
VIRTUAL CGNAT

HORIZON NETWORKS

Virtual CGNAT

Carrier-Grade Performance. Cloud-Native Flexibility.

Up to 400G on a Single Standard x86 Server

DPDK Accelerated | NAT44 & NAT64 | Stateful HA | HPE Ready





IPv4 Scarcity Should Not Limit Network Growth

The rising cost and limited availability of public IPv4 addresses directly affect subscriber growth, service economics and time to market.

KEY CHALLENGES

- Rapid subscriber and traffic growth
- Increasing public IPv4 costs
- Legacy CGNAT capacity limitations
- Expanding compliance requirements

Grow subscribers—not IPv4 expenditure.

Carrier-Grade CGNAT, Delivered as Software

Horizon Networks Virtual CGNAT combines high-performance address translation, advanced routing, stateful resiliency and real-time operational visibility in one scalable software platform.

PRODUCT PILLARS

- Up to 400G per x86 server
- NAT44, NAT64, NAT444 and DS-Lite
- Physical, virtual and cloud deployment
- Stateful carrier-grade availability
- Centralized operations



Break Free from Proprietary Appliances

The complete CGNAT network function is delivered as portable software, separating the software lifecycle from the underlying server infrastructure.

OPERATOR BENEFITS

- No proprietary CGNAT chassis
- Flexible hardware lifecycle
- Reduced vendor lock-in
- Faster capacity expansion
- Simplified infrastructure modernization

Software freedom with carrier-grade performance.





Run CGNAT on Standard HPE Infrastructure

Deploy Horizon Networks CGNAT on validated HPE ProLiant servers using commercially available processors, memory and high-speed network adapters.

INFRASTRUCTURE ADVANTAGES

- Standard HPE ProLiant servers
- Commercial x86 processors
- 10/25/40/100/200GbE interfaces
- Familiar maintenance model
- Flexible CPU, memory and NIC sizing

From regional POPs to national core sites.

One Software Platform. Multiple Deployment Models.

Deploy the same CGNAT software architecture across centralized data centers, regional POPs and distributed edge environments.

DEPLOYMENT OPTIONS

- Bare Metal
- Virtual Machine
- NFVI
- Telco Cloud
- Private Cloud
- Containerized and Edge environments

SUPPORTED INFRASTRUCTURE ENVIRONMENTS

KVM | OpenStack | Proxmox | oVirt | Docker

EXTENDED PLATFORM FLEXIBILITY

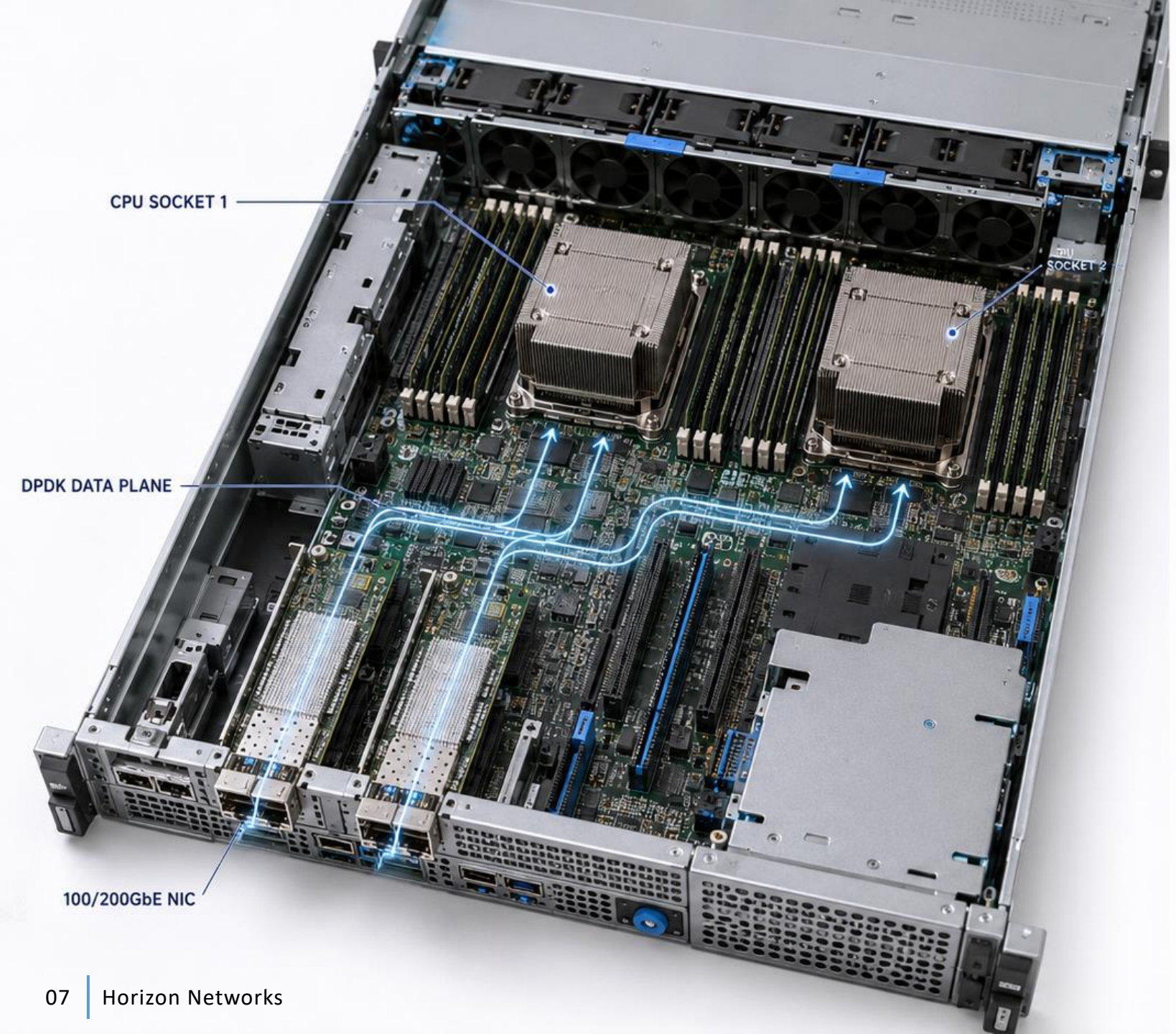
VPP-based deployment can extend the architecture across x86, ARM and PowerPC platforms where required.











High-Performance CGNAT Powered by DPDK

DPDK-accelerated packet processing removes traditional software bottlenecks and enables efficient use of multi-core x86 processors and high-speed network interfaces.

TECHNICAL FOUNDATION

- Kernel-bypass packet processing
- Multi-core parallelization
- NUMA-aware resource allocation
- High-speed NIC queue optimization
- Low-overhead packet forwarding

Up to 400G on a Single x86 Server

Consolidate high-volume CGNAT traffic on fewer servers while simplifying traffic distribution, infrastructure management and capacity planning.

THROUGHPUT	PPS
400 Gbps	1.02B
SESSIONS	**NEW SESSIONS/SEC**
322.6M	2.21M



PERFORMANCE INDICATORS

- Up to 400G throughput
- High packet-processing capacity
- Massive concurrent sessions
- High new-session establishment rate

Performance depends on the validated hardware profile, traffic model and enabled service functions.

Scale Capacity Without Replacing the Platform

SCALE UP

- Add CPU, memory and NIC resources
- Expand licensed capacity
- Move to a higher validated server profile

SCALE OUT

- Add active CGNAT nodes
- Distribute traffic using BGP and ECMP
- Build multi-terabit aggregate capacity

PAY-AS-YOU-GROW

- License capacity according to operational demand
- Expand capacity without hardware replacement
- Avoid unnecessary initial overprovisioning

Start efficiently. Expand predictably.



Multiple Translation Models for Every Migration Strategy

Support IPv4 extension and IPv6 transition through multiple carrier-grade translation and tunneling models.

NAT44

Private IPv4 subscribers share public IPv4 addresses through address and port translation.

NAT444

Multi-stage IPv4 translation extends public IPv4 utilization across large subscriber populations.

NAT64

IPv6-only subscribers access existing IPv4 services through protocol translation.

DS-Lite

Subscriber IPv4 traffic is carried across an IPv6 access network and processed by centralized NAT44 after tunnel decapsulation.

Extend IPv4 today. Build the path to IPv6 tomorrow.









Designed to Fit Existing Operator Networks

Horizon Networks CGNAT integrates into established Layer 2 and Layer 3 networks without requiring a disruptive redesign.

INTEGRATION CAPABILITIES

- MPLS and VLAN environments
- Multi-VRF operation
- Link Aggregation
- Multiple high-speed interfaces
- Separate management plane
- Inline and NAT-on-a-Stick deployment

TYPICAL PLACEMENT

BNG/BRAS | Internet Edge | PGW/UPF | Regional POP



Dynamic Routing for Resilient Traffic Delivery

Integrated routing capabilities enable seamless traffic distribution, public pool advertisement and rapid convergence during network or node failures.

ROUTING CAPABILITIES

- BGP
- OSPF
- Static Routing
- ECMP
- BFD-assisted convergence

ADDITIONAL RESILIENCE

- AS-path-based route preference
- Fast link and neighbor failure detection
- Predictable forward and return traffic paths

KEY FUNCTION

Dynamic advertisement of public NAT pools



Standards-Based Mapping and Filtering Control

Predictable NAT behavior improves application compatibility while maintaining precise inbound traffic control.

MAPPING BEHAVIOR

- Endpoint-Independent Mapping
- Consistent public mapping across destination changes
- Standards-aligned address and port translation

FILTERING BEHAVIOR

- Endpoint-Independent Filtering
- Address-Dependent Filtering
- Address-and-Port-Dependent Filtering
- Policy-controlled inbound access

ADDITIONAL CAPABILITY

NAT Hairpinning for communication between subscribers behind the same CGNAT





Flexible Public Address Pool Management

Create independent public address pools for different services, subscriber groups, regions and operational policies.

POOL TYPES AND ALLOCATION MODELS

- NAPT pools
- Static NAT pools
- Stateless NAT pools
- Port Block Allocation pools
- Deterministic NAT pools
- Paired and Arbitrary allocation modes

OPERATIONAL CONTROLS

- Configurable NAT ratio per pool
- Primary and overflow pools
- Subscriber-group-based allocation
- Low and high utilization thresholds
- Automated SNMP Trap generation

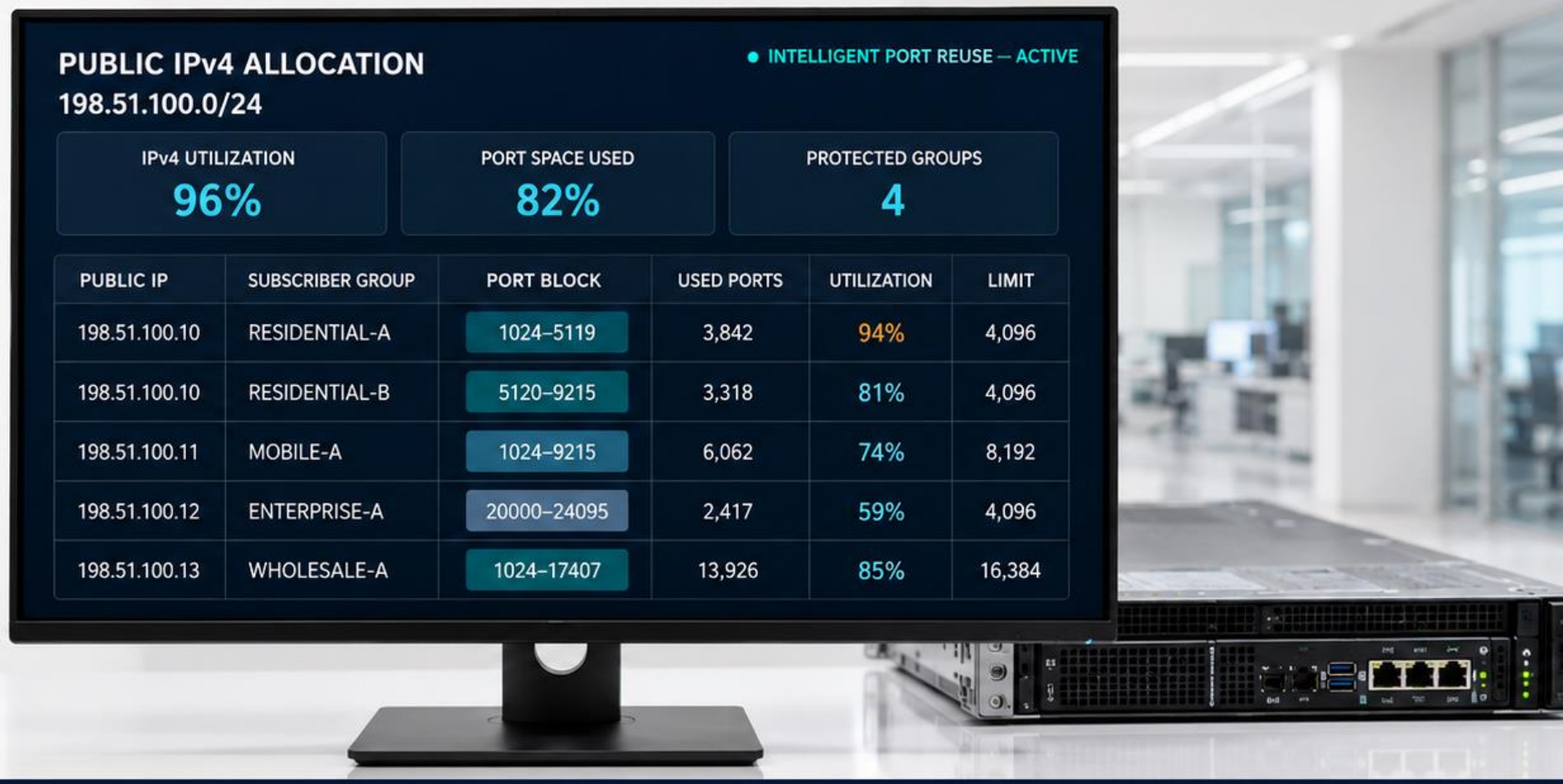
Apply the right address policy to every subscriber segment.

Maximize Every Public IPv4 Address

Intelligent address and port allocation improves public IPv4 utilization while protecting resource availability for individual subscribers.

OPTIMIZATION CAPABILITIES

- Dynamic port allocation
- Port Block Allocation
- Deterministic NAT
- Intelligent port reuse
- Configurable NAT ratio
- Per-subscriber port limits
- Resource protection per subscriber group



Use more of every address—without compromising subscriber fairness.

ADDRESS POOLS → PORT ALLOCATION → OPTIMIZED UTILIZATION

Intelligent Session and Resource Management

Protocol-aware controls preserve legitimate connections while releasing idle resources and protecting platform capacity.

CAPABILITIES

- Per-pool session policies
- Protocol-aware timeouts
- Independent TCP established timeout
- Independent TCP unestablished timeout
- UDP and ICMP session control
- Per-subscriber session and port limits
- Real-time session utilization

Preserve valid sessions.
Release idle resources.



Preserve Application Experience Behind CGNAT

Standards-based NAT behavior and protocol-aware processing maintain reliable connectivity for consumer, enterprise and real-time applications.

CAPABILITIES

- NAT Hairpinning
- Fragment and ICMP processing
- Static inbound mappings
- Configurable protocol helpers
- Selective ALG activation
- IPsec NAT-Traversal compatibility

SUPPORTED ALG EXAMPLES

FTP | TFTP | SIP | RTSP | PPTP | DNS

OPERATIONAL NOTE

ALG functions can be enabled selectively to avoid unnecessary interference with applications that already use native NAT-traversal mechanisms.


VOIP

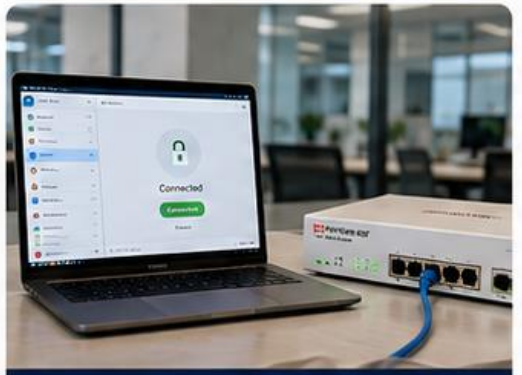


VIDEO

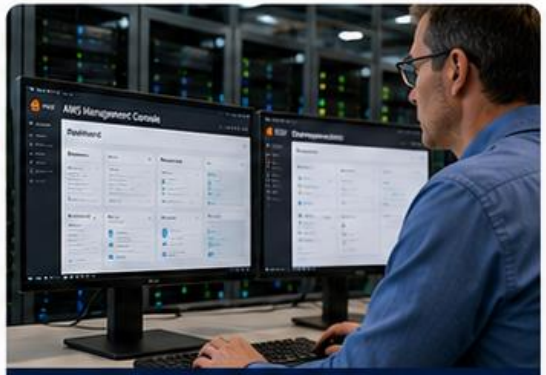

GAMING



FILE TRANSFER



ENTERPRISE VPN


CLOUD SERVICE



Service Continuity by Design

Distributed NAT state synchronization protects subscriber sessions during node, interface and network failures.

HA CAPABILITIES

- Stateful NAT context synchronization
- Distributed NAT state replication
- Session and mapping preservation
- Port-allocation state synchronization
- Rapid failure recovery

A node may fail. Subscriber sessions should continue.



Controlled Inbound Connectivity Behind CGNAT

Provide standards-based and policy-controlled mechanisms for applications that require inbound reachability.



PORT CONTROL PROTOCOL — PCP

- RFC 6887-based port requests
- MAP and PEER operations
- Configurable THIRD_PARTY control
- External port creation without a pre-existing session

STATIC MAPPING

- IP-to-IP mapping
- IP:Port-to-IP:Port mapping
- Protocol-specific inbound publishing
- Controlled access to subscriber-hosted services

Enable inbound services without compromising operational control.

FLEXIBLE HA ARCHITECTURES

Active–Active or Active–Standby

Choose the high-availability model that aligns with your service objectives.
Both architectures are stateful, resilient and built for carrier-grade scale.



ADDITIONAL MECHANISMS

BGP | BFD | ECMP | VRRP | Link and Neighbor Tracking

Choose the resilience model that fits your network.

Preserve Flow Stability During Network Changes

Resilient ECMP limits traffic disruption when a link or next-hop becomes unavailable.

CAPABILITIES

Configurable ECMP flow hashing

Five-tuple-based traffic distribution

Stable flow-to-next-hop assignment

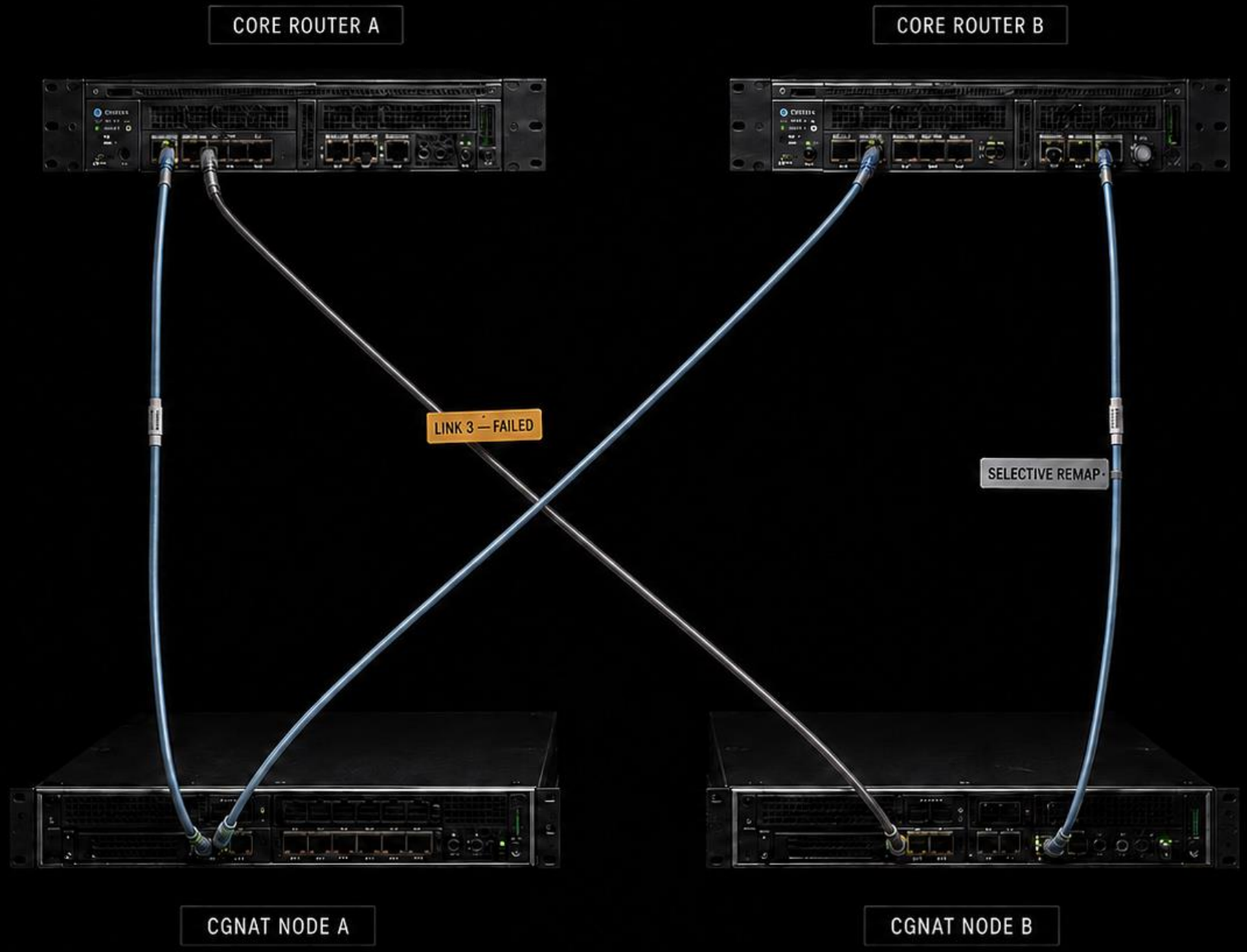
Selective remapping after next-hop failure

Reduced disruption to unaffected sessions

Predictable return-path handling

OPERATIONAL VALUE

Move only the affected flows—not the entire traffic population.



One Control Point for Every CGNAT Node

Centrally configure, monitor and operate CGNAT nodes across multiple sites through an intuitive management environment.

MANAGEMENT CAPABILITIES

- Centralized NMS
- Intuitive Web UI
- Powerful operational CLI
- Multi-node configuration
- Unified alarm and event management
- Configuration backup and restore

STANDARDS-BASED MONITORING

- SNMP monitoring and Trap generation
- IF-MIB and NATV2-MIB support
- CPU, memory and platform-resource monitoring
- NAT pool threshold monittoring
- Zabbix monitoring integration

One Control Point. Multiple CGNAT Nodes.



Simplify Multi-Node Operations

Automate repeatable configuration and lifecycle workflows across distributed CGNAT infrastructure.

CAPABILITIES

- Template-based provisioning
- Centralized policy deployment
- Configuration consistency validation
- Backup and restore
- OSS and orchestration integration

OPERATIONAL VALUE

Faster deployment | Fewer errors | Consistent operations



See Every Dimension of CGNAT Performance

Real-time monitoring provides immediate visibility into traffic, sessions, pools, ports and platform health.

KEY METRICS

- Throughput and packets per second
- New and concurrent sessions
- NAT pool and port utilization
- Subscriber-level resource consumption
- CPU, memory and NIC health
- HA synchronization status
- Logging and collector health

Detect capacity risks before subscribers are affected.



Complete Subscriber Traceability at Carrier Scale

Standard and customizable IPDR records provide accurate subscriber-session correlation for operations, security and regulatory compliance.

CORRELATION CHAIN

Private IP → Public IP and Port → Destination → Subscriber

SUPPORTED RECORD MODELS

- Address Mapping
- Port Mapping
- Full Session
- Port Block Allocation
- Deterministic mapping reconstruction

EXPORT AND INTEGRATION

IPFIX | NetFlow | Syslog | RADIUS | External Collectors

Accurate records. Scalable collection. Defensible traceability.



Connect IPv6-Only Subscribers to IPv4 Services

Integrated carrier-grade NAT64 enables operators to introduce IPv6-only subscriber segments while preserving access to existing IPv4 services.

CAPABILITIES

- Integrated CGNAT and NAT64
- IPv6-to-IPv4 connectivity
- IPv6-only subscriber support
- Independent NAT44 and NAT64 policies
- Integration with DNS64 infrastructure
- Controlled multi-stage migration

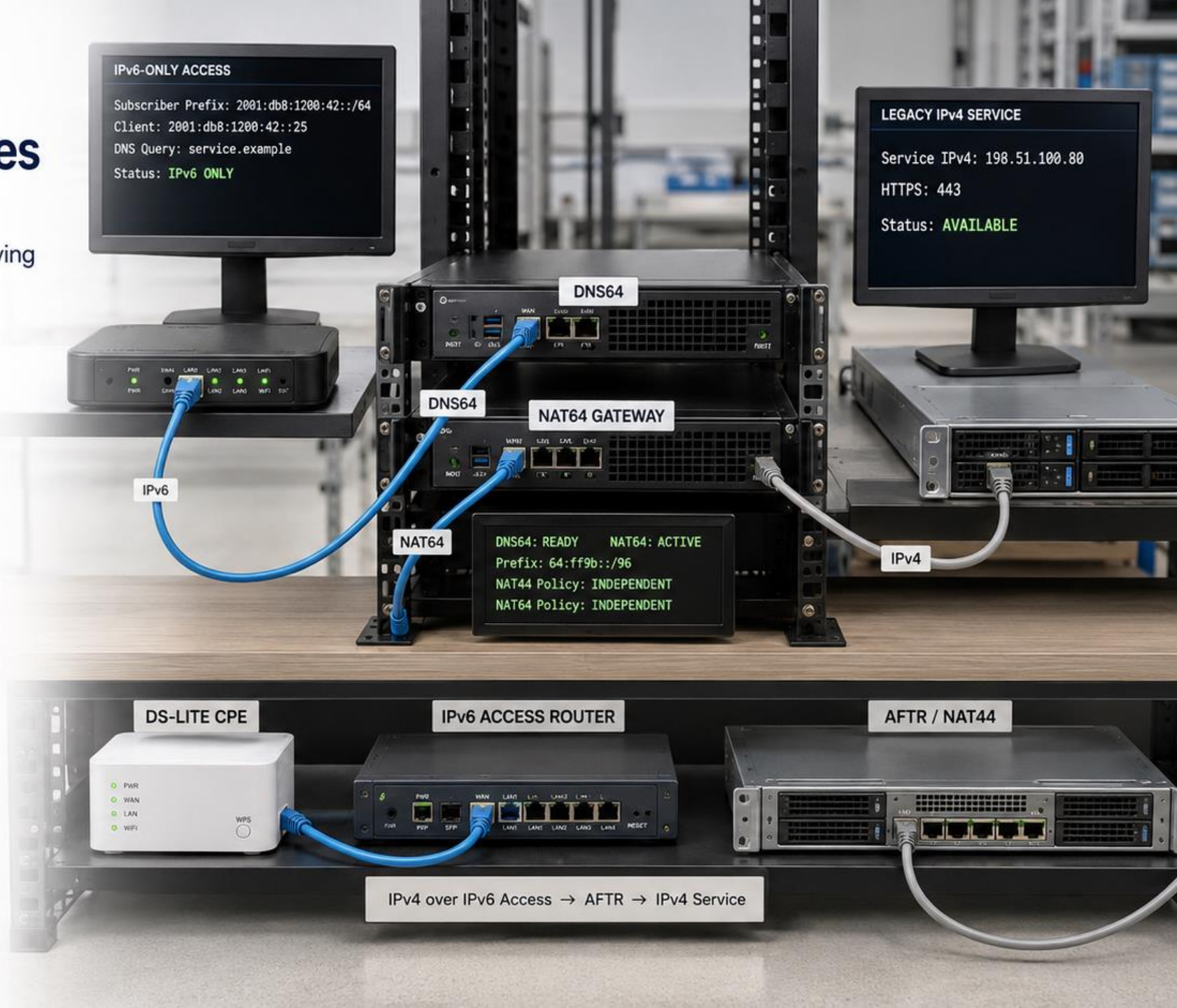
MIGRATION OPTIONS

Dual Stack → IPv6 Preferred → IPv6-Only with NAT64

ALTERNATIVE TRANSITION MODEL

DS-Lite for IPv4 service delivery across IPv6 access networks

Move toward IPv6 without leaving IPv4 services behind.



Built on Open Networking Standards

Standards-based implementation improves interoperability, predictable behavior and integration with established operator environments.

KEY STANDARDS

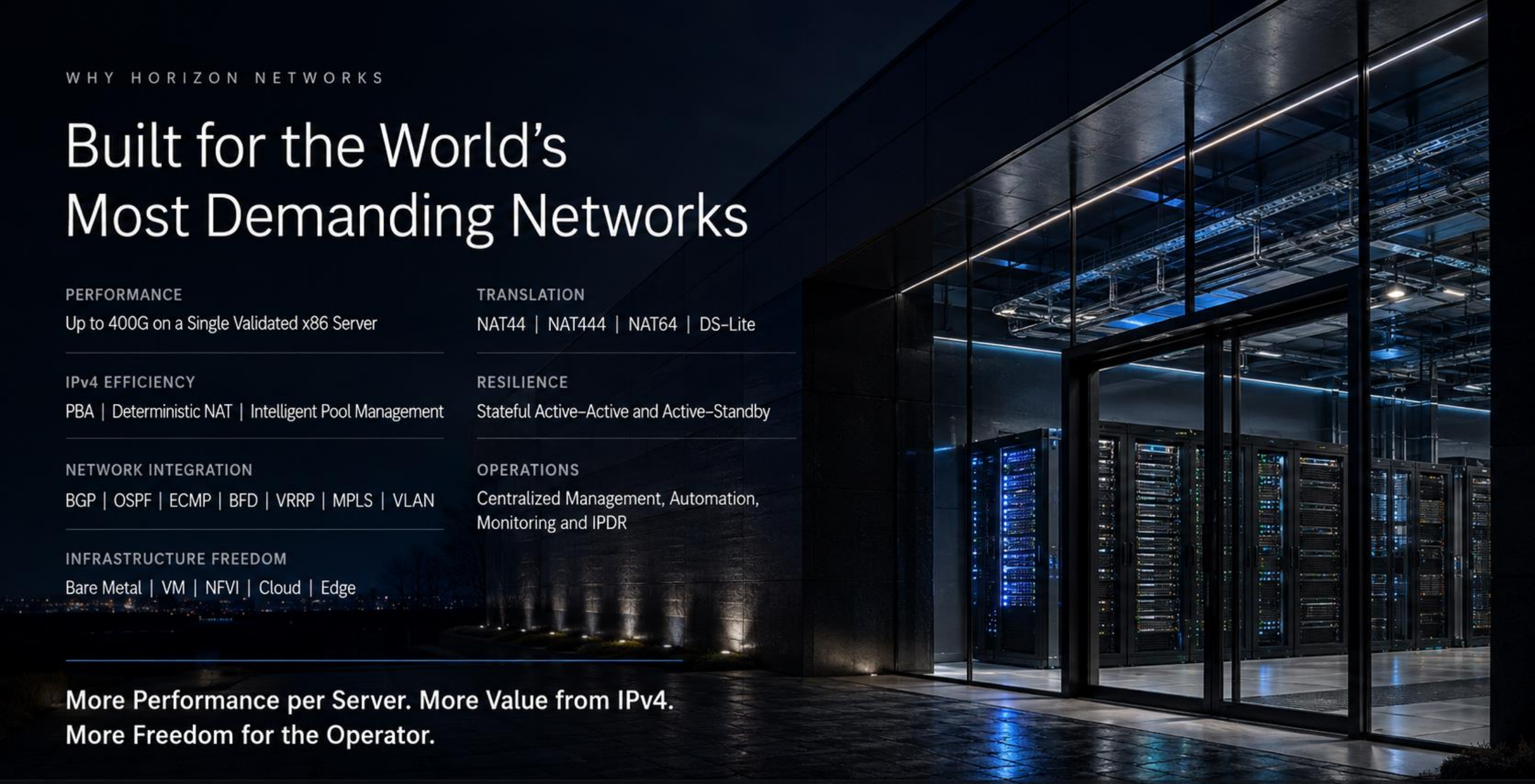
NAT44 —	RFC 4787, RFC 5382, RFC 5508, RFC 6888 and RFC 7857	**NetFlow —**	RFC 3954
NAT64 —	RFC 6146	**IPFIX —**	RFC 7011
Deterministic NAT —	RFC 7422	**RADIUS Accounting —**	RFC 2865 and RFC 2866
Port Control Protocol —	RFC 6887	**NATV2-MIB —**	RFC 7659
Syslog —	RFC 5424	**IF-MIB —**	RFC 2863



Predictable behavior. Open integration. Carrier-grade interoperability.

