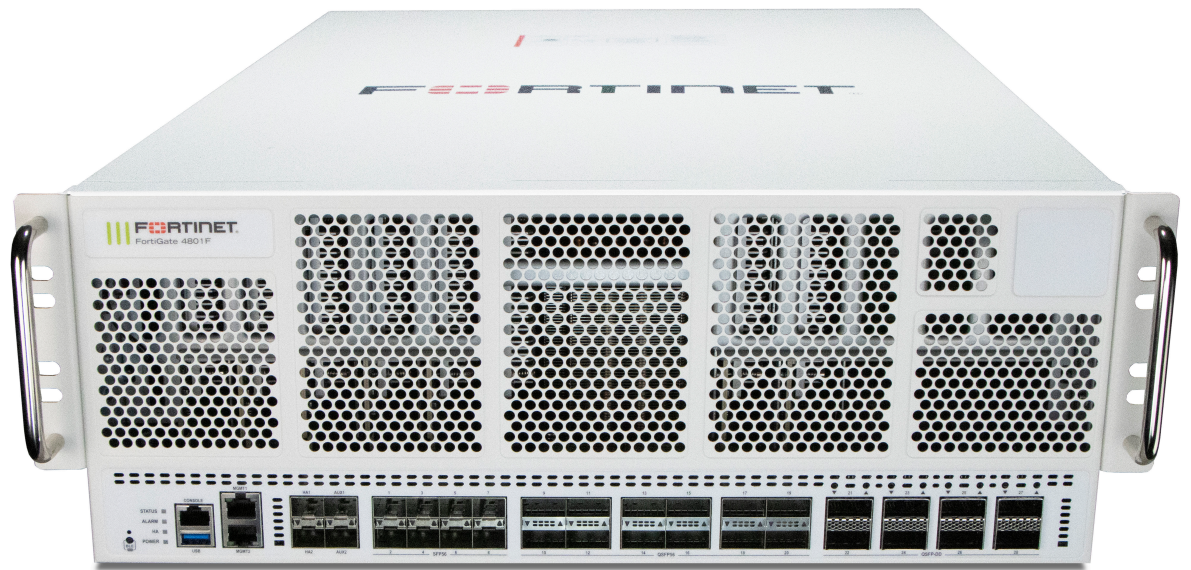


Carrier-Grade NAT Solutions



Highlights

- Proven High Performance
- Flexible Solutions
- Licensing Options
- Seamless Deployment

IPv4 and IPv6 Addresses Management and Security for Seamless Operations

Given the co-existence of IPv4 and IPv6 infrastructures for years to come, coupled with the explosion of connected devices and the migration to 5G, service providers must extend the life of IPv4 network infrastructures and ensure a transparent and scalable IP address translation to their customers.

Fortinet Carrier Grade NAT (CG-NAT) solutions offer a broad, scalable, and flexible set of tools, consumption models, and form factors to empower service providers to connect IPv4 and IPv6 devices and support the current exponential traffic growth.

Fortinet CG-NAT is natively secured with stateful L4 firewalling and continuous threat intelligence powered by FortiGuard Labs security services.

Solution Features

Network Address Translation

- Implements key CG-NAT function defined by 3GPP specifications that protect 5G and 4G mobile networks
- Fortinet CG-NAT solutions allow operators to conserve the public IPv4 space assigned to them
- Carrier-grade scalability with ultra-high number of IP address translations and connection setup rates, high throughput, and high-speed logging
- Comprehensive Application Layer Gateway (ALG) support
- Comprehensive Carrier-Grade NAT and IPv6 migration options including: NAT44, NAT444, NAT64/DNS64, NAT46

Security

- Provides a powerful and stateful L4 firewall for the N6 and SGi/Gi interfaces that blocks random attacks coming from Internet
- Known attacks detection and prevention using continuous threat intelligence from AI-powered FortiGuard Labs security services
- IP mapping logging in compliance with national regulation

Performance

- Specialized hardware acceleration architecture with carrier grade connections per second (CPS) for processing massive signaling surges
- Fortinet's NP7 purpose-built security processor units (SPU) deliver the industry's best performance and ultra-low latency
- Virtual CG-NAT appliances feature advanced virtual security processing units (vSPU) to provide top performance.

Management

- Includes a centralized management console that is effective and simple to use, which provides comprehensive network automation and visibility
- Zero-Touch Provisioning with Single-Pane-of-Glass Management powered by the Fabric Management Center
- Application programming interfaces (APIs) and connectors for operations and management integration

Total Cost of Ownership (TCO) Reduction

- High performance, low footprint physical and virtual appliances, coupled with flexible licensing
- Lower TCO through efficient space and power consumption and efficient management and operations tools



Certification

- Independently tested and validated best security effectiveness and performance

Form Factors

- FortiGate physical appliances: 1800F, 2600F, 3000F, 3500F, 4200F, 4400F, 4800F
- FortiGate virtual appliances: VM04, VM08, VM16, VM32, VMUL
- FortiFirewall series: 1801F, 2600F, 3001F, 3501F, 4200F, 4400F, 4801F, VMUL
- Public cloud support: AWS, MS Azure, Google Cloud, Oracle Cloud

Proven, High Performance, and Flexible CG-NAT Platforms and Solution

Fortinet's FortiGate and FortiOS have long provided iron-clad security services in many service provider and large enterprise networks. Our Carrier-Grade IPv4/v6 Network services are based on the same familiar interface and proven carrier-grade reliability of the FortiOS.

Fortinet CG-NAT solutions deliver high predictability and service-level consistency to environments that generate massive amounts of connection set-ups and teardowns. With Fortinet's powerful Security Processing Units (SPUs), we provide a high level of performance supporting up to 25 million new connections per second, 1.8 billion concurrent sessions and 3.1 Tbps of throughput in a single CG-NAT appliance with hardware acceleration, ensuring consistent high performance.

- Comprehensive Carrier-Grade NAT and IPv6 migration option including: NAT44, NAT444, NAT46, NAT64/DNS64
- Predictable high performance for centralized and regional sites with security processing units (SPU and vSPU) for offload and acceleration, including hardware-generated NAT logs and IP fragment handling in the SPUs
- Native multitenancy support with virtual domains (VDOMs) enables separate CG-NAT policies per network slice or APN/DNN
- Compact form factor is ideal for space-constraint applications and lowers colocation cost for service providers
- The most efficient, smallest footprint CG-NAT VNF enables energy efficiency and is a good fit for environments with limited resources, such as Private 5G or Multi-access Edge Computing (MEC)
- A rich ecosystem of application programming interfaces (APIs) and connectors for ease of onboarding and integration to the MNO's ecosystem such as operation and management, orchestration, and business support system (BSS)

Model (with hyperscale license for physical appliances)	4800F	4400F	4200F	3500F	3000F	2600F	1800F	VMUL	VM32	VM16	VM08	VM04
CG-NAT Throughput	3.1 Tbps	1.15 Tbps	800 Gbps	595 Gbps	389 Gbps	196 Gbps	197 Gbps	NA*	50 Gbps	36 Gbps	33 Gbps	28 Gbps
Concurrent Sessions (TCP)	1800M	700M	450M	348M	230M	40M	40M	NA**				
New Sessions Per Second (TCP)	25M	10M	7M	5M	3M	2M	2M	NA*	850K	680K	520K	290K

* Will depend on the characteristics of the underlying platform

** Will depend on the amount of available memory



Flexible Licensing Models

Carrier-Grade NAT (CG-NAT) functionality can be delivered via three different pricing models described as follows.

FortiGate CAPEX Pricing Model

- In this pricing model, the platform, physical and/or virtual FortiGate, is paid in advance, covering the full capacity that the platform can deliver

FortiFirewall Bandwidth-Based Pricing Model

This pricing model consists of two components:

- The barebone platform, physical and/or virtual FortiFirewall, is paid upfront.
- Perpetual and stackable bandwidth licenses of 10 Gbps and 100 Gbps. This is a network-wide bandwidth license that allows for short, rare bursts of traffic exceeding the licensed capacity.

This pricing model allows operators to better align their costs with revenues from their customers, with flexibility of adding a network-wide peak bandwidth license based on traffic usage.

Flex VM Pricing Model

The VM-only model allows service providers to purchase prepaid points in advance in units of 10,000 consumption points. Points are deducted daily, based on resource consumption. Unused points can be rolled over annually, provided additional terms and conditions are satisfied. This model simplifies license management and provides predictable OpEx.

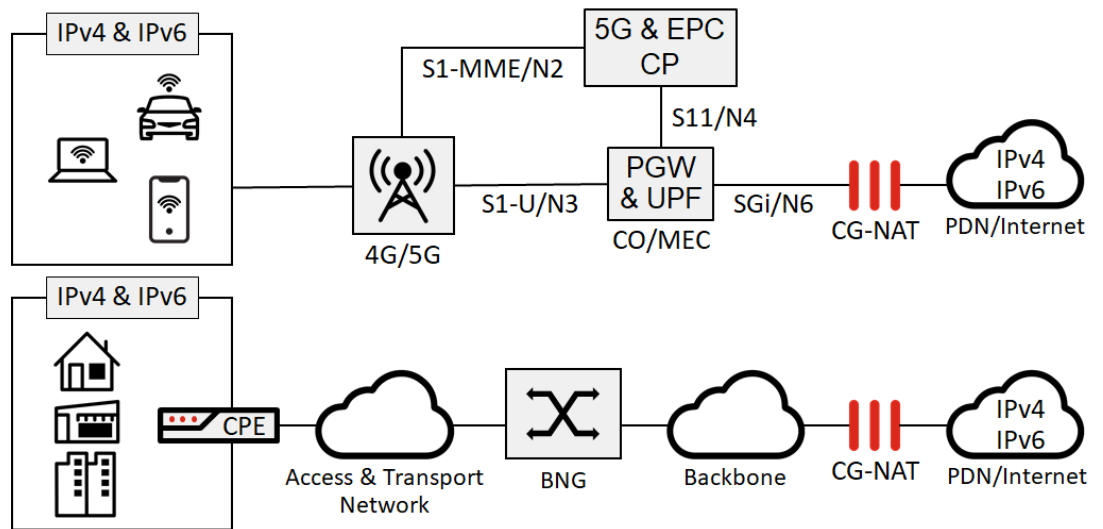
Hyperscale Firewall License

The hyperscale license enables ultra-high scalability and performance by unlocking further performance boosts and is applicable to both the FortiGate and the FortiFirewall CG-NAT physical platforms. The Hyperscale Firewall License will enable the hardware acceleration of CG-NAT features by utilizing the latest SPU NP7. These features include session setup, session logging, and NAT all performed in hardware at market-leading speeds.



Seamless IPv4/IPv6 CG-NAT Deployment (ISP, 4G, 5G)

Fortinet CG-NAT platforms can either be in a physical appliance form factor or in a virtual form factor. Physical FortiGates and FortiFirewalls are suitable for centralized CG-NAT architectures requiring high performance. FortiGates and FortiFirewalls VMs are suitable for more distributed CG-NAT architectures where PDN breakout points are distributed over regional data centers and Multiaccess Edge Compute (MEC) sites. Using a mix of Fortinet CG-NAT platforms, operators can build a high-performance, cost-effective solution for hybrid architectures in ISP, 5G, and 4G networks.



CG-NAT DEPLOYMENT

Features

FEATURE	SUPPORTED MODES
NAT Modes	NAT44, NAT444, NAT64, DNS64, NAT46, NAT 66, 464 XLAT, MAP-E, MAP-T, EIM, EIF
Address-Port Allocation Policies	Port Block Allocation (PBA), Overload PBA, Single Port Allocation (SPA), Overload SPA, Fixed Allocation/Deterministic, Overload, One-to-One, Fixed Port Range
Application Layer Gateway (ALG)	FTP, TFTP, SIP, MGCP, H.323, PPTP, L2TP, ICMP Error/IP-options, PMAP, DCE-RPC, RAS, RSH, TNS
Subscriber category	PFCP (N4, Sxa, Sxb), RADIUS Accounting
High availability mechanism	VRRP + eBGP, ECMP, FGCP, FGSP
High availability mode	Active/active, active/passive
IP fragment handling in hardware	Yes
Dynamic routing	Yes
NAT log format in hardware	Syslog, NetFlow/IPFIX
HW based traffic distribution	Source IP, 5 tuple
Hardware log generation	Per session, per session ending, per NAT mapping
Hardware log server targets	Up to 16

Specifications

CATEGORY	4800F	4400F	4200F	3500F	3000F	2600F	1800F
Interfaces and Modules							
400GE/200GE QSFP-DD slots	8						
200GE/100GE/40GE QSFP56/ QSFP28/ SFP28 slots	12						
100/40 GE QSFP+/QSFP28 Slots		12	8	6	6	4	45
50GE/25GE/10GE/GE SFP56/28/SFP+/SFP slots	8						
25 GE SFP28 /10 GE SFP+ /GE SFP Slots		16	16	32	16	16	12
25 GE SFP28 /10 GE SFP+ /GE SFP HA Slots		2	2				
50GE/25GE/10GE/GE SFP56/28/SFP+/SFP HA/AUX slots	4						
25 GE SFP28 /10 GE SFP+ /GE SFP AUX Slots		2	2				
1/10 GE SFP/SFP+ Slots						2	84
1/10 GE RJ45 Slots					18	16	164
GE RJ45 Management Ports	2	2	2	2	2	2	2
USB Ports	1	1	1	1	1	1	1
Console Port	1	1	1	1	1	1	1
Internal Storage		4 TB (4401F)	4 TB (4201F)	4 TB (3501F)	2 TB (3001F)	2 TB (2601F)	2 TB (1801F)
Included Transceivers	2x SFP+ (SR 10 GE)	2x SFP+ (SR 10 GE)	2x SFP+ (SR 10 GE)	2x SFP+ (SR 10GE)	2x SFP+ (SR 10GE)	2x SFP+ (SR 10GE)	2x SFP+ (SR 10GE)
Performance and Capacity - CG-NAT							
CG-NAT and Firewall Throughput (1518/512/64 byte, UDP)	3.1 / 3.1 / 0.93 Tbps	1.15/1.14/0.50 Tbps	800/788/400 Gbps	595/590 /420 Gbps	397/389/221 Gbps	198/196/120 Gbps	198/197/140 Gbps
Latency (64 byte, UDP)	3.6 µs	2.98 µs	3.02 µs	2.98 µs	3.92 µs	3.41 µs	3.22 µs
Concurrent Sessions (TCP)	280 Million/ 1.8 Billion ²	210 Million/ 700 Million ²	210 Million/ 450 Million ²	140 Million/ 348 Million ²	70 Million/ 230 Million ²	24 Million/ 40 Million ²	12 Million/ 40 Million ²
New Sessions/Second (TCP)	915,000/ 25 Million ²	1 Million/ 10 Million ²	1 Million/ 7 Million ²	1 Million/ 5 Million ²	870,000/ 3 Million ²	1 Million/ 2 Million ²	750,000/ 2 Million ²
High Availability Configurations	Active / Active, Active / Passive, Clustering	Active/Active, Active/Passive, Clustering	Active/Active, Active/Passive, Clustering	Active/Active, Active/Passive, Clustering	Active / Active, Active / Passive, Clustering	Active/Active, Active/Passive, Clustering	Active/Active, Active/Passive, Clustering
Dimensions and Power							
Height x Width x Length (inches)	6.89 × 17.13 × 26.10	6.97 × 17.20 × 26.17	5.22 × 17.20 × 26.17	3.5 × 17.4 × 21.9	3.50 × 17.40 x 21.90	3.5 × 17.25 × 21.1	3.5 × 17.25 × 21.1
Height x Width x Length (mm)	175 × 435 × 663	177 × 437 × 665	132.5 × 437 x 664.8	89 × 443 × 556	89 × 443 × 556	88.4 × 438 × 536	88.4 × 438 × 536
Weight³	90.83 lbs (41.2 kg)	81.8 lbs (37.1 kg)	59.75 lbs (27.1 kg)	43.8 lbs (19.9 kg)	43.8 lbs (19.9 kg)	30.6 lbs (13.9 kg)	30.2 lbs (13.7 kg)
Form Factor (supports EIA/non- EIA standards)	Rack Mount, 4 RU	Rack Mount, 4 RU	Rack Mount, 3 RU	Rack Mount, 2 RU	Rack Mount, 2 RU	Rack Mount, 2 RU	Rack Mount, 2 RU
AC Power Supply	100-240V AC, 50/60 Hz	100-240V AC, 50/60 Hz	100-240V AC, 50/60 Hz	100-240V AC, 50/60 Hz	100-240V AC, 50/60 Hz	100-240V AC, 47/63 Hz	100-240V AC, 50/60 Hz
Power Consumption³ (Average / Maximum)	1602 W / 1918.2 W	1533W/1875W	931 W/1291 W	760 W/1174 W	425 W / 680 W	416 W/510 W	388.3 W/543.6 W
AC Current (Maximum)	7.99A@240VAC	20A@100V, 9A@240V	13.5A@120V, 5.5A@240V	12A@120V, 9A@240V	12A@100V, 9A@240V	6A	7A@100VAC, 3A@240VAC
Heat Dissipation³	6544.9 BTU/h	6397.77 BTU/h	4405 BTU/h	4006 BTU/h	2321 BTU/h	1740 BTU/h	1854.84 BTU/h
DC Power Input Range		-48V to -60V DC	-48V to -60V DC			-48VDC to -60VDC	-48V to -60V DC
DC Current (Maximum)		32A/100Apk	20A/100Apk			15A	20A
Redundant Power Supplies	Yes, Hot Swappable, 2+2 (AC), 1+1 (DC)	Yes, Hot Swappable, 2+2 (AC), 1+1 (DC)	Yes, Hot Swappable	Yes, Hot Swappable	Yes, Hot Swappable	Yes, Hot Swappable	Yes, Hot Swappable



