Stingray Service Gateway

Network, Traffic Control and Analysis System

2020
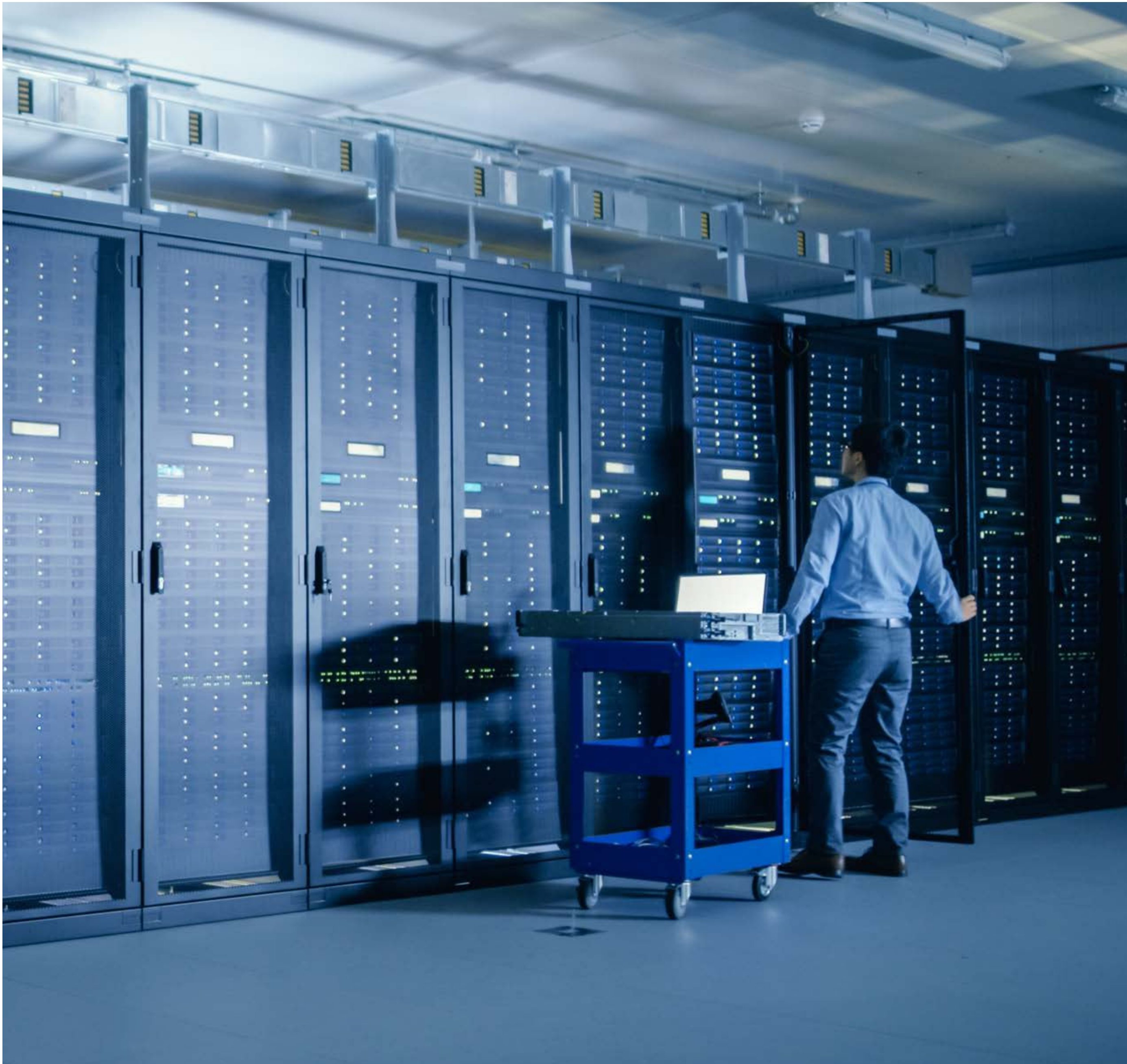
Content

About

ITGLOBAL.COM is an international group of companies, a global provider of IT services, products, and solutions. Our company has offices in Europe, Asia and USA. Leveraging 10 years of experience and skills, ITGLOBAL.COM has become a major worldwide integrator that helps its customers to perform their business. VasExperts LLC. is one of the companies that is part of the ITGLOBAL.COM Group.
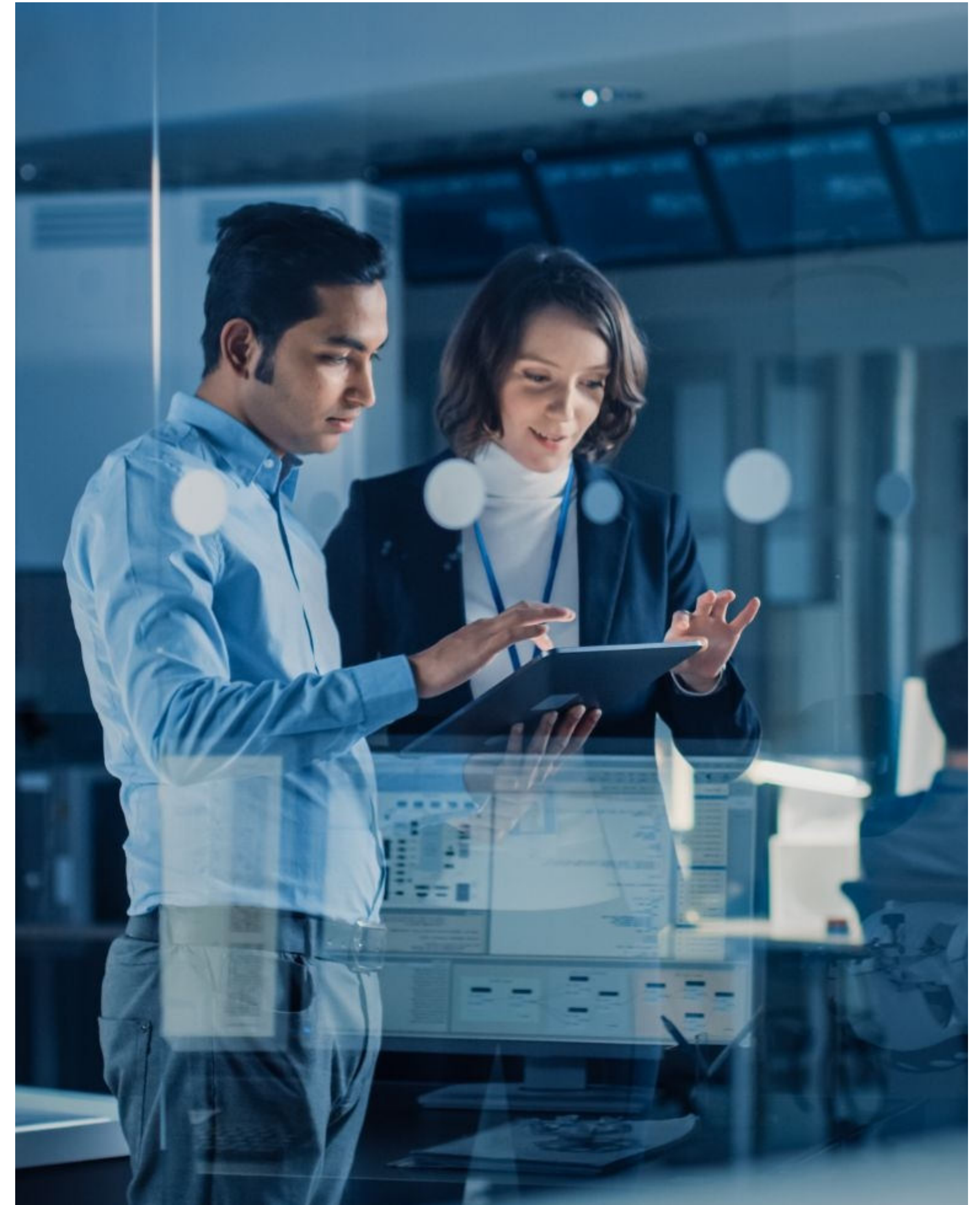
VAS Experts LLC is a telecom software developer. Development team with over 15 years work experience in telecommunication and software development placed in Russia, Saint-Petersburg. Since 2013 more than 1000 ISPs in CIS, eastern Europe, and central America are using Vas Experts software solutions

Stingray Service Gateway

Stingray SG is an All-in-One solution.

The main idea when creating the product was to combine all those devices that are present in the network of the Internet service provider (telecom operator) such as Deep Packet Inspection platform (DPI), broadband network gateway (BNG), NAT and Router into one, to make it easy to maintain and operate.
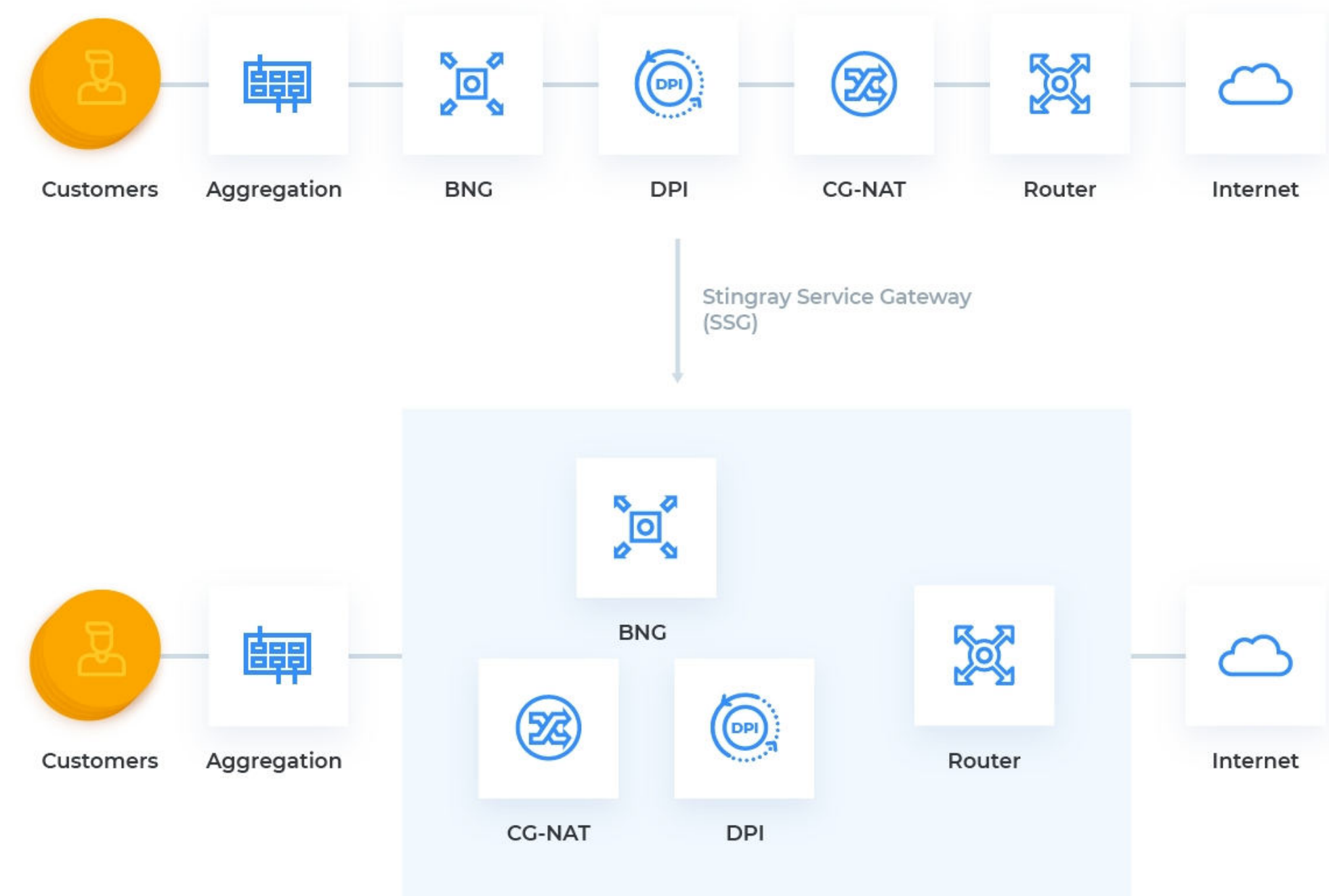
Own DPI Engine

There are about 10 companies in the world that manage to create their own traffic processing engine and signatures. VAS Experts LLC is one of them. The functionality and high quality of Stingray engine can compete with Cisco SCE, Ericsson SE, Allot, Huawei ME and Sandvine/Procera solutions.

The solution doesn't depend on a particular server hardware supplier and can be flexibly adapted to business requirements.
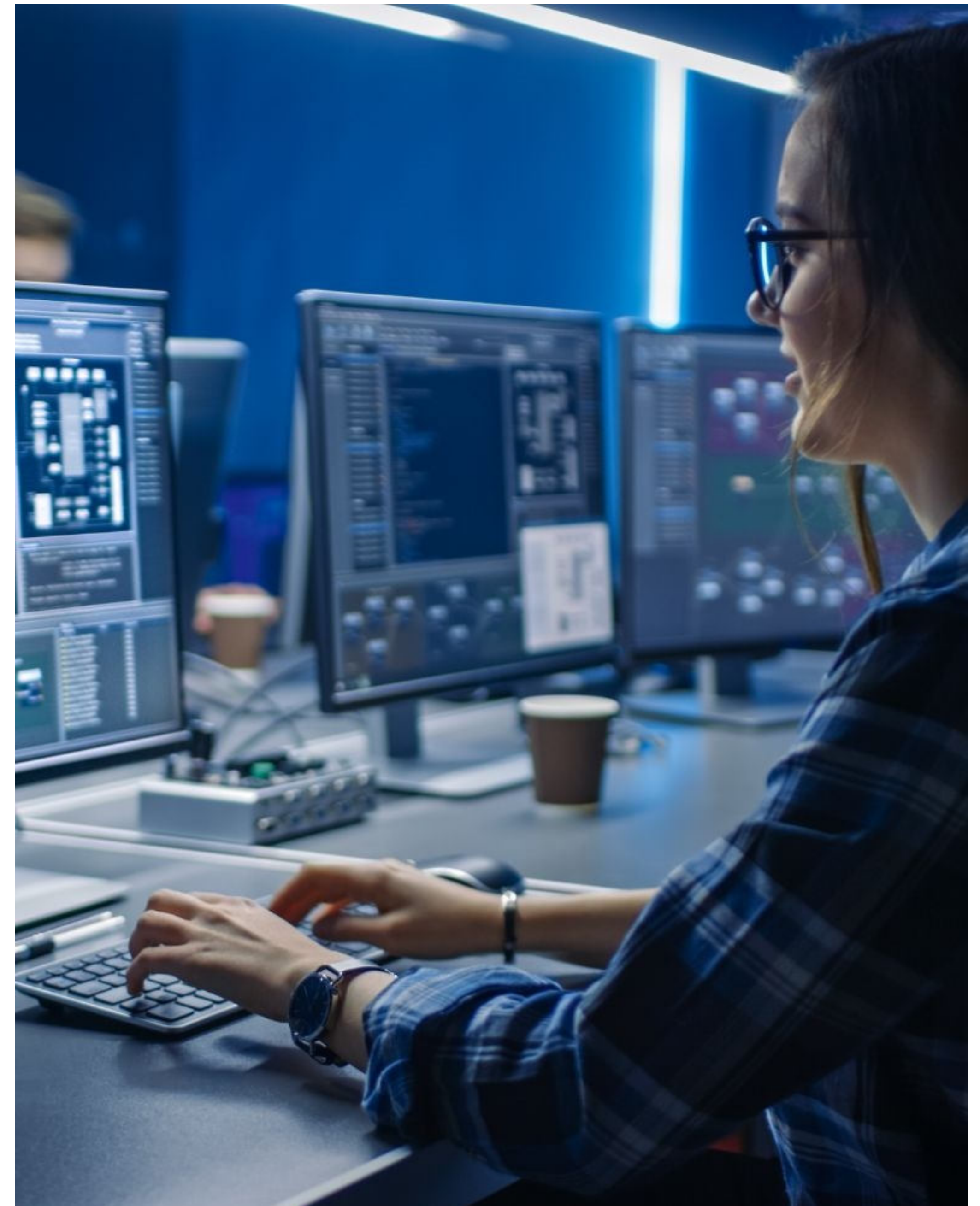
Quality of Service (QoS)

