NEOX NETWORKS
NEXT GENERATION NETWORK VISIBILITY

Feature Brief

Enhanced Security & Visibility with

Tunnel Encapsulation & Decapsulation

In the era of 5G and IoT, mobile networks rely heavily on tunneling protocols to transport user data securely across complex infrastructures. However, the encapsulation and decapsulation of traffic introduce security blind spots, performance bottlenecks, and compliance risks. Traditional monitoring tools struggle to inspect encapsulated payloads, leaving networks exposed to attacks, data leaks, and service disruptions. Tunnel Encapsulation & Decapsulation solves this challenge by providing deep visibility into encapsulated traffic, ensuring secure and efficient data transmission. At NEOX Networks, we go beyond basic packet inspection—we deliver intelligent decapsulation and reassembly, empowering operators to secure, optimize, and troubleshoot their mobile, data center, and other infrastructure.

What is Tunnel Encapsulation & Decapsulation

Tunnel Encapsulation & Decapsulation is the process of wrapping (encapsulating) and unwrapping (decapsulating) data packets within another protocol for secure transmission across networks, enabling end-to-end traffic visibility by extracting and inspecting inner headers and payloads from GTP, IPsec, GRE, and VXLAN tunnels. This advanced capability enhances threat detection by identifying malicious payloads hidden in encrypted traffic, optimizes performance by monitoring latency, fragmentation, and packet loss, and ensures compliance & forensics through lawful interception and session reconstruction. By intelligently processing encapsulated traffic, NEOX delivers true network intelligence, empowering operators to secure and optimize their infrastructure.

Why Tunnel Encapsulation & Decapsulation Matters

Mobile, data center, and cloud networks depend on tunneling for security and scalability. Here's why deep tunnel inspection is critical:

1. **Enhanced Security & Threat Prevention**
   The system detects malicious payloads hidden within encrypted tunnels (e.g., VPN abuse and data exfiltration), prevents tunnel hijacking and man-in-the-middle (MITM) attacks through encapsulation header validation, and identifies protocol misuse including GTP tunneling for firewall evasion...

2. **Optimized Network Performance**
   The solution optimizes network performance by monitoring tunnel overhead to prevent fragmentation and latency spikes, detecting misconfigured tