



REPORT ON
VIET NAM INTERNET RESOURCES

2019



VNNIC - 20 YEARS
WITH THE DEVELOPMENT OF
INTERNET RESOURCES IN VIET NAM

DIRECTING COMPILATION

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INTRODUCTION

The **“Report on Viet Nam Internet Resources”** was first introduced in 2012 and since has become an annual publication which provides statistics and development results of Internet resources in Viet Nam.

In commemoration of the 20th anniversary of Vietnam Internet Network Information Center (VNNIC) (28/04/2000 – 28/04/2020) – the affiliation of the Ministry of Information and Communications that serves the function of management and development of Internet resources in Viet Nam, the **“Report on Viet Nam Internet resources 2019”** presents a full picture of the Internet resources development and the growth of VNNIC in the past 20 years.

We expect that this year’s report would continue to benefit the policy authorities from all reference of information and knowledge; to support enterprises and businesses to catch the popular trend of Internet resources development in Viet Nam, for better market research and activities.

This publication would be a meaningful gift on the occasion of VNNIC’s 20th anniversary for greater successes in the future. Due to the insufficient sources of data, any comment or feedback for this report is definitely welcome.

Thank you!

VIETNAM INTERNET NETWORK INFORMATION CENTER

PREFACE

OF DIRECTOR GENERAL OF VIETNAM INTERNET NETWORK INFORMATION CENTER

On behalf of Vietnam Internet Network Information Center, I would like to extend my greetings to all readers.

On April 28th 2000, Vietnam Internet Network Information Center (VNNIC) was established, marking a significant milestone in the field of Internet resources management that was still completely new in Viet Nam. With a lasting mission to manage and promote the Internet resources, ensure the stability and security of national critical information infrastructures, VNNIC has strived over the past 20 years to successfully complete our tasks, contributing greatly to the development of Internet in Viet Nam. We are proud that we have gained the recognition and a strong position in the Internet community.



The 20 year road was the effort and struggle of VNNIC's team to master high technologies and develop feasible management policies at different times. From the beginning with various difficulties in human and facilitate resources, VNNIC has overcome many challenges and expanded to the current position in the domestic and international field. Enormous gratitude must be paid to the attention and direction of former Leaders of the General Bureau of Posts, the Ministry of Information and Communications over the periods, the devotion of many generations of staffs, as well as the support from other Ministries, committees, regional and international organizations, “.vn” domain name Registrars, IP members and all Internet community.

“Report on Viet Nam Internet resources 2019” is a special publication that we would like to introduce to you a full picture of the Internet resources development and the growth of VNNIC in the past 20 years. There might be more difficulties and challenges in the upcoming path, but we believe our tradition and support from the community would help us to continue our effort to achieve more successes and contribute to the development of Viet Nam's Internet in the new age.

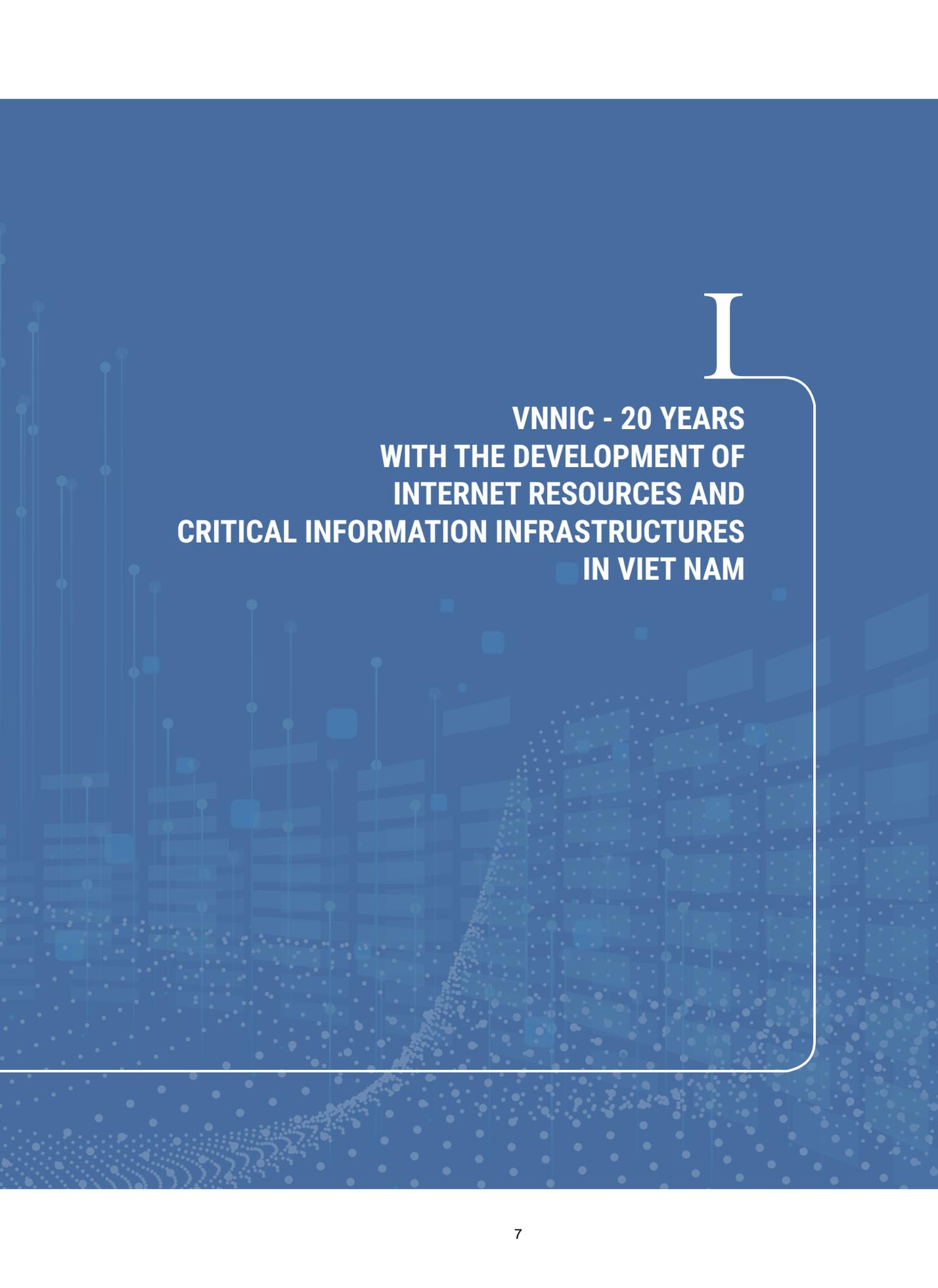
Thank you very much.

A handwritten signature in blue ink, which appears to read 'Tran Minh Tan'. The signature is written in a cursive style and is positioned above the printed name and title.

Dr. Tran Minh Tan
Director General

20

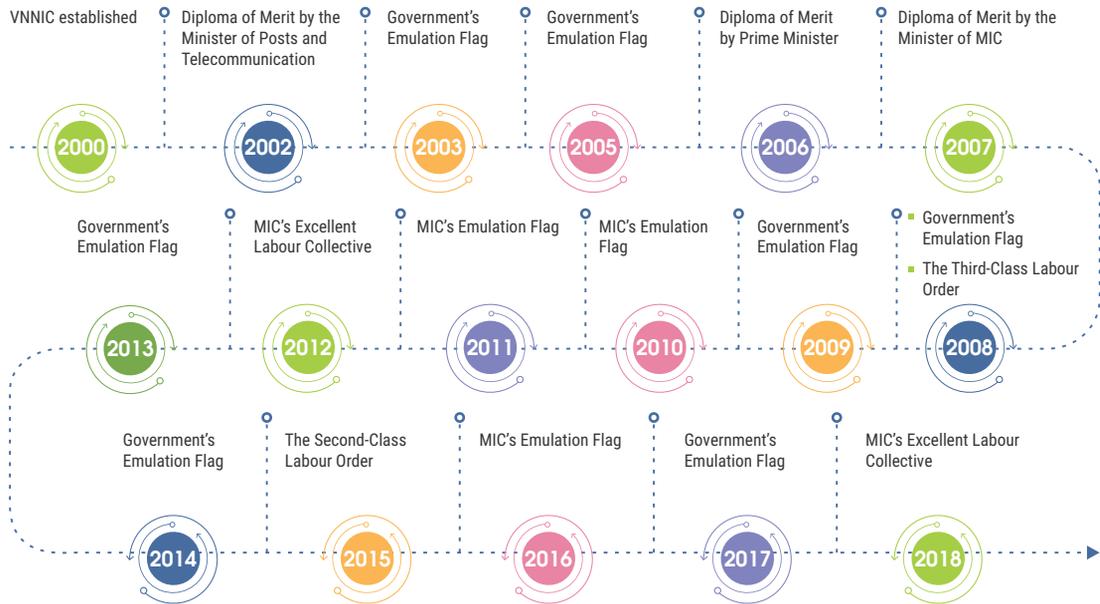




I

VNNIC - 20 YEARS WITH THE DEVELOPMENT OF INTERNET RESOURCES AND CRITICAL INFORMATION INFRASTRUCTURES IN VIET NAM

1. VNNIC - 20 YEARS OF ESTABLISHMENT AND DEVELOPMENT



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Deputy Director General



Mr. Le Nam Trung
Deputy Director General



Mr. Nguyen Hong Thang
Deputy Director General

Human resources and infrastructure development



IN HANOI

At the beginning, there were 12 staffs of VNNIC that temporarily worked at the office of the General Bureau of Posts and the Hanoi Post Office.

2003-2007: VNNIC office in Ha Noi City moved to the Radio Frequency Department building.

2008: VNNIC moved to a new office with the Department of Quality Management in Cau Giay District, Ha Noi City.

2012: VNNIC completed its office at Hoa Lac Hi-Tech Park.

2019: VNNIC moved the Head office to VNTA building.

By October 31st 2019, there have been 70 staffs working in Ha Noi City.



IN HOCHIMINH CITY

2002: DNS station number 2 was established and located in 27 Nguyen Binh Khiem Street, District 1.

2003: VNNIC office in Ho Chi Minh City was opened.

2008: VNIC Branch in Ho Chi Minh City was established.

2015: VNNIC Branch in Ho Chi Minh City was moved to Tan Thuan Export Processing Zone.

By October 31st 2019, there have been 15 staffs working in Ho Chi Minh City.



IN DANANG CITY

2005: DNS Station number 3 was established and located at the Ministry's office in the Middle and Central Highlands.

2011: VNNIC office in Da Nang City was moved to An Don Industrial Park.

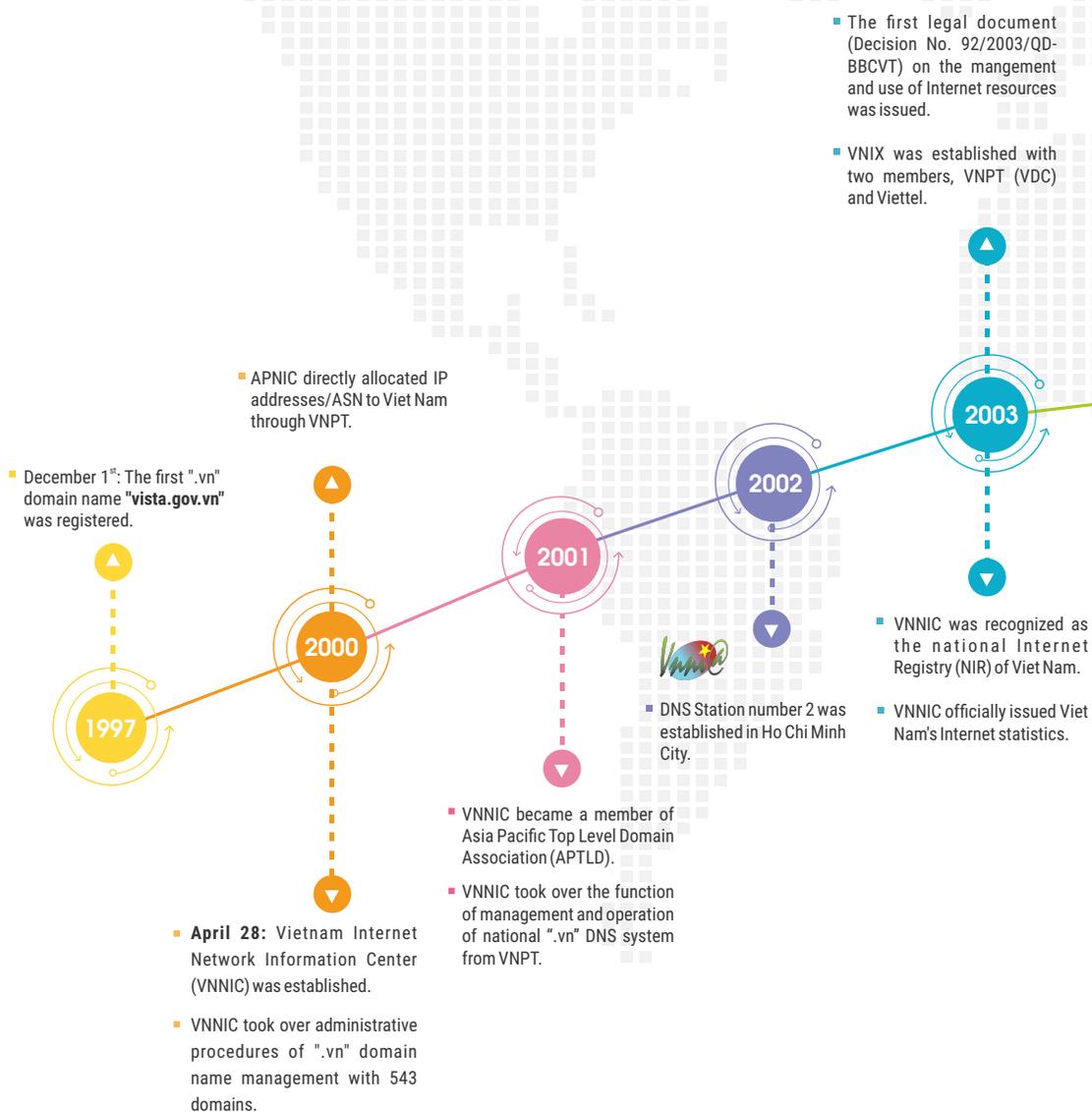
2015: VNNIC branch in Da Nang City was established.

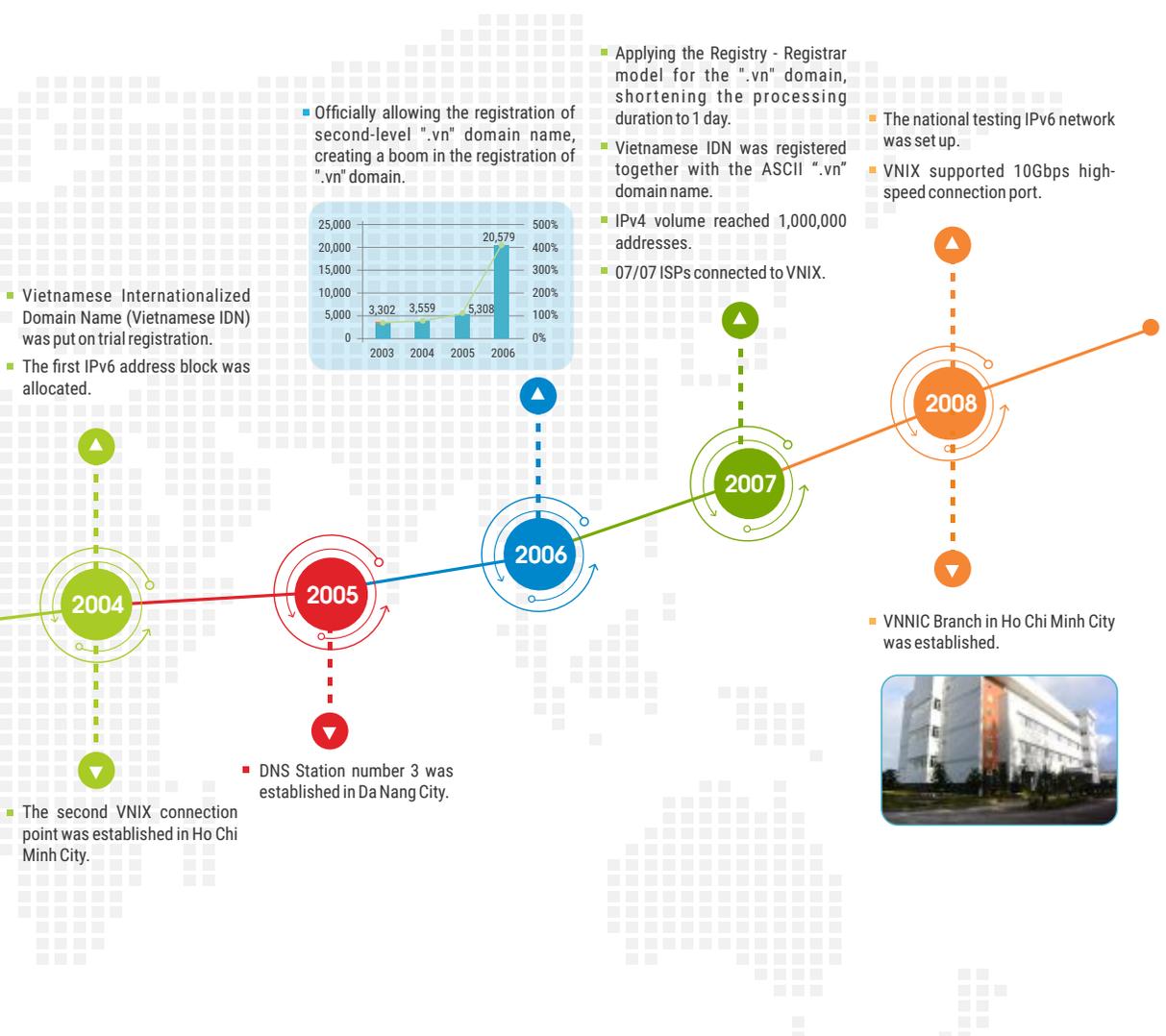
By October 31st 2019, there have been 19 staffs working in Da Nang City.

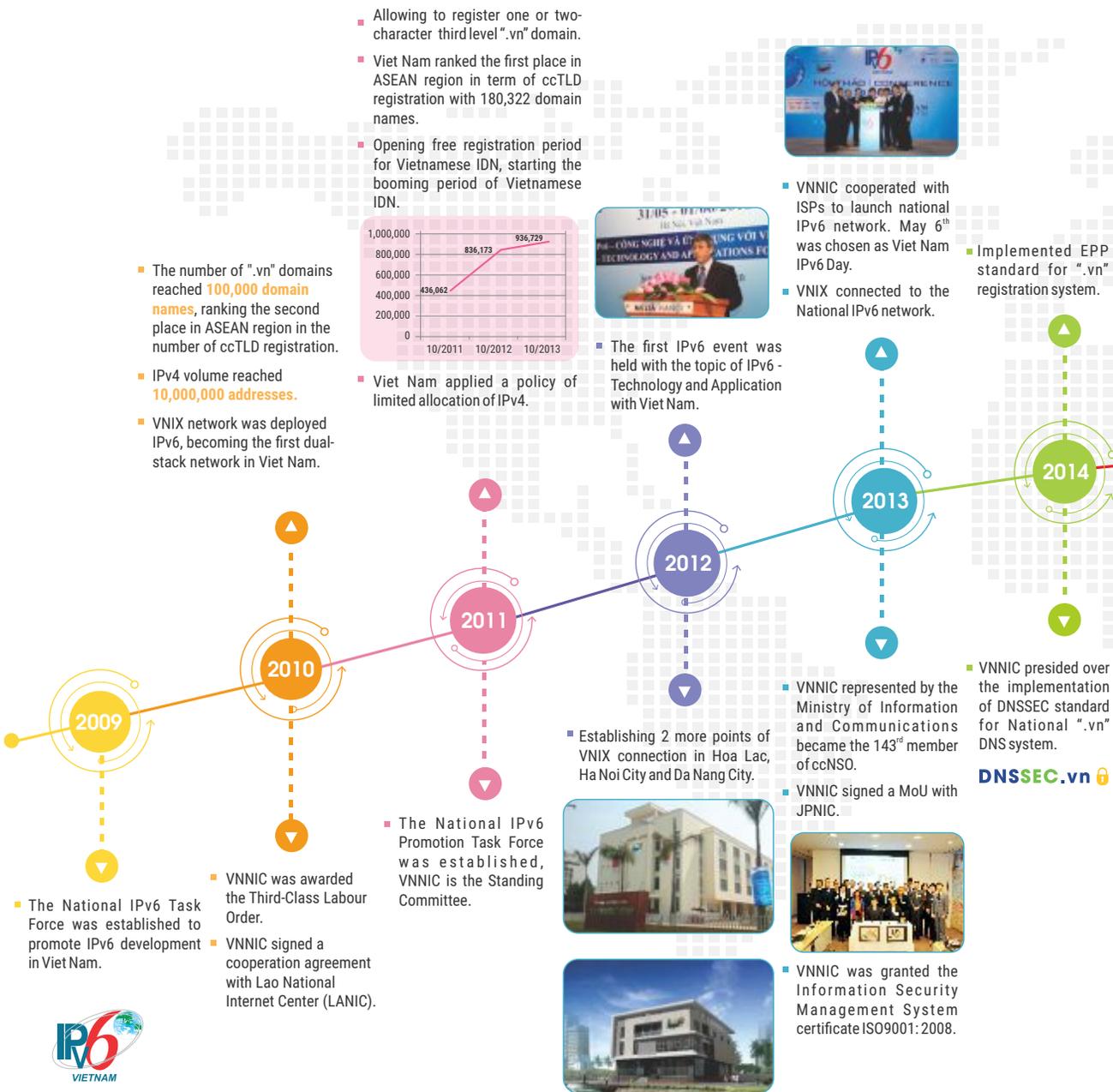
After 20 years, VNNIC has established and operated offices in Ha Noi City, Da Nang City and Ho Chi Minh City. By October 31st 2019, there are 104 staffs including 35 females and 69 males. 76% of staffs are under the age of 30 and staffs with Bachelor's and higher degrees account for 75%.

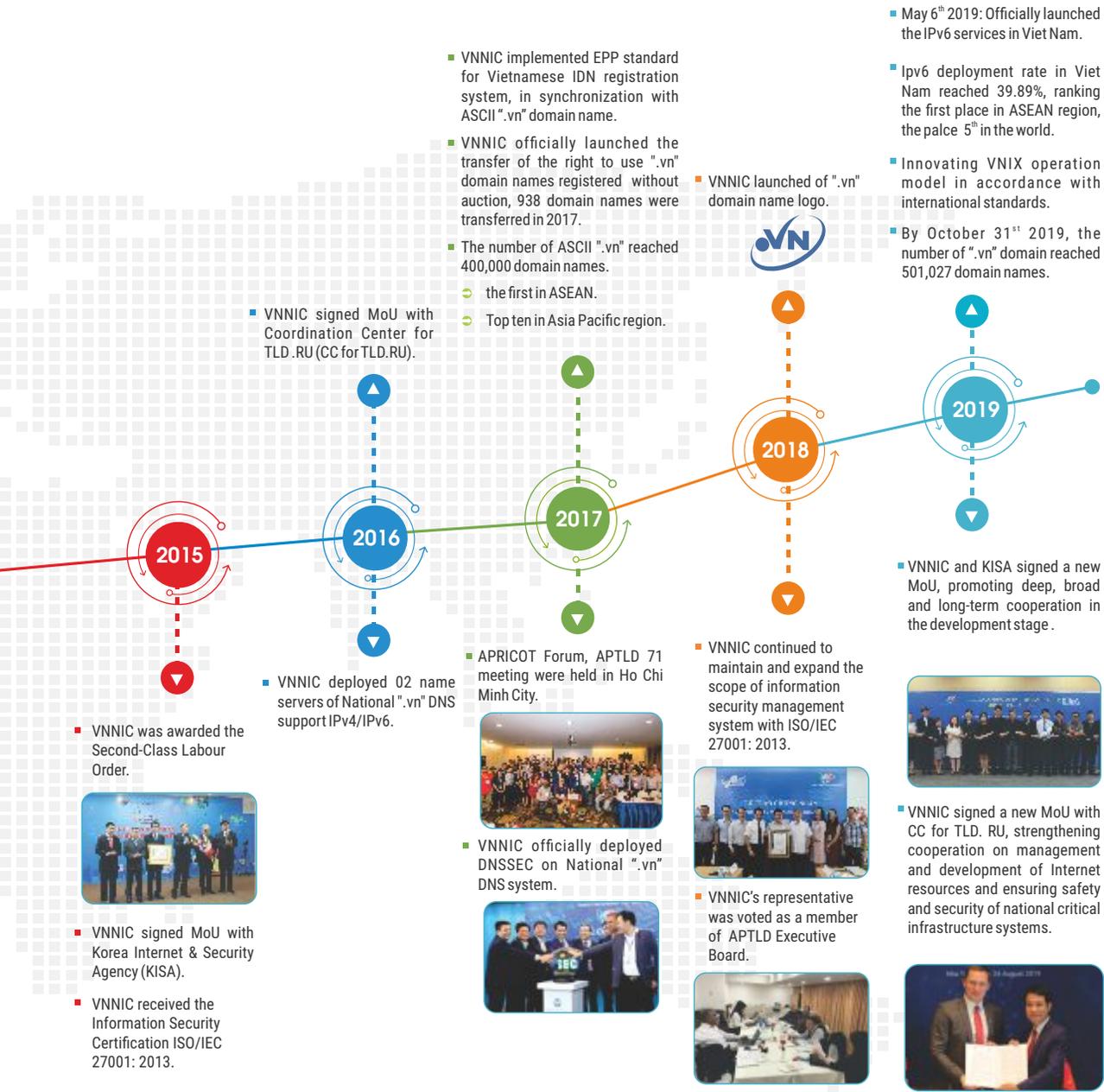


VNNIC - 20 YEARS OF ESTABLISHMENT AND DEVELOPMENT











2. INTERNET RESOURCES AND CRITICAL INFORMATION INFRASTRUCTURES IN INTERNET DEVELOPMENT IN VIET NAM



The role of Internet resources in the development of Internet in Viet Nam

The development of Internet in Viet Nam over the past 20 years has been closely linked with the development of Internet resources (domain names, IP addresses, Autonomous System Number - identifiers for entities involved in Internet activities). The spectacular growth of the Internet in Vietnam has always been a parallel of the development of Internet resources and the operation of national critical information infrastructures (national “.vn” DNS system and Viet Nam National Internet eXchange).

“.vn” domain name

When VNNIC was officially established and took over the management of “.vn” registration, along with rapid growth of Internet in Viet Nam, the number of “.vn” domain name grew over 100% per year on average. By October 2019, the number of “.vn” domain names in Viet Nam has now reached more than 500,000 domains.

Nowaday, in the era of industrial revolution 4.0, the Internet is the infrastructure for a digital economy. It can be seen that “.vn” domain name has played an important role in the development of the national Internet. Regarding the state management, “.vn” is a prerequisite for the application of information technology in the operation of state agencies, in particular, the electronic information portals, online public services, etc. This is a priority task for e-government in particular as well as the socio-economic development in general.

With the expansion and extensive coverage of the Internet to every citizen, the domain name is the foundation for developing websites and social networks to provide information to the community and improve the social literacy. Regarding the socio-economic development, the current period, with the rapid growth of number of Internet users, online business has become an emerging trend. This is also a potential platform, creating opportunities for developing e-commerce in

Viet Nam. In e-commerce, building a Website with a trusted domain name, which is close to a company or product portfolio to increase the accessibility to customers would be a sustainable goal. With the advantages of a ccTLD, “.vn” domain name becomes the best choice in Viet Nam market.

IP address and ASN

Since 2003, as a National Internet Registry (NIR), VNNIC has promoted the use of IPv4 from a modest 16,896 IPv4 addresses in 2000, to 1 million addresses in 2007 and 10 million addresses in 2010. By the end of October 2019, this number has reached 16,001,024 addresses, ranking the second place in ASEAN region, the 8th place in Asia and 29th place in the world.

The rapid development of the Internet led to the global exhaustion of IPv4 addresses in 2011. Currently, the world has more than 4 billion Internet users (about 53% of the world's population). The integration of Internet and telecommunications, the explosion of mobile information and the rapid development of new technology trends such as Internet of Things (IoT), Artificial Intelligence, Big Data in the Industrial revolution 4.0 all lead to the number of devices connected to the Internet increasingly high. The world has transformed to the IPv6 version of Internet address to continue Internet activities.

In anticipation of the inevitable trend in IPv6 application, Viet Nam has been implementing activities to promote IPv6 transition since 2008 with the overall goal of ensuring “Viet Nam's Internet would operate safely and stably on IPv6 technology platform from 2019”.

In the current period, promoting the application of IPv6 deployment on networks and services of state agencies is an indispensable requirement of building and developing e-government and smart cities.

Over the course of 10 years of implementation IPv6 National Plan, Viet Nam now has remarkable application of IPv6 implementation. According to APNIC's statistics,

by the end of October 2019, Viet Nam's IPv6 adoption rate reached about 39.68%, ranking the second place in ASEAN, 8th in the world with more than 21,000,000 IPv6 users.

National critical Information infrastructures

The National “.vn” DNS system is a technical system to ensure the operation of the “.vn” domain name on the Internet, and responsible for managing “.vn” domain; receive and response the queries of “.vn” domain names. Currently, the national .vn DNS system in Vietnam has 7 name servers, 5 name servers of which are located in the country (in Hanoi, Ho Chi Minh and Da Nang City), other 2 name servers are located in many locations in the world, ensuring and maintaining the activities on the Internet are smooth and secure. VNNIC has implemented Anycast, DNSSEC, IPv6 technology for National “.vn” DNS system.

For the Viet Nam Internet eXchange (VNIX), in the 2000s, the Vietnam Internet developed with many difficulties, challenges, including high access fees and speed of access limit. By 2003, the Ministry of Post and Telecommunications (now the Ministry of Information and Communications) established Viet Nam Internet eXchange (VNIX) - a national Internet traffic exchange point as a non-profit model. Over 16 years of construction and development, VNIX has made important contributions to Viet Nam's Internet development, helping to lower network costs, improve optimal service quality and secure national Internet Networks.

The above results are the clearest evidence for the important role of VNNIC in promoting the use of Internet resources in Viet Nam and ensuring the national critical information infrastructures safe and stable operation.



II

INTERNET RESOURCES DEVELOPMENT IN VIET NAM



501,027

Number of ".vn" domain names
(including ASCII domain and IDN)

📍 1st place in ASEAN



14

".vn" Accredited Registrars



16,001,024

Number of IPv4 addresses

📍 2nd place in ASEAN

📍 8th place in Asia

📍 29th in the world



339 billions /64 blocks

Number of IPv6 addresses



39.68%

IPv6 adoption rate

📍 2nd in ASEAN

📍 8th in the world



21,000,000

IPv6 users

1. “.vn” COUNTRY CODE TOP LEVEL DOMAIN (“.vn” CCTLD)



1.1 “.vn” ccTLD in Viet Nam market

Currently, according to many experts, the country code top level domain name (ccTLD) is still the optimal choice for the domestic market and the dominant trend in the Internet. Before the explosion of new generic top - level domain name (New gTLD), ccTLD still maintained a sustainable development. According to a report from Verisign, ccTLDs have the new registration growth rate of 6.0%, higher than gTLDs (.com and .net) and New gTLDs by 4.3% and 5.9%, respectively. In Viet Nam, by the end of October 2019, there have been 501,027 “.vn” domain names active, accounting for 49% of the total market share of domain names in Viet Nam. According to forecasts of global tendency in domain name usage, ccTLD will establish dominance in each country and “.vn” will not be exception.

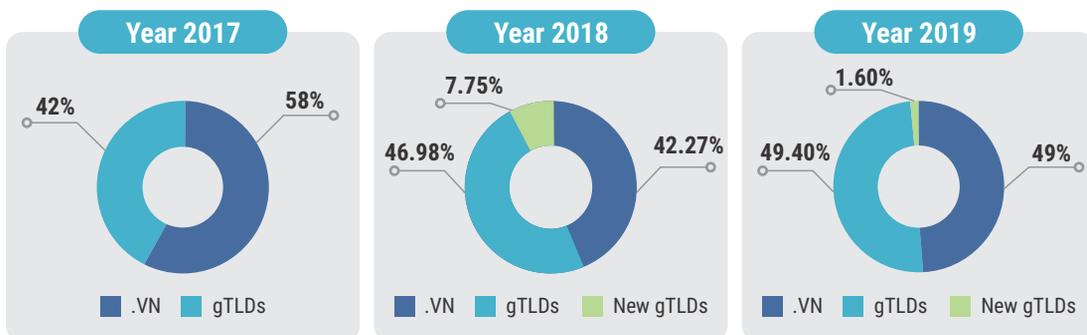


Figure 1: “.vn” domain names vs gTLDs over the years in Viet Nam

Country/Territory	ccTLD	Number of domain names	ccTLD market share in the country/territory	ccTLD per 100 population
Taiwan	.tw	6,738,773	96.40%	28.6
Australia	.au	3,193,183	50.60%	13
Japan	.jp	1,569,923	26.70%	1.2
New Zealand	.nz	711,182	68.80%	14.8
Viet Nam	.vn	484,492	49%	0.5
Malaysia	.my	327,237	43.80%	1
Indonesia	.id	325,756	28.50%	0.1
Hong Kong	.hk	259,130	17.70%	3.5
United Arab Emirates	.ae	214,143	45.40%	2.3
Singapore	.sg	181,485	31.50%	3.2
Kazakhstan	.kz	148,614	91.50%	0.8
Thailand	.th	71,638	8.20%	0.1
Uzbekistan	.uz	67,685	97.80%	0.2
Saudi Arabia	.sa	58,094	22.60%	0.2
Sri Lanka	.lk	36,018	52.70%	0.2
Qatar	.qa	21,724	45.50%	0.8

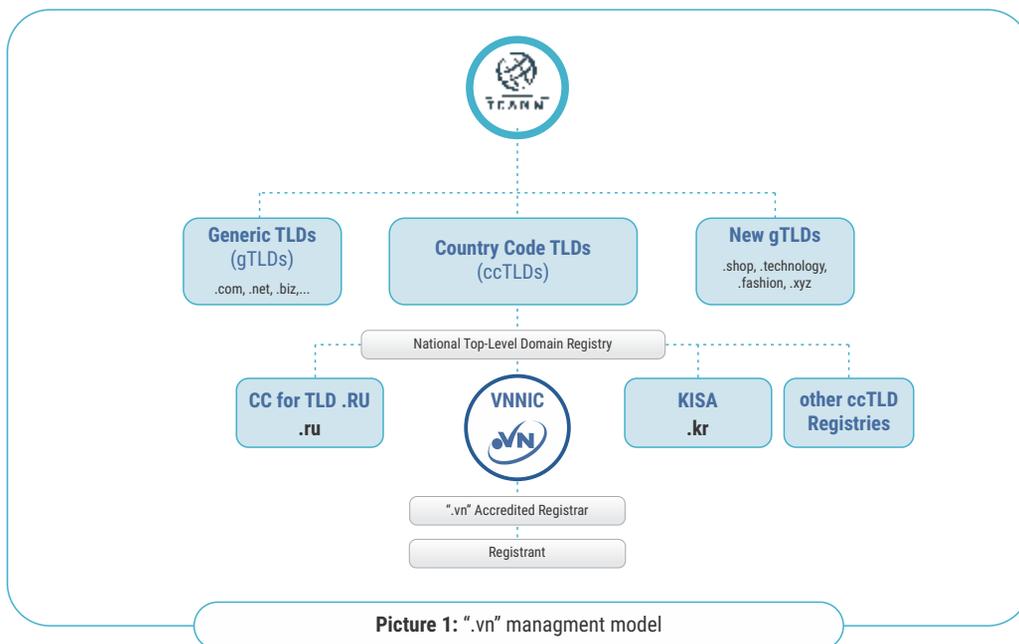
Table 1: Ranking of ccTLDs in Asia-Pacific region (updated to July 2019)
(Source: APTLD)

1.2 Development of “.vn” domain name management model and policies

Twenty years after the “.vn” domain name was formally recognized as the national Internet resource, VNNIC has always concentrated on the management and registration of “.vn” domain name as one of the key tasks. The management model has been improved during each period, while still ensuring management requirements, meeting the development needs of society and the community; and complying with international general practices.

Before 2006, the registration procedure of “.vn” domain names was delivered by VNNIC with some restrictions on procedures and length of time for approval and processing. However, this was the period when domain name management policies were shaped and concretized in legal documents. The legal corridors supporting and laying the foundation for the strong development of the “.vn” domain name were also completed in this period with the expansion of individual registrants, the granting of second-level domain names directly under “.vn”, creating a premise for strong development in the later stage.

With the development in regulations and legal frameworks, the period of 2006-2007 marked a decisive transformation towards the development of “.vn” domain name. The application of Registry – Registrar model in the management of “.vn” domain name helped to simplify procedures and shorten processing time for domain name registration. This is also an important step for VNNIC to completely switch to perform the role of a Registry for “.vn” domain name since 2011 when domain operation was fully performed by “.vn” Accredited Registrars.



Picture 1: ".vn" management model

In 2015, along with the uniformity in the policy of managing the registration of ".vn" domain name when Circular No. 24/2015 / TT-BTTTT was issued, the management model using EPP standards was applied in domain name management in Viet Nam, affirming its position and bringing the value of ".vn" ccTLD closer to gTLD. From then, it was inevitable that ".vn" domain name had really matured in both policies and management model, ensuring a stable development in the past period and in the future. Existing issues in management or arising from actual needs have also been adjusted and supplemented in time through the new Circular No. 06/2019/ TT-BTTTT issued in 2019.

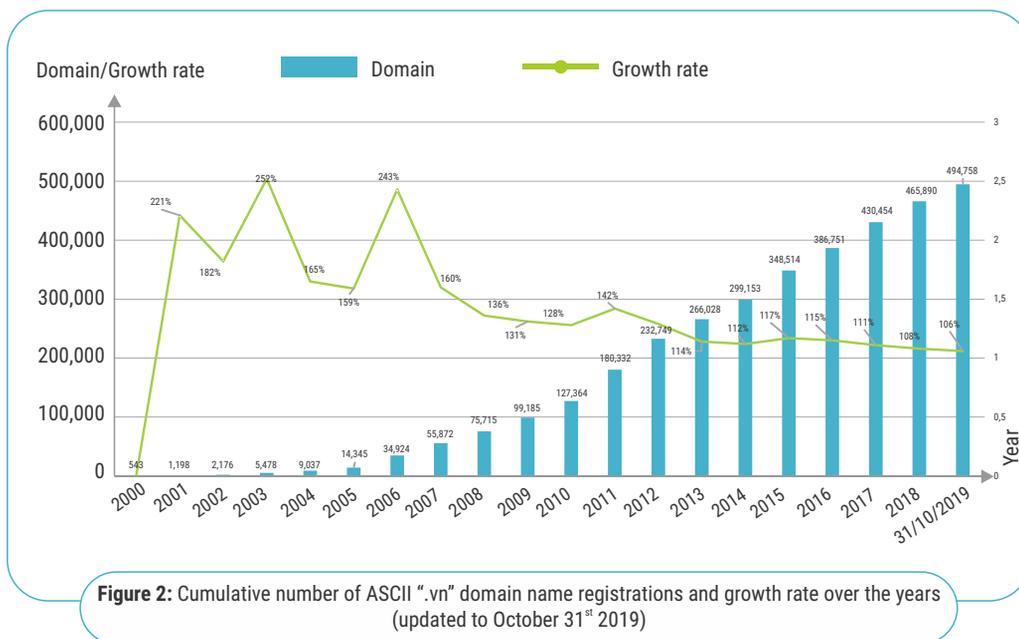
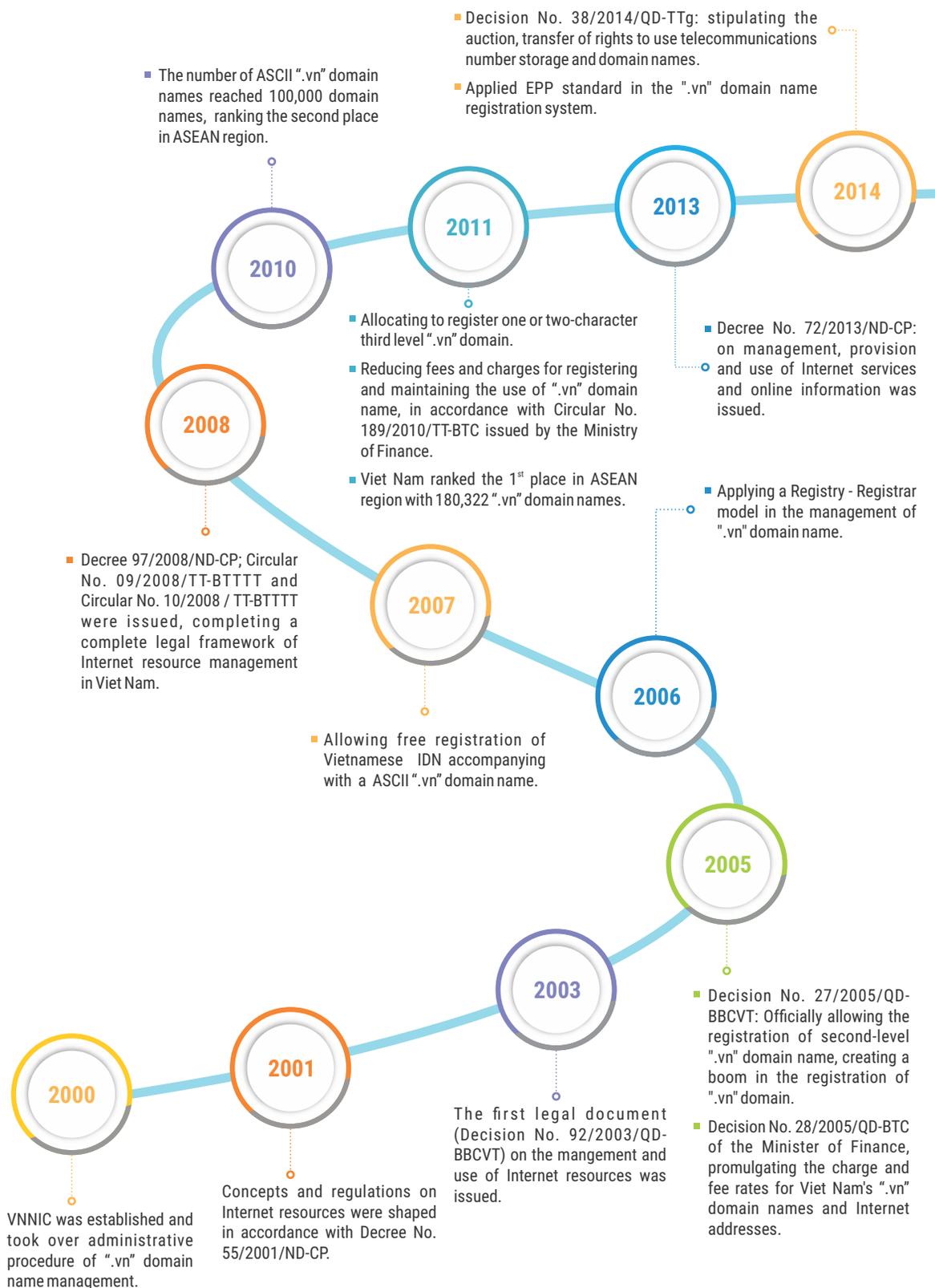
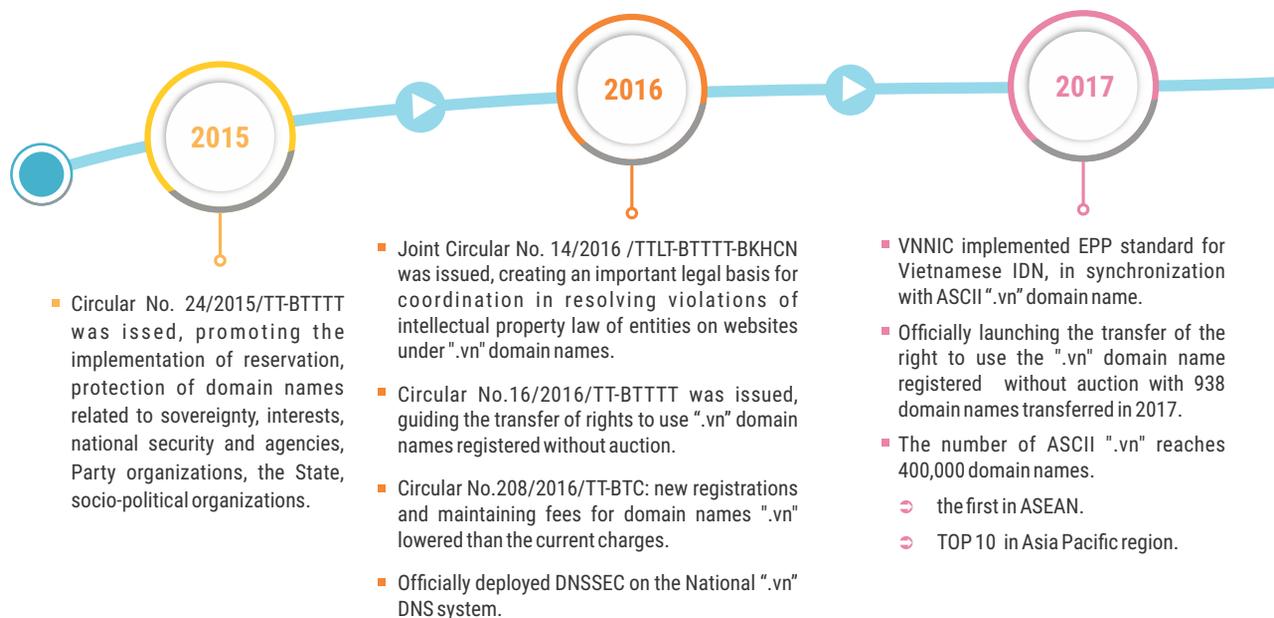


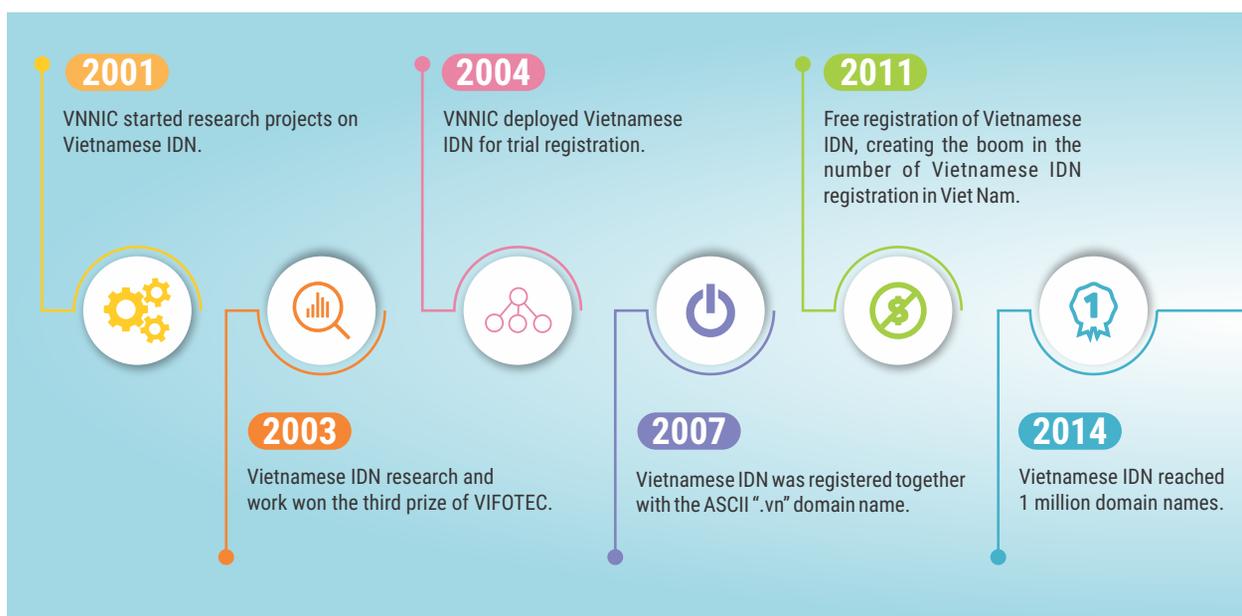
Figure 2: Cumulative number of ASCII ".vn" domain name registrations and growth rate over the years (updated to October 31st 2019)

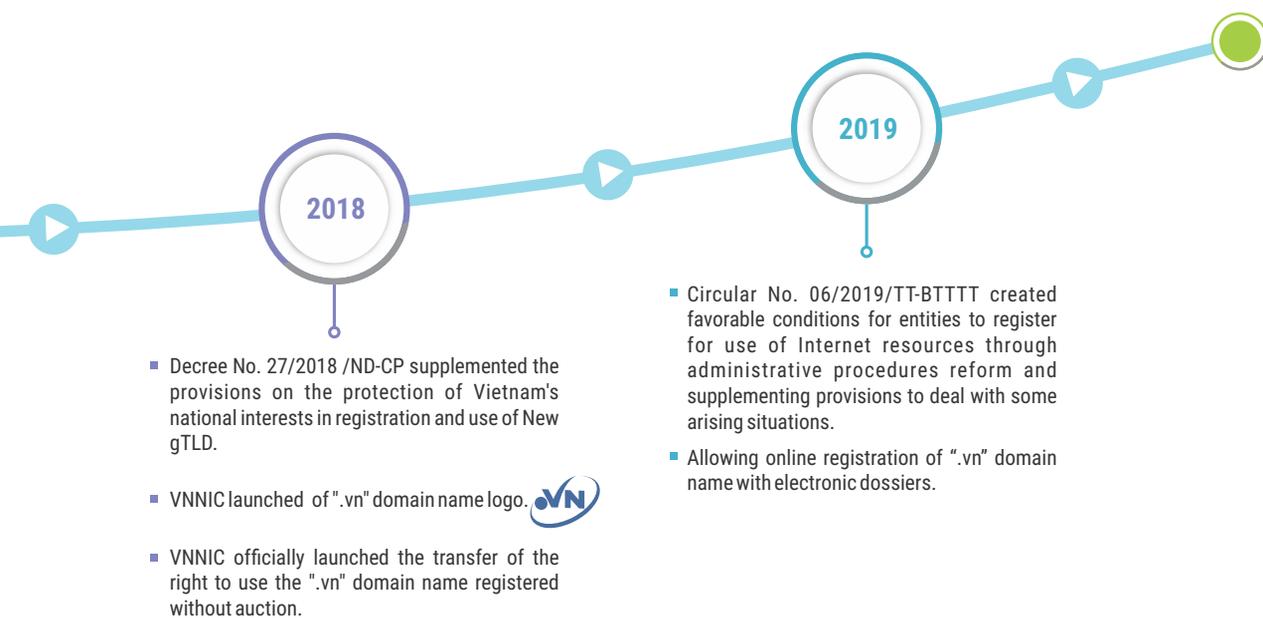
ASCII “.vn” domain name development timeline





Vietnamese IDN development timeline





2015
Revocation of Vietnamese IDN registrations which were not put into use.



2019
VNNIC integrated Vietnamese IDN management system with ASCII ".vn" domain name management system.



2017
Officially applying registration fee at 0 VND and maintenance fees at VND 20,000/year.
VNNIC implemented EPP standard for Vietnamese IDN, in synchronization with ASCII ".vn" domain name.



Year	Growth Rate (%)
2011	0
2012	~45
2013	~25
2014	~25
2015	~20
2016	~25
2017	~10
2018	~5
31/10/2019	~25

1.3. “.vn” DOMAIN NAME USAGE

ASCII “.vn” domain name

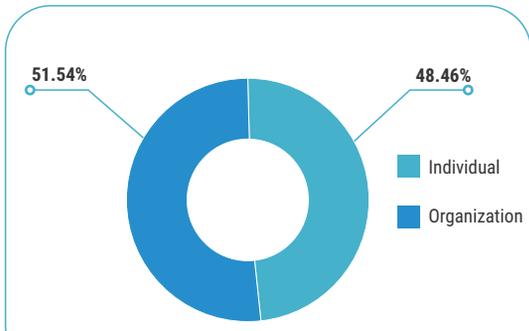


Figure 4: ASCII “.vn” domain names by registrant type (Updated to October 31, 2019)

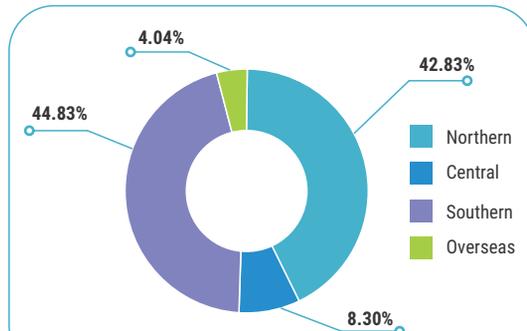
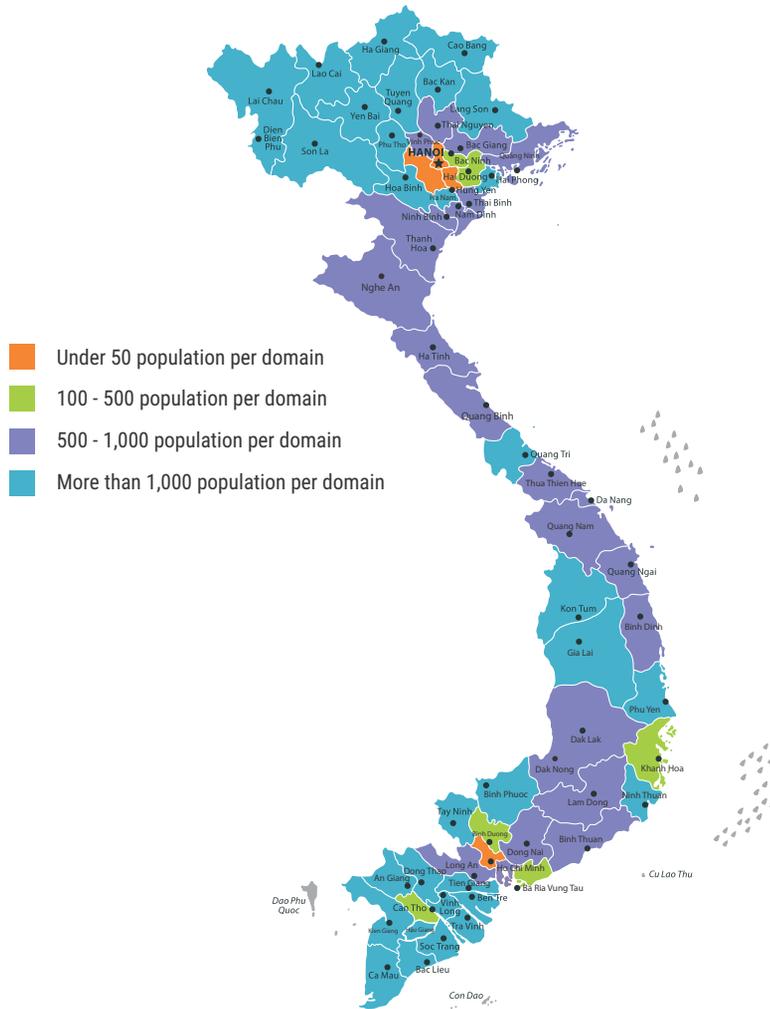


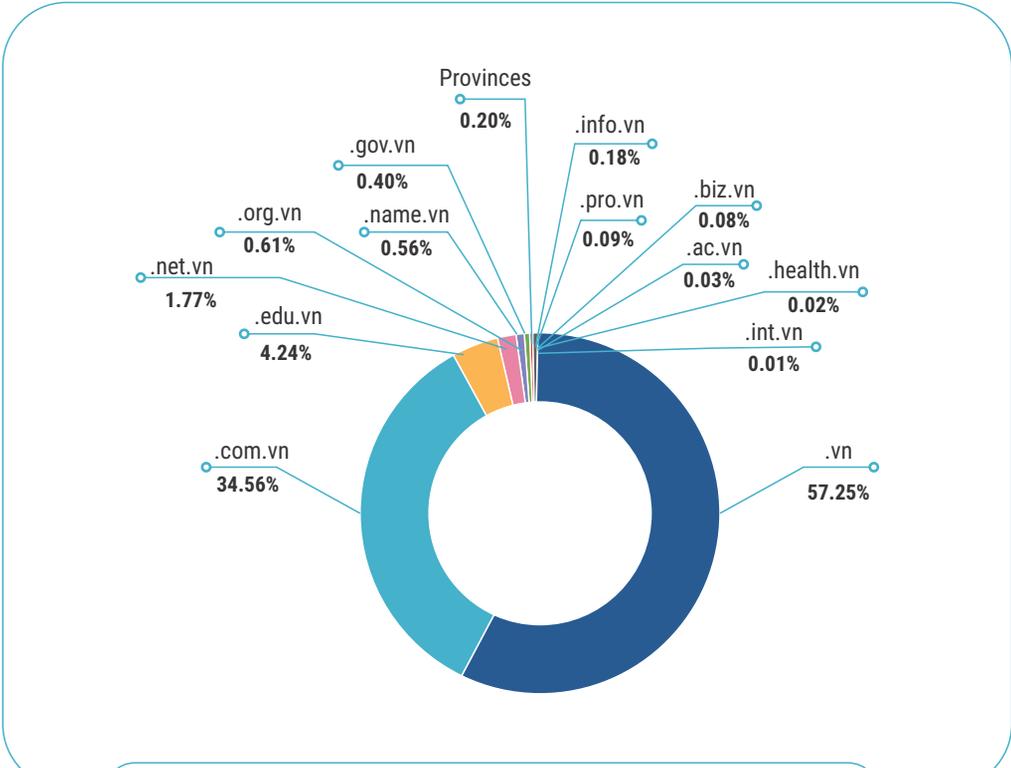
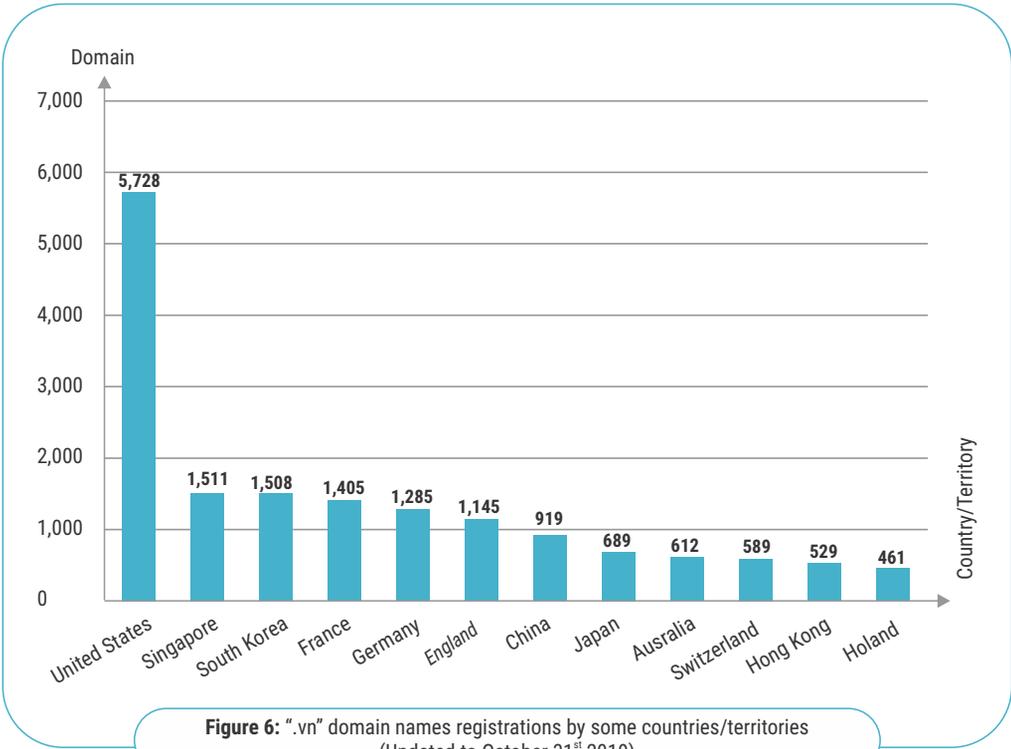
Figure 5: ASCII “.vn” domain names by geographical distribution (Updated to October 31, 2019)



Picture 2: Population per “.vn” domain name in Provinces/Cities (Updated to April 1, 2019)
Source of population statistics: Population and Housing Census, Publishing House Statistical

Rank	Province/City	".vn" domain	".gov.vn" domain	Rank	Province/City	".vn" domain	".gov.vn" domain
1	Ho Chi Minh City	189,336	245	33	Binh Thuan	1,321	11
2	Ha Noi City	174,171	658	34	Tien Giang	1,302	9
3	Da Nang City	9,577	32	35	An Giang	1,213	7
4	Binh Duong	7,475	25	36	Ben Tre	1,212	11
5	Hai Phong	6,386	38	37	Quang Binh	979	17
6	Dong Nai	6,166	28	38	Binh Phuoc	940	31
7	Thanh Hoa	4,311	49	39	Tay Ninh	866	5
8	Nghe An	4,161	56	40	Gia Lai	801	8
9	Khanh Hoa	3,886	50	41	Hoa Binh	775	13
10	Nam Dinh	3,404	17	42	Dong Thap	772	12
11	Ba Ria - Vung Tau	3,246	13	43	Phu Yen	728	11
12	Hai Duong	2,994	11	44	Lao Cai	594	11
13	Bac Ninh	2,939	9	45	Tra Vinh	589	6
14	Can Tho	2,872	16	46	Quang Tri	530	29
15	Hung Yen	2,771	15	47	Ninh Thuan	519	6
16	Thai Binh	2,658	12	48	Vinh Long	512	4
17	Lam Dong	2,486	14	49	Ca Mau	492	11
18	Quang Nam	2,426	130	50	Yen Bai	449	15
19	Quang Ninh	2,414	27	51	Soc Trang	428	8
20	Long An	2,319	9	52	Tuyen Quang	361	28
21	Binh Dinh	2,317	17	53	Lang Son	332	7
22	Dak Lak	2,126	23	54	Hau Giang	329	3
23	Bac Giang	2,104	14	55	Kon Tum	314	13
24	Vinh Phuc	1,962	8	56	Bac Lieu	308	20
25	Thai Nguyen	1,689	22	57	Son La	285	23
26	Ha Nam	1,626	15	58	Dak Nong	283	6
27	Ninh Binh	1,522	15	59	Ha Giang	175	4
28	Phu Tho	1,516	13	60	Dien Bien	173	19
29	Quang Ngai	1,458	15	61	Bac Kan	132	15
30	Thua Thien Hue	1,434	15	62	Cao Bang	124	9
31	Ha Tinh	1,391	27	63	Lai Chau	112	7
32	Kien Giang	1,378	18		Total	474,471	2,035

Table 2: Accumulated ASCII ".vn" domain names distributed by provinces/cities
(Updated to October 31st 2019)



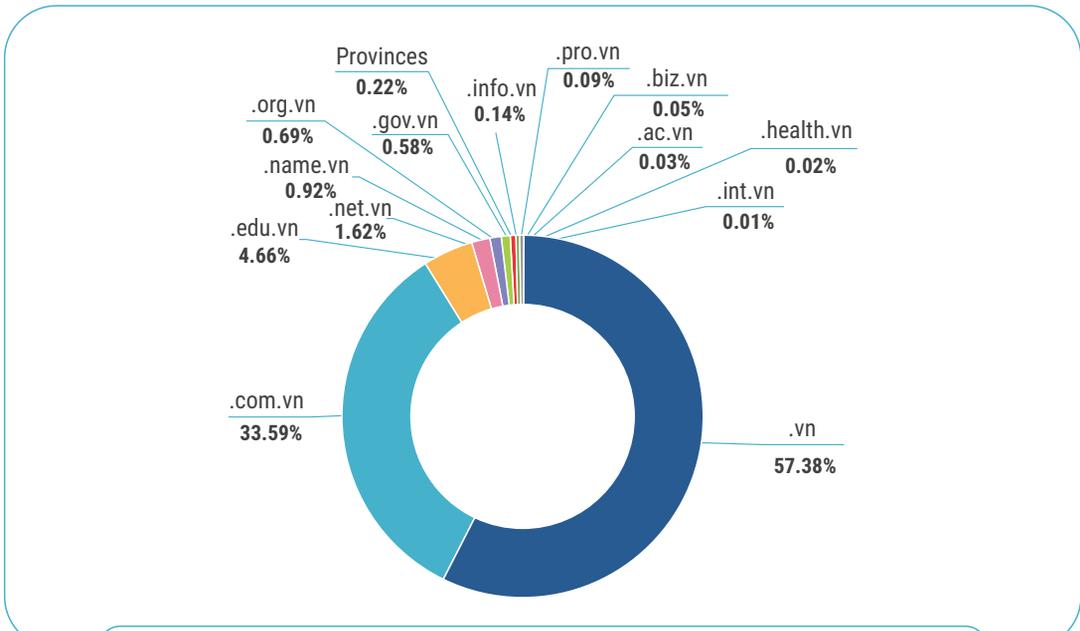


Figure 8: ASCII ".vn" domain names having Website by extensions (Updated to October 31st 2019)

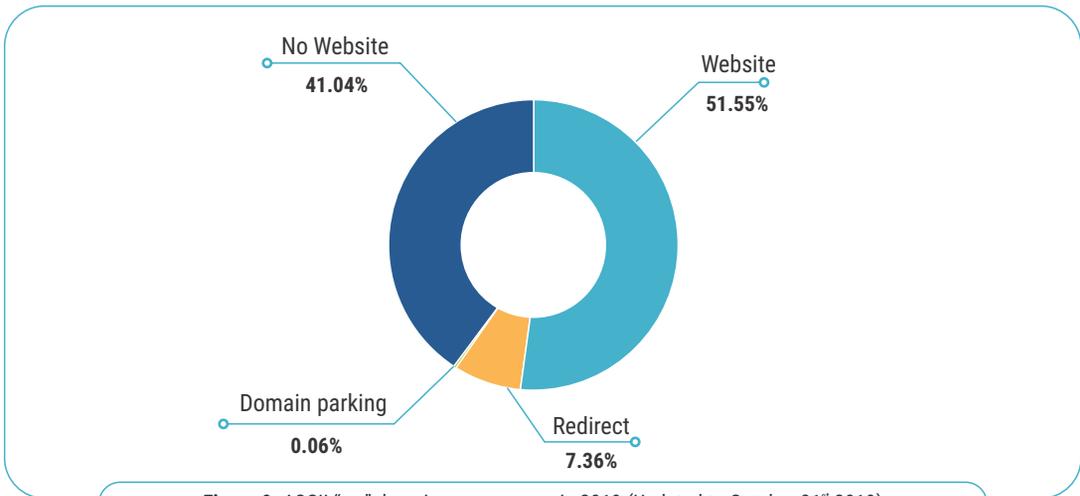


Figure 9: ASCII ".vn" domain names usage in 2019 (Updated to October 31st 2019)

1	tiki.vn	11	kenh14.vn
2	shopee.vn	12	tinhte.vn
3	horizon.vn	13	lazada.vn
4	24h.com.vn	14	fshare.vn
5	fptonline.vn	15	ketnoitieu.dung.vn
6	zing.vn	16	sendo.vn
7	viettinbank.vn	17	vietbao.vn
8	google.com.vn	18	vov.vn
9	eva.vn	19	vietnamnet.vn
10	cliptv.vn	20	dienmaycholon.vn

Table 3: List of ASCII ".vn" domain names most queried on the national ".vn" DNS system



Vietnamese IDN

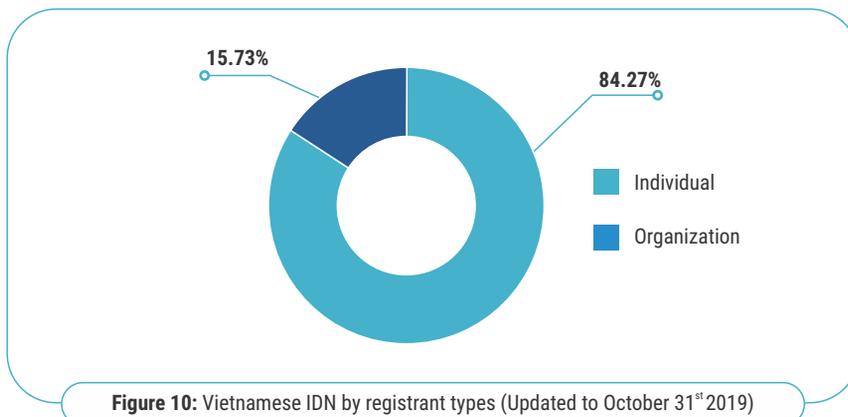


Figure 10: Vietnamese IDN by registrant types (Updated to October 31st 2019)

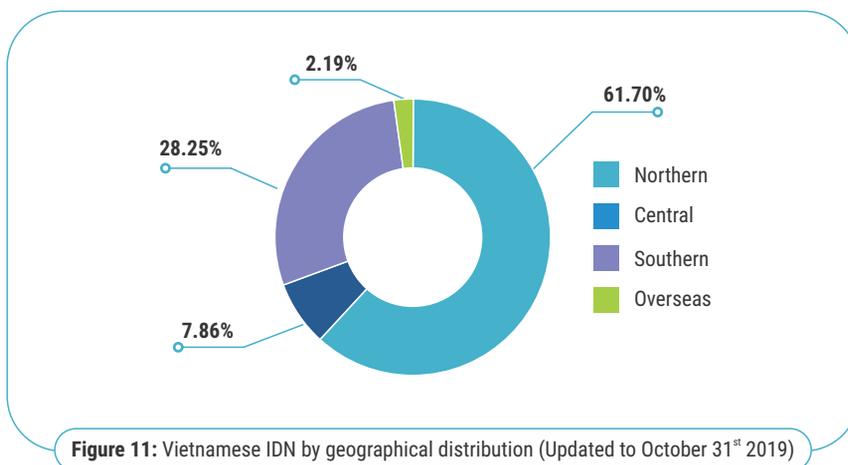


Figure 11: Vietnamese IDN by geographical distribution (Updated to October 31st 2019)

củahàngcamera.vn	01	11	viêmkhópdạngthấp.vn
vườnbiahànhội.vn	02	12	bệnhđăngtrí.vn
skmobilehànhội.vn	03	13	miềntây.vn
lớpnhàyhiệndại.vn	04	14	giasutânbinh.vn
bệnhgout.vn	05	15	đọc-sách.vn
usbsáchnói.vn	06	16	bệnhgút.vn
bệnhmấtnổ.vn	07	17	đẹpngay.vn
bộtmỹkimngư.vn	08	18	xâynhàtrọngói.vn
đồgỗđồngkỵ.vn	09	19	mónănngon.vn
viêmgan.vn	10	20	tribệnhgout.vn

Table 4: List of Vietnamese IDN most queried on the National “.vn” DNS system

1.4 Services for “.vn” domain name

Registry Lock

Registry Lock service would help to protect “.vn” domain from threats of potential attack or change of contact details and domain hijacking.

3,237 “.vn” domain names

were provided this service.

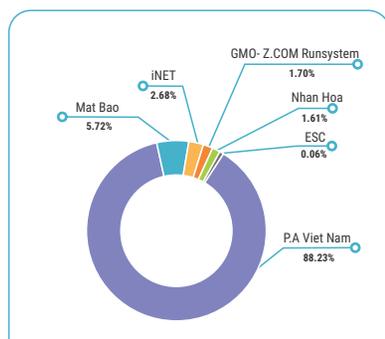


Figure 12: Registry lock service usage by Registrars

Extensions	Number of domains
.vn	2,066
.com.vn	1,062
.edu.vn	74
.net.vn	25
.org.vn	6
.biz.vn	2
.ac.vn	1
.info.vn	1

Table 5: Registry Lock usage by extensions

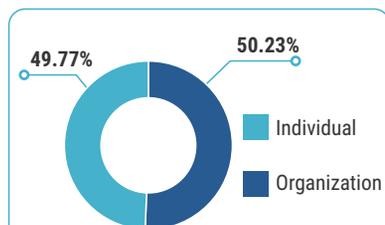


Figure 13: Registry Lock usage by registrant type

DNSSEC

DNSSEC (Domain Nam System Security Extensions) helps to protect users from redirection to fraudulent websites and unintended addresses.

170 “.vn” domain names

were signed DNSSEC in 2019.

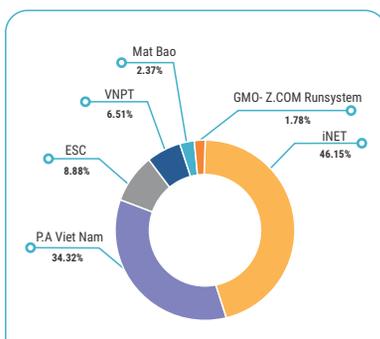


Figure 14: DNSSEC usage by Registrars

Extensions	Number of domains
.vn	112
.com.vn	38
.name.vn	10
.gov.vn	4
.net.vn	3
.edu.vn	2
.org.vn	1

Table 6: DNSSEC usage by extensions

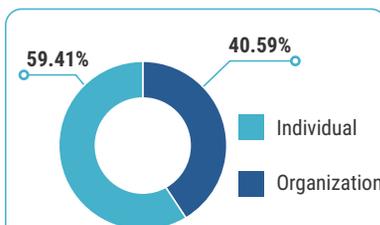


Figure 15: DNSSEC usage by registrant type

Transfer of the right to use the “.vn” domain name registered without acution

The transfer was conducted legally and domain service is not interrupted during the transaction.

2,396 “.vn” domain names

were successfully transferred in 2019.

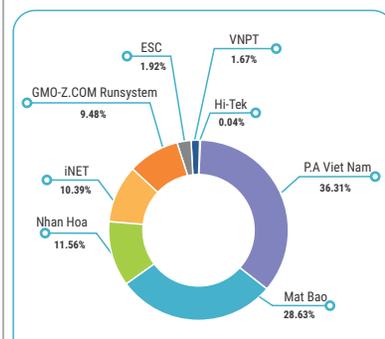
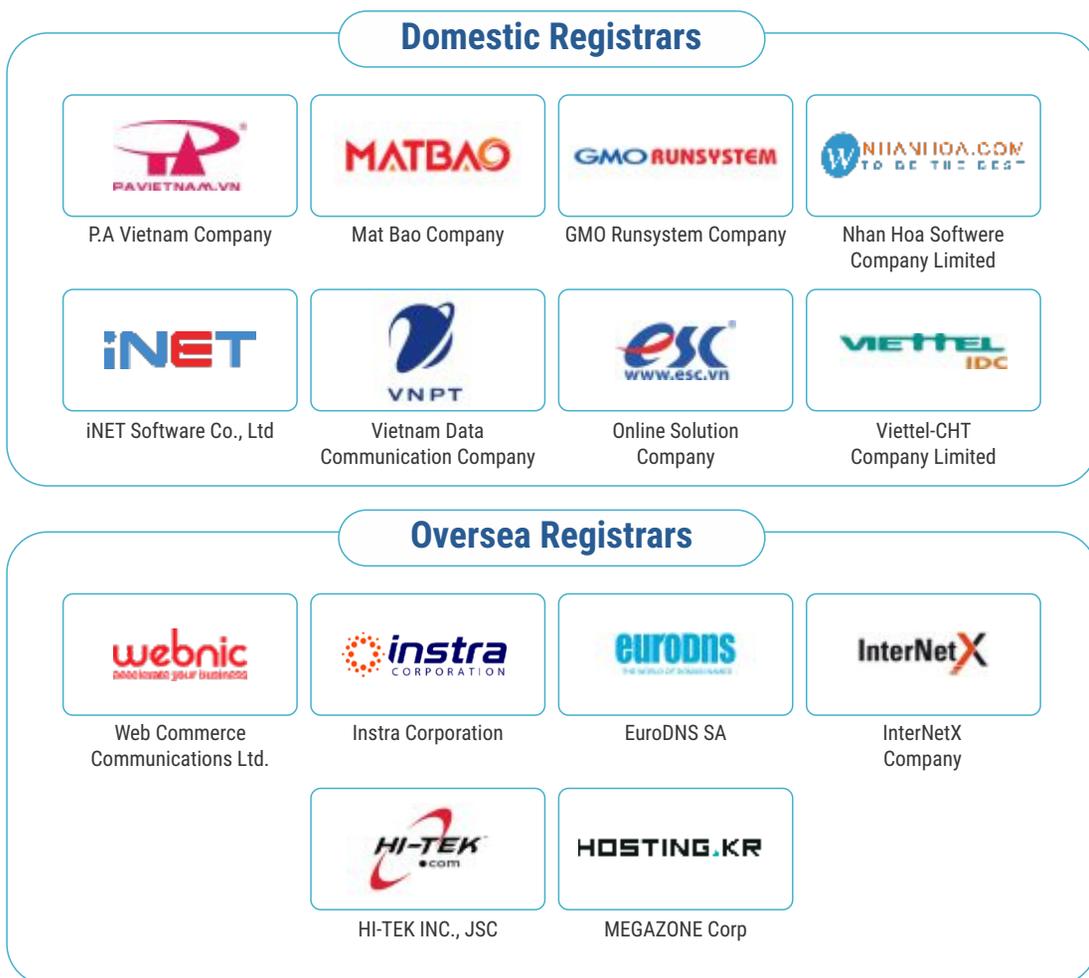


Figure 16: “.vn” domain names transferred by Registrars

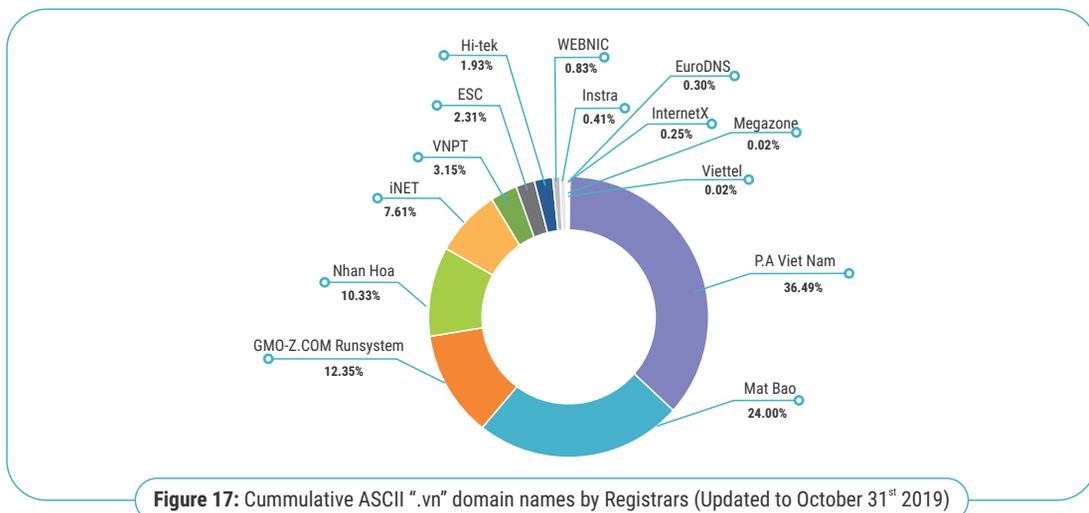
Extensions	Number of domains
.vn	1,526
.com.vn	782
.edu.vn	56
.net.vn	16
.org.vn	5
.info.vn	4
.ac.vn	2
.biz.vn	2
.health.vn	1
.pro.vn	1
đôi tỉnh thành	1

Table 7: “.vn” domain names transferred by extensions

1.5 “.vn” Accredited Registrars



“.vn” domain name market share by Registrars



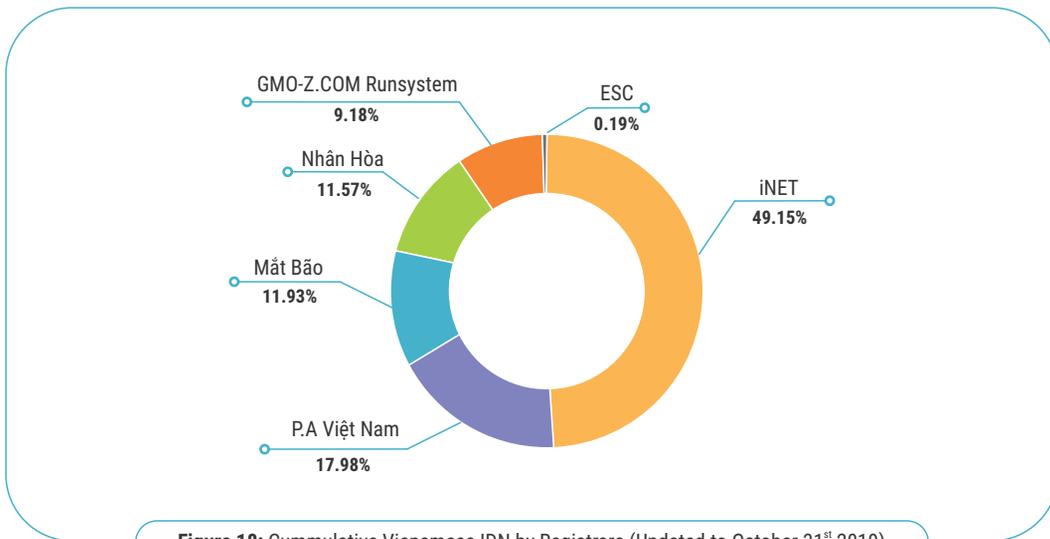


Figure 18: Cumulative Vietnamese IDN by Registrars (Updated to October 31st 2019)

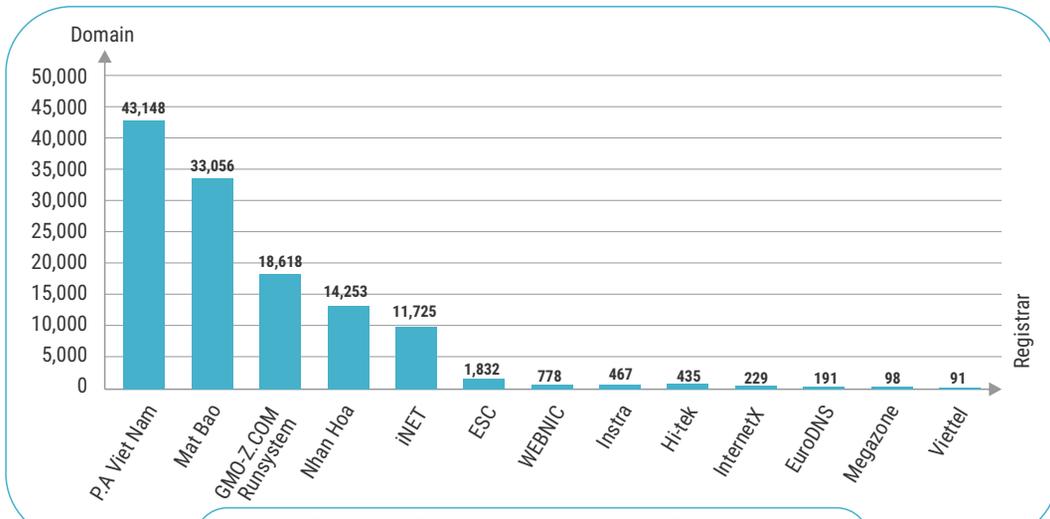


Figure 19: ASCII ".vn" new registrations by Registrars (Updated to October 31st 2019)

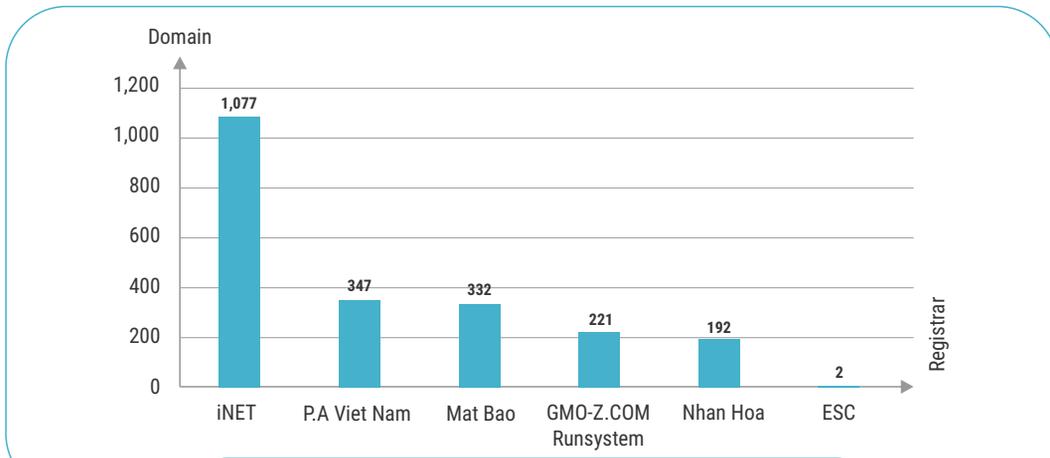
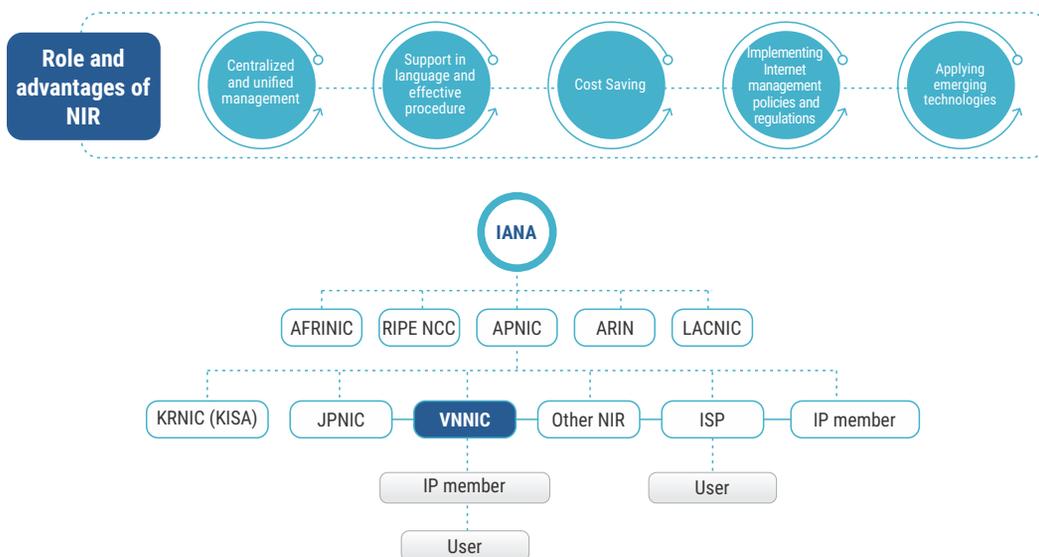


Figure 20: Vietnamese IDN new registrations by Registrars (Updated to October 31st 2019)

2. IP ADDRESS, AUTONOMOUS SYSTEM NUMBER (ASN)

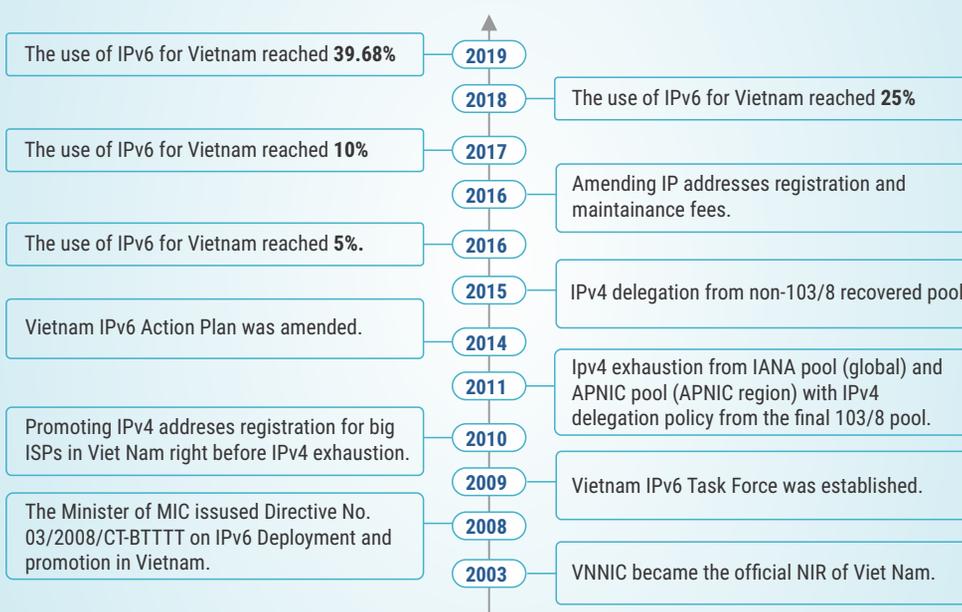
2.1 Role of Internet number resources in Internet development in Viet Nam

On July 31st 2003, VNNIC was recognized as the National Internet Registry (NIR), holding responsibility for management of IP address and ASN in Viet Nam.



Picture 3: IP and ASN management model

The IP address plays an important role for a stable and secure Internet in Viet Nam. VNNIC had 10 years in promoting IPv4 usage and has spent next 10 years in promoting IPv6 deployment.



2.2. IP address and ASN growth

Number of IPv4 addresses: **16,001,024 addresses** (2 ASEAN, 8 ASIA, 29 in the world)

Number of IPv6 addresses: **113 x /48s and 79 x /32s** (IPv6 adoption rate: **39.68%**, 2 ASEAN, 4 ASIA, 8 in the world)

Number of ASN: **324** Number of IP members: **424**

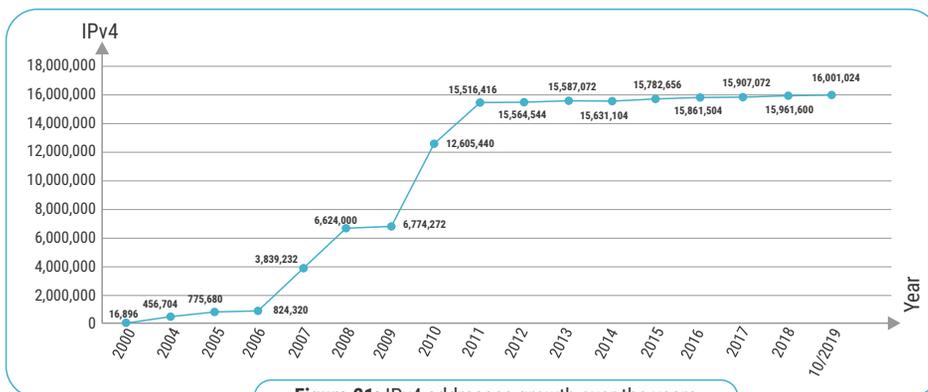


Figure 21: IPv4 addresses growth over the years

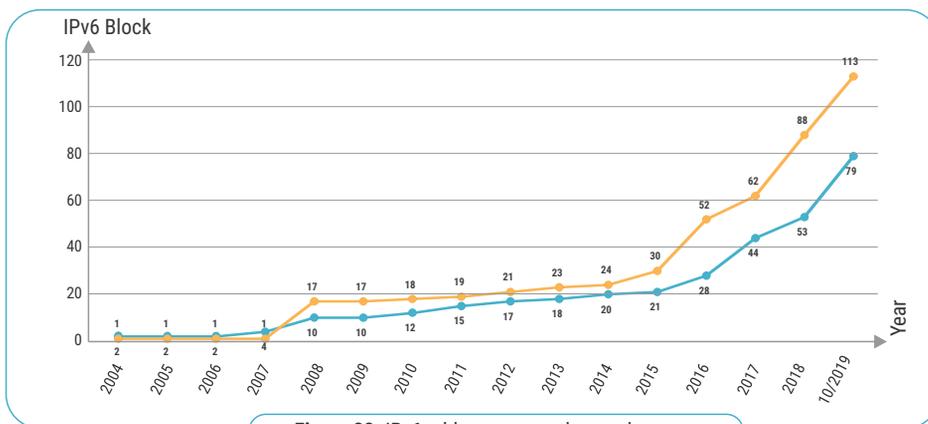


Figure 22: IPv6 addresses growth over the years

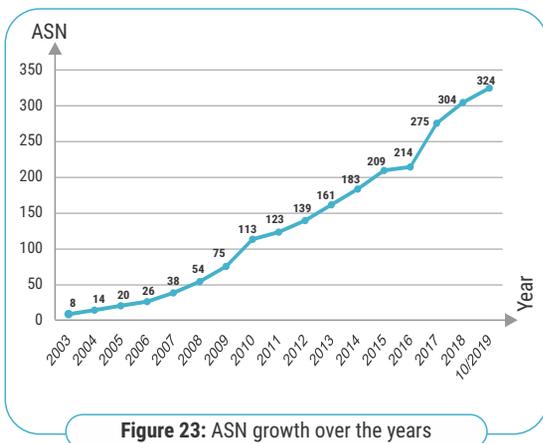


Figure 23: ASN growth over the years

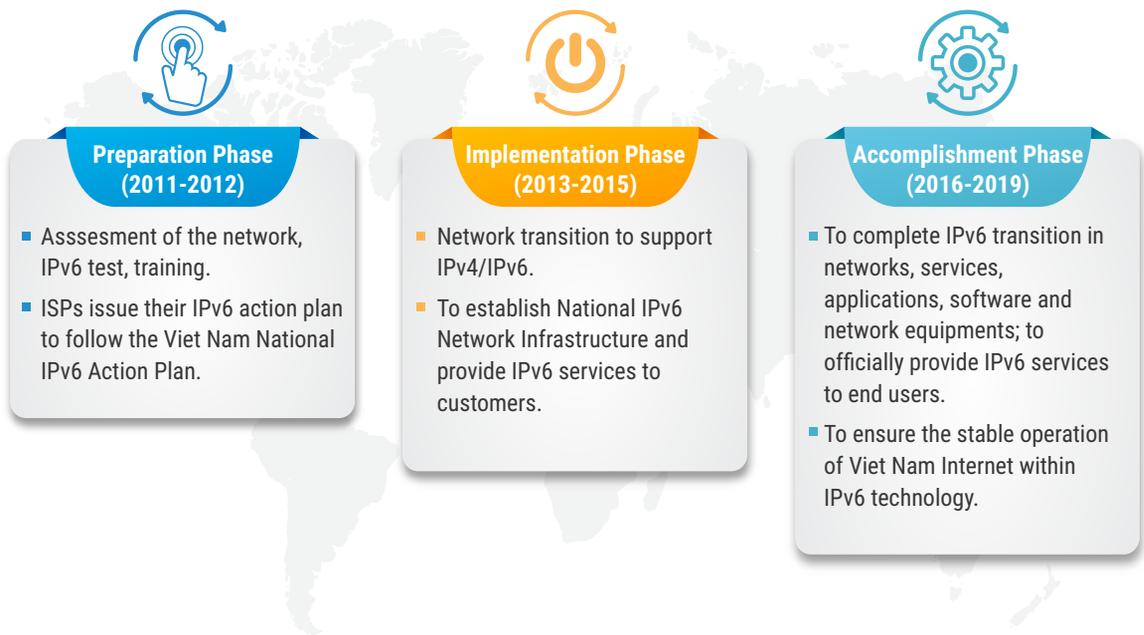


Figure 24: IP members growth over the years

2.3. IPv6 deployment in Viet Nam

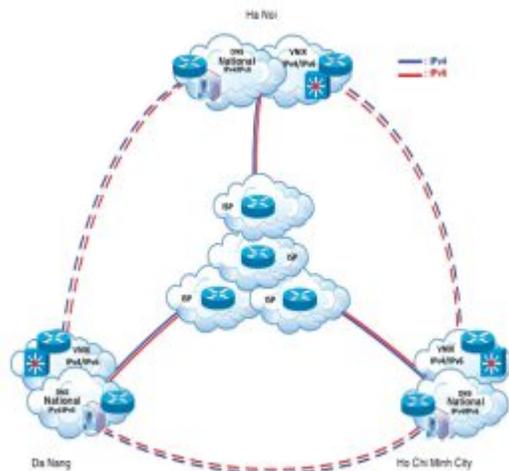
Regarding the important of IPv6 transition in Internet development, the IPv6 promotion activities in Viet Nam were started from 2008 when the Directive No.03/2008/CT-BTTTT was issued on 6th May 2008. By 2011, the National IPv6 Action Plan was issued by Minister of MIC. With the aim to increase the use of IPv6 in Viet Nam and accomplish missions following the National Action Plan on IPv6, Vietnam National IPv6 Task Force (VNIPV6TF) has coordinated with enterprises, government agencies to conduct several promotion activities. As the result, Vietnam was ranked as one of top ten countries in the field of IPv6 deployment.

2.3.1. Vietnam National IPv6 Action Plan



The importance of Vietnam National IPv6 Action Plan

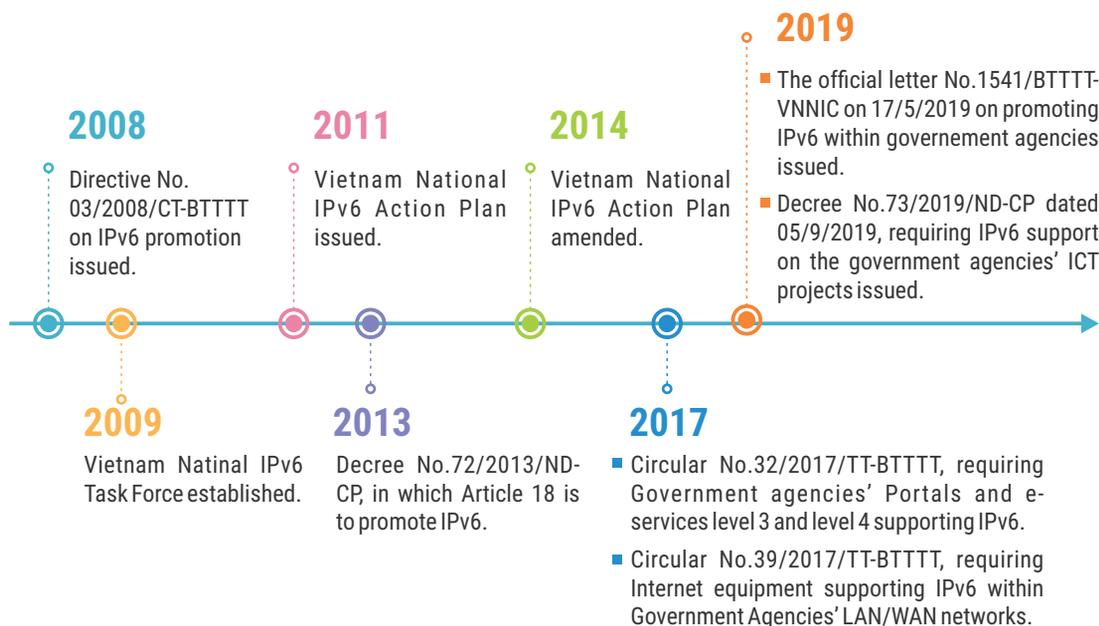
-  Establishing roadmap orientation on IPv6 deployment in Viet Nam.
-  Setting the scope and responsibilities of specific organizations.
-  Contributing to the success of IPv6 deployment in Viet Nam with the main target of “ensuring the stable operation of Viet Nam Internet within IPv6 technology”.



Picture 4: The national IPv6 network

2.3.2 IPv6 Promotion Activities

Policies



IPv6 Training

Vietnam IPv6 Task Force has initiated and delivered more than 50 IPv6 training courses for 1,950 attendees from enterprises (ISP, CP, software vendors, etc.) and government agencies (from central to local agencies).

The manual documents on IPv6 deployment

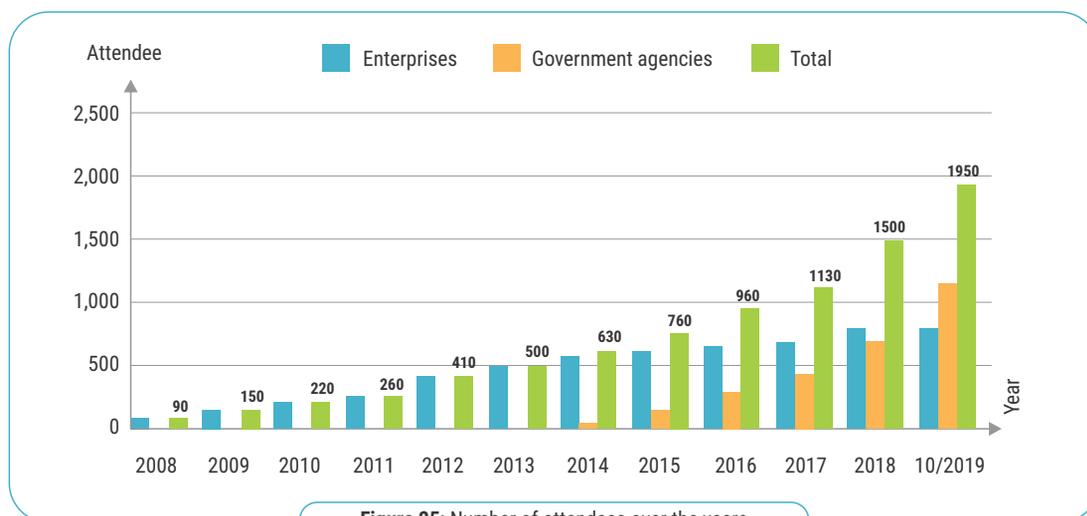
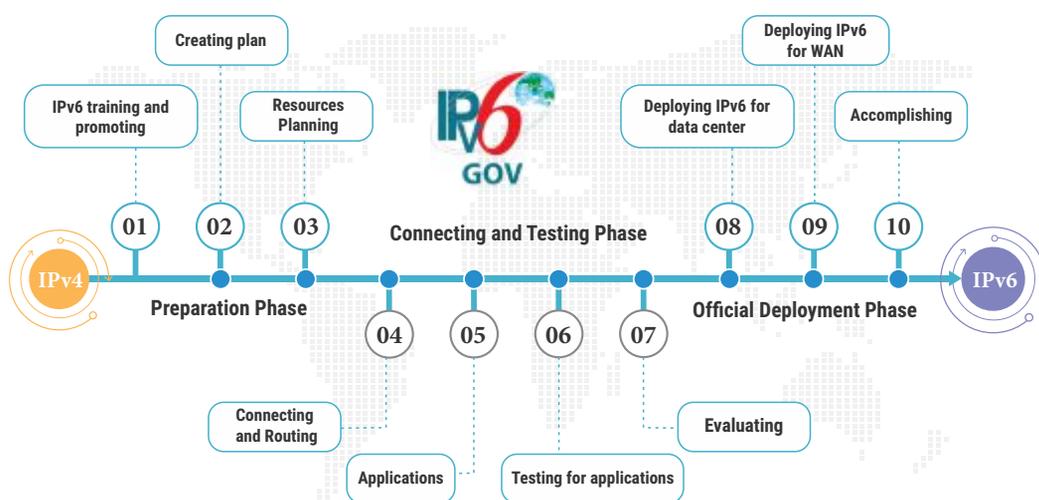


Figure 25: Number of attendees over the years

“IPv6 For Gov” Program

- Specific training courses and consulting meetings for Information Technology Departments, Information Centers of Ministries, Departments of Information and Communications of Cities/Provinces and other government agencies with the aim to support Pv6 deployment within their networks;
- The Guidance Document for IPv6 deployment in government agencies;
- The Specific Plan with 3 stages and 10 steps for IPv6 deployment in government agencies

10 steps for IPv6 deployment in government agencies



No.	Organization	No.	Organization
1	Office of the Party Central Committee	12	Binh Duong Department of Information and Communications
2	Office of the Government	13	Dong Nai Department of Information and Communications
3	Office of National Assembly	14	Da Nang City Department of Information and Communications
4	Authority of Information Technology and Natural Resource Data	15	Ho Chi Minh City Department of Information and Communications
5	Information Center	16	Thai Binh Department of Information and Communications
6	Authority of Telecommunications	17	Bac Giang Department of Information and Communications
7	Authority of Radio Frequency Management	18	Quang Ninh Department of Information and Communications
8	Authority of Information Technology Application	19	Ha Noi City Department of Information and Communications
9	Long An Department of Information and Communications	20	Dac Nong Department of Information and Communications
10	Dong Thap Department of Information and Communications	21	Bac Kan Department of Information and Communications
11	Lam Dong Department of Information and Communications	22	Binh Phuoc Department of Information and Communications
	

Table 8: List of organizations participating consultation meetings and training courses on IPv6

Promotion of IPv6 awareness



Promoting IPv6 on Public media, IPv6 sub-site in MIC Portal and many Departments' Portals, ect.



Annual Viet Nam IPv6 Days from 2012 – 2019 (<http://ipv6event.vn>).



Promoting IPv6 in annual IP Member Meetings, VNIX-NOG meetings and other ICT events.



Vietnam IPv6 Launch Ceremony on May 2013



IPv6 services and applications of government agencies and Content Providers Launching Ceremony on May 2019

Other promotion activities

- Annual working visits with big ISPs, Mobile operators and ICPs in Viet Nam such as VNPT Group, Viettel Group, Mobifone, FPT Telecom, VnExpress, VietNamNet, etc.
- Consultation meetings for Government agencies.
- Working visits to learn IPv6 deployment experiences and best practices from Japan, Singapore, Korea and Malaysia.



2.3.3 Accomplishing National IPv6 Action Plan

With the main target to ensure the stable operation of Viet Nam Internet within IPv6 technology, VNNIC has taken efforts in promoting IPv6 deployment in Viet Nam. As a result, the IPv6 adoption rate in Viet Nam has been increased and overcome the target of the National IPv6 Action Plan, helping Viet Nam become one of the top best countries in the field of IPv6 deployment.

According to APNIC's statistics, by October 2019, the use of IPv6 for Vietnam reaches approximately 40%, ranking the second place in ASEAN region and the 8th place in over the world with more than 21,000,000 IPv6 users.

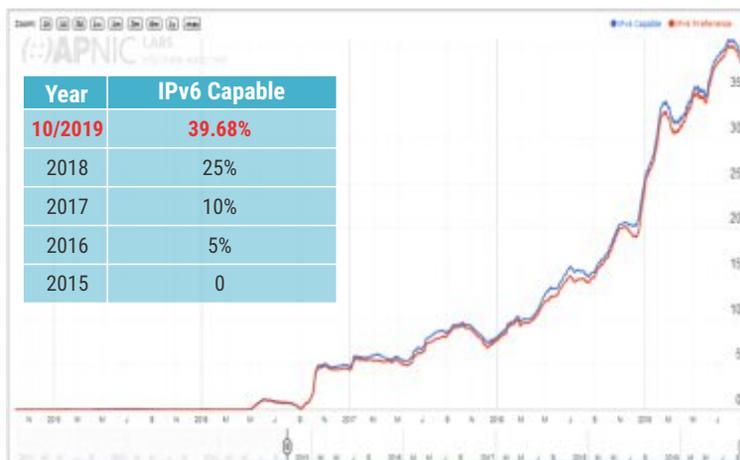


Figure 26: The use of IPv6 in Viet Nam (Source: APNIC, updated to October 2019)

STT	Country/Territory	IPv6 Capable
1	India	69.76%
2	Belgium	56.09%
3	United States	55.69%
4	Mayotte	51.10%
5	Taiwan	42.82%
6	Malaysia	40.81%
7	Germany	40.64%
8	Viet Nam	39.68%
9	Greece	39.54%
10	Guiana	36.62%
11	Japan	34.69%
12	Finland	33.97%
13	France	32.57%
14	Brasil	31.69%
15	Switzerland	31.66%
16	Uruguay	31.34%
17	Lucembourg	30.60%
18	England	30.51%
19	Thailand	28.71%
20	Norwau	28.33%

Table 9: The use of IPv6 for top 20 countries (Source: APNIC, updated to October 2019)

Network Infrastructure and Internet Services with IPv6

1 National IPv6 Network

- **The national “.vn” DNS system:** 6/7 DNS name servers supporting IPv4/IPv6.
- **VNIX:** 18/21 ISPs and national “.vn” DNS system connecting VNIX that supports both IPv4 and IPv6.

2 IPv6 Internet Services

- **FTTH:** 11 million IPv6 FTTH subscribers (including 5 million subscribers of Viettel, 4 million subscribers of VNPT, 1.5 million subscribers of FPT Telecom).
- **Mobile:** 24 million IPv6 3G/4G subscribers (including 11 million subscribers of Viettel, 10 million subscribers of Mobifone and 3 million subscribers of Vinaphone).
- **Website:** More than 10,650 Websites under “.vn” domain were enabled IPv6, 61 of which there are Government agencies’ Portals.

Top Government agencies and enterprises in IPv6 deployment

TOP GOVERNMENT AGENCIES					TOP ENTERPRISES			
Ministry of Information and Communications (MIC)	Ministry of Natural Resources and Environment (MONRE)	Vietnam Internet Network Information Center (VNNIC)	Authority of Central Posts (CPT)		VNPT Group	Viettel Group	FPT Telecom	MobiFone Corp.
Dong Nai Department of Information and Communications	Da Nang City Department of Information and Communications	Long An Department of Information and Communications	Lam Dong Department of Information and Communications	Ho Chi Minh City Department of Information and Communications	NetNam	VnExpress (FPT Online)	CMC Telecom	

III

NATIONAL CRITICAL INFORMATION INFRASTRUCTURES



1. NATIONAL “.vn” DNS SYSTEM

1.1 Critical role of National “.vn” DNS system in the development of Internet in Viet Nam

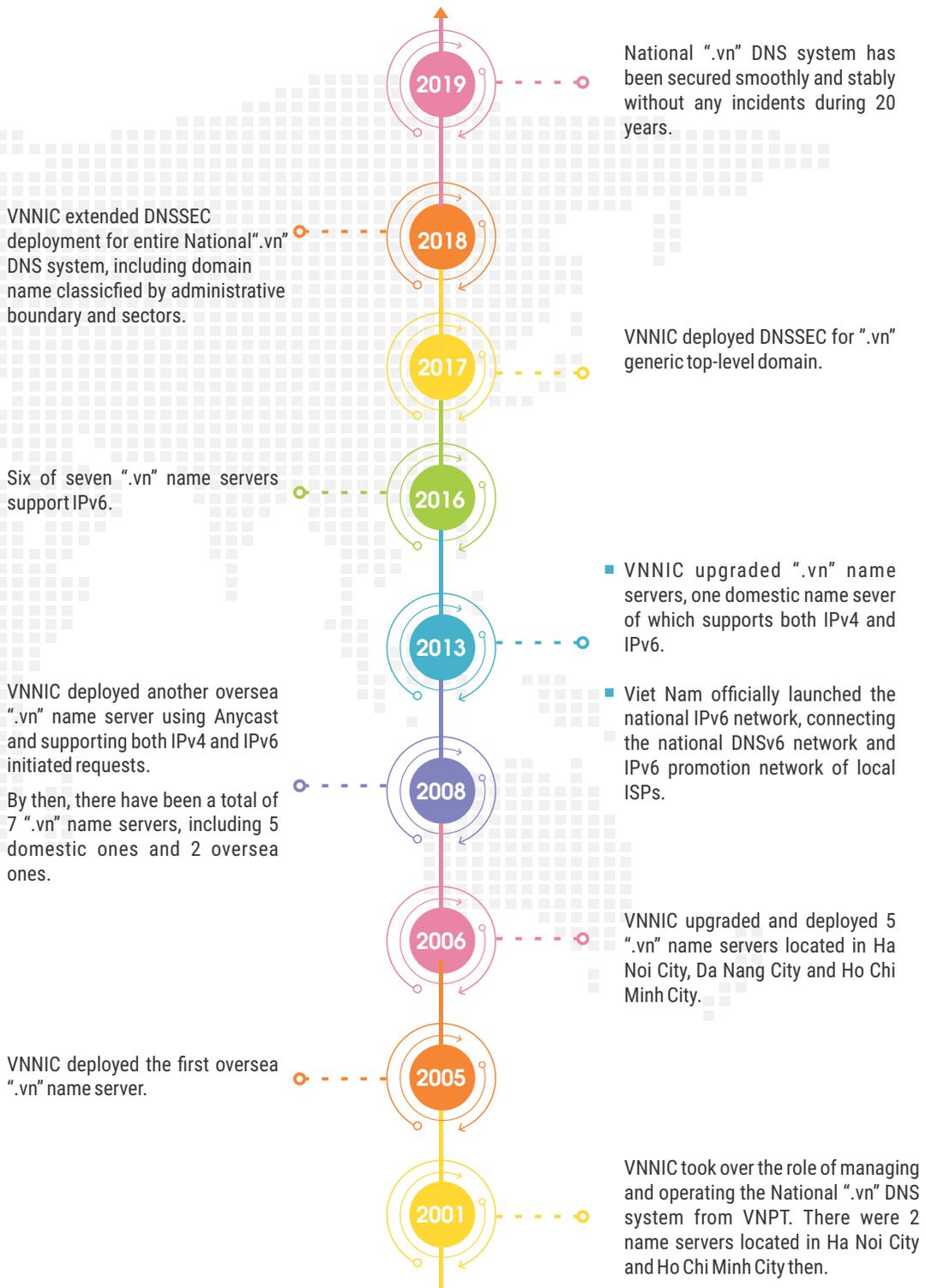
DNS system is an important information system that is considered as the heart of the Internet. Almost every activities on the Internet starts with a DNS query to lookup the IP address which corresponds to a domain name. The rapid growth of the Internet and the massive expansion of emerging technologies and trends such as Internet of Things (IoT), Bigdata, 5G, cloud computing, green IDC, green Internet, etc., has resulted in an increase of Internet usage and the volume of DNS queries accordingly. Some DNS providers log hundreds of billions of queries every year.

In Viet Nam, National “.vn” DNS system is a critical information system managed by VNNIC, holding responsibility for managing “.vn” domain name, receiving and responding the queries of “.vn” domain name from legal resource in the Internet. There are 7 name servers, five of which are located in Ha Noi City, Ho Chi Minh City and Da Nang City; other two name servers are located in many places in over the world. During 20 years, VNNIC has been maintaining and reinforcing National “.vn” DNS system for secure connection and operational stability that helps to strengthen the Internet and contribute to the development of e-commerce and e-government in Viet Nam.



Picture 5: Allocation map of National “.vn” DNS system

1.2 Development of National “.vn” DNS system



1.3 Number of queries and the average response time of National “.vn” DNS system

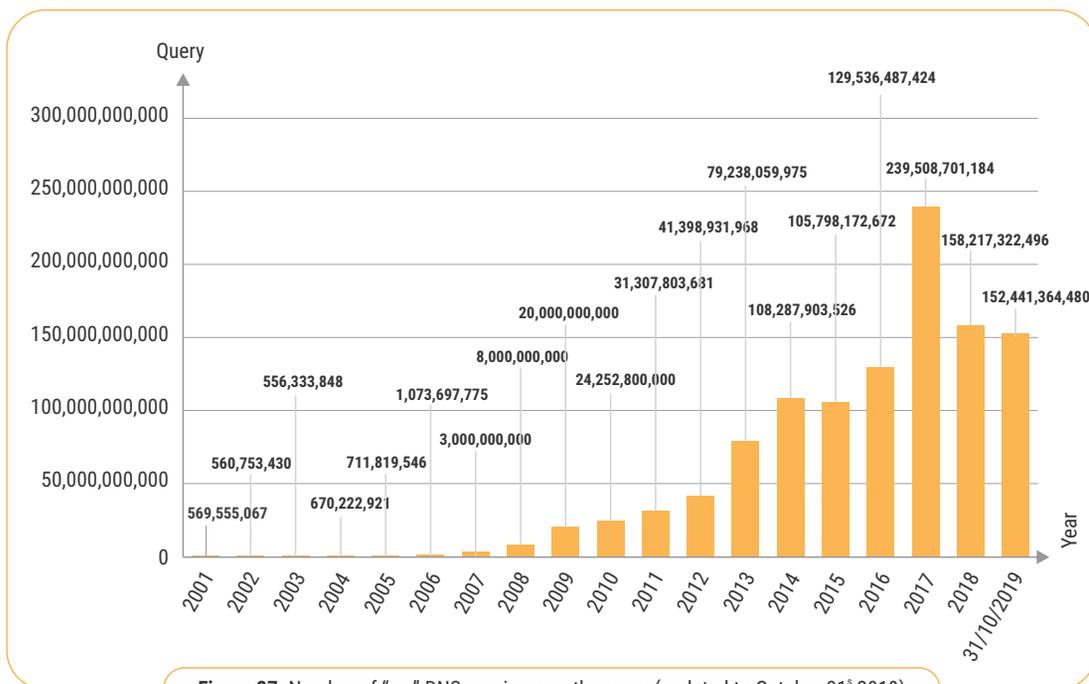


Figure 27: Number of “.vn” DNS queries over the years (updated to October 31st 2019)

The quality of service and implementation of new technologies



- Seervice Level Agreement (SLA): 99.999%.

National “.vn” DNS system has been secured smoothly and stably without any incidents during 20 years.
- The average query response time from domestic name servers and oversea name servers is 15ms and 62ms, respectively.
- National “.vn” DNS system was deployed emerging technologies including Anycast, DNSSEC and IPv6.

1.4 “.vn” DNS query by extensions

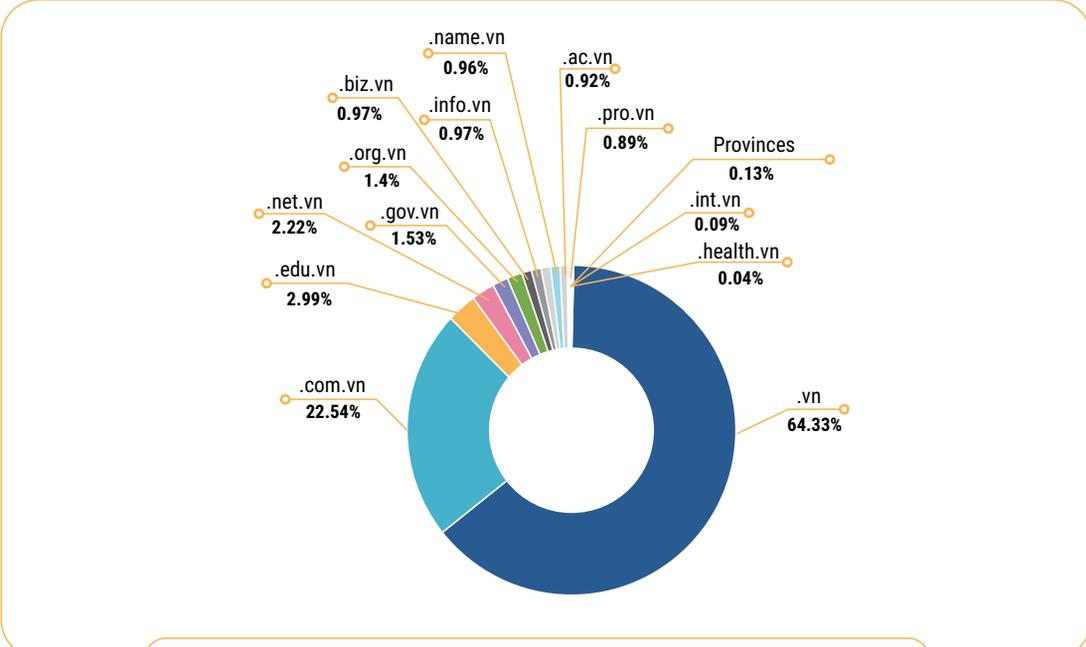


Figure 28: “.vn” DNS queries by extensions (updated to October 31st 2019)

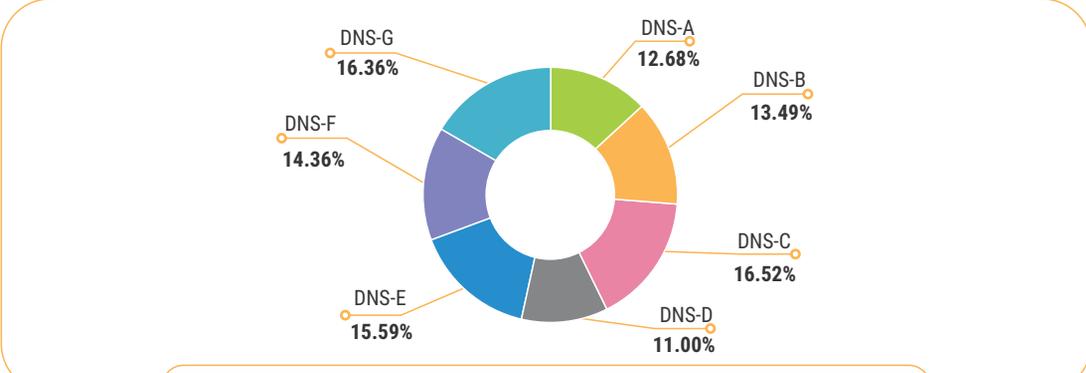


Figure 29: “.vn” DNS queries by servers (updated to October 31st 2019)

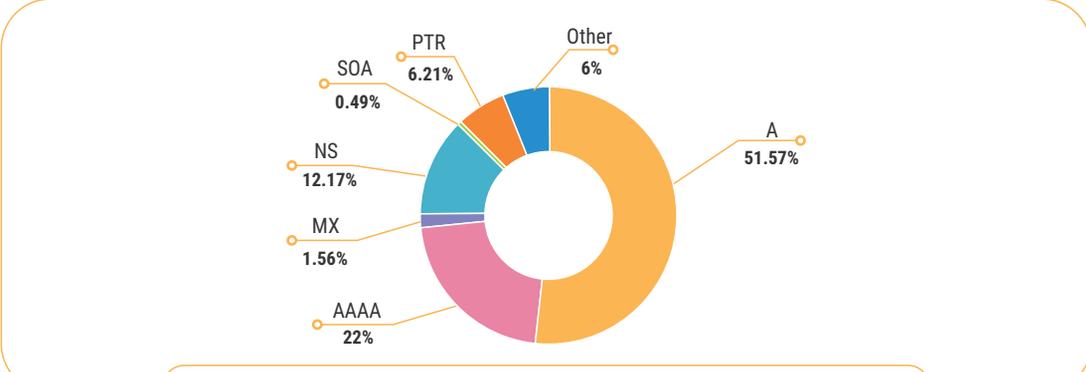


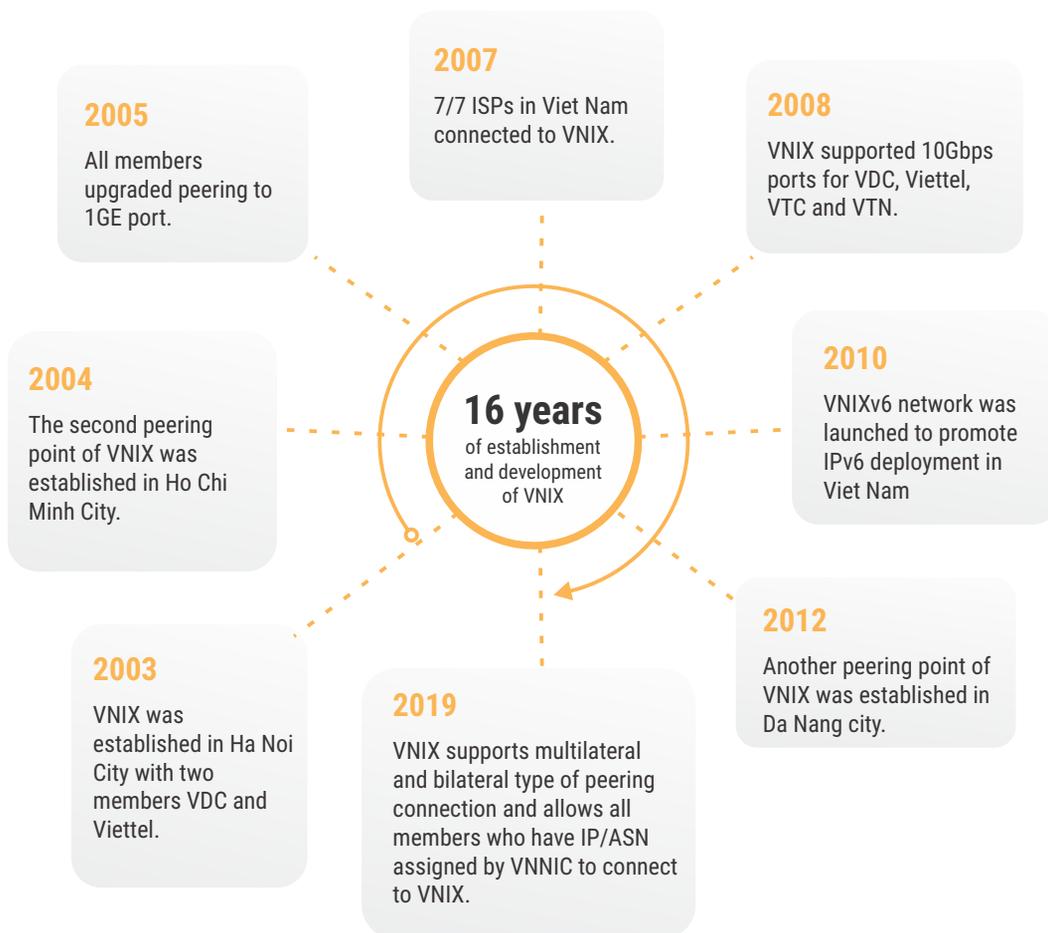
Figure 30: “.vn” DNS queries by record types (updated to October 31st 2019)



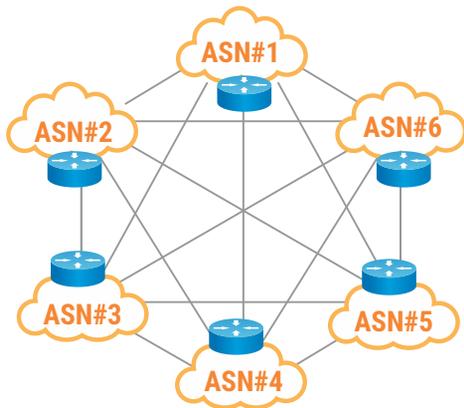
2. VIET NAM INTERNET EXCHANGE (VNIX)

2.1 Essential role of VNIX in the development of Internet in Viet Nam

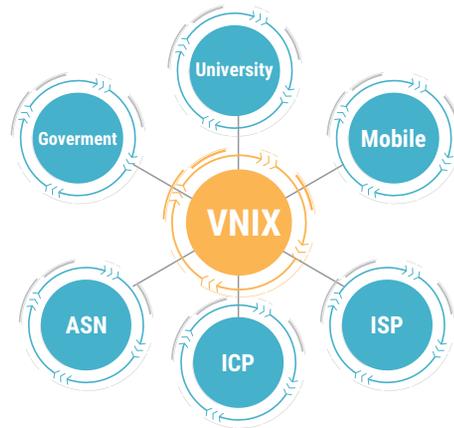
During 16 years of establishment and development, VNIX has played an important role in the development of Internet in Viet Nam, connecting ISPs and organizations, reducing costs, improving network quality and securing the national Internet infrastructures.



VNIX's contributions to the development of Internet infrastructure



Picture 6: Internet infrastructure without VNIX



Picture 7: Internet infrastructure with VNIX

EASY AND FLEXIBLE CONNECTIVITY

- VNIX offers various profiles of peers from Internet service provider, content provider, government agency, “.vn” DNS network, DNS ROOT, etc. When connecting to VNIX, members can peer with all other members' networks.
- VNIX support 2 types of peering: multilateral peering and bilateral peering.
- It's easy for members to interconnect with other peer and transit service providers via bilateral peering service.

SUBSTANTIAL COST-SAVINGS

- Reduce ongoing transit and network costs
- With just one cross connect to VNIX, a member reach all other networks.
 - VNIX helps to save international bandwidth cost as all domestic traffic is directly exchanged via VNIX.

INCREASE NETWORK PERFORMANCE

- Reduce latency of Internet traffic, improve the routing efficiency and network bandwidth.
- Speed up the response time of “.vn” DNS and DNS ROOT query.
- Enhance the end-user Internet experience.

IMPROVE SECURITY AND PROVIDE A BACK-UP

- Being a back-up network in case of international failure or other channel failure.
- Connecting to many peering locations of VNIX helps to secure network and optimize network infrastructure.

No.	VNIX MEMBER	ASN	VNIX LOCATION		
			HA NOI	HCMC	DA NANG
1	CMC Telecom	45903	30GE	20GE	1GE
2	DCNET Telecom	63741		10GE	
3	".vn" DNS Network – VNNIC	29302; 24066 131415	10GE	10GE	1GE
4	FPT Telecom Joint Stock Company	18403	1GE	1GE	
5	Global Data Service JSC	38735	1GE		
6	Hanoi Telecom Corporation	24088	10GE	1GE	
7	L.C.S Co., Ltd	38738	10GE		
8	Mobifone Global Technology JSC	45896	1GE	1GE	
9	Vietnam Mobile Telecom Services One Member Limited Liability Company	131429	10GE	10GE	
10	Minh Tu Telecommunications Company Limited	55309		10GE	
11	NetNam Corporation	24173	2GE	1GE	
12	ODS Joint Stock Company	45538		1GE	
13	Saigontourist Cable Television Company Limited	45543		2GE	
14	Saigon Posts and Telecommunications service Joint Stock Corporation	7602	1GE	20GE	
15	Telecom and IT Solutions & Services	63731		1GE	
16	Viettel Networks Corporation – Military Industry and Telecoms Group	7552	20GE	20GE	2GE
17	VNPT NET Corporation – Vietnam Posts and Telecommunications Group	45899	20GE	30GE	
18	Vietnam Technology & Telecommunications JSC	45557		1GE	
19	Vietnam Television Corporation – VTC	38248	10GE	10GE	
20	Vietnam Television Cable Joint Stock Company	131410	1GE		
21	Vinadata Information Technology Service Joint Stock Company	38244		10GE	

Table 11: List of VNIX members

2.2 Statistic, growth and services usage via VNIX

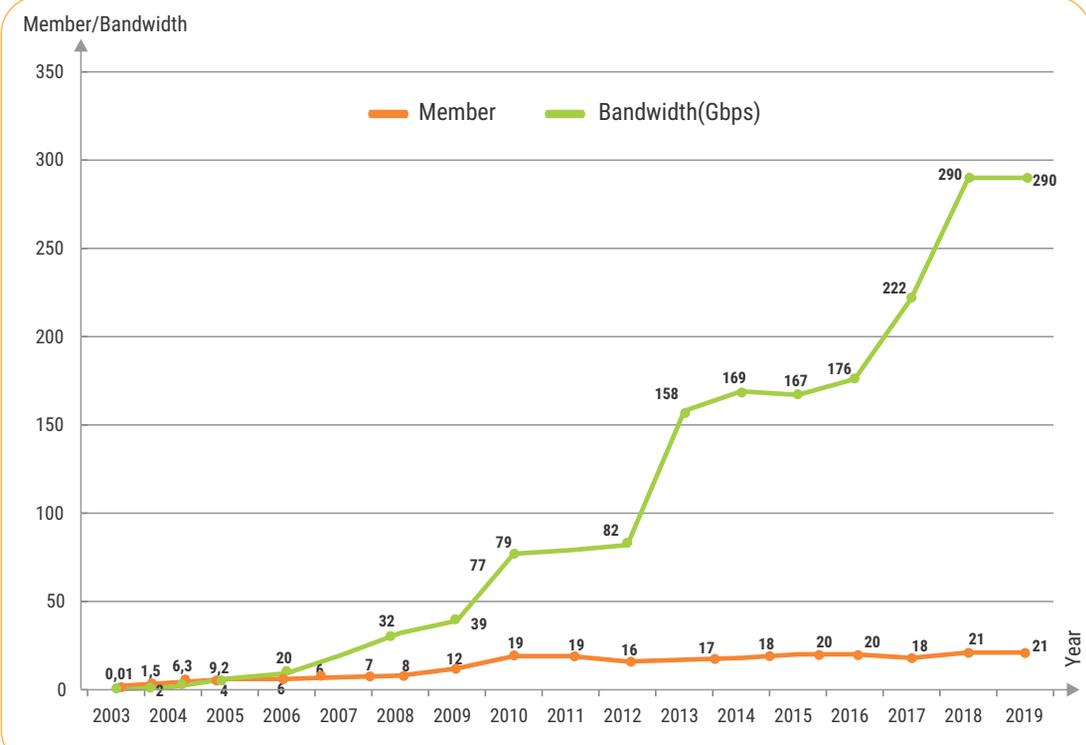


Figure 31: Growth of members and connection bandwidth via VNIX over the years

Total of bandwidth
290 Gbps

IPv4 prefix
15246

IPv6 prefix
2106

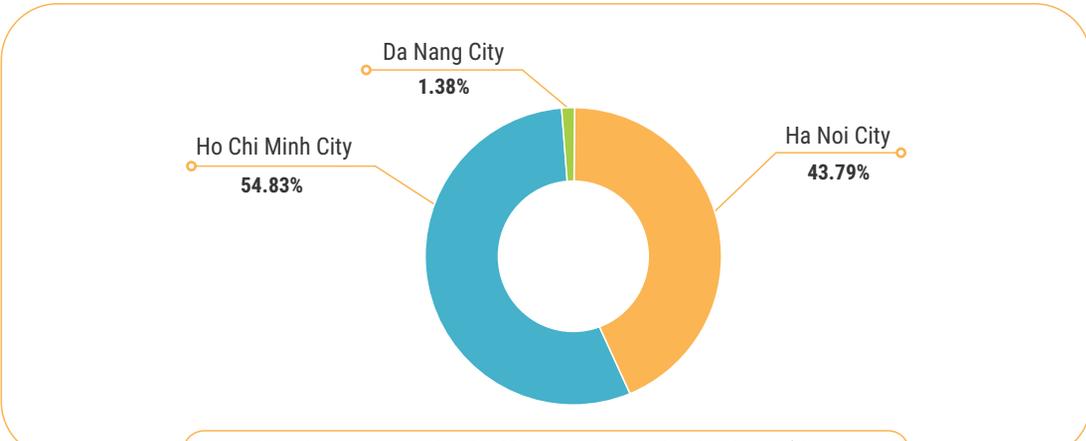


Figure 32: Connection bandwidth by area (updated to October 31st 2019)

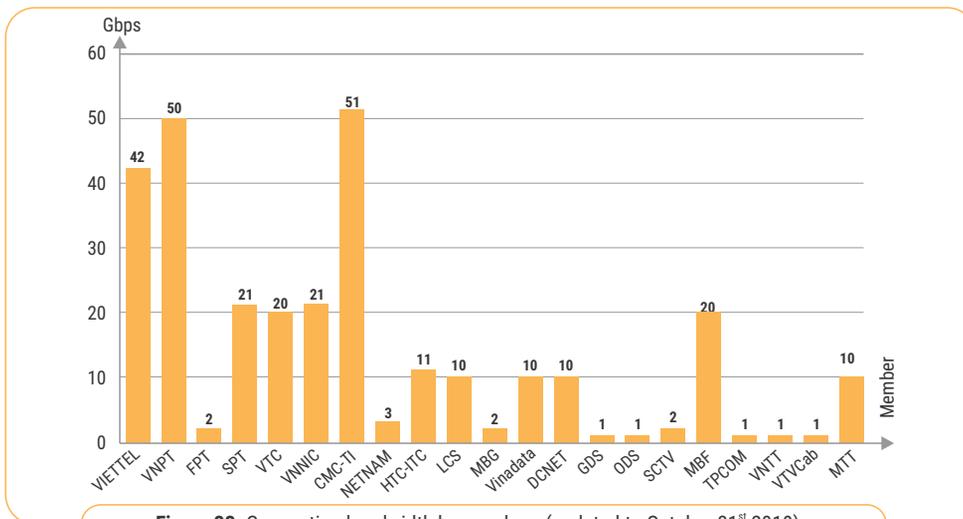


Figure 33: Connection bandwidth by members (updated to October 31st 2019)

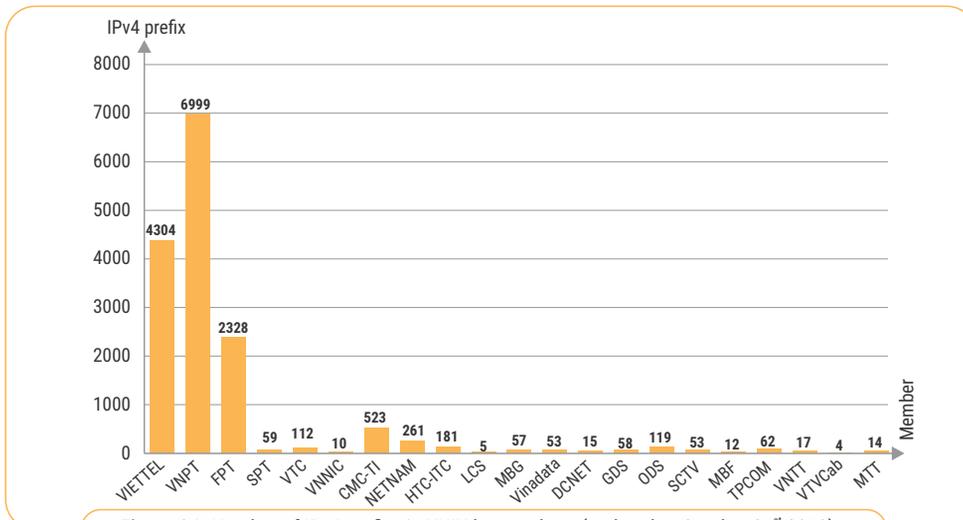


Figure 34: Number of IPv4 prefix via VNIX by members (updated to October 31st 2019)

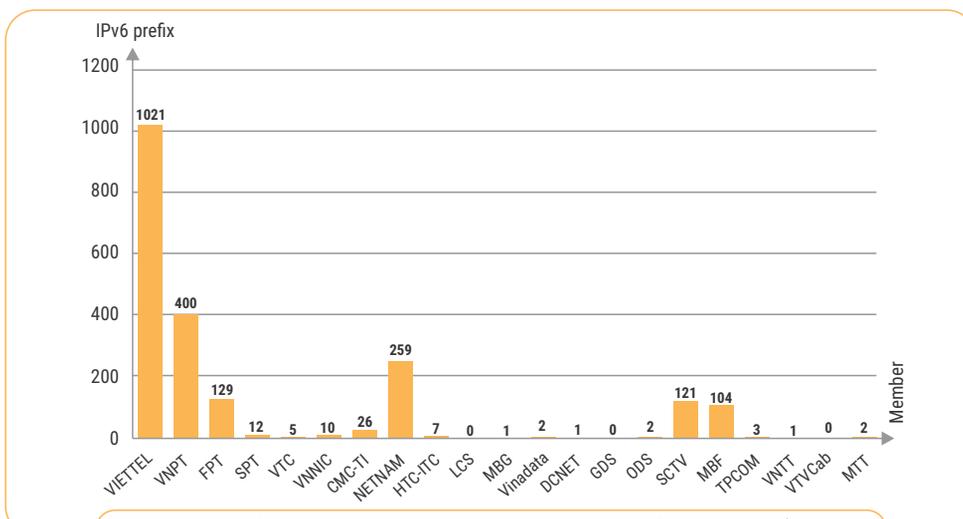
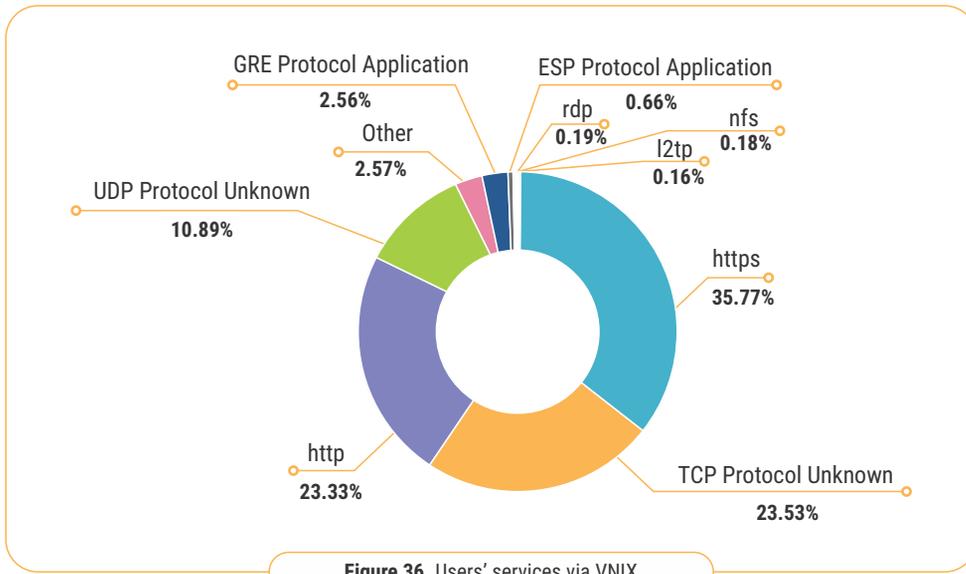


Figure 35: Number of IPv6 prefix via VNIX by members (updated to October 31st 2019)



2.3. Viet Nam Internet eXchange Network Operators Group (VNIX-NOG)

With the aim to enhance the engagement of VNIX members and improve the quality of operation and connection via VNIX, VNNIC established Viet Nam Internet eXchange Network Operators Group (VNIX-NOG) and held annual events since 2016 (<https://vnx-nog.vn>). They have been well attended by experts from local Internet Service Providers, Mobile Services Providers, Internet Exchange Points, National Internet Network Centers DNS Operators, Data Centre Operators, Content Providers, Vendors and other interested groups in Asia-Pacific region.



VNIX-NOG Conference has become an important technical forum for Viet Nam Internet community, providing both an opportunity to exchange technical information, interact frequently with local and International experts, and thereby foster greater collaboration to improve the overall Internet ecosystem in Viet Nam. Besides the main topic of the essential role of Internet Exchange Point, VNIX-NOG conferences focus on contents of optical transmission, network security, emerging new technologies and solutions for network quality improvement, becoming an effective approach for promotion of IPv6 transition, RPKI deployment and DNSSEC deployment in Viet Nam.

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IP/ASN



VNIX



DNS

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RESEARCH AND DEVELOPMENT



1. Application of Anycast, DNSSEC, IPv6 and analytic technology for National “.vn” DNS system

In 2005, VNNIC deployed the first “.vn” overseas name server (VN.CCTLD.AUTHDNS.RIPE.NET), using high availability (HA) architecture. In 2008, VNNIC deployed the second overseas name server (DNS-A: A.DNS-SERVERS.VN). In July 2017, VNNIC upgraded the first overseas name server, replacing VN.CCTLD.AUTHDNS.RIPE.NET name server with DNS-G name server (G.DNS-SERVERS.VN). Both DNS-A: A.DNS-SERVERS.VN and (G.DNS-SERVERS.VN) were deployed Anycast technology, support both IPv4 and IPv6 with the aim to reduce latency, ensure faster connection, safe and stable operation. In 2017, the Decision No.1524/QĐ-BTTTT was approved by the Minister of Information and Communications on October 31st 2014 on the implementation of DNSSEC standards for National “.vn” DNS system in Viet Nam. The National “.vn” DNS system was officially implemented the DNSSEC standard since 2016, marking an important milestone in the development of Viet Nam's Internet infrastructure that would be ready to set up the development of safe, accurate and reliable e-commerce service e-government in Viet Nam. By 2018, VNNIC had expanded the implementation of DNSSEC standard on the whole server system of second level domain name (.com.vn, .gov.vn,...) and domains by administrative boundaries (.hanoi.vn, .danang.vn,...). Along with that, VNNIC had created a new key and signed DNSSEC a second time for the “.vn” domain name. The annual key generation and re-signing of DNSSEC (DNSSEC Key Rollover) to ensure the highest security for the “.vn” domain name would serve the process of managing DNS system operation, in compliance with international standards and recommendations of ICANN.



2. Application of international standards ISO/IEC in the management of critical information infrastructures

VNNIC has researched and implemented ISO9001, ISO 27001, ISO20000, ITIL, in compliance with state regulations on network information security into management and operation of the national “.vn” DNS system, VNIX and other service systems. This has helped the management work become synchronized, systematic and coherent; enhance security and safety assurance, and contribute to ensure KPI (SLA) for National “.vn” DNS system, VNIX system and other service systems of VNNIC. In particular, in 2015, VNNIC was awarded ISO/IEC27001:2013 certification in management and operation of National “.vn” DNS system and IDC in Ha Noi City by D.A.S - the leading international certification organization of the United Kingdom. In 2018, the certification has been expanded for VNIX and the entire IDC infrastructures in Ha Noi City, Ho Chi Minh City, Da Nang City. The implementation of information security management activities in accordance with international standards ISO/IEC 27001: 2013 is a confirmation of the determination to improve the quality of information security for critical information infrastructures under VNNIC management.



3. Application of Quality Management System with National Standard TCVN ISO 9001

In 2015, VNNIC's operational management of “.vn” domain names, IP addresses, ASN and VNIX in Viet Nam was certified with the quality management system ISO 2001: 2008 (published by Quacert Center- Directorate for Standards, Metrology and Quality, the Ministry of Science and Technology). Quality management system in accordance with ISO 9001: 2008 has been implemented, maintained, improved and developed continuously by VNNIC over the past few years, actively contributing to improving the efficiency of management system and promoting the use of Internet resources in Viet Nam.





4. Innovation of VNIX



VNIX is one of the important infrastructure contributing to the safety, quality and efficiency of Internet in Viet Nam. Research and development for VNIX has always been highly appreciated by VNNIC. Every year, new technologies and solutions are applied.

In 2018, VNIX was awarded the certificate of maintaining the Information Security Management System according to ISO/IEC 27001:2013 with the scope of "Information security in infrastructure operation management of IDC and VNIX".

In the process of IPv6 transition, VNIX was the first network deployed IPv6, connecting ISPs in Viet Nam in the roadmap to promote IPv6 transition in Viet Nam.

In 2019, VNIX conducted a survey of the IX operating model in the world then expanded multilateral and bilateral policies and connection members. At the same time, VNIX was deployed new services such as Looking Glass, National ".vn" DNS system, DNS Root, SpeedTest, NTP, etc. There were also studies on RPKI deployment, MANRS - a routing security agreement, routing solutions using open source, technical solutions to ensure safety for VNIX infrastructure as well as the security of Viet Nam Internet.

5. Application of PKI

Since 2003, VNNIC has researched on PKI then built a digital certificate issuance (CA) management system, conducted a test deployment in electronic transactions at the Ministry of Post and Telematics, including test deployment in signing and encryption, email, sign documents, authenticate security of internal web portals. On the basis of successful test results, VNNIC continues to research and deploy the application CA system in the management of Internet resources, using RPKI in the management of ".vn" Accredited Registrar System, VNIX system and VNNIC's internal applications.



6. Formulation of policies and regulations



Legal documents VNNIC presided

- Circular No.09/2008/TT-BTTTT dated December 24th 2008 guiding the management and use of Internet resources.
- Circular No.10/2008/TT-BTTTT dated December 24th 2008 regulating the settlement of disputes over Vietnam's national domain names ".vn".
- Circular No.24/2015/TT-BTTTT dated August 18th 2015 on regulations on management and use of Internet resources.
- Circular No.16/2016/TT-BTTTT dated June 28th 2016 guiding the transfer of rights to use Internet domain names granted without auction.
- Circular No.06/2019/TT-BTTTT dated July 19th 2019 of the Ministry of Information and Communications amending and supplementing a number of articles of Circular No. 24/2015 / TT-BTTTT dated August 18, 2015 of the Ministry of Information Information and Communication on the management and use of Internet resources.

The research and development of Internet resource management policy has always been focused by VNNIC and timely advised to the Ministry's leaders. Up to now, the legal framework has been completed, creating momentum to promote sustainable development of Internet resources.

Legal documents with VNNIC's coordination

- Decree No.72/2013/ND-CP dated July 15th 2013 on the management, provision and use of Internet services and online information was issued replacing Decree No. 97/2008 / ND-CP.
- Decision No.38/2014/QĐ-TTg dated July 1st 2014 on auction, transfer of rights to use telecommunications number storage and Internet domain names.
- Decree No.27/2018/ND-CP dated March 1st 2018 amending and supplementing a number of articles of the Government's Decree No.72/2013 / ND-CP dated July 15th 2013 on management, provision and use of services Internet and online information.
- Circular No.189/2010/TT-BTC dated November 8th 2010 prescribing rates, collection, remittance and management of charges and fees for ".vn" domain names and Internet addresses in Viet Nam.
- Circular No.208/2016/TT-BTC dated November 10th 2016 regulating the rates, collection, remittance, management and use of national domain name ".vn" charges and fees and IP address in Viet Nma, replacing Circular No. 189/2010/TT-BTC.
- Joint Circular No.14/2016/TTLT-BTTTT-BKHCN dated June 8th 2016 guiding the order and procedures for domain name withdrawal in violation of the law on intellectual property.

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TRAINING PROGRAMS, NATIONAL AND INTERNATIONAL COOPERATION ACTIVITIES



1. NATIONAL COOPERATION ACTIVITIES

As the economy and social life is driven by the growth of Internet and related digital technologies, the government has faced some unique challenges in Internet resources management and network development. With the aim to promote Internet resources and emerging technologies deployment in local area, VNNIC has conducted cooperation activities with many government agencies.

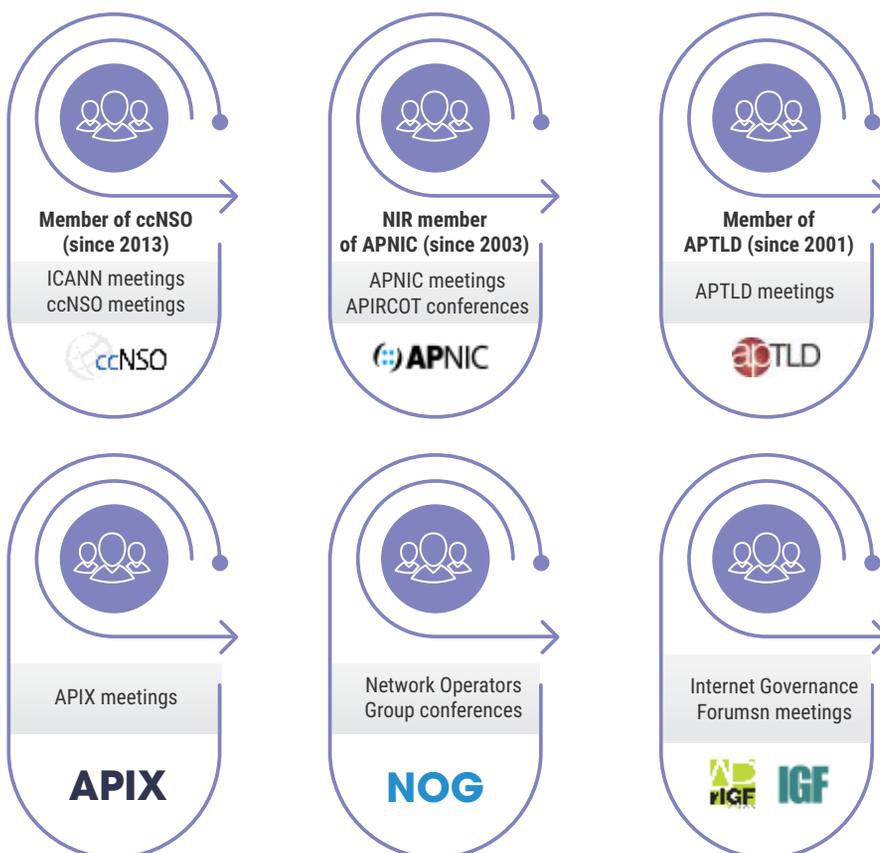


2. INTERNATIONAL COOPERATION ACTIVITIES

During 20 years of establishment and development, VNNIC has actively taken part in many ICT conferences, workshops, meetings, and contributed greatly to the development of policies and initiatives to promote ccTLD usage, IPv6 deployment and network infrastructure development in Asia-Pacific region. There have been some notable achievements such as VNNIC's representative became a Board member of APTLD board during the term of 2 years (2018-2020), Viet Nam had global ranking of the sixth in IPv6 deployment with adoption rate of 40%, etc., These contribution and achievement helps to strengthen VNNIC's international role in Internet resources management.



VNNIC's representative was voted as a Board member of APTLD during the term of 2018-2020



In the field of bilateral cooperation, VNNIC signed Memorandum of Understanding (MoU) Agreements with some national Internet organizations including Korea Internet & Security Agency (KISA), Japan Network Information Center (JPNIC) and Coordination Center of Top Level Domain .RU (CC for TLD .RU). In recent years, VNNIC has expanded the depth and breadth of international cooperation relationship, setting up new inputs and ideas for mutual interests in the development and management of Internet resources in the era of Industrial 4.0 with a focus on developing value-added services for ccTLD and IDN and implementing high standards to strengthen security of critical information infrastructures in general and security of DNS in particular, etc.

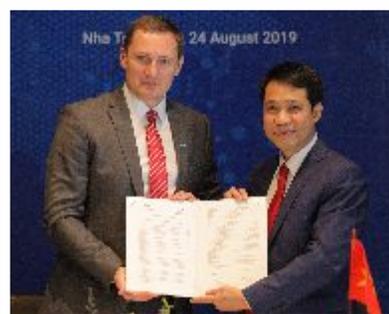
Partnership with KISA



Since 2001, VNNIC and KRNIC (the former of KISA) has conducted many cooperation activities that supported VNNIC in developing management policies of ccTLD, IP address and improving DNS service performance and transparency. Working meetings have been held annually with the aim to share information and updates from each side and promote the co-ordination and efficiency of VNNIC and KISA partnership in the term of the MoU signed in 2015 and the last MoU signed in 2019.

Partnership with CC for TLD .RU

Since 2014, VNNIC and CC for TLD .RU have cooperated and supported each other's activities in the management of Internet resource (VNIX-NOG, RIGF,...), setting a solid foundation for future long term relationship. The cooperation partnership with CC for TLD .RU is one of important tasks for VNNIC in order to maintain the strong, long-term relationship in the field of information and communications between two countries Viet Nam and Russia generally.



Partnership with JPNIC



Since 2013, JPNIC has supported VNNIC in developing the management systems of Internet resources and promoting the deployment of emerging technologies (RPKI, IPv6 and DNSSEC). In the year of 2018 and 2019, VNNIC cooperated with JPNIC to hold workshops on RPKI deployment with the aim to raise community's awareness of routing security.

Partnership with LANIC

Since LANIC was established, VNNIC has cherished the long-term partnership by supporting in training activities for LANIC's key staffs and helping LANIC to take over ".la" management. The partnership between VNNIC and LANIC helps to firm up the cooperation relationship between the Ministry of Information and Communications in Viet Nam and the Ministry of Post and Telecommunications (Laos).



In 2010, Mr. Nguyen Le Thuy signed a cooperation agreement with LANIC under the witness of Mr. Douangchay Pichit, Prime Minister and Mr. Khamlout Sidlakone, Minister of Post and Telecommunications of Laos.



VNNIC collaborated with LANIC to hold some workshops on ccTLD and IPv6 deployment for officers of LANIC and ".la" Registrars.



3. TRAINING PROGRAMS

With the aim to enhance the efficiency of management and development of Internet resources in Viet Nam, VNNIC has initiated several conferences, seminars and workshops for interested groups and organizations.



Training programs for ".vn" Accredited Registrars



Training workshops and advisory meetings on IPv6 deployment



Conferences on the management and development of Internet resources



Training workshops on DNSSEC



Training workshops on RPKI

***D**uring these 20 years, the impressive development of Internet resources, accompanied by the safe and stable operation of critical Internet infrastructures, has contributed greatly to the expansion of Internet in Viet Nam. Thanks to those results, Viet Nam has had a remarkable integration to the global Internet. In the trend of digital transformation and online services, we believe that, Viet Nam's Internet resources and national critical Internet infrastructures would continue to reinforce their roles in the overall development of Internet activities in our country.*

The Report on Viet Nam Internet Resources 2019 would express the gratitude from Viet Nam Internet Network Information Center to all leaders of the Ministry of Information and Communications, domestic and foreign partners, the Internet community in Viet Nam for the valuable support all over the time. Without the support, we would not have achieved all these success.

Thank you!

VIET NAM INTERNET NETWORK INFORMATION CENTER