The Quality of Service (QoS) module enables bandwidth management based on application layer protocols, data flows, and bandwidth usage. With prioritization, up to 25% of the bandwidth is saved.

QoS can be used to classify inbound traffic and provide more resources for high priority applications and protocols. The option is highly suitable for IP telephony, IPTV, video streams, online conferences, and other latency-sensitive data flows.

Features

Prioritize traffic in peak hours

DPI-enabled prioritization moves low-priority applications to the background and assigns high priority to more important services, which preserves the quality of connection even in peak hours.

Hierarchical traffic prioritization

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- Public access channel
- A user
- VLANs
- Ports (if several uplinks are used)

Bandwidth monitoring

Stingray SG prevents bandwidth congestion by sending notifications when the limit is reached. Prioritizing traffic by protocols and flows, it ensures that low-priority traffic is displaced by high-priority traffic.

Bandwidth limitation based on subscription

Stingray SG limits bandwidth based on user subscription plan and prioritizes traffic within the bandwidth. It protects high priority applications, especially when several users share the same IP address and one of them overloads the bandwidth, affecting the work of important services. Such services will be given high priority, ensuring their stable operation.

Success story Yota

Yota de Nicaragua project was developed under the direction of Russian Yota branch offices. Since 2009, the company has been actively expanding in Central and South America. All services were configured and supported from Russia. The project task was to build a high capacity network with a focus on real-time protocols and relevant content for improving user loyalty to the operator. The project also needed to take local engineering specifics into account.

Current Cisco SCE2020 equipment couldn't go beyond 2 Gbps; therefore, it was necessary to find a new strategic solution that would simultaneously simplify local network maintenance, and improve Internet connection quality and download speed.

ITGLOBAL.COM restructurred the current WiMAX networks and integrated Stingray Service Gateway.

"With Stingray at our disposal, we began to gradually lower the stress on the transport network. We decided to get move away from Cisco hardware due to its complex configuration, because it was practically impossible to find skilled experts in these labor shortage conditions. We migrated the network logic to other devices. For the first time, we got the opportunity to offer nightly flatrates and turbo buttons, which have already become the quality standard for Russian Internet. The solution helped us cut the speed according to fixed billing plans, which we couldn't offer earlier."

Dmitry Erankevich, developing manager, Yota de Nicaragua

We created personalized billing plans for customers, improved quality of "heavy" content playback: games, online videos, communication applications (Skype, Zoom), and, as a result, greater brand loyalty.

Quality of Experience (QoE)

QoE is a software product created for collecting statistics and assessing the quality of service perception. The resulting statistics is superimposed on specific metrics to determine user experience and take actions aimed at improving the quality of communication services.

How to use QoE metrics

Sales and marketing

The DPI is used in the context of marketing to serve targeted advertising to users. Moreover, the DPI technology categorizes the market by top players, protocols, type of devices and end user. The ability to build and upload reports is also useful for providers to obtain valuable information about the use, market share, growth rate and trends.

Metrics

- Number of sessions, devices, agents, IP addresses per subscriber

- Traffic by application and transport layer protocols

- Sequence of clicks, pages, and websites per each subscriber

- Traffic by direction and AS

- Retransmission rate

- RTT (Round Trip Time)
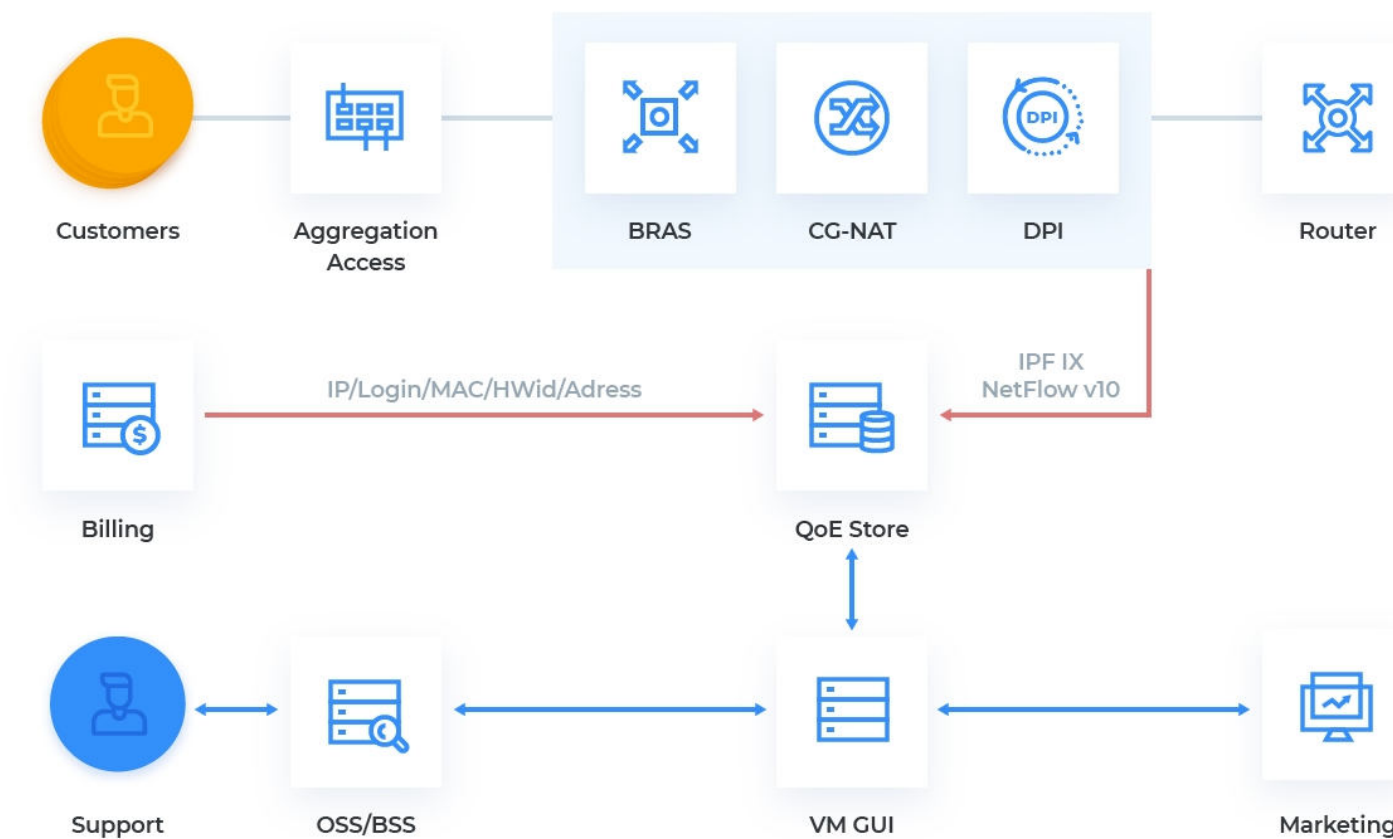
Use cases for deep packet inspection

- Upselling new service, Wi-Fi equipment, traffic plans

- Work with outflow and analysis of the causes of outflow in the past

- Target advertising with using subscriber profiling Technical and Support departments

- Deep troubleshooting and monitoring with using Round Trip Time and TCP retransmitting

- Identification of problems with client terminal equipment, Wi-Fi router, access switch and aggregation

- Search for optimal peering points and connections to higher providers.

Features

- Compatible with key BRAS/BNG functions

- Supplemented with billing information

- Integration via APIs

- Custom filters and triggers

- Automatic support ticket creation

Success story Interdnestrcom

Interdnestrcom (IDC) provides wired Internet access, mobile communication, including 3G and 4G, and television services in Moldova. IDC used Cisco SCE8000 to work with traffic for a long time. Replacement was required after Cisco stopped supporting SCE, developing functionality and updating protocol signatures in 2015. A significant traffic increase was the second reason.

The provider needed a solution capable of:

- Filtering websites according to the Ministry of Communications lists

- Billing subscribers having per-megabyte plans (3G-subscribers)

- DSCP prioritization of different protocols

- Quality of Experience (QoE)

  Analyzing resources of those competitors, which subscribers visit (for marketing needs)

In addition to Traffic Monitoring System, IDC considered Allot and Proteus DPI platforms. Allot was decided against due to its high costs, and the need for a license for additional functions and a separate hardware solution for which spare parts were necessary. Proteus was decided against because its services cost more than the services of Stingray system, and it also needed a partial hardware implementation.

"The Traffic Monitoring System passed all our tests. A few issues, detected during testing, were quickly fixed. Comfortable pricing of the system and the ease of licensing were also quite important. By purchasing the Complete license, you get access to all the functions with no further need for increased costs."

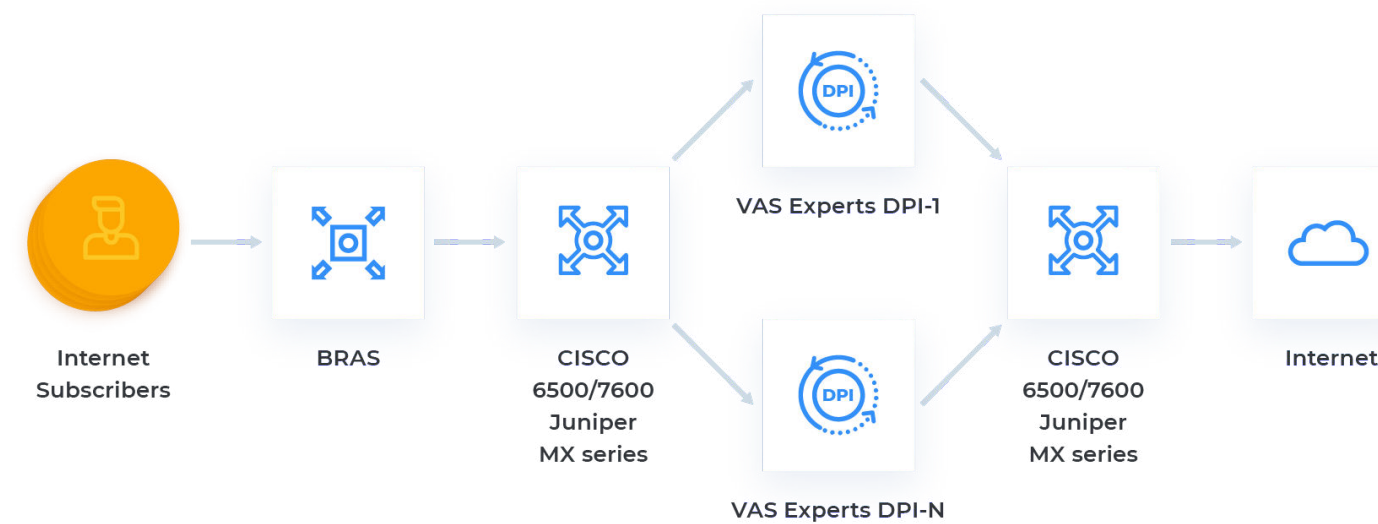**Vladimir Pisarenko**, senior engineer, IDC IT Service

CG-NAT

Network Address Translation function allows the telecom operator to share one public IPv4 address with multiple subscribers, extend usage of the restricted IPv4 address space, and simplify passing to IPv6 addressing. Since Stingray SG is designed for huge loads with deep traffic analysis, it can easily realize network address translation function (Carrier-Grade NAT), in addition to which the customer receives a full set of standard DPI tools.

CG-NAT blocks torrent trackers and other peer-to-peer protocols. The solution is CG-NAT which allows inbound connections on any port. Stingray SG used as a NAT gateway with redundancy.

Main Features

- Effectively uses the limited IPv4 address space;

- Complies with industry standards specified in RFC 6888, RFC 4787;

- Provides transparent operation of peer-to-peer protocols (torrents, games);

- Allows to limit the number of TCP and UDP ports for the subscriber (DDoS protection);

- Supports functions of Hairpinning, Paired IP address pooling and Full Cone. To implement CG-NAT function, it is required to enable DPI in «in-line» scheme. To implement fault tolerance, it is recommended to install a backup platform.

Internet Subscribers — BRAS — CISCO 6500/7600 Juniper MX series — VAS Experts DPI-1 / VAS Experts DPI-N — CISCO 6500/7600 Juniper MX series — Internet

Since the solution is designed for huge loads with deep traffic analysis, it can handle CG-NAT.

Success story Schelkovo.net

Schelkovo-net provides a wide range of communication services for companies and private users in the city of Schelkovo and the wider Moscow Oblast: Internet, IPTV, telephony, video surveillance, etc. The operator also implements federal telecommunication projects for state-owned companies.

Before switching over to Stingray SG, they used several solutions for traffic filtering and NAT at the same time.

They used Cisco SCE8000 for traffic filtering, and Linux-based servers for NAT.

"Due to traffic volumes of up to 60Gbps, SCE8000 has been failing more and more often lately," says Alexander Morozov, lead system administrator at Schelkovo-net. "We had a Linux-based NAT on x86 servers as well, but they were also at their limit. We tried a few different solutions," says Alexander. "Some parts were suitable, some weren't, some functions didn't work as we expected. In the end, the tests showed that Stingray SG was our best bet. We had a lot of units around for all the hardware we needed to deal with all of those tasks. Stingray SG, on the other hand, just needs one."

Aleksandr Morozov, senior system administrator, Schelkovo.Net

Now, Stingray SG meets all of the customer's requirements: traffic filtering, QoS, and CG-NAT. At the moment, Schelkovo-net doesn't use all of the platform's functionality, but, according to Alexander, it's possible that they will eventually use features like QoE.

BRAS/BNG

This solution allows broadband operator to control subscribers access to the Internet and apply the policies of tariff plans and additional tariff options.
Stingray SG directly interacts with RADIUS server to obtain information about the authorized user, compares IP addresses with the tariff plan and additional services that are defined on the billing server.

Features

- Authorization of IPoE and PPPoE sessions on RADIUS

- Identification of users by IP, Q-in-Q label, MAC address

- Assignment and modifying policies (tariff plans and additional services) through VSA (Vendor Specific Attribute) in the process of authorization on RADIUS and through CoA (Change of Authorization)

- Redirecting users to Captive Portal (blocking)

- Working at L3 and L2 levels

L2-connected BRAS/BNG

BRAS ensures layer 2 connectivity by routing VLAN/Q-in-Q/PPPoE traffic to the DPI system. MAC, VLAN, Q-in-Q, or login PPPoE/option 82 can be used to authorize a user and assign an IP address. From the subscriber's point of view, the DPI system acts as a virtual gateway answering ARP requests.
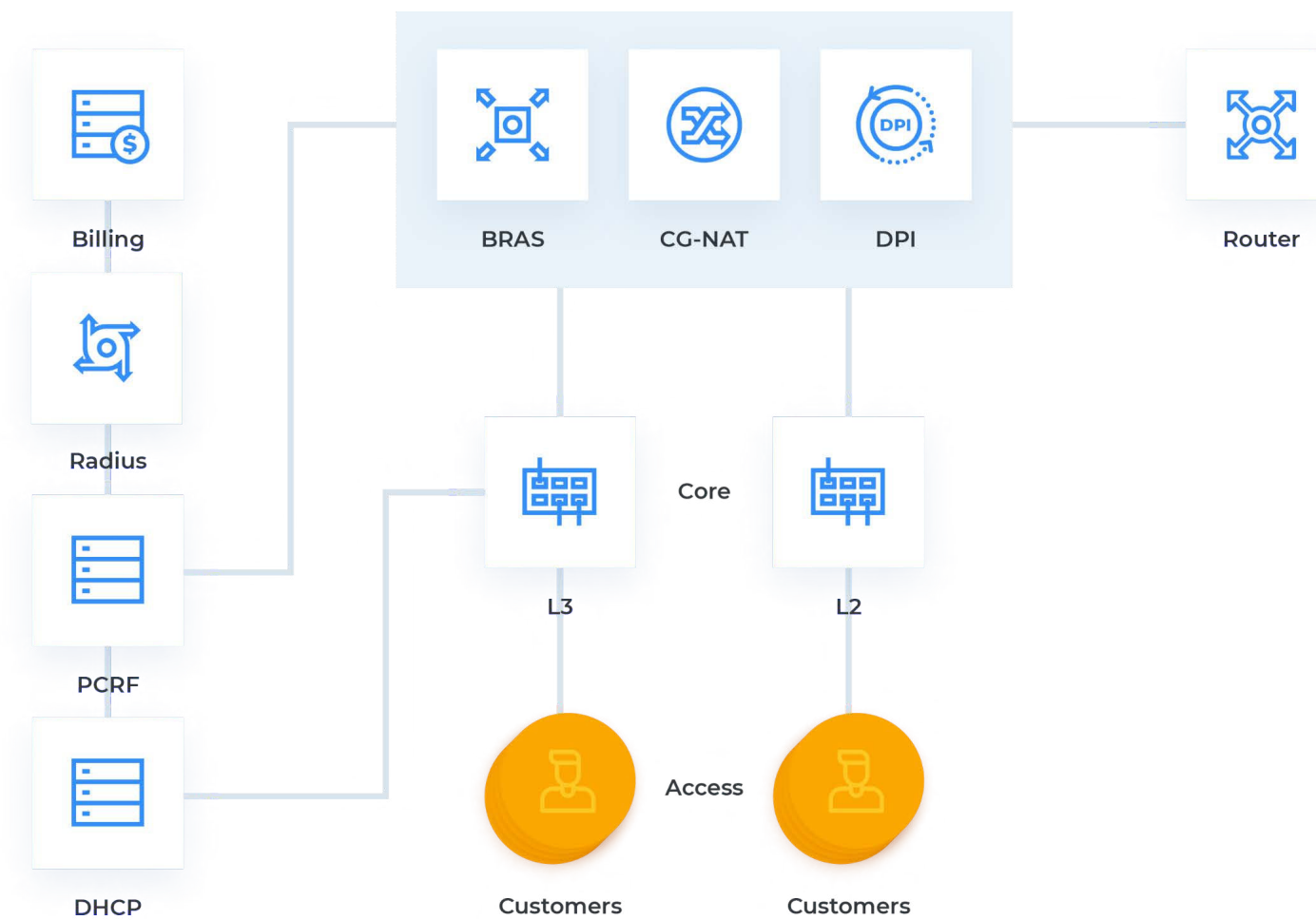
In VLANs and Q-in-Q, BRAS/BNG L2 performs the following functions:

- DHCP – tracks requests generated by DHCP Clients for immediate RADIUS-based authorization if the acknowledgement message from the DHCP server is received.

- Proxy ARP – monitors ARP requests inside a subnet and blocks any other ARP requests.

