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Hardware requirements and performance

Minimum Requirements

SSG software runs on general-purpose x86 servers that are installed in a 19-inch rack and have redundant AC/DC power and cooling fans. Due to the high degree of code optimization and integration with hardware, there are some special requirements:

The CPU and RAM parameters are determined according to the required bandwidth. We advise you to look through the Recommended Requirements and agree on the choice of software server with VAS EXPERTS's representatives or our partners to install the software.

CPU	**One CPU** supporting **SSE 4.2** staring from Intel Nehalem and AMD EPYC Zen2 with **4 or more processor cores**, **2.5 Ghz clockspeed** and above**.** !SSG only works with one processor!
RAM	Not less than 8Gb, it is necessary to install memory modules in all processor channels on the motherboard
SSD Disks	To host the OS and SSG software, it is necessary to use 2 disks with a capacity of 256GB or more, combined in RAID 1 (mirror). It is necessary to use a hardware RAID controller. NVMe SSD disks (in M.2, U.2 form factor or PCI Express expansion cards) are a priority. If the platform does not support this type of media, we recommend using SATA/SAS SSD (DWPD>=1) instead of HDDs
Number of network ports	At least **3 ports are required**: **one** for the remote management using SSH (any kind of chipset), **the two** other to process network traffic (network cards with DPDK support)

Supported network cards	It is recommended to use **only tested cards** on **Intel** chipsets [1] with 2, 4, or 6 ports [2]. The most popular models: **1GbE interfaces:** - e1000 (82540, 82545, 82546) - e1000e (82571, 82572, 82573, 82574, 82583, ICH8, ICH9, ICH10, PCH, PCH2, I217, I218, I219) - igb (82573, 82576, 82580, I210, I211, I350, I354, DH89xx) - igc (I225) **10GbE interfaces:** - ixgbe (82598, 82599, X520, X540, X550) - i40e (X710, XL710, X722, XXV710) - mlx5 **25GbE interfaces:** - i40e (XXV710) - mlx5 **Many server platforms have bandwidth limitations for 40G/100G ports, we recommend purchasing equipment from our partners for these installations** **40GbE interfaces:** (the x8 PCIe 3.0 card has a maximum bandwidth of 64Gbps. Thus, a 2x40GbE port card can handle no more than 32Gbps in + 32Gbps out in inline mode. In on-stick mode, a 2x40GbE port card can handle no more than 64Gbps in+out across both ports. To avoid these limitations, it is recommended to use only one port on a two-port 40GbE card - i40e (X710, XL710, X722, XXV710) **100GbE interfaces require a motherboard with PCIe 4.0 x16 or higher support. PCIe 4.0 x16 supports 256Gbps in each direction:** A 2x100GbE card is guaranteed to handle up to 100Gbps in + 28Gbps out in inline mode. In on-stick mode, a 2x100GbE port card can handle no more than 128Gbps in+out per port. For onstick, it is recommended to use only one port on a dual-port 100GbE card. - mlx5 (ConnectX-4, ConnectX-4 Lx, ConnectX-5, ConnectX-6, ConnectX-6 Dx, ConnectX-6 Lx, ConnectX-7) - ice (Intel E810, E810-CQDA2, Intel E830, Intel E610) **For BRAS PPPoE, only Intel 100G cards must be used (Mellanox cards lack RSS support for PPPoE traffic; RSS enables preliminary traffic balancing on the card)**
Bypass support	Bypass is supported for Silicom cards 100GbE, 40GbE, 10GbE and 1GbE

SSG platform operates only under control of the VEOS (VAS Experts Operating System)

Recommended Requirements

Server performance is determined based on peak traffic volume value on the channel. When choosing a CPU, RAM, it is necessary to take into account that the calculation is presented for asymmetric traffic. This means that when installing "in-line" for peak incoming traffic of 12 Gbps (Max IN traffic), you need to purchase a SSG-20 license and a platform with parameters: 1 CPU 16 cores and more, RAM 64GB and more.

Total traffic (in+out) Gbps	Max incoming traffic Gbps	Stingray SG Version	Number of cores per ONE CPU with a frequency of 2.5 GHz	RAM, GB necessary to install memory modules in all processor channels on the motherboard	Type and number of ports for in-line or on-stick connection	Number of Public IPs in a NAT pool	Packet per second in Million base CPU frequency from 2,5GHz
2	1,5	**SSG-2**	4	12	4x1G, 2x10G	100	1M pps
4	3	**SSG-4**	4	16	6x1G, 2x10G	500	1,5M pps
6	5	**SSG-6**	6	32	2x10G	1000	3-4M pps
10	8	**SSG-10**	12	48	2x10G	2000	6M pps
20	15	**SSG-20**	16	64	4x10G	3000	9M pps
40	35	**SSG-40**	18 Intel 6242R	96	6x10G, 4x25G, 4x40G, 2x100G	4000	12M pps
60	50	**SSG-60**	28 Intel 6258R, Intel 5320, 32 AMD 7502P	128	10x10G, 4x25G, 4x40G, 2x100G	5000	15M pps
80	70	**SSG-80**	64 AMD 7702P	160	12x10G, 6x25G, 6x40G, 4x100G	6000	18M pps
100	80	**SSG-100**	64 AMD 7702P	192	20x10G, 8x25G, 8x40G, 4x100G	7000	20M pps
120	100	**SSG-120**	64 AMD 9534	256	20x10G, 8x25G, 8x40G, 4x100G	10000	22M pps
180	160	**SSG-180**	96 AMD 9654	384	24x10G, 16x25G, 10x40G, 6x100G	12000	30M pps
240	200	**SSG-240**	128 AMD 9754	512	16x25G, 14x40G, 8x100G	15000	45M pps
300	260	**SSG-300**	160 AMD 9845	768	24x25G, 16x40G, 10x100G	20000	52M pps
360	320	**SSG-360**	192 AMD 9965	768	28x25G, 20x40G, 12x100G	24000	60M pps

Important when selecting a server:

1. **The Stingray SG uses only one processor** because of the impact on performance of NUMA for dual-processor configurations.
2. **When choosing a CPU, it is necessary to take into account the base frequency** , the higher the frequency, the greater the performance.
3. **It is recommended to take equipment with a reserve of 20-30% of the**

planned traffic, in order to prevent congestion during DDoS attacks and the possibility of growth in the future. For a SSG-40 license implement the SSG-60 platform.

4. **The use of 100G** interfaces is possible only when the platform is delivered through a partner in order to control the server specification.
5. **Using the Policing of Virtual Channel (vChannel) option** and/or **Policing of the Common Channel** entails additional internal locks, which reduces system performance to 40G (when using tbf) and to 20G (when using htb) of total traffic on a vChannel or on a shared channel, regardless of the number of cores.
6. **Every 256 public IP addresses in NAT Pool (/24 subnet) consume 5GB of RAM. /23 = 10GB, /22 = 20GB, /21 = 40GB, /20 = 80GB, /19 = 160GB.**
7. Depending on the amount of routing information, **an additional 4-8GB of memory will be required for the router (Soft-Router)**.

Requirements for Installation on a Virtual Machine

SSG software can be installed on a Virtual Machine (VM).
VM has the following requirements:

- Hypervisor: VMware, KVM
- CPU of at least 4 cores with a frequency of 2.5 GHz
- RAM of 8 Gb and more
- Storage space of 20 Gb and more

Check VM preparation for test:

OS CentOS: **cat /etc/redhat-release**

```
CentOS Linux release 8.5.2111 (Core)
```

OS VEOS: **cat /etc/*releas*** or **cat /etc/system-release**

```
VEOS release 8.7 (Sakhalin)
```

RAM: **cat /proc/meminfo**

```
MemTotal:       16254744 kB
```

Checking whether all cores belong to one CPU: **grep "physical id" /proc/cpuinfo |sort -u**

```
physical id     : 0
```

Number of cores: **grep "cores" /proc/cpuinfo |sort -u**

```
cpu cores       : 4
```

There must be at least three interfaces (two for traffic and one for administration): **lspci | grep Ethernet**

```
0b:00.0 Ethernet controller: VMware VMXNET3 Ethernet Controller (rev 01)
13:00.0 Ethernet controller: VMware VMXNET3 Ethernet Controller (rev 01)
1b:00.0 Ethernet controller: VMware VMXNET3 Ethernet Controller (rev 01)
```

For SSG to work in a virtual environment, in the Security settings of virtual networks in which in_dev and out_dev are composed, you need to enable:

- Promiscuous mode Accept
- MAC address changes Accept
- Forged transmits Accept

Recommended file system partitioning

FS format: ext4

Disk type	**RAID type**
2x960GB SSD SATA	RAID-1

Mounting point	**Logical partition size, GB**	**Disc type**
/boot	1	2x960GB SSD - RAID-1
/	128	2x960GB SSD - RAID-1
/SWAP	4	2x960GB SSD - RAID-1
/var	All available	2x960GB SSD - RAID-1

[1)]

if your card is not on the tested list, software adaptation, development, and additional testing will be required

[2)]

a specific model list is not provided, as there is a very large selection of manufacturers for these cards: from Intel itself to branded options like Huawei, HP, Dell, Silicom, Advantech, Lanner, Supermicro, Silicom, and dozens of others, as well as built-in cards on motherboards or as part of SOC