WHY HORIZON NETWORKS

Built for the World's Most Demanding Networks



PERFORMANCE
Up to 400G on a Single Validated x86 Server

TRANSLATION
NAT44 | NAT444 | NAT64 | DS-Lite

IPv4 EFFICIENCY
PBA | Deterministic NAT | Intelligent Pool Management

RESILIENCE
Stateful Active–Active and Active–Standby

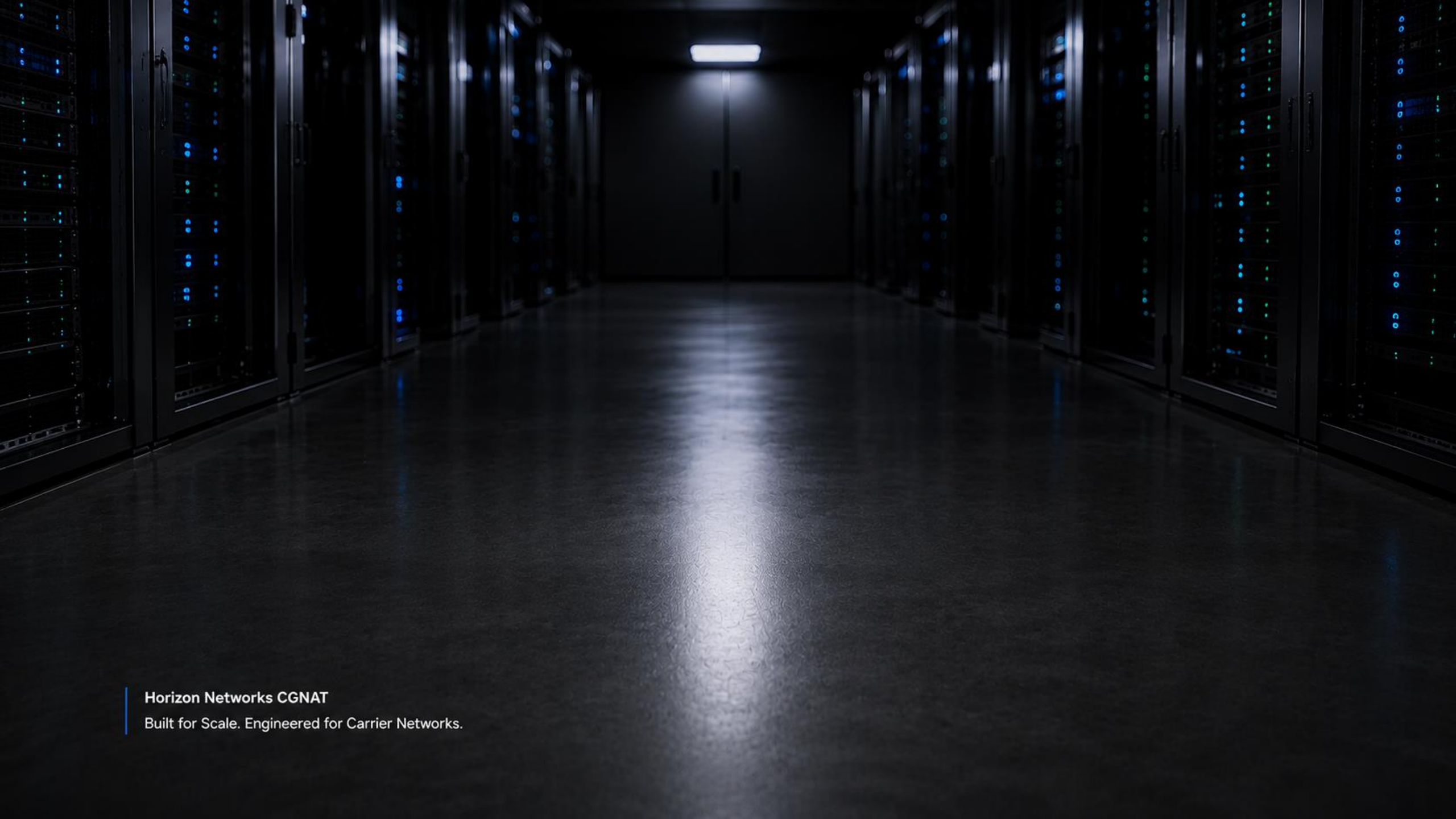
NETWORK INTEGRATION
BGP | OSPF | ECMP | BFD | VRRP | MPLS | VLAN

OPERATIONS
Centralized Management, Automation, Monitoring and IPDR

INFRASTRUCTURE FREEDOM
Bare Metal | VM | NFVI | Cloud | Edge

More Performance per Server. More Value from IPv4.
More Freedom for the Operator.

Request a Technical Workshop | Schedule a Live Demo | Start a Proof of Concept



Horizon Networks CGNAT

Built for Scale. Engineered for Carrier Networks.