Specifications

CATEGORY	4800F	4400F	4200F	3500F	3000F	2600F	1800F
Operating Environment and Certifications							
Operating Temperature	32°–104°F (0°–40°C)	32–104°F (0–40°C)	32–104°F (0–40°C)	32–104°F (0–40°C)	32–104°F (0–40°C)	32–104°F (0–40°C)	32–104°F (0–40°C)
Storage Temperature	-31°–158°F (-35°–70°C)	-31–158°F (-35–70°C)	-31–158°F (-35–70°C)	-31–158°F (-35–70°C)	-31–158°F (-35–70°C)	-31–158°F (-35–70°C)	-31–158°F (-35–70°C)
Humidity	20%–90% non- condensing	20–90% non- condensing	20–90% non- condensing	20–90% non- condensing	5–90% non- condensing	10–90% non- condensing	10–90% non- condensing
Noise Level	68.9 dBA	68.9 dBA	57 dBA	53.5 dBA	69 dBA	71.72 dBA	62.74 dBA
Operating Altitude	Up to 7400 ft (2250 m) ⁶	Up to 7400 ft (2250 m)	Up to 7400 ft (2250 m)	Up to 7400 ft (2250 m)	Up to 7400 ft (2250 m)	Up to 7400 ft (2250 m)	Up to 7400 ft (2250 m)
Compliance	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB	FCC Part 15 Class A, RCM, VCCI, CE, UL/cUL, CB

1 Without Hyperscale Firewall License

2 With Hyperscale Firewall License

3 Version without storage

4 GE only

5 40 GE QSFP+ only

6 Operating at maximum temperature derates 1.5°C per 1000 ft (305 m)

CATEGORY	VM-UL	VM-32	VM-16	VM-08	VM-04
Performance and Capacity - CG-NAT					
vCPU Support (minimum/Maximum)	1/unlimited	1/32	1/16	1/08	1/04
Memory Support (Minimum)	NA*	2 GB	2 GB	2 GB	2 GB
Storage Support (Minimum/Maximum)	32 GB/2 TB	32 GB/2 TB	32 GB/2 TB	32 GB/2 TB	32 GB/2 TB
CG-NAT and Firewall Throughput (1518 byte, UDP)	NA*	110.4 Gbps	107.1 Gbps	114.3 Gbps	61 Gbps
Concurrent Sessions (TCP)	NA*	NA	NA	NA	NA
New Sessions/Second (TCP)	NA*	850K	680K	520K	290K