- IP Source Guard — checks LAN packets against VLAN entries stored in the DHCP database, If the packet header does not match the entry, the packet is discarded.

    LAN traffic termination.

    LAN to WAN, and WAN to LAN connectivity.

BRAS/BNG performs these functions by establishing when a user session starts and ends, using IP addresses, MAC addresses, and VLAN/Q-in-Q tags. Using this data, BRAS/BNG filters out malicious requests, significantly improving LAN security in general.

Success story StarNet

StarNet is one of the largest telecom operators in Moldova, working on the market since 2003. Its subscriber base is over 130,000 active users. StarNet is the first company in Moldova to provide fiber-optic Internet connection.

The task was to replace the existing BRAS, introduce CG-NAT with IPv6 support.

To solve the issue, StarNet was looking at several options: CISCO ASR and Stingray. The main criteria for selection, apart from fulfilling the objective, were the cost, reliability, modernization potential, maintenance, redundancy, IPv4/IPv6 Dual Stack, and shaping support. Having analyzed the requirements as well as the disadvantages of CISCO ASR, the decision was made in favor of VAS Experts solution. The DPI system addresses all of StarNet's concerns and is considerably less expensive than similar products.

"We chose a software-based solution, which is more efficient in terms of upgrades, scaling and redundancy. Almost every vendor (CISCO, Juniper, Nokia, Huawei, HP, etc.) offers its own software-based BRAS products. However, we decided in favor of Stingray Service Gateway, which proved optimal in terms of cost and functionality. ITGLOBAL.COM helped us select, license, and install the system."

Andrian Vishnevsky, lead system administrator, StarNet

Hardware

	DPI-6	DPI-20	DPI-40	DPI-80	DPI-100
Performance	6Gbps/3Gbps FullDuplex	20Gbps/10Gbps FullDuplex	40Gbps/20Gbps FullDuplex	80Gbps/40Gbps FullDuplex	100Gbps/50Gbps FullDuplex
Maximum of session	4 M	16 M	32 M	64 M	80 M
Maximum of new sessions/sec.	100 K	250 K	350 K	400 K	500 K
Determining protocols	6000+	6000+	6000+	6000+	6000+
Maximum number of subscribers	400 K	2 M	4 M	8 M	10 M
Traffic interfaces (Intel DPDK support required)	6x1GbE RJ-45 (Intel)	2x10GbE SFP+	4x10GbE SFP+	8x10GbE SFP+	4x25GbE SFP28
Maximum Latency	30 μc	30 μc	30 μc	30 μc	30 μc
Recommend platform, OS	1U, 19" CentOS 8.1	1U, 19" CentOS 8.1	1U, 19" CentOS 8.1	2U, 19" CentOS 8.1	2U, 19" CentOS 8.1
CPU (Intel/AMD)	6 cores 2,5Ghz	8 cores 2,5Ghz	16 cores 2,5Ghz	28 cores 2,5Ghz	32 cores 2,5Ghz
RAM	16 GB	32 GB	64 GB	128 GB	192 GB

BASE	BNG	COMPLETE	OPTIONS
✓	✓	✓	Bypass
✓	✓	✓	Filtering by the blocklisted Internet sites
✓	✓	✓	Statistics gathering and analysis on protocols and directions
✓	✓	✓	Traffic prioritization depending on a protocol and direction
✓	✓	✓	Common channel policing
✓	✓	✓	Subscriber notification and marketing campaigns
✗	✓	✓	Subcribers channel policing for IPv4 and IPV6
✗	✓	✓	Allowlist and Captive Portal
✗	✓	✓	BNG L3 (IPoE), Dual Stack IPv4/IPv6, Radius with CoA

BASE	BNG	COMPLETE	OPTIONS
✗	✓	✓	BNG L2 (PPPoE, DHCP), Dual Stack IPv4/IPv6
✗	✓	✓	Carrier Grade-NAT
✗	−	✓	Ads blocking and replacing
✗	−	✓	Lawful Interception
✗	−	✓	Mini-Firewall for blocking on certain ports
✗	−	✓	Protection against DOS and DDOS attacks
✓	✓	✓	One-year Support and Subscription Services
Subscription			Adding banners to HTTP resources
Subscription			Categorization of web resources

STAND BY LICENSE 25% FROM MAIN LICENSE

✓ Yes   ✗ No   − Optional

Conclusion

Deep traffic analysis systems are becoming more and more important for providers and telecom operators. In large part, this is due to growing mobile traffic, smartphones getting cheaper, and an increase in demand for high-speed Internet access. Users have grown to expect much more from the quality of their Internet connections and from the service level of their provider in general.

DPI, BRAS/BNG, QoE and other solutions can help maintain the quality of service and user experience at the appropriate level. They let the provider classify traffic, prioritize it, and analyze it in detail. On top of that, the provider can adjust their customers' bandwidth in a flexible manner, evaluate their behavior and preferences, and protect them from DDoS attacks.

ITGLOBAL.COM specialists have all the experience and skills needed to implement DPI solutions. Our experts are ready to answer any questions you may have about the technical capacities of the products, their configuration and utilization.

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