic.

MojelD is currently clearly perceived as a **way of authenticating and identifying internet users**.

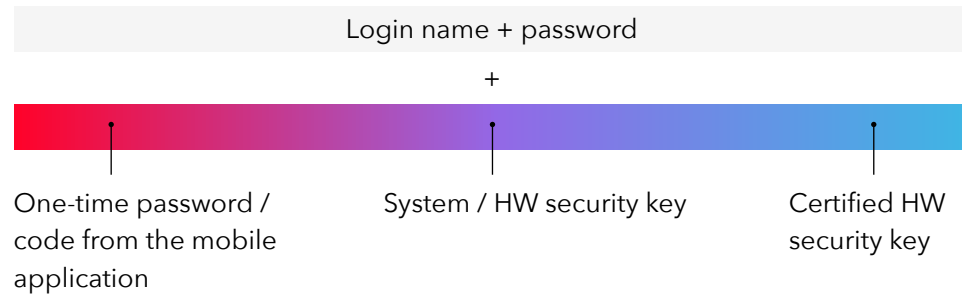
7.1 Security of mojelD

The basic features of mojelD include the security and trustworthiness of the entire system and the protection of personal data. The register of user details is protected on the same high level as the .CZ domain register. Users themselves can define which details from their profiles can be provided to the given provider for whose services the user wants to sign up using mojelD. This gives the user maximum control over their data.

MojelD offers a wide range of login options:

- A login name and password are the basics.
- Furthermore, the service provider may determine whether this level of security is sufficient for the user to log in to its services, or whether the user must also authenticate by entering:
 - a one-time password,
 - code from the mobile application,
 - a system or hardware security key (this is required, for example, when logging in to online public administration services. For users, such a solution is easily accessible – a system security key is often included in common operating systems such as Windows 10 or Android version 7 and above).

Security level options for login methods



7.2 Private-public partnership services

A key factor in the systematic expansion of the mojelD service is its support by internet service providers. The growing range of places where mojelD can be used is having an impact on attracting new users, for whom it is important to be able to log in to as many services as possible with one name and password - whether they use them every day or when they first visit (for example, online shops). At the same time, mojelD saves them time during registration and ensures control over the data provided.

In the areas listed below, the association aims to maintain and consolidate its position, but it also seeks to penetrate new segments.

7.2.1 Private sector service providers

The partner network of private service providers had a similar composition in 2020 as in the previous year. The list of partners can be found in the [catalogue on the mojelD website](#).

In the private sector, mojelD is used by:

- e-shops that are interested in the possibility of verifying the age of majority of their customers when selling specific goods or services,
- community servers,
- discussion forums,
- news sites,
- servers providing microservices,
- advertising servers and others.

7.2.2 Public administration service providers

In the autumn of 2020, the option of linking the mojelD account to the **National Identification and Authentication Point (NIA)** was launched.

Individuals can use mojID to **log in to state and local government services**, such as:

- **the Citizen's Portal** (checking the validity of documents, the balance of points in the driver's account, extracts from public registers, ...),
- the Financial Administration Portal **My Taxes** (online filing of personal income tax returns, real estate tax returns and other tax returns),
- the **ePortal** of the Czech Social Security Administration (for example, to view the pension insurance information sheet),
- client applications **of health insurance companies** (reports on care provided, payers of insurance contributions and arrears, applications for contributions from prevention funds, ...),
- the patient application for electronic prescriptions **eRecept**,
- **the web portals of some regions, cities and municipalities**,
- **library systems**,
- **the systems of education institutions** and other entities.

The expected trend for the future is the development of eGovernment and with it a further expanding network of public administration partners.

In 2020, the long-term cooperation with the developers DATRON, a.s. and VERA, spol. s r.o., which develop portals for public services, continued.

#overenomojeid campaign

The **linking of user accounts to the basic registers** was supported by the #overenomojeid marketing campaign. Users who registered for the campaign on the [MojID - Verified](#) website, completed the process of linking their account to the NIA and shared information about the authentication option on their social networks with the hashtag #overenomojeid, received a free USB/NFC security key that is suitable for logging into public administration services.

The interest of the users far exceeded the possibilities of the campaign, so the most active users of mojID got priority first. The campaign was launched on 23 September 2020 and by the end of the year alone over 2,000 security keys had been sent to users.

The CZ.NIC Association plans to continue the campaign in 2021 because of the great interest.

7.3 Users of mojID

The user base is the most valuable asset of the mojID service. Without an increasing number of users, it would be difficult to attract more and more important service providers and make the service known among the general public.

During 2020, **the mojID user base grew** by 34,779 new users **to a total of 698,064 users**.

As of 31 December 2020, a **total of 4,611 users** of mojID had been **connected to the National Identification and Authentication Point (NIA)**. In 2021, one of the objectives will be to increase the proportion of mojID users connected to the NIA.

The trend of an increasing share of **validated users** continued to rise, reaching **a total of 30,501** at the end of the year. This result can be attributed to two main factors - the possibility of validating the mojID account through the information system of data boxes or at Czech POINT branches and the launch of the connection of user accounts to the basic registers (NIA).

The negative impact on the growth rate of validated accounts was clearly due to the Covid-19 pandemic and measures restricting the movement of people. The validation of users was complicated by the closure of external validation points in libraries, the reduction of opening hours at various offices and the preference for not visiting Czech POINT branches in person.

Level of user identity authentication

Year	Partially identified contact	Identified contact	Validated contact	Contact linked to the NIA	Users in total
2010	1,324	2,168	163		3,655
2011	24,369	17,218	680		42,267
2012	86,218	75,513	1,760		163,491
2013	144,376	143,364	3,324		291,064
2014	211,409	207,242	5,920		424,571
2015	241,270	249,649	8,280		499,199
2016	257,650	273,334	10,446		541,430
2017	283,133	293,503	18,378		595,014
2018	301,806	308,764	23,233		633,803
2019	318,547	344,738	26,290		663,285
2020	336,375	361,689	30,501	4,611	698,064

7.4 MojEID as a tool for cross-border authentication in Europe

In 2020, CZ.NIC also actively participated in **the Czech Republic's involvement in building an infrastructure for cross-border electronic identification**, as defined by the eIDAS Regulation. This regulation builds on the work under the STORK (Secure idenTity acROss boRders linKed) pilot project, which the association participated in with the Ministry of the Interior of the Czech Republic.

In 2020, the CZ.NIC Association ended the operation of a gateway that had been created within the framework of the STORK project and which had allowed logging into the services of the European Commission using mojEID. This gateway has been completely replaced with the official **eIDAS node for the Czech Republic**.

In 2020, CZ.NIC also operated an eIDAS node based on a contract with the National Registers Authority, which enabled Czech online services to use login means notified by other EU Member States and at the same time a middleware component necessary for logging in for German electronic identity cards.

The second component of the eIDAS node was launched, which will enable Czech electronic identity card holders to use them for foreign online services. As part of contractual performance, the active

involvement of the association's staff in the functioning of the platforms that were established by the European Commission, namely the eIDAS Cooperation Group and eIDAS Technical SubGroup, continued throughout the year. The contract for the operation of the eIDAS node was concluded for the period of 2018-2020, and therefore a tender for the operation of the eIDAS node in the next period, this time for 2020-2024, was held in the middle of the year. The CZ.NIC Association was again successful in this procedure and the operation continues without interruption.

In relation to the connection of mojID to the NIA, the association initiated negotiations with the Ministry of the Interior of the Czech Republic in order to notify mojID as another Czech means for cross-border authentication. The successful completion of this process would return mojID to the role it played in the STORK pilot project, as mentioned in the introduction to the chapter.

8 CZ.NIC Labs

The CZ.NIC Labs are an organisationally separate research and development centre that focuses primarily on **innovative projects for the benefit** of the **Czech and global** internet community.

The projects are mainly focused on:

- infrastructure protocols and services,
- DNS traffic monitoring,
- network security.

Some of the projects deliberately support major trends in today's digital society, such as open data, eGovernment, open source software and support for disadvantaged users.

The CZ.NIC Labs are represented in all the regional branches of the association, and therefore they make intensive use of tools for distributed software development and other means for remote cooperation (video conferencing, discussion forums, etc.). The exceptional conditions of the Covid-19 pandemic thus do not pose any significant difficulties for the activities of the CZ.NIC Labs.

Brief summary of activities in 2020

In 2020, the CZ.NIC Labs focused primarily on the further **development of existing projects**.

The key projects are:

- [ADAM](#) - a system for the monitoring and analysis of services provided by the association,
- [BIRD](#) - a multiprotocol routing daemon,
- [Datovka](#) - a multiplatform desktop and mobile application for access to data boxes,

- [Knot DNS](#) and [Knot Resolver](#) - a pair of DNS servers,
- [Tablexia](#) - an educational application for children with dyslexia and other learning difficulties,
- [Turris](#) - a router for end home and SOHO network security.

8.1 ADAM

An important prerequisite for the reliable operation of DNS servers in the .CZ domain, domain register and other services provided by the CZ.NIC Association is, among other things, systematic and detailed monitoring of real DNS traffic and its immediate and additional analysis. These procedures can detect potential technical problems or network attacks to which the DNS infrastructure is permanently exposed in a timely manner, and also effectively plan further development of the infrastructure and services.

The ADAM (Advanced DNS Analytics and Monitoring) project aims to **develop tools for the effective and robust collection and processing of data on DNS transactions**, to improve and expand the methods of their analysis and to develop appropriate user interfaces and reporting methods.

In 2020, two previously developed tools used to collect data from the .CZ domain and DNS traffic were deployed in production:

- in cooperation with the CSIRT.CZ team, regular scanning of DNS, web and mail servers of all second-level domains under .CZ was started using the **DNS crawler** tool. The goal is to verify the correctness of DNS data and zone configurations, detect cybersecurity problems and obtain statistical data for further analysis and visualisation.

- The second tool deployed in 2020, after about six months of testing, was the **DNS probe**. This software is designed for high-speed real-time processing of DNS traffic, generating selected output data in C-DNS format (RFC 8618) and then sending it to a remote collection point. The DNS probe is currently deployed on all the authoritative DNS servers managed by the association, replacing earlier, not very efficient, procedures based on collecting network traffic in PCAP format. The experience gained in production deployment shows that the volume of C-DNS data represents only 15-25% of the volume of the corresponding PCAP data.

8.2 BIRD

The routing daemon for dynamic IP protocol routing is designed for Linux and BSD. The project began at the Faculty of Mathematics and Physics of Charles University, and the CZ.NIC Labs are participating in its further development. It is currently the most used route server software in peering centres in the world. According to a survey conducted by EURO-IX, more than two-thirds of them use it.

In 2020, the association did not release any new versions because all its development energy was focused on developing a completely new architecture that could allow multithreading. The public launch of this new branch is planned for next year.

8.3 Datovka

The Datovka project is developing a **multiplatform application for access to data boxes**. The application is available for Windows, macOS and Linux and in a mobile version for Android and iOS.

In 2020, the desktop application added **support for shadow accounts** – user accounts that do not store data in the application. If the shadow accounts have sufficiently low permissions and at the same time there are corresponding conventional accounts in the application for the same mailboxes, Datovka can use the shadow accounts to automatically download a list of received messages without delivering the received data messages.

In addition, the **API for file services has been extended** in the application to report the number of messages in different processing states. There is also an **option to manage the accounts of other data box users** if the application user has permission to do so. It is also possible to produce development builds of the application for Windows and macOS. Windows and macOS users are now offered the option to automatically download and start installing the latest version. A **64-bit installation package for Windows** has been distributed since 2020.

The code for communication with the ISDS server and the code for processing the transmitted XML data were completely rewritten in the mobile application.

The desktop application used the libisds library for communication with the ISDS server. The CZ.NIC Association does not manage it directly but tried to contribute to it by correcting and extending it with new functions as changes in the interface on the ISDS servers occurred. The reluctance of the library administrator to communicate and incorporate the changes

proposed by the association limited the development of Datovka itself. So the developers of the association created an alternative called *libdatovka*, which they provided with a code waiting to be included in libisds. These were mostly functions and data structures for managing data box users. The desktop application now uses the libdatovka library.

8.4 Knot DNS and Knot Resolver

Knot DNS is a software implementation of an authoritative DNS server.

Its main goals include achieving high performance in processing DNS queries and efficient administration of large TLD zones, including advanced automation of DNSSEC signing. The project has already gained recognition in the DNS community and among users, whose number is constantly growing.

In 2020, the Linux environment managed to increase the performance of query processing in both normal mode and the new XDP (eXpress Data Path) mode, which offers processing of network traffic that is up to several times faster. It allows you to significantly optimise current and future DNS server installations.

Other significant new features include support for catalogue zones, deterministic signing with ECDSA algorithms, a new DNSSEC validation mode and backup and restoring of zone data and metadata.

During 2020, the association established cooperation with the administrator of the Canadian national domain (CIRA) and the administrator of the Japanese national domain (JPRS).

The Knot Resolver Project is developing the recursive DNS resolver and pioneering technologies that improve security and performance. It has been protecting users with Query Name Minimisation since 2015 and has provided this protection as the default resolver on Turris Omnia routers since 2016. In 2018, the so-called aggressive DNSSEC cache was added to improve performance while protecting against Random Subdomain attacks. In the same year, Cloudflare deployed our implementation on the public resolver 1.1.1.1. In 2019, experimental support for the DNS-over-HTTPS protocol was added and further optimisation was performed to improve throughput.

Protection against other types of attacks, such as NXNSAttack and fragmentation attacks, was added in 2020. Previous work also paid off, as Knot Resolver proved to be one of the few not vulnerable to a newly discovered attack called SAD DNS. Further efforts were made to improve performance:

- The same DNS-over-HTTPS protocol throughput as the well-known Nginx web server was achieved.
- Similarly to the Knot DNS authoritative server, new XDP technology was implemented to further improve throughput for unencrypted UDP traffic.

A side effect of the performance optimisations was the achievement of a level of resolver throughput that could no longer be tested with traditional tools. That was why a new tool called DNS Shotgun was developed to realistically test and compare the performance of top DNS resolvers.

Thanks to its features, Knot Resolver was also deployed indirectly when Whalebone built its own DNS solution on it. By the end of 2020, 140 ISPs and telecom operators in 39 countries were using Knot Resolver in this way.

8.5 Tablexia

Tablexia is a modern educational application that **helps with the development of cognitive skills**. It is intended primarily for children with dyslexia at the second level of elementary school.

The application should find its use both in schools as a supplement to standard teaching and in pedagogical and psychological counselling centres and other counselling facilities for pupils with learning difficulties. It is available for free in Google Play and the App Store, and the desktop version is available on the [project website](#).

In 2019, Tablexia joined the Safer Internet Centre project and, as part of this collaboration, they have been developing new games that focus on training spatial orientation, memory and attention. These areas were chosen because the excessive use of applications and mobile devices affects cognitive abilities and, in particular, attention, memory, concentration and spatial orientation.

In 2020, **three brand new games** were released in the application, where the player takes on different tasks as a detective:

- **Archive** (memory training) – the main goal of the detective is to remember and then correctly match objects to the numbers with which the objects were labelled.
- **On the Trail** (spatial orientation training) – the detective must find his/her way around a city and track down a thief before they disappear for good.
- **Catch the Thief** (attention training) – the task is to collect the necessary amount of evidence to catch a criminal, but at the same time be careful of the pitfalls along the way. The detective also uses different means of transport while collecting evidence at each level of difficulty.

In addition to the new games, the application has undergone minor functional changes and graphical improvements.



8.6 Turris

The year 2020 was marked by the **rationalisation of the sales network, expanding the functionality and security of the Turris device**. This year, the CZ.NIC Association carried out the first high-volume (1,000+ devices) order for one of its corporate customers. This successful cooperation will continue in 2021.

8.6.1 Hardware development

The association also took advantage of the fact that 2020 was a year of increasing public interest in safety. This resulted in the **new Turris Shield device**, based on the Turris MOX. It has a greatly simplified interface and security features already enabled in the basic configuration. The device was launched in September 2020 and was received with great enthusiasm.

While the sales of routers from the Turrís family have traditionally been aimed more at the professional public, which is assumed to cover more technically proficient users, Turrís Shield is conceptually different. It is aimed at ordinary users who do not want advanced features from the device; on the contrary, they are discouraged by the number of options. Yet they care about security and want a device with regular updates and an easy-to-use VPN. They are also attracted by the Turrís Sentinel security program.

In terms of hardware development, the Turrís team has also started working on future challenges. It has begun testing next-generation technologies, particularly wireless connections using Wi-Fi 6 and 5G cellular networks. It will use this knowledge to develop new products in 2021 and 2022. The aim is not only to respond to current technological innovations but also to maintain high quality so that only a minimum number of devices is returned in the future as part of the complaints procedure.

8.6.2 Software development

In addition to new hardware, 2020 also saw further **expansion** in the form of **software and the Sentinel security project**.

After the release of Turrís OS 4.0 in 2019, thanks to closer collaboration with the OpenWrt upstream, **Turrís OS 5.0** was released not long after OpenWrt 19.07. Routers with Turrís OS 4.0 have been automatically migrated to Turrís OS 5.0, and migration work has begun for older routers.

Users of Turrís Omnia routers with Turrís OS 3.X can now easily start the automatic migration process from the web interface. The plan is to activate that migration automatically over the next year.

At the same time as the distribution itself, the **design of a new web front-end** to control it continued. New features were also added to the front-end that were previously unavailable in our interface, such as the ability to configure an OpenVPN client easily or manage snapshots. The development team has also improved the system for integrating third-party web applications and has integrated, for example, the NetData application for visualising and collecting statistics on router traffic.

The **development of the Sentinel security program** continued. Here, the development of new minipots that detect attackers trying to exploit HTTP, FTP and SMTP protocols has been completed. As the amount of collected data grew and the interest of users increased, it was necessary to address the setup of the entire system and the aggregation of collected and stored data several times during the year.

8.6.3 Business cooperation

In 2020, the association renewed its cooperation with the online shop Alza.cz and optimised its distribution network in the Czech Republic and Slovakia. In 2021, the association expects the first positive results thanks to the expansion of the foreign distribution network within the European Union.

9 Education and awareness

9.1

Communication with the public

During 2020, the Czech National Domain Administrator's activities were covered by the media, in cooperation with public and private media. Newspapers, radio and television stations and major media servers dealing with the internet and technologies thus provided news about the CZ.NIC Association.

In total, the association published:

- 24 press releases,
- 35 press communications.

These were given to professional journalists and journalists from media aimed at the general public or specific target groups. Press releases and communications are published by the CZ.NIC Association on its website in the [News](#) section, which is also part of the information pages of the association's learning centre (the CZ.NIC Academy), the CSIRT.CZ security team and selected CZ.NIC Labs projects.

The communication was mainly related to topics concerning the administration, operation and development of the Czech national domain, key projects of the association and activities related to its operations – for example, cybersecurity, personal data protection or education and awareness in the field of the internet and internet technologies.

Media outputs

In 2020, press releases appeared mainly in technically-oriented media. This most frequently meant the Root.cz and Lupa.cz portals. In the print media, reviews of Turrís routers were predominant – in *Hospodářské noviny* and the *Computer, IT Systems or Chip* magazines. The *Řízení školy* (School Management) magazine and *Učitelské noviny* reported on the topic of the online safety of children on the internet.

CZ.NIC employees published **64 original articles** in 2020.

Ondřej Filip, Managing Director of the CZ.NIC Association, as well as other employees, appeared as **guests on television and radio programmes**, most often on Czech Television, Czech Radio, FTV Prima, TV Noe and Frekvence 1. The interest was mainly in topics related to the Czech national domain and internet security.

Social media

As in previous years, the CZ.NIC Association also used its social media accounts – [Facebook](#), [Twitter](#) and [LinkedIn](#) – as official communication channels in 2020. Supporters were able to read, in regular contributions, about the activities of the association, events and current happenings in individual projects.

Audience on social media at the end of 2020:

- Twitter: 4,695 followers,
- Facebook: 3,156 fans,
- LinkedIn: 1,223 followers.

Other communication channels

An important part of the communication is the **newsletter News of CZ.NIC**, through which the association sends messages to those who subscribe to it.

During 2020, the association's staff wrote 50 articles on the online [CZ.NIC Staff Blog](#). The blog plays the role of the association's official communication channel, so it is also used by journalists with different focuses.

	Outputs in media		Social networks (fans)	
	Papers	Blog	Facebook	Twitter
2012	21	97	900	630
2013	29	95	1,100	1,000
2014	38	84	1,500	1,750
2015	57	82	1,800	2,370
2016	57	59	2,600	3,088
2017	73	49	2,826	3,573
2018	56	55	2,905	3,942
2019	63	47	2,984	4,297
2020	64	50	3,156	4,605

Internal communication is mainly provided by the **IN newsletter**, which CZ.NIC employees usually receive once every two weeks.

9.2 Popularisation series

Jak na Internet (How to Use the Internet)

The Jak na Internet (How to Use the Internet) series is the association's **largest educational activity** which is focused on the general public. With its 125 episodes broadcast on Czech Television channels in 2012-2020, it reached a total of 225 million views. In addition to the public service media, the series is also used in local cable television.

The popularity of the series is also evidenced by the repeatedly positive results in awareness surveys among the internet public. **More than a quarter (25-35%) of internet users** in the Czech Republic **know the programme**.

In 2020, Czech Television channels broadcast episodes focused on public administration and convenient access to the internet. These episodes were supplemented by a new sponsorship message of CZ.NIC, which was created in 2020.

In addition to television, Jak na Internet is broadcast on the YouTube channel. There, the individual episodes reach approximately half a million total views. The video content can also be found in the entertainment portals of RegioJet buses and trains and on the Methodological Portal of RVP.cz for teachers.

Expanding texts published on the [Jak na Internet](#) website are also gaining in popularity. This is evidenced, among other things, by the fact that they are widely cited in graduate theses (see [Theses.cz](#)).

Selected episodes of the series are also published in a two-part [comic book adaptation](#).

Co-production programmes of Czech Television

In the past, the CZ.NIC Association made it possible to create several co-production programmes of Czech Television.

These included two seasons of the series **Nauč tetu na netu (Teach Your Aunt to Use the Internet)** and selected episodes from the series **Lovci záhad (Hunters of Mysteries)**, intended for children and young people. The original series [Nebojte se Internetu \(Don't Be Afraid of the Internet\)](#) is aimed at seniors.

All of the above-mentioned video materials were also available online in 2020 and systematically used by organisations that focus on educating the selected risk groups – children and seniors.

An innovation for 2020 was the series **Datová Lhota**, aimed at the youngest viewers. In 2020, the series was the most watched programme on the ČT:D channel. It achieved an above-average viewership overall. The first season has ten episodes and the association plans to collaborate on a second season in the coming years.

Support for the film V síti (Caught in the Net)

An equally important part of internet awareness this year was supporting the production of the documentary film [V síti \(Caught in the Net\)](#), which focuses on the issue of risky online communication of children.

The CZ.NIC Association acted as the general partner of the film, the main partner of the awareness campaign (together with [STOPonline.cz](#)) and the sponsor of the video clip for the documentary entitled “Je doma máma?” (“Is Mom at Home?”) by Tomáš Klus.

9.3 The CZ.NIC Academy educational centre

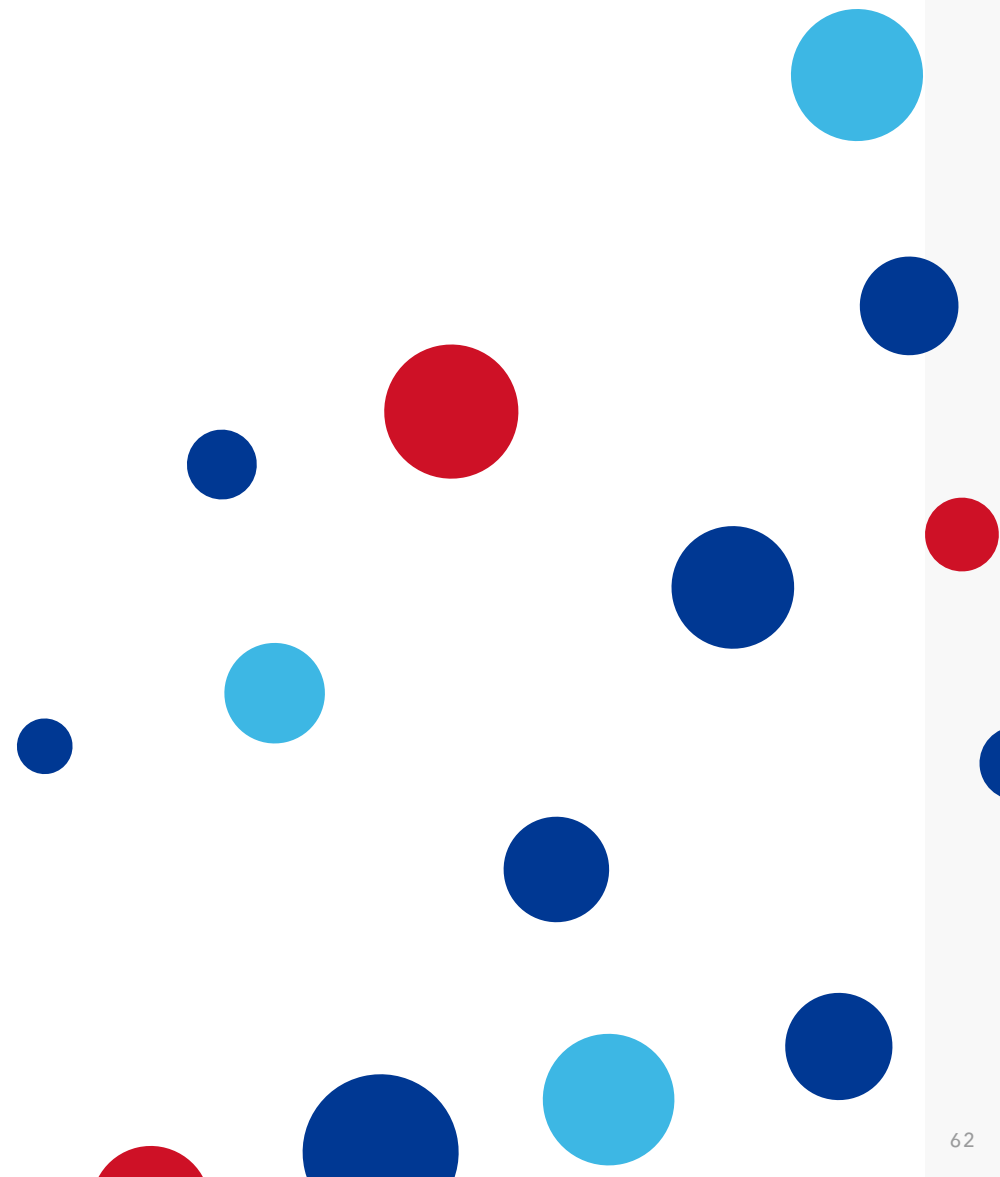
The year 2020 was very specific for the [CZ.NIC Academy](#), as for many other projects of the association. The spring offer of courses was cancelled because of the Covid-19 pandemic; from May to the end of the year the **teaching took place only in online form**. Not all courses could be converted to online form; nevertheless, the Academy managed to maintain a relatively diverse offer and also expand it with **three new courses**:

- E-mail Authentication,
- Ansible – Mass Automation and Server Management,
- Practice of Verifying Electronic Signatures.

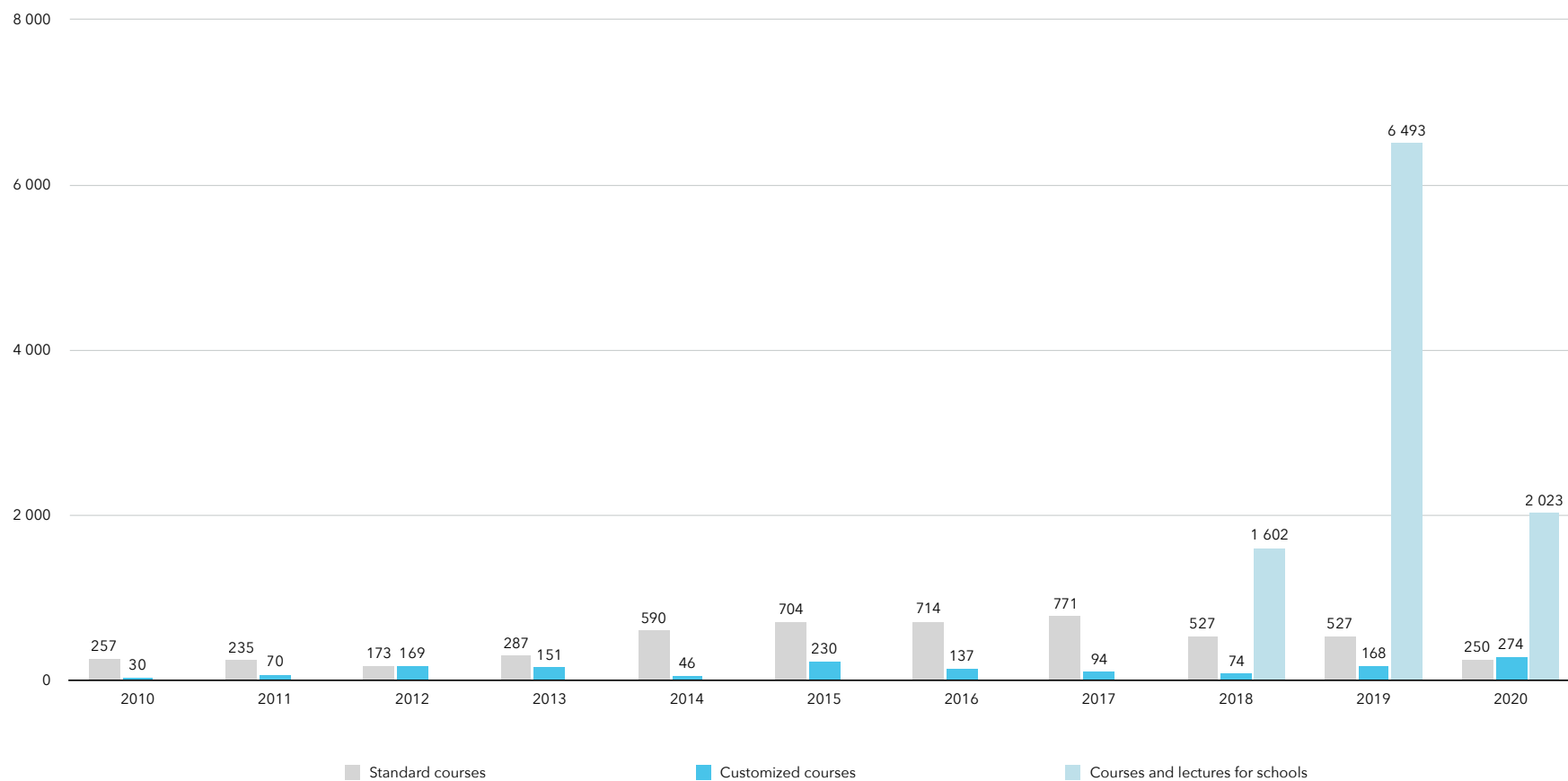
In addition to these courses, the Academy also introduced another **e-learning activity**: Networking in Linux.

The CZ.NIC Academy has adapted very well to the pandemic situation. The 3D printers available to the Academy were used, and the space was transformed into a **workshop for printing protective shields** for medical staff. The premises also served as a **studio for organising events** and conferences which were forced into the online space. The CSNOG 2020 or Internet and Technology 20 conferences, or working groups of the CZ.NIC or NIX.CZ associations, were able to take place in the Academy.

During the summer pandemic break, the Academy also served as a **facility for a day camp** for children of the association's employees.



Development of the number of students in the CZ.NIC Academy



List of professional courses conducted at the CZ.NIC Academy in 2020

Name	Number of courses	Number of students
Ansible - Mass Automation and Server Management	2	11
Ansible - Introduction to Mass Automation	2	30
Internet Security and Privacy	2	6
Barrier-Free Digital Design for Beginners	4	46
E-mail Authentication	1	13
Git - Universal Versioning System	4	41
Cyberbullying and Other High-Risk Phenomena on the Internet	3	25
Practice of Verifying Electronic Signatures	1	17
DNS Principles and Administration	1	12
The BGP Routing Protocol	1	15
Technical Writers' Exchange of Experience Workshop	1	19
Vim	1	15

List of customised courses offered at the CZ.NIC Academy in 2020

Name	Number of courses	Number of students
Internet Risks, Not Only for Civil Servants	1	76
Cyberbullying and Other High-Risk Phenomena on the Internet	2	45
Lecture on Cyberbullying	3	153

List of courses and lectures for schools held in 2020

Name	Number of courses	Number of students
(Not) Safe mobile phone	21	458
Discussion with the Book "ONLINE ZOO"	27	667
Children and Mobile Phones	1	44
Cyber Grooming	11	275
Illegal Online Content	4	122
Lecture on Cyberbullying	10	255
Lecture on Cyberbullying and Sexting	6	150
Dating on the Internet	2	52

Total number of courses organised by the CZ.NIC Academy in 2020

Course type	Organised in total	Total students
Professional courses	23	250
Customised courses	6	274
Schools	82	2,023
Total	111	2,547

9.4 Conferences

On 11 and 12 November 2020, the CZ.NIC Association organised the traditional [Internet and Technology \(20\) conference](#), which, for the first time in the history of the event, took place only online.

The programme offered contributions that included:

- news from the world of domains,
- interesting things in DNS,
- current events in key projects of the association,
- internet security,
- amendments to laws affecting the internet.

In 2020, the CZ.NIC Association presented itself at a number of **events and specialised conferences**, which took place mainly in the **online format**, for example:

- InstallFest,
- Linux Days,
- Openalt,
- CyberCon,
- Panel discussions of experts in the field of cybersecurity,
- Digital Identity,
- Scale 18x,
- IS2,
- Civic Tech Open.

As in the previous two years, CZ.NIC, together with the NIX.CZ and CESNET associations, organised the third year of the **CSNOG (Czech and Slovak Network Operators Group) community meeting** in 2020. The main objective of that event was to exchange experience, discuss current topics and share

solutions leading to the development of internet networks in the Czech and Slovak Republics. The meeting took place online on 8 and 9 September 2020 and was attended by 215 people.

9.5 CZ.NIC Editions

Publishing specialised and popular publications on topics related to the internet and its technologies is already a traditional educational activity of the association. **Printed and electronic books** are published by the CZ.NIC Editions.

Electronic versions of books are available for free download on the website of the [CZ.NIC Editions](#), as well as in the content distributor network (Palmknihy, Wooky, eReading, Flexibooks, BookPort, Municipal Library of Prague) in PDF or e-reader formats (EPUB and MOBI).

Printed books are also available in the book distribution networks Kosmas, Euromedia Group and Pemic Books and in Slovakia in the IKAR network.

Following the **publication of the first audiobook, Online ZOO**, which was published in 2020, the association managed to establish cooperation with Grand IT, which provides distribution of electronic content. At present, it cooperates with the portals of Galerie Vodafone, Alza, Audiolibrix, Digiport, iKiosek and others.

In 2020, the list of the Editions was expanded by two more printed titles – Data, čipy, procesory (Data, Chips, Processors) and Unity. As a result, the offer has grown to **25 professional or popular science titles**.

Data, čipy, procesory (Data, Chips, Processors)

The title *Data, čipy, procesory* (*Data, Chips, Processors*) is the third book in the Editions by Martin Malý. The author freely builds on previous titles and after an introduction to electronics and the basics of microprocessor constructions brings an introduction to work with programmable logic arrays. It deals in detail with the interpretation of the VHDL language, which is used to describe logic circuits, and continues from the basic principles through more complex circuits and components to “systems on a single chip”. At the end of the presentation, thanks to the acquired knowledge, you can construct your own 16-bit microprocessor with simple software.

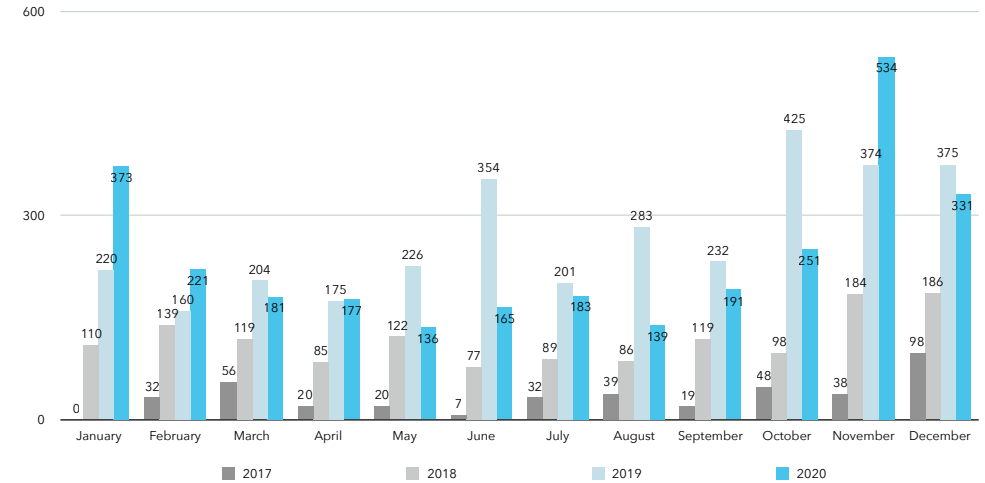
Unity

The second title, *Unity* by Tomáš Holan, expands the list of the CZ.NIC Editions by books dedicated to programming languages. *Unity* is a tool that lets you create professional-looking 2D and 3D computer games that run on a variety of platforms, from Windows to web applications and mobile phones.

There is such a flood of information, tutorials and guides about *Unity* on the internet that it can be hard to decide how to get started. In the book, the author tries to present the basic principles, techniques and building blocks, while pointing out the possible problems and their solutions. The book does not have the format of a manual or textbook; it is rather a gradual discovery of what tasks we need to solve when creating a game and what resources *Unity* provides for this.

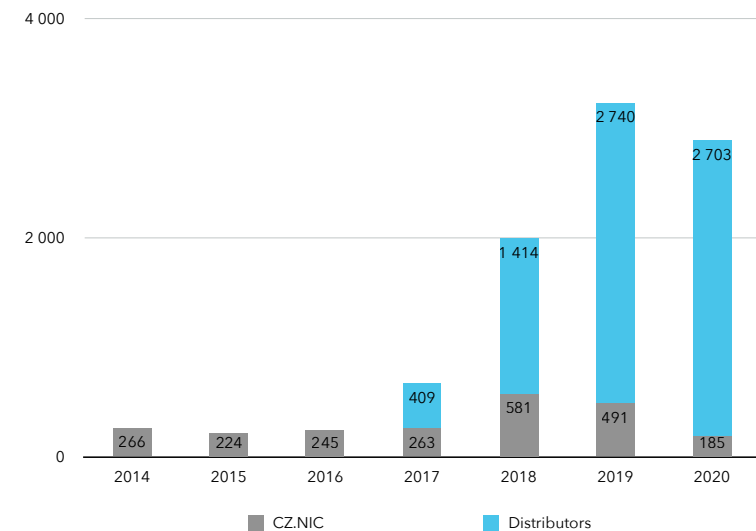
The book is intended primarily for curious high school students and possibly also for their teachers who are looking for an interesting topic in computer science courses. When writing the book, the author also had in mind all the other readers who have heard of *Unity* and are about to get acquainted with it, but did not yet know where to start.

Development of the sale of titles in the CZ.NIC Editions



In 2020, a total of **2,888 printed books** were sold in the CZ.NIC Editions, which represents a decrease to 89.6% compared to 2019. This is mainly due to the closure of bookshops and the release of a smaller number of new titles compared to 2019.

Overview of book sales by channel





10 Cooperation and partnerships

Connecting tens of millions of users across continents, the internet is clearly the most important communication tool today. We can often hear that the internet has no borders and does not fall under the authority of any government. This does not mean, however, that the internet is not controlled and has no rules. However, unlike many other sectors, the rules are often created by the internet community, which also includes employees of the CZ.NIC Association.

To ensure that no efforts of any member or organisation are in vain, mutual cooperation is essential, both at the national and international level.

Cooperation with our domestic partners helps find the most acceptable system for national domain administration for the Czech user. At the same time, it contributes, mostly thanks to the projects of our Labs, to the expansion of new technologies and the development of the information society.

International cooperation not only helps to follow world trends, but also - thanks to the active participation of the association's employees - contributes to their creation and shaping, which affects our everyday lives.

Thanks to their high level of expertise, the representatives of the association, both management and other staff, are welcome guests at domestic and international expert forums.

10.1 Cooperation in the Czech Republic

CZ.NIC is a natural partner of public administration and special-interest associations operating in the field of the internet.

10.1.1 Cooperation with public administration

The importance of the domain name administration system and related **internet infrastructure** is comparable to that of other critical infrastructures, for example in the energy and transport sectors. As the administrator of the national .CZ domain, the CZ.NIC Association considers the protection of this infrastructure its duty and a moral obligation to the Czech Republic.

The association has established cooperation with a number of state authorities, such as the National Cyber and Information Security Agency (NÚKIB), the Czech Telecommunication Office (CTO), the Ministry of the Interior of the Czech Republic and the Ministry of Industry and Trade of the Czech Republic.

Cooperation with the Czech state in the field of critical infrastructure was intensified in 2017 with the launch of the project entitled "**Securing DNS Servers in the Czech Republic**". It is being implemented within the

framework of the Programme of Security Research for the Needs of the State in 2016-2019.

The representatives of the CZ.NIC Association from the “Development Projects” department made significant contributions to the **implementation of Regulation (EU) No 910/2014** of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market (the so-called eIDAS Regulation). In connection with the operation of the national eIDAS node mentioned in [Chapter 7.4](#), our colleague, Jaromír Talíř, as the representative of the Czech Republic, regularly attended meetings of the eIDAS Technical SubGroup, which defines the technical standards of cross-border authentication.

The position of a trustworthy and reliable public administration partner was also confirmed by the CZ.NIC Association as part of the **Safer Internet Centre** project, as it took over the operation of the Police Cybercrime Reporting Line.

The association deepened its cooperation with the regions, mainly with the project **Kraje pro bezpečnější Internet (Regions for a Safer Internet)**.

Furthermore, the association cooperates with the Police of the Czech Republic, enforcement authorities, courts and authorities according to the statutory authorisation, i.e. with the Office for Personal Data Protection, trade and tax offices, the Czech Trade Inspection Authority, the Customs Administration and other entities.

10.1.2 Cooperation with the non-profit sector and social responsibility

The CZ.NIC Association supports a number of organisations and projects of the non-profit sector.

In the second half of 2020, the association, through the School Informatics Unit (Jednota školských informatiků), offered schools several servers that it had already decommissioned and withdrawn from its infrastructure, but that were still sufficiently functional and powerful.

Thus, seven servers and three computers found their way into schools, and they will help either directly in teaching or in building the school infrastructure.

Člověk v tísní (People in Need)

The association mainly supports the educational project **Jeden svět (One World)**. It offers schools documentary films and accompanying methodological aids for teaching current topics of the contemporary world and modern history.

OSF Foundation

The main goals of the project **Náš stát, naše data (Our State, Our Data)**, of which the association is a long-term partner, are to promote the principles and standards of open data and to promote, raise awareness and coordinate activities and experts on this topic. In 2020, the situation was complicated by anti-epidemic measures, so a large part of the events was held online. The association’s experts joined the project, for example, by

presenting at a webinar on the topic of the European Data Strategy with a focus on B2G. The partnership included **support for the fifth annual Open Data Expo**.

Representatives of the association sat on the expert panels of the competition **Společně otevíráme data (Together We Open Data)**, which for the eighth time awarded the best public applications using open data for social services, in the categories Education, Urban Data, Environment and Climate Crisis, Health and in the special category COVID-19.

The association also supported the first year of the competition **Na stojáka** - for the best idea of the civil sector for data processing and solving social problems digitally.

Helping animals

The CZ.NIC Association supports Southern Cassowaries in the zoos in Prague and Zlín on a long-term basis. The original home of this burly non-flying bird with black feathers and a bone helmet is New Guinea and Australia.

10.1.3 Membership of professional and interest organisations

Czech Television - Děčko

In 2020, the CZ.NIC Association was represented in “**Děčkolegium**”, an informal board of advisors providing expert advice, feedback and

opinions on the programmes and content of the popular Czech children’s channel Děčko. It also helps to acquaint parents with media issues.

NIX.CZ

The largest Czech Internet Exchange Point (IXP) covers domestic and foreign internet service providers for the interconnection of their networks. The NIX.CZ Association is the largest IXP in the Czech Republic and one of the most important in the world.

The CZ.NIC Association is a member of NIX.CZ and actively contributes to its activities, primarily through the **FENIX** project. NIX.CZ also uses the products of CZ.NIC Labs, especially the BIRD multiprotocol routing daemon.

Involvement in the FENIX project

The association helped establish the FENIX project on the platform of the biggest Czech peering node, NIX.CZ, in 2013. The main aim of the project is to secure the availability of internet services among entities involved in this activity in the event of massive DoS attacks. The FENIX project is intended for businesses providing connectivity for major connectivity and content providers who need also to secure their operation in the most critical situations.

Any entity that meets the entry terms can join the FENIX project. These terms resonate with what the CZ.NIC Association has been promoting for a long time, especially with the development of a trustworthy, secure and stable internet infrastructure and services of general interest. To join the FENIX project, the applicant must, for example, run its CERT/CSIRT team, support IPv6 and DNSSEC, have response rate limiting implemented and use BCP-38 source address filtering in its network.

10.2 Cooperation abroad

Thanks to the activities of the association on the international internet scene, interested foreign organisations are increasingly selecting CZ.NIC as a partner for cooperation and the Czech Republic as the venue for their meetings. It gives representatives of the local internet community easier access to interesting topics and the world's leading experts on the internet.

10.2.1 Membership of professional and interest organisations

APWG (Anti-Phishing Working Group)

A global coalition of private companies, state institutions and security forces focused on the global fight against cybercrime, especially spam.

CENTR (Council of European National Top Level Domain Registries)

A non-profit organisation that associates top-level national and generic domain name administrators. It primarily targets European registers, but members also include representatives of more distant regions, e.g. Canada and Japan.

The CZ.NIC association has been a member since 2001 and has been regularly involved in individual working group meetings. The CENTR Technical Working Group has been headed by Jaromír Talíř, a technical partner of the association, since 2019.

DNS-OARC (The Domain Name System Operations, Analysis and Research Centre)

A trusted platform where key stakeholders meet and share their experience with DNS operation, analyses and research, so that they can coordinate their work as efficiently as possible, particularly in the field of security. As in 2019, Jaromír Talíř, a technical partner of the CZ.NIC Association, remains a member of the DNS-OARC Board of Directors in 2020.

EURid (The European Registry of Internet Domain Names)

An association, which, under the authority of the European Commission, administers the .EU top-level domain. CZ.NIC is an associate member and has a representative in the Board of Directors.

EuroISPA (European Internet Services Providers Associations)

The European Internet Services Providers Association is the largest organisation, bringing together more than 2,300 organisations around the world. The main objective of EuroISPA, of which CZ.NIC has been a member since 2008, is to represent ISPs within the legislative processes of the European Union and facilitate the exchange of experience between individual internet service providers.

CSIRT Network

A CSIRT team interest group, which acts as a contact point for obliged entities identified in the NIS Directive (Directive of the European Parliament and of the Council concerning measures for a high common level of security of networks and information systems across the union). The group primarily deals with technical issues related to the implementation of this agenda.

In 2020, CSIRT.CZ actively participated in meetings and activities within the European CSIRT Network, where, during the first wave of the pandemic, national and government teams focused on each other's weekly reporting of special and unusual phenomena. The community has demonstrated the ability to work together and help each other and, if necessary, set up effective small groups to solve partial problems.

FIRST (Forum of Incident Response and Security Teams)

The first international organisation that associates security teams. It has around 400 members, and the American and European teams are represented to a significant degree. It is the only organisation that provides membership to teams from around the world and also covers product teams. The CSIRT.CZ team became a member of the FIRST organisation as early as 2015.

ICANN (Internet Corporation for Assigned Names and Numbers)

An international non-profit organisation founded in 1998, the main task of which is to administer and assign not only generic top-level domain names (gTLDs) and top-level national domain names (ccTLDs) but also IP addresses. The CZ.NIC association, as a national domain administrator, sends its representatives to regular meetings and its experts actively

participate in the activities of the working groups. Ondřej Filip, managing director of CZ.NIC, is a member of the prestigious Security & Stability Advisory Committee (SSAC) within ICANN.

IETF (Internet Engineering Task Force)

An organisation founded in 1986, which is directly linked to the birth of the internet. It includes an international community of leading experts, network architects and representatives of the commercial sphere. The IETF approves and promotes internet standards and RFC documents, which govern the majority of internet operations. Our employees are actively involved in some of them. Meetings of members of this organisation have also taken place several times, thanks to the cooperation of the CZ.NIC Association in Prague.

The CZ.NIC Labs' employees participate in the IETF, mainly in the DNSOP (DNS operation) activities, NETCONF (network device configuration) and NETMOD (configuration and status data modelling) working groups. Ladislav Lhotka, Head of the CZ.NIC Labs, is the author or co-author of six RFC standards.

INHOPE (International Association of Internet Hotlines)

INHOPE is an international association of over 50 hotlines aimed at combating and eliminating illegal online content, especially child pornography. The main benefits of INHOPE membership include access to the ICCAM database (derived from "I see Child Abuse Material") and the possibility of effective cooperation with other countries and institutions, particularly Interpol, in removing illegal content.

The CZ.NIC Association, with the STOPonline.cz line operated by it, became an associate member in June 2017. In 2018, as part of the

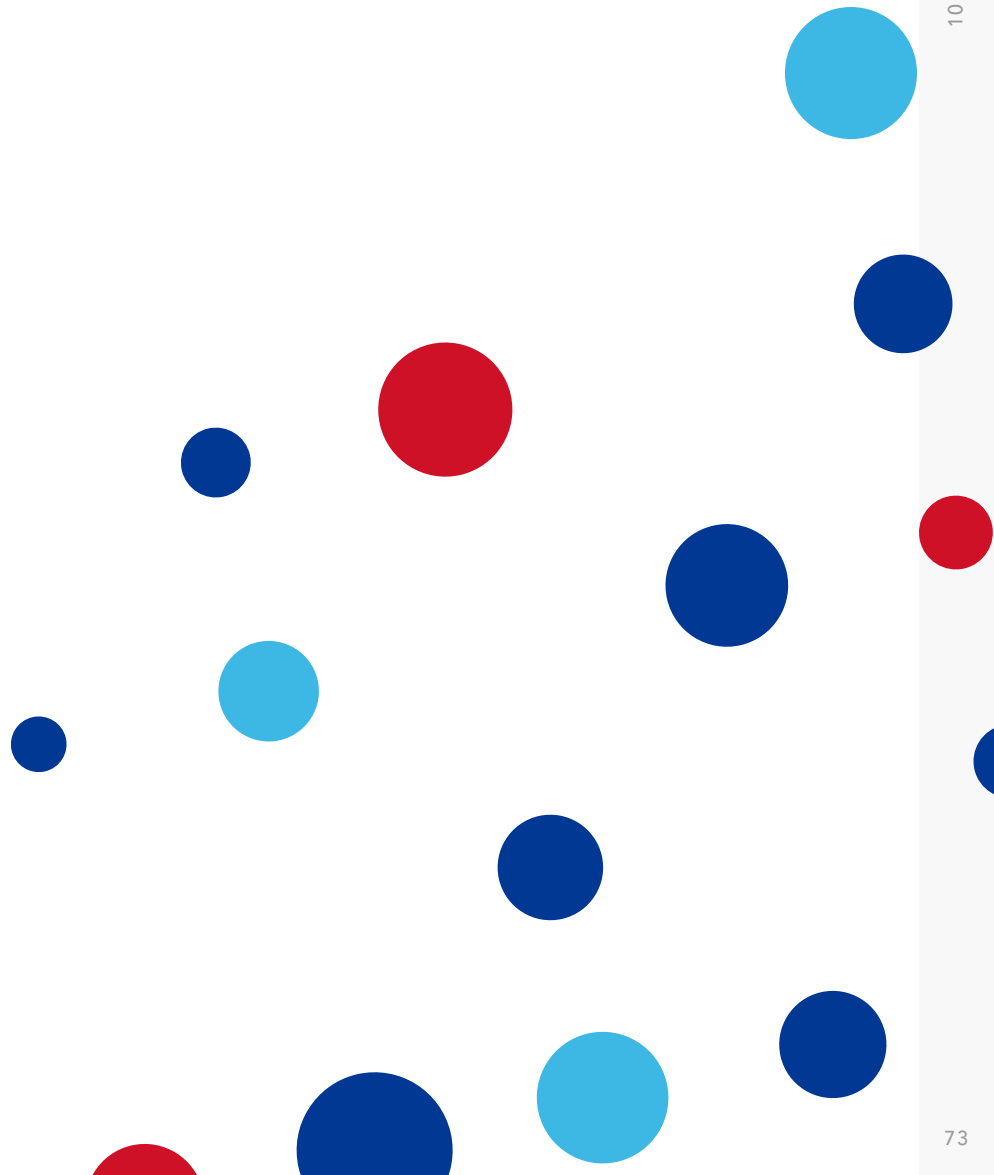
implementation of the Safer Internet Centre project, the association received full membership of that prestigious association, and a year later received a special financial reward as recognition for a high number of processed reports. The same was true in 2020.

RIPE NCC (Réseaux IP Européens Network Coordination Centre)

An independent non-profit organisation that supports internet infrastructure. Its core activities include the operation of the RIR (Regional Internet Registry), which allocates internet resources and related services (such as IP addresses) to its members. The CZ.NIC association, as one of the members, not only attends regular meetings, but also participates in other thematic meetings and training events organised by this organisation. In 2019, Ondřej Filip, Managing Director of the CZ.NIC Association, became a member of the board of directors of this organisation.

TF-CSIRT

TF-CSIRT is an organisation that brings together security teams, predominantly from Europe. The CSIRT.CZ team has the highest possible level of membership of this organisation - certified. CZ.NIC-CSIRT is an accredited member.





11 Grant projects

The CZ.NIC Association continued to participate in a number of research and development projects that addressed new technological challenges at the national and international levels and supported the development of modern technologies and the information society. In accordance with the long-term focus of the association and the development strategy for the period of 2020-2024, innovative projects with high added technological and social value have entered key areas of interest, including those that are not primarily of interest to ordinary commercial entities.

The association's priorities in this area include:

- cybersecurity,
- low-level internet protocols,
- IPv6,
- routing,
- the area of electronic identity,
- safe behaviour on the internet,
- eGovernment.

Grant projects are not only a welcome source of co-financing of the association's goals, but above all provide the opportunity to cooperate with Czech and foreign partners in creating advanced technical solutions, advancing the level of knowledge in the areas of CZ.NIC's activities and increasing the skills and knowledge of its employees.

By participating in international projects, the association also contributes significantly to the development of key internet infrastructure, including the area of electronic public administration services. At the national level, the projects contribute to the development of cybersecurity solutions and significantly influence the scope and form of activities implemented to promote a safe internet for children and young people. By implementing them, CZ.NIC strengthens its position as a trusted partner of the state and a responsible technology actor.

11.1 Involvement in European cooperation projects

The CZ.NIC Association is involved in several European projects co-financed from the main EU development programmes, Horizon 2020 and Connecting Europe Facility (CEF). Through them, the European Commission implements its strategies and goals in key areas of the economy. Great attention is paid to information and communication technologies and European networks.

In the period under review, the following projects were implemented with the support of the European Commission:

- Safer Internet Centre CZ (SIC CZ)
- CyberExchange
- THREAT-ARREST
- SPARTA
- RegelD
- CZ Node Upgrade

Safer Internet Centre CZ (SIC CZ)

CZ.NIC has been the national coordinator of Safer Internet activities since 2019, also implemented under the name [Bezpečně na netu \(Safe on the Net\)](#). Through the Safer Internet programme, the European Commission is working to create a safe internet for children and young people and to promote mutual cooperation in Europe and globally.

The Safer Internet Centre CZ is based on three pillars in the form of:

1. a centre for the prevention of negative phenomena associated with the use of modern technologies,
 2. a helpline for children and adults, provided by the Safety Line as a project partner,
 3. the STOPonline.cz line for reporting illegal content on the internet.
- The objectives of SIC CZ also include the interconnection of partial activities and projects of national entities on the topic of a safe internet and ensuring mutual cooperation between them.

Under the auspices of the centre, **83 educational courses for schoolchildren** and **15 seminars for adults** – the professional public, teachers, parents and government employees – were implemented. Because of the Covid-19 pandemic, most of them were implemented **in the online space**.

The same was true of most planned conferences, including the one in the Senate of the Parliament of the Czech Republic. Last but not least, a meeting of representatives of the public, non-profit and private sectors in the Advisory Board and Czech youth in the Youth Panel also took place remotely. Of the large events, at least the Zlín Film Festival was

successfully held, and two debates with children and young people took place there.

Another activity of the centre is **the creation of preventive and educational content**:

- Cooperation with the MALL.TV internet television and producers from Bionaut on the **series on cyberbullying #martyisdead** resulted in the Czech Republic winning its historically first prestigious Global Emmy Award for television production.
- There have been several other campaigns on social networks and internet portals, such as **Dětská nahota na Internet nepatří (Children's Nudity Does Not Belong on the Internet)**.
- For the youngest children, the association further developed the Austrian project **Online ZOO**. The book of the same name has been supplemented with audio versions, colouring books, worksheets and a methodology for teachers, which provides teachers at the lower level of primary school (primarily the first to third grades) with instructions on how to work with the book and offers other accompanying activities for children.

The Safer Internet Centre is also the national coordinator of the **Safer Internet Day**, which takes place every second Tuesday in February. More than 40 commercial entities, organisations, ministries and schools actively participated in the event, and dozens of other organisations supported it by sharing it in the media and on social networks.

In order to support the safe use of mobile devices and applications, the project further developed the modern **educational application Tablexia**.

In cooperation with the national CSIRT.CZ team, the SIC CZ project provides **operation of the STOPonline.cz** line for reporting illegal content, especially child abuse, inappropriate child nudity and cyber

grooming. On the basis of a concluded memorandum, it cooperates with the National Centre against Organised Crime and the Police of the Czech Republic in evaluating and resolving individual reports. In 2020, a total of 2,689 reports were received. Nearly 600 cases involved child pornography or nudity. Thirty reports of inappropriate content were handed over to ISPs for resolution and 254 cases were submitted to the Police of the Czech Republic. Because of the increased amount of content displaying naked children captured by their parents, the campaign “Dětská nahota na internet nepatří (Children’s Nudity Does Not Belong on the Internet)” was launched on the website operated by Seznam.cz, a.s.

CyberExchange

The association is the author of the European project CyberExchange, which **supports active cross-border cooperation in the fight against cyber threats**. A total of 11 national and government security teams from the Czech Republic, Croatia, Latvia, Luxembourg, Malta, Poland, Austria, Romania, Greece and Slovakia are involved in the project.

The core of the project is professional internships, during which representatives of security teams have the opportunity to share experience and strengthen their professional capacities. The project also supports technical internships aimed at supporting the deployment of modern software tools developed by individual national teams. In this respect, CyberExchange is compatible with the MeliCERTes platform, which is one of the “building blocks” of cross-border digital infrastructure services.

THREAT-ARREST

The aim of the THREAT-ARREST scientific project, implemented under the European Horizon 2020 programme, is **to develop an advanced platform for training against cyber attacks**. The new platform is intended to cover

emulation and the simulation of gaming and visualisation capacity and their application for the preparation and development of expertise in the field of the protection of high-risk cybernetic systems and entities. Through the outputs of the project, the ability of security teams to face advanced, known and new computer attacks is to be increased. Training activities are built on selected model scenarios supplemented by advanced tools for their evaluation.

From the point of view of achieving the set goal, the key is the design and development of a CTTTP (Cyber Threat and Training Preparation) platform designed to train defence against cyber attacks and improve the protection of selected systems. The CERT/CSIRT.CZ team specialists of CZ.NIC are involved in several project activities related to the creation and evaluation of the mentioned CTTTP model.

SPARTA

Since 2019, the CZ.NIC Association, together with Brno University of Technology and the CESNET Association, has been involved in another project implemented within the Horizon 2020 programme – SPARTA. It brought together 44 organisations focused on science and research, technological innovation and the social sciences.

The general objective of the project is to **map and re-evaluate the current way of conducting cybersecurity research in Europe**. Within the individual parts of the project, solutions are being developed and shared to help security experts prevent cybercrime and increase cybersecurity.

CZ.NIC is represented in the project by experts from the national CERT/CSIRT team, who, from the position of the end user, participate in the implementation of one of the research programmes of the project called T-Shark. The aim of this programme is to create a comprehensive

framework for the detection, identification and, above all, prediction of cyber threats and the sharing of information among partners.

At the same time, the implementation of the project makes it possible to establish and deepen relations with actors across the continent who, from various angles of their professional activities, focus on cybersecurity. The CZ.NIC Association is thus further establishing itself in the professional European community.

RegelID

At the end of 2020, the European Commission published the publication *Connecting Europe Facility - TELECOM*, in which it presents selected activities supporting the deployment of digital networks and cross-border interoperable services throughout Europe. Among the projects highlighted was the RegelID project, behind which the CZ.NIC Association stands and which it manages.

The project supports the integration of eID DSI with the registration services of national top-level domain administrators (TLDs) in four EU countries: the Czech Republic, Denmark, Estonia and the Netherlands. The project will reduce restrictions on the management of EU domain names in other EU Member States. Applicants for registration will be able to secure their registered domain information through national eIDs (electronic identifications). This will increase trust, confidence and security throughout the internet environment. In addition, this should prevent false domain registrations, which will significantly help in the fight against cybercrime and contribute to the protection of intellectual property rights.

The project will also identify barriers to the connection of national registrars to the eIDAS infrastructure, and these will be shared with relevant stakeholders. The project thus prepares the environment for the

future absorption of eID DSI into various segments of the internet domain industry.

CZ Node Upgrade

This project **follows on from the CZ.PEPS project**, implemented in 2016-2019. The goal of the new CZ Node Upgrade project is to update the eIDAS node to the latest version of the software, CEF eIDAS Node 2.5, which implements the new version of the eIDAS 1.2 technical specifications. The European Commission, with financial support for this upgrade, is seeking to encourage Member States to support the latest versions of the specifications for maximum interoperability. The **eIDAS node allows for the cross-border recognition of electronic identification in Europe**, in accordance with Regulation 910/2014 of the European Parliament and of the Council (the so-called eIDAS).

11.2 Engagement in national and other projects

The CZ.NIC Association is also actively involved, in the long term, in national scientific research and development projects, especially within the Security Research Programme of the Czech Republic for the years 2015-2020.

Prediction and Protection from Cyber Incidents (PROKI)

The aim of the project is to build a modern **system for the detection, identification and prediction of cyber threats**, which, on the basis of the analysis of data and information about traffic in electronic communications networks, creates methods and procedures for assessing vulnerabilities in critical information infrastructure.

PROKI allows the data that is affected to be correlated, and thus a deeper insight to be gained into the relationship between individual incidents and their perpetrators. The second layer of the system is the distribution of information about security incidents. This is both in the form of identified vulnerabilities and the so-called Graylists (lists of malicious IP addresses), which will be taken over by the operators of critical information infrastructure. Another integral part of the project is a system for reporting cybersecurity incidents in accordance with the Cyber Security Act and their evaluation and handover to the NSA.

Through PROKI, network administrators in the Czech Republic will gain a high-quality and time-relevant overview of cyber events and incidents that originate in their networks, and an advanced tool for analytical work and the modern display of traffic data.

In 2020, the PROKI development team focused on completing small details, such as the connection of the PROKI analytical interface to the PassiveDNS service, and prepared the documents and outputs required as part of the project completion.

The project was thus **formally completed in 2020** and passed by the Ministry of the Interior of the Czech Republic. The CZ.NIC Association met all the set goals and indicators that were set at the beginning of the project. The experts of the national CERT/CSIRT.CZ team are behind the design, implementation and operation of the solution.

Within the next five-year period of project sustainability, which was a precondition for project financing, CSIRT.CZ plans to carry out, in addition to the necessary maintenance of the system, further gradual development based on its own knowledge or community requirements.

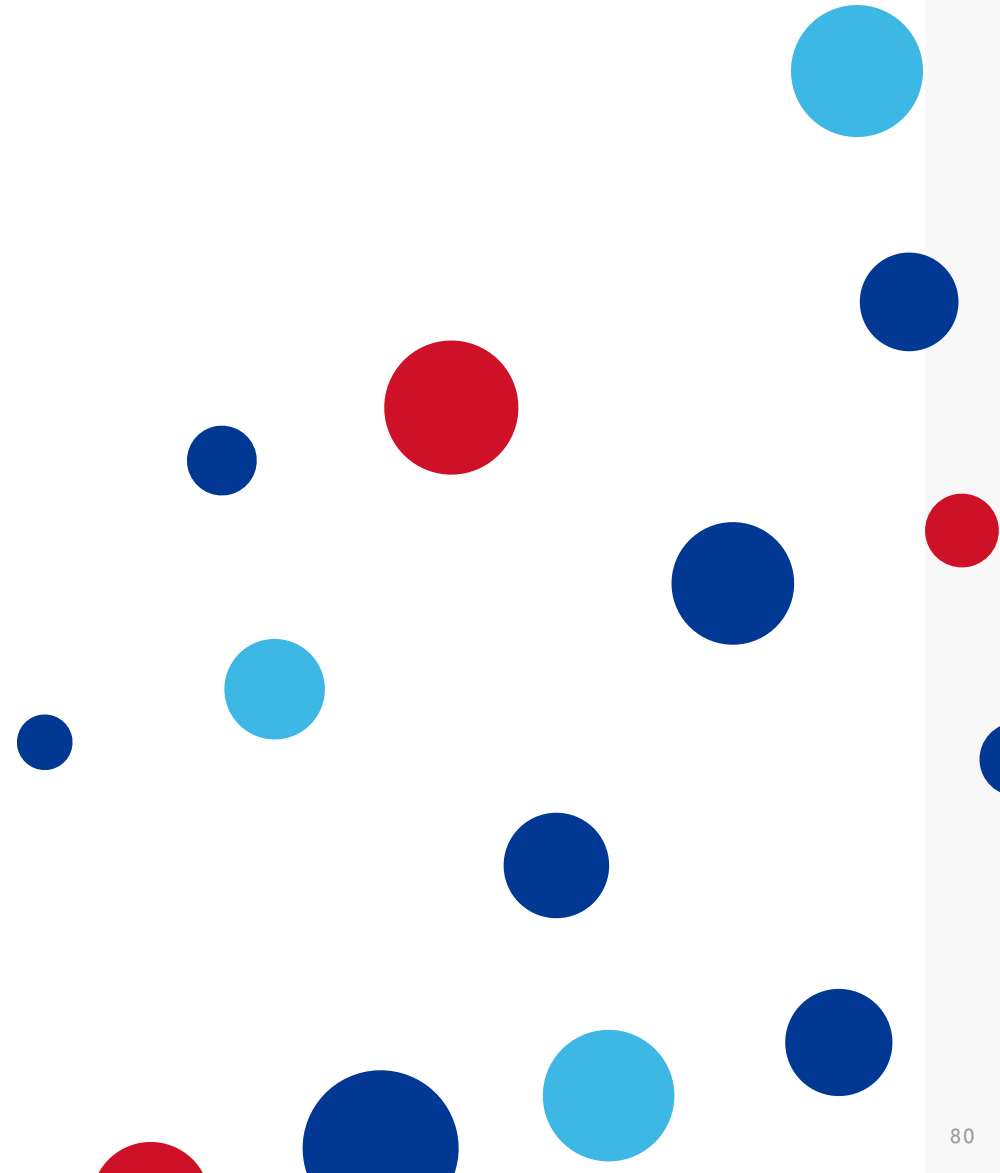
Building and testing Cyber Threat Intelligence (CTI)

The project is aided by the Ministry of the Interior of the Czech Republic within the Programme of Security Research for the Needs of the State in the period of 2016-2021. It focuses on **strengthening the protection of critical information infrastructure** and other important information systems and networks.

The aim of the project is to design and verify in operation the feasibility of an effective mechanism for the detection, identification and prevention of cyber threats and evaluation of cybersecurity incidents (Cyber Threat Intelligence - CTI). The main research task is to create procedures for identifying problems (attacks, threats, vulnerabilities) typical of network environments of a similar nature. Another part of the solution, which should contribute to the implementation of selected parts of Act No. 181/2014 Coll., on cybersecurity, is the sharing of information on security events, incidents and threats by both international and governmental CERTs and selected operators of electronic communications networks.

By building an effective system for detecting, identifying and predicting cyber threats and evaluating cybersecurity incidents, it seeks to reduce the damage caused by cybercrime. The project is being implemented in close cooperation with the CESNET Association and in communication with the project guarantor in the form of the National Cyber and Information Security Agency (NÚKIB). Specialists from selected departments are involved on behalf of CZ.NIC.

The project also includes the distribution and placement of more than 700 hardware probes based on Turrus routers, which will function as devices for data collection and protection against cyber attacks in the environment of selected public administration entities.





12 Structure of the association

12.1 Members

The member base of the association is made up of a number of entities which are significantly **involved in the functioning of the Czech internet**. Among its members are representatives of internet and telecommunications service providers, domain name registrars, publishers of internet and print media, e-commerce businesses and companies for whom the internet and domain names are an important communication tool.

The CZ.NIC association is one of the places where these representatives can meet and thus influence the future direction of the Czech internet. Further expansion of the association's knowledge portfolio, streamlining its management and response to the constant development of the internet allow a wide range of business activities of members and their involvement in the association, either by attending general meetings, working groups and seminars, email conferences or directly working in bodies of the association.

Membership conditions

A legal entity that meets the general conditions for membership can become a member of the association:

- location of the seat or organisational unit in the territory of one of the Member States of the European Union,
- holding at least one domain name in ccTLD .CZ,
- payment of the entrance membership fee.

The members of the association are divided into three chambers:

- Chamber of Domain Name Holders,
- ISP Chamber,
- Chamber of Registrars.

The statutes govern the special conditions of the membership of the individual chambers. The chamber arrangement brings benefits to the members of the association, who can easily formulate and defend their opinions and interests together with other similarly-oriented entities.

The chamber arrangement also streamlines the course and the meetings of the association bodies, in particular, the Collegium and the General Meeting.

12.1.1 Number of members by chamber

As of 31 December 2020, the CZ.NIC Association had a total of **119 members**.

Development of the number of members by chamber

Chamber/ Year	ISP	Registrars	Domain name holders	Total
2008	15	11	31	57
2009	17	14	32	63
2010	19	19	37	75
2011	23	17	49	89
2012	27	18	61	106
2013	27	19	65	111
2014	24	20	69	113
2015	23	20	72	115
2016	25	20	67	112
2017	26	18	71	115
2018	26	19	69	114
2019	27	17	72	116
2020	27	17	75	119

Division of members according to chambers

ISP	23%
Registrars	14%
Domain name holders	63%

12.1.2 Overview of members by chamber

Overview of chamber members as of 31 December 2020

Chamber of Domain Name Holders (business name, company identification number)

ABRATICA s.r.o.	26108534
ACOMWARE s.r.o.	25047965
ADAPTIVITY s.r.o.	24156027
AdminIT s.r.o.	27864901
Advio Network, s.r.o.	28565673
Adytia Innovation OÜ	14498430
AKREDIT, spol. s r.o.	25797387
ALEF NULA, a.s.	61858579
ALENSA, s.r.o.	27179681
AliaWeb, spol. s r.o.	26117363
Asociace pro elektronickou komerci, z.s. (Association of E-commerce)	68684797
AUDITEL, s.r.o.	26775034
CD PROFESIONAL security agency, s.r.o.	25712713
CISCO SYSTEMS (Czech Republic) s.r.o.	63979462

ComSource s.r.o.	29059291
Com-Sys TRADE spol. s.r.o.	16188781
CQK HOLDING a.s.	28405579
CYBERSALES a.s.	26199653
Datahost s.r.o.	26390973
DELL Computer, spol. s.r.o.	45272808
ECOMOLE LTD.	9526615
ekolo.cz s.r.o.	27141659
Fortion Networks, s.r.o.	26397994
Greenlux s.r.o.	28608747
Holubová advokáti s.r.o.	24686727
H17 Networks, s.r.o.	27374041
ICZ a.s.	25145444
igloonet, s.r.o.	27713482
I. H. P. společnost s ručením omezeným	48117846
INBES, spol. s r.o.	14502593
Intell. Net s. r. o.	27971546
Internet Info, s.r.o.	25648071
Internet Mall, a.s.	26204967
i - registry s.r.o.	28451082
Klíč, spol. s r.o.	28129377
Laurián s.r.o.	29018919
MAFRA, a.s.	45313351
Mailkit s. r. o.	26449901
MARIAS s.r.o.	26136139
MASANTA s.r.o.	25730533
MEDIA FACTORY Czech Republic a.s.	26288311
Michal Krsek & partneři s.r.o.	27418570
MITE Infonet s.r.o.	25660292
Modrá Busina s.r.o.	28885961
Moonlake Web Services, s.r.o.	29249911
Neutral czFree eXchange, z.s.p.o.	75093201
NEW MEDIA GROUP s.r.o.	26124611

Nux s.r.o.	27234631
Občanské sdružení Ubuntu pro Českou republiku	22674608
Orego finance s.r.o.	24718955
Panificium, s.r.o.	4526767
PharoCom s.r.o.	25172131
Prague Business Office s.r.o.	27143481
Pražský Účetní Servis s.r.o.	26740575
Qrator Labs CZ s.r.o.	3620174
Q3, s.r.o.	26226073
Skymia s.r.o.	28238613
Software602 a.s.	63078236
Socha, spol. s.r.o.	48291153
Solitea, a.s.	1572377
SuperNetwork s.r.o.	25492063
SVBsoft, s.r.o.	28523644
Tech Ware spol. s.r.o.	14891107
TIKWI s.r.o.	28917651
Trustica s.r.o.	26514362
Unie vydavatelů, z.s. (Czech Publishers Association)	15887081
ÚVT, s.r.o.	25701118
Vedea s.r.o.	28913876
VIZUS.CZ s.r.o.	27155315
VOLNÝ, a.s.	63080150
Vymáhání a odkup pohledávek s.r.o.	27566510
Webarium, s.r.o.	26089602
Webnames s.r.o.	44848692
Ztracené kobylinky, z.s.	22753001
1X s.r.o.	44632142

ISP Chamber (business name, company identification number)

ABAK, spol. s r.o., CZE ABAK, GmbH GER ABAK, Co.Ltd. ENG	40763153
Casablanca INT a.s.	9070931
CentroNet, a.s.	26165473
CESNET, z.s.p.o.	63839172
COOLHOUSING s.r.o.	14893983
ČD - Telematika a.s.	61459445
České Radiokomunikace a.s.	24738875
Dragon Internet a.s.	27237800
Družstvo EUROSIGNAL	26461129
Faster CZ spol. s.r.o.	60722266
FreeTel, s.r.o.	24737887
INTERNEXT 2000, s.r.o.	25352288
IPEX a.s.	45021295
ISP Alliance a.s.	28205812
JHComp s.r.o.	26051362
LAM plus s.r.o.	25129619
Mach3net s.r.o.	27344860
Master Internet, s.r.o.	26277557
NetArt Group s.r.o.	27612694
Pe3ny Net s.r.o.	27252183
PODA a.s.	25816179
STARNET, s.r.o.	26041561
T-Mobile Czech Republic a.s.	64949681
ÚVT Internet s.r.o.	24288705
VIVO CONNECTION, spol. s r.o.	26900696
VSHosting s.r.o.	61505455
2 connect a.s.	29007542

Chamber of Registrars (business name, company identification number)

ACTIVE 24, s.r.o.	25115804
Dial Telecom, a.s.	28175492
e-BAAN Net s.r.o.	26867257
INTERNET CZ, a.s.	26043319
KRAXNET s.r.o.	26460335
Media4web, s.r.o.	26735903
ONE.CZ s.r.o.	25503651
ONEsolution s.r.o.	27710335
O2 Czech Republic a.s.	60193336
Seonet Multimedia s.r.o.	27522041
Seznam.cz, a.s.	26168685
Stable.cz s.r.o.	28741048
TELE3 s.r.o.	26096960
IGNUM, s.r.o.	26159708
Web4U s.r.o.	26058774
ZONER software, a.s.	49437381
ZooControl s.r.o.	5766656

12.2 Bodies of the association

12.2.1 General Meeting

The supreme body of the association is the General Meeting, i.e. all members of the association. They are divided into three chambers - the Chamber of Registrars, the ISP Chamber and the Chamber of Domain Name Holders.

Each member of the association has the right to participate in the General Meeting and promote their ideas and provide opinions and comments.

12.2.2 Collegium

The Collegium is a body of the association consisting of members elected by the individual chambers of the General Meeting and/or by other persons.

The powers of the Collegium include, for example, approving the association's concept and budget, approving agreements between the association and the state, and electing and removing members of the Board of Directors and Supervisory Board.

The Collegium has a total of 21 members, of which 18 members are elected by the individual chambers of the General Meeting. Public

administration authorities nominate three members.

Members of the Collegium are elected to serve three-year terms.

Members of the Collegium elected by the General Meeting in the period from 1 January 2020 to 18 December 2020

Chamber of Domain Name Holders

- Marek Antoš
- Dan Ohnesorg
- Bedřich Košata
- Jan Redl
- Karel Taft
- Pavel Tvrdík

ISP Chamber

- Ondřej Filip
- Tomáš Košnar
- Jiří Kysela (died on 6 December 2020)
- Vlastimil Pečínka
- Zbyněk Pospíchal
- Milan Švácha

Chamber of Registrars

- Tomáš Fiala
- Martin Kukačka
- Stanislav Kysela
- Erich Syrovátka
- Petr Šmída
- Jaroslav Štětina

Members of the Collegium elected by the General Meeting in the period from 19 December 2020 to 31 December 2020

Chamber of Domain Name Holders

- Marek Antoš
- Dan Ohnesorg
- Bedřich Košata
- Jan Redl
- Karel Taft
- Pavel Tvrdík

ISP Chamber

- Tomáš Košnar
- Vlastimil Pečínka
- Zbyněk Pospíchal
- Marcel Procházka
- Milan Švácha

Chamber of Registrars

- Tomáš Fiala
- Tomáš Hála
- Martin Kukačka
- Stanislav Kysela
- Petr Šmída

Collegium members nominated by state authorities:

- **Zina Bumbálková**, Ministry of Industry and Trade of the Czech Republic
- **Marie Moravcová**, Czech Chamber of Commerce
- **Jiří Peterka**, Czech Telecommunication Office

12.2.3 Board of Directors

The Board of Directors is a governing body that manages the association's activities and acts in its name.

Members of the Board of Directors in the period from 1 January to 31 December 2020

- **Karel Taft** (born in 1971), Chair of the Board of Directors
- **Marek Antoš** (born in 1979), Deputy Chair of the Board of Directors
- **Tomáš Košnar** (born in 1965), member
- **Martin Kukačka** (born in 1980), member
- **Jiří Kysela** (born in 1955), member - until his death on 6 December 2020

12.2.4 Supervisory Board

The association's control body, which supervises the performance of the Board of Directors and the implementation of the association's activities.

Members of the Supervisory Board in the period from 1 January to 31 December 2020

- **Jan Redl**, Chairman of the Supervisory Board
- **Ilona Filípková**, member
- **Vlastimil Pečínka**, member

12.2.5 Management

- **Ondřej Filip**, Chief Executive Officer
- **Martin Peterka**, Chief Operating Officer
- **Tomáš Fuňka**, Chief Financial Officer
- **Zdeněk Brůna**, Chief Technical Officer
- **Ladislav Lhotka**, Head of Research Team (CZ.NIC Labs)
- **Michal Hrušecký**, Head of the Hardware Development Department
- **Jaromír Talíř**, Technical Fellow
- **Ondřej Písek**, Chief Marketing Officer
- **Vilém Sládek**, Chief Communications Officer
- **Jaromír Novák**, Partner for Relations with Public Administration
- **Petr Palán**, Global Growth Manager

13 Human resources

The association's strength lies in its professionally competent and qualified employees, who are essential for achieving its mission and further development. Many employees are truly leading experts in the field who have a reputation both in the Czech Republic and internationally.

In order to strengthen individual competencies, all employees are continuously educated in the field of foreign languages, soft skills and professional knowledge in order to achieve the maximum professional and personal qualities, and thus contribute to the further development of the CZ.NIC Association and the Czech internet.

13.1 State and development of the number of employees

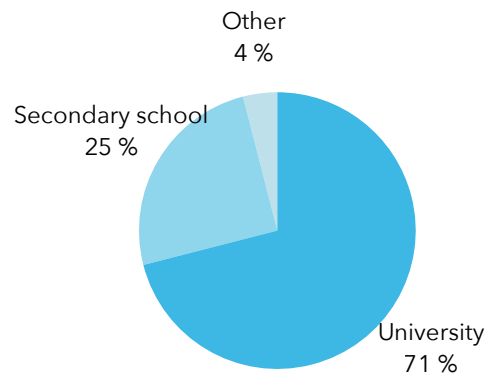
In 2020, the number of employees of the association increased slightly again. In particular, the HW Development Department and development and network management teams were strengthened. The association also filled the position of public relations partner, who became a member of the management.

Department	Number of employees (as of 31 December 2019)	Number of FTEs (as of 31 December 2019)	Number of employees (as of 31 December 2020)	Number of FTEs (as of 31 December 2020)
Management	8	8.000	11	10.600
Marketing/PR	8	7.750	9	9.000
Academy	2	2.000	1	1.000
Development	22	19.275	24	21.550
Network Administration	10	8.875	13	11.250
CZ.NIC Labs	27	24.100	27	24.350
Legal	2	1.750	2	1.750
Secretariat	2	2.000	2	2.000
HR	1	1.000	1	0.000
Customer Support	11	10.800	11	11.000
CSIRT	10	9.000	9	7.000
HW Development Department	25	20.750	29	23.100
EU Projects	3	3.000	5	2.750
Total	131	118.300	144	125.350

13.2 Employee structure

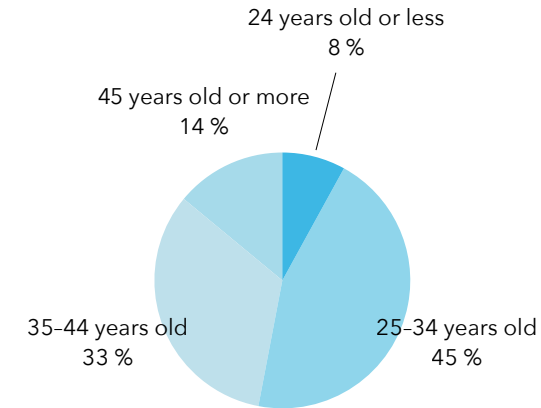
Employee structure by education

Most employees of the association have a university degree. The CZ.NIC Association also provides the opportunity to acquire professional experience to fresh university graduates, for whom it is trying to build suitable conditions and whom it assigns to its branches in Brno, České Budějovice and Plzeň. Thanks to this, the association managed to slightly increase the share of university-educated employees.



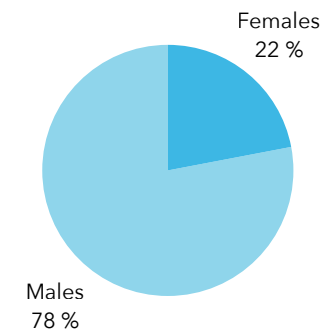
Employee structure by age

The average age of the employees of the association is 36 years. In terms of age structure, employees aged 25-34 predominate. This is mainly due to the support of university graduates.



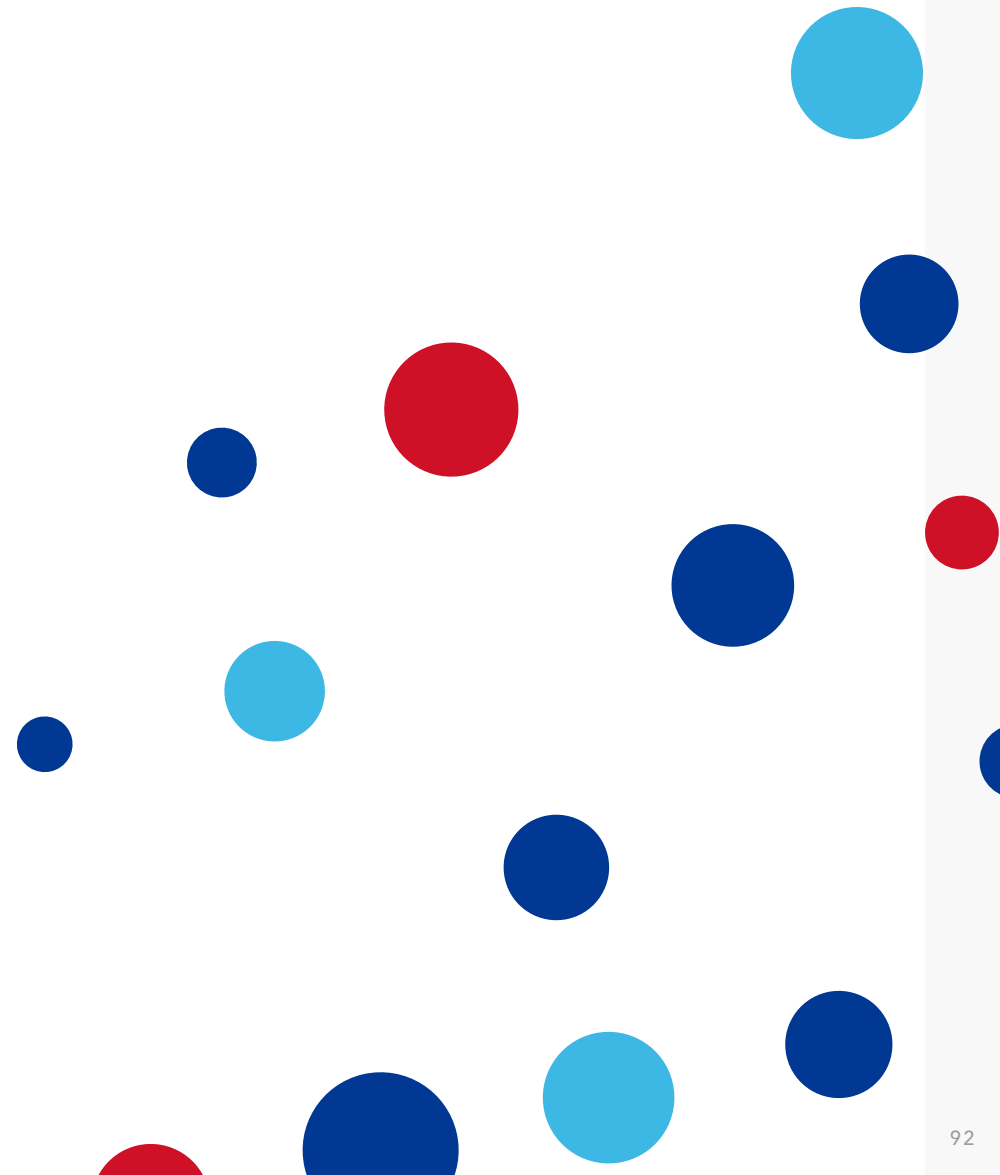
Employee structure by gender

In recruiting new employees, CZ.NIC encourages equal opportunities and the involvement of women. Among other things, it offers the possibility of working part-time, which allows employees to combine their work and parental responsibilities. As a result of the structure of graduates in the technical branches of higher education institutions, however, the proportion of men still prevails, as in other technology companies.



Impact of Covid-19 on employees

The year 2020 was highly exceptional in the field of HR as well, as a result of the Covid-19 pandemic. CZ.NIC employees have proved that they can work responsibly even in the forced home office mode. The association has, of course, given them every possible support.





14 Selected financial indicators

14.1 Balance sheet

	2016	2017	2018	2019	2020
Total assets	491,643	503,747	534,656	569,478	602,667
Fixed assets	84,611	85,885	89,103	89,001	80,579
Intangible fixed assets	1,914	659	1,438	1,333	931
Tangible fixed assets	82,697	85,226	87,665	87,668	79,648
Non-current financial assets	0	0	0	0	0
Current assets	406,080	416,699	444,082	479,202	521,033
Inventory	14,340	20,829	40,435	41,045	49,591
Receivables	6,340	17,174	8,860	10,425	14,560
Current financial assets	171,141	102,257	132,609	194,885	206,593
Cash	214,259	276,439	262,178	232,847	250,289
Accrual of assets	952	1,163	1,471	1,275	1,055
Total liabilities	491,643	503,747	534,656	569,478	602,667
Equity	324,045	332,308	338,039	358,705	382,368
Registered capital	0	0	0	0	0
Capital funds	0	0	0	0	0
Funds from profit	135,197	156,847	167,121	172,853	193,520
Profit/loss of previous years	167,198	165,185	165,185	165,185	165,185
Profit/loss for the current fiscal period	21,650	10,276	5,733	20,667	23,663
External sources	48,059	53,906	67,723	68,862	72,841
Reserves	2,359	3,064	6,454	8,691	14,512
Payables	45,700	50,842	61,269	60,171	58,329
Accrual of liabilities	119,539	117,533	128,894	141,911	147,458

In CZK '000

14.2 Profit and loss account

	2016	2017	2018	2019	2020
Revenue from the sale of products and services	166,635	182,860	178,530	193,364	207,631
Revenue from the sale of goods	28,262	13,886	11,267	20,210	24,522
Other operating income	1,884	12,184	13,304	13,813	11,657
Production consumption	73,668	75,970	67,523	70,268	65,827
Change in inventories of the association's own operations	-372	0	-951	82	256
Association's own work capitalised	-153	0	0	0	0
Staff costs	85,706	98,706	111,018	117,380	129,418
Adjusting values in the operational area	16,996	16,524	12,747	17,104	14,393
Other operating expenses	1,486	2,258	3,957	5,005	7,663
Operating profit/loss	19,450	15,472	8,807	17,548	26,253
Interest income and similar income	138	62	311	1,286	920
Other financial income	13,417	96,726	57,271	30,343	24,606
Other financial expenses	11,731	100,810	58,233	25,590	22,578
Financial profit/loss	1,824	-4,022	-651	6,039	2,948
Profit before tax	21,274	11,450	8,156	23,587	29,201
Income tax	-376	1,174	2,423	2,920	5,538
Profit after tax	21,650	10,276	5,733	20,667	23,663

In CZK '000

15 List of suppliers

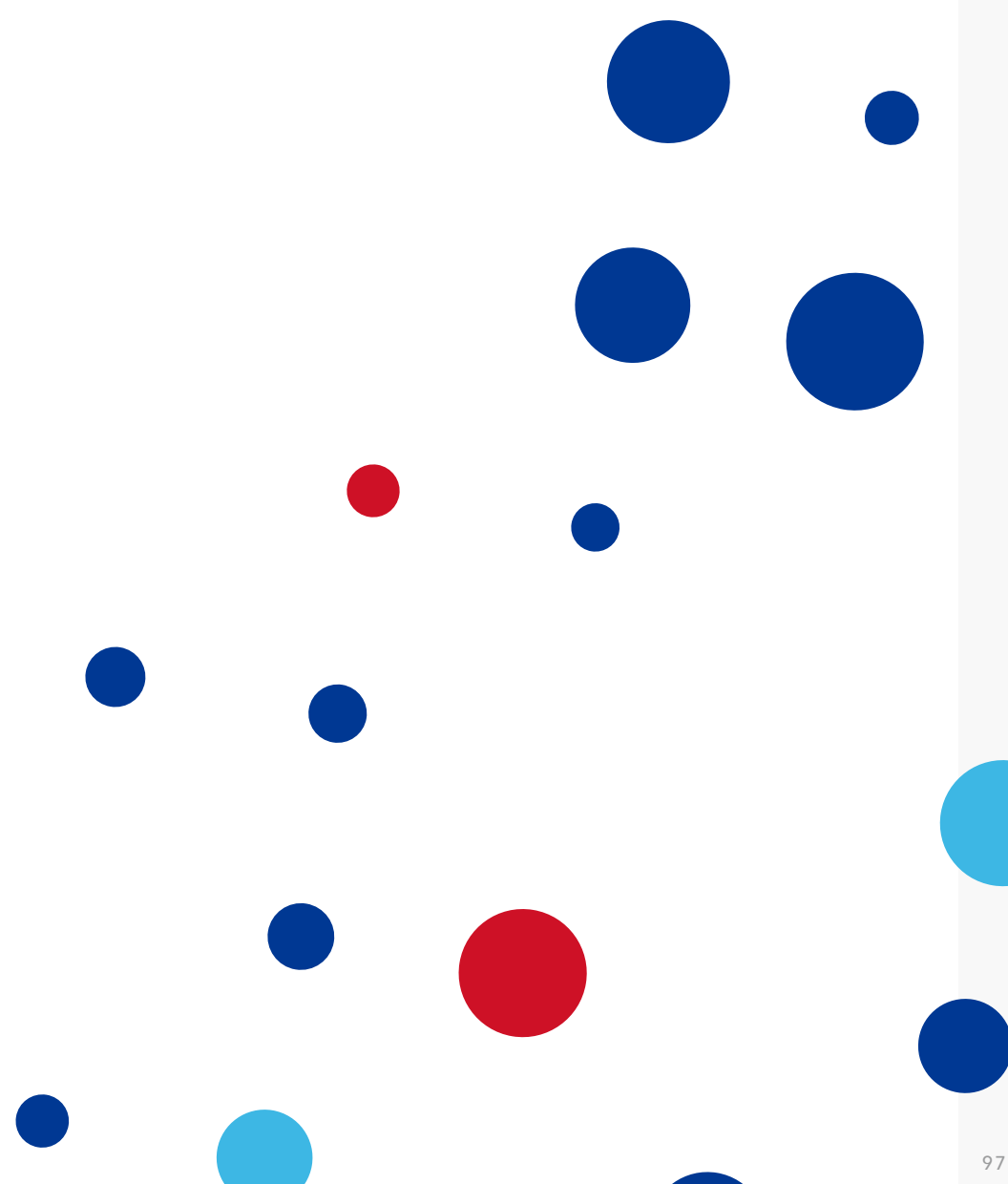
List of suppliers according to Article 45.4 of the Statutes:

AVNET Europe COMM.VA (An Operating Company) (Belgium)

CZK 7,459,072

COMPEX SYSTEMS PTE LTD. (Singapore)

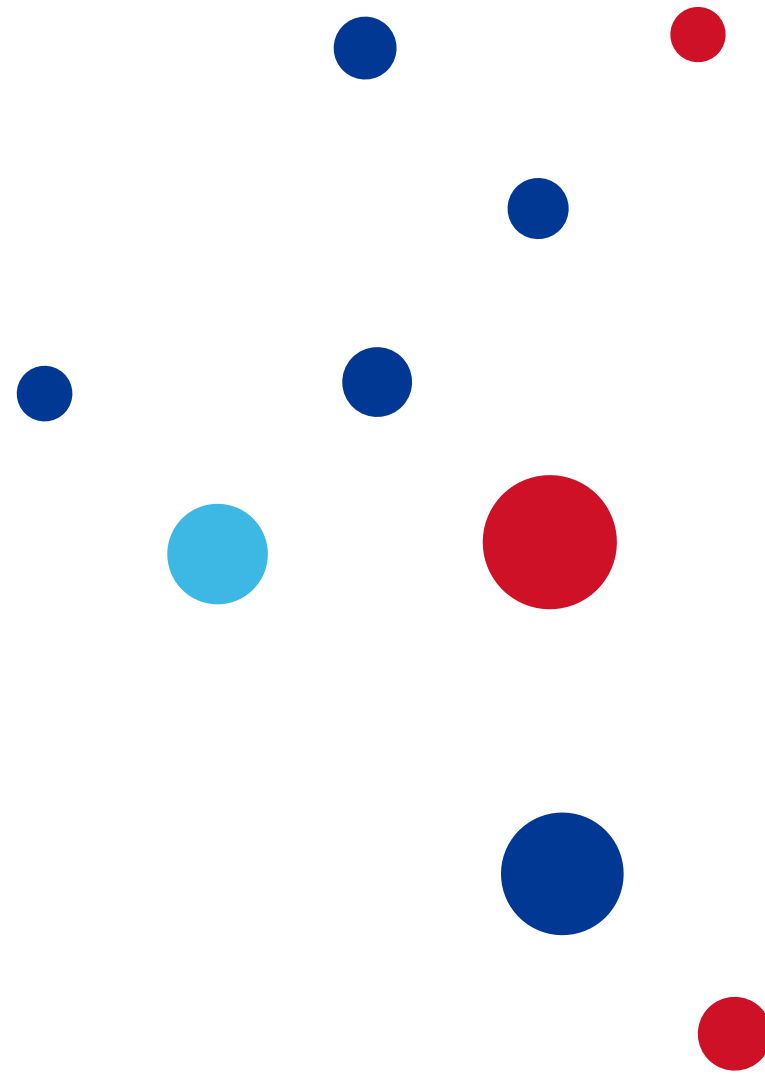
CZK 16,632,923





16 Data on facts between the date of the financial statements and the General Meeting

No events occurred in the given time that had an impact on the data presented in the financial statements for 2020.





17 Auditor's report

ZPRÁVA NEZÁVISLÉHO AUDITORA pro členy zájmového sdružení právnických osob

Výrok auditora

Provedli jsme audit přiložené účetní závěrky zájmového sdružení právnických osob CZ.NIC (dále jen „CZ.NIC“) sestavené na základě českých účetních předpisů, která se skládá z rozvahy k 31.12.2020, výkazu zisku a ztráty, za rok končící 31.12.2020, přehledu o změnách vlastního kapitálu, přehledu o peněžních tocích a přílohy této účetní závěrky, která obsahuje popis použitých podstatných účetních metod a další vysvětlující informace. Údaje o CZ.NIC jsou uvedeny v části 1 přílohy této účetní závěrky.

Podle našeho názoru účetní závěrka podává věrný a poctivý obraz aktiv a pasiv zájmového sdružení právnických osob CZ.NIC k 31.12.2020 a nákladů a výnosů a výsledku jejího hospodaření za rok končící 31.12.2020 v souladu s českými účetními předpisy.

Základ pro výrok

Audit jsme provedli v souladu se zákonem o auditorech a standardy Komory auditorů České republiky pro audit, kterými jsou mezinárodní standardy pro audit (ISA) případně doplněné a upravené souvisejícími aplikačními doložkami. Naše odpovědnost stanovená těmito předpisy je podrobněji popsána v oddílu Odpovědnost auditora za audit účetní závěrky. V souladu se zákonem o auditorech a Etickým kodexem přijatým Komorou auditorů České republiky jsme na CZ.NIC nezávislí a splnili jsme i další etické povinnosti vyplývající z uvedených předpisů. Domníváme se, že důkazní informace, které jsme shromáždili, poskytují dostatečný a vhodný základ pro vyjádření našeho výroku.



Ostatní informace uvedené ve výroční zprávě

Ostatními informacemi jsou v souladu s § 2 písm. b) zákona o auditorech informace uvedené ve výroční zprávě mimo účetní závěrku a naši zprávu auditora. Za ostatní informace odpovídá představenstvo CZ.NIC.

Náš výrok k účetní závěrce se k ostatním informacím nevztahuje. Přesto je však součástí našich povinností souvisejících s auditem účetní závěrky seznámení se s ostatními informacemi a posouzení, zda ostatní informace nejsou ve významném (materiálním) nesouladu s účetní závěrkou či s našimi znalostmi o účetní jednotce získanými během provádění auditu nebo zda se jinak tyto informace nejeví jako významně (materiálně) nesprávné. Také posuzujeme, zda ostatní informace byly ve všech významných (materiálních) ohledech vypracovány v souladu s příslušnými právními předpisy. Tímto posouzením se rozumí, zda ostatní informace splňují požadavky právních předpisů na formální náležitosti a postup vypracování ostatních informací v kontextu významnosti (materiality), tj. zda případné nedodržení uvedených požadavků by bylo způsobilo ovlivnit úsudek činěný na základě ostatních informací.

Na základě provedených postupů, do míry, již dokážeme posoudit, uvádíme, že

- ostatní informace, které popisují skutečnosti, jež jsou též předmětem zobrazení v účetní závěrce, jsou ve všech významných (materiálních) ohledech v souladu s účetní závěrkou a
- ostatní informace byly vypracovány v souladu s právními předpisy.

Dále jsme povinni uvést, zda na základě poznatků a povědomí o CZ.NIC, k nimž jsme dospěli při provádění auditu, ostatní informace neobsahují významné (materiální) věcné nesprávnosti. V rámci uvedených postupů jsme v obdržených ostatních informacích žádné významné (materiální) věcné nesprávnosti nezjistili.

Odpovědnost představenstva CZ.NIC za účetní závěrku

Představenstvo CZ.NIC odpovídá za sestavení účetní závěrky podávající věrný a poctivý obraz v souladu s českými účetními předpisy a za takový vnitřní kontrolní systém, který považuje za nezbytný pro sestavení účetní závěrky tak, aby neobsahovala významné (materiální) nesprávnosti způsobené podvodem nebo chybou.





Při sestavování účetní závěrky je představenstvo CZ.NIC povinno posoudit, zda je CZ.NIC schopno nepřetržitě trvat, a pokud je to relevantní, popsat v příloze účetní závěrky záležitosti týkající se jejího nepřetržitého trvání a použití předpokladu nepřetržitého trvání při sestavení účetní závěrky, s výjimkou případů, kdy představenstvo CZ.NIC plánuje zrušení CZ.NIC nebo ukončení její činnosti, resp. kdy nemá jinou reálnou možnost než tak učinit.

Odpovědnost auditora za audit účetní závěrky

Naším cílem je získat přiměřenou jistotu, že účetní závěrka jako celek neobsahuje významnou (materiální) nesprávnost způsobenou podvodem nebo chybou a vydat zprávu auditora obsahující náš výrok. Přiměřená míra jistoty je velká míra jistoty, nicméně není zárukou, že audit provedený v souladu s výše uvedenými předpisy ve všech případech v účetní závěrce odhalí případnou existující významnou (materiální) nesprávnost. Nesprávnosti mohou vzniknout v důsledku podvodů nebo chyb a považují se za významné (materiální), pokud lze reálně předpokládat, že by jednotlivě nebo v souhrnu mohly ovlivnit ekonomická rozhodnutí, která uživatelé účetní závěrky na jejím základě přijmou.

Při provádění auditu v souladu s výše uvedenými předpisy je naší povinností uplatňovat během celého auditu odborný úsudek a zachovávat profesní skepticismus. Dále je naší povinností:

- Identifikovat a vyhodnotit rizika významné (materiální) nesprávnosti účetní závěrky způsobené podvodem nebo chybou, navrhnout a provést auditorské postupy reagující na tato rizika a získat dostatečné a vhodné důkazní informace, abychom na jejich základě mohli vyjádřit výrok. Riziko, že neodhalíme významnou (materiální) nesprávnost, k níž došlo v důsledku podvodu, je větší než riziko neodhalení významné (materiální) nesprávnosti způsobené chybou, protože součástí podvodu mohou být tajné dohody (koluze), falšování, úmyslná opomenutí, nepravdivá prohlášení nebo obcházení vnitřních kontrol.
- Seznámit se s vnitřním kontrolním systémem CZ.NIC relevantním pro audit v takovém rozsahu, abychom mohli navrhnout auditorské postupy vhodné s ohledem na dané okolnosti, nikoli abychom mohli vyjádřit názor na účinnost jejího vnitřního kontrolního systému.
- Posoudit vhodnost použitých účetních pravidel, přiměřenost provedených účetních odhadů a informace, které v této souvislosti představenstvo CZ.NIC uvedlo v příloze účetní závěrky.

3 ADU.CZ s.r.o. - společnost zapsána v Obchodním rejstříku u Krajského soudu v Českých Budějovicích, oddíl C, vložka 4943
Záměstí 68. 387 06 Malenice. IČO: 62522078. DIČ: CZ62522078



- Posoudit vhodnost použití předpokladu nepřetržitého trvání při sestavení účetní závěrky představenstvem a to, zda s ohledem na shromážděné důkazní informace existuje významná (materiální) nejistota vyplývající z událostí nebo podmínek, které mohou významně zpochybnit schopnost CZ.NIC nepřetržitě trvat. Jestliže dojdeme k závěru, že taková významná (materiální) nejistota existuje, je naší povinností upozornit v naší zprávě na informace uvedené v této souvislosti v příloze účetní závěrky, a pokud tyto informace nejsou dostatečné, vyjádřit modifikovaný výrok. Naše závěry týkající se schopnosti CZ.NIC nepřetržitě trvat vycházejí z důkazních informací, které jsme získali do data naší zprávy. Nicméně budoucí události nebo podmínky mohou vést k tomu, že CZ.NIC ztratí schopnost nepřetržitě trvat.
- Vyhodnotit celkovou prezentaci, členění a obsah účetní závěrky, včetně přílohy, a dále to, zda účetní závěrka zobrazuje podkladové transakce a události způsobem, který vede k věrnému zobrazení.

Naší povinností je informovat představenstvo CZ.NIC mimo jiné o plánovaném rozsahu a načasování auditu a o významných zjištěních, která jsme v jeho průběhu učinili, včetně zjištěných významných nedostatků ve vnitřním kontrolním systému.

Ve Strakonících, dne 23. června 2021

ADU.CZ s.r.o.
Záměstí 68, 387 06 Malenice
oprávnění Komory auditorů České republiky číslo 368
za auditorskou společnost vypracovala Ing. Simona Pacáková, auditor
auditorské oprávnění Komory auditorů České republiky číslo 1825



Digitálně podepsal
Ing. SIMONA
PACÁKOVÁ
Datum: 2021.06.23
00:34:33 +02'00'

4 ADU.CZ s.r.o. - společnost zapsána v Obchodním rejstříku u Krajského soudu v Českých Budějovicích, oddíl C, vložka 4943
Záměstí 68. 387 06 Malenice. IČO: 62522078. DIČ: CZ62522078



18 Seat and contact details

CZ.NIC, z.s.p.o.

Milešovská 1136/5
130 00 Prague 3

Company ID No.: 67985726

Tax ID No.: CZ67985726

Phone: +420 222 745 111

www.nic.cz

The association is registered in the Register of Associations maintained by the Municipal Court in Prague, File No. L 58624.

CZ.NIC - 24-hour customer support

Phone: +420 222 745 111

Phone: +420 731 657 660

Email: podpora@nic.cz