*Will depend on the characteristics of the underlying platform



Ordering Information

CG-NAT PHYSICAL PLATFORMS			
Model	Product	FortiGate SKU	FortiFirewall SKU
4800F	Appliance	FG-4800F	FFW-4801F
	FortiCare Premium Support for 4800F	FC-10-F48HF-247-02-DD	FC-10-B481F-247-02-DD
	Hyperscale Firewall License 4800F	LIC-FG48F-HYPSC	LIC-FG48F-HYPSC
4400F	Appliance	FG-4400F	FFW-4400F
	FortiCare Premium Support for 4400F	FC-10-F44HF-247-02-DD	FC-10-B440F-247-02-DD
	Hyperscale Firewall License 4400F	LIC-FG44F-HYPSC	LIC-FG44F-HYPSC
4200F	Appliance	FG-4200F	FFW-4200F
	FortiCare Premium Support for 4200F	FC-10-F42HF-247-02-DD	FC-10-B420F-247-02-DD
	Hyperscale Firewall License 4200F	LIC-FG42F-HYPSC	LIC-FG42F-HYPSC
3500F	Appliance	FG-3500F	FFW-3501F
	FortiCare Premium Support for 3500F	FC-10-F3K5F-247-02-DD	FC-10-FF35F-247-02-DD
	Hyperscale Firewall License 3500F	LIC-FG35F-HYPSC	LIC-FG35F-HYPSC
3000F	Appliance	FG-3000F	FFW-3001F
	FortiCare Premium Support for 3000F	FC-10-F3K0F-247-02-DD	FC-10-FF3K1-247-02-DD
	Hyperscale Firewall License 3000F	LIC-FG30F-HYPSC	LIC-FG30F-HYPSC
2600F	Appliance	FG-2600F	FFW-2600F
	FortiCare Premium Support for 2600F	FC-10-FD26F-247-02-DD	FC-10-F260F-247-02-DD
	Hyperscale Firewall License 2600F	LIC-FG26F-HYPSC	LIC-FG26F-HYPSC
1800F	Appliance	FG-1800F	FFW-1801F
	FortiCare Premium Support for 1800F	FC-10-F18F1-247-02-DD	FC-10-F181F-247-02-DD
	Hyperscale Firewall License 1800F	LIC-FG18F-HYPSC	LIC-FG18F-HYPSC
CG-NAT VIRTUAL PLATFORMS			
Model	Product	FortiGate SKU	FortiFirewall SKU
VM-UL	Virtual Appliance	FG-VMUL	FF-VMBB
	FortiCare 24x7 Support for FortiGate VM-UL	FC-10-FVMUL-248-02-DD	FC-10-FVMBB-248-02-DD
VM-32	Virtual Appliance	FG-VM32	
	FortiCare 24x7 Support for FortiGate VM-32	FC-10-FVM32-248-02-DD	
VM-16	Virtual Appliance	FG-VM16	
	FortiCare 24x7 Support for FortiGate VM-16	FC-10-FVM16-248-02-DD	
VM-08	Virtual Appliance	FG-VM08	
	FortiCare 24x7 Support for FortiGate VM-08	FC-10-FVM08-248-02-DD	
VM-04	Virtual Appliance	FG-VM04	
	FortiCare 24x7 Support for FortiGate VM-04	FC-10-FVM04-248-02-DD	



Ordering Information

CG-NAT FORTIFIREWALL BANDWIDTH LICENSES ¹		
Product	FortiGate SKU	FortiFirewall SKU
10Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FG-PBC-10G
FortiCare Premium Support for 10Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC1-10-FGPBC-248-01-DD ²
FortiCare Elite Support for 10Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC1-10-FGPBC-285-01-DD ²
FortiCare Upgrade-to-Elite Support for 10Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC1-10-FGPBC-204-01-DD ²
100Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FG-PBC-100G
FortiCare Support for 100Gbps CG-NAT Bandwidth License for FortiFirewall	N/A (included in Platform)	FC2-10-FGPBC-248-01-DD ²
FortiCare Elite Support for 100Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC2-10-FGPBC-285-01-DD ²
FortiCare Upgrade-to-Elite Support for 100Gbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC2-10-FGPBC-204-01-DD ²
1Tbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FG-PBC-1000G
FortiCare Support for 1Tbps CG-NAT Bandwidth License for FortiFirewall	N/A (included in Platform)	FC3-10-FGPBC-248-01-DD ²
FortiCare Elite Support for 1Tbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC3-10-FGPBC-285-01-DD ²
FortiCare Upgrade-to-Elite Support for 1Tbps CG-NAT Bandwidth License for FortiFirewall (BW stackable)	N/A (included in Platform)	FC3-10-FGPBC-204-01-DD ²

1. Network-wide bandwidth licenses to be added on the top of a collection of FortiFirewall physical or virtual platforms.

2. Replace DD by 12 or 36 months.



Fortinet CSR Policy

Fortinet is committed to driving progress and sustainability for all through cybersecurity, with respect for human rights and ethical business practices, making possible a digital world you can always trust. You represent and warrant to Fortinet that you will not use Fortinet's products and services to engage in, or support in any way, violations or abuses of human rights, including those involving illegal censorship, surveillance, detention, or excessive use of force. Users of Fortinet products are required to comply with the [Fortinet EULA](#) and report any suspected violations of the EULA via the procedures outlined in the [Fortinet Whistleblower Policy](#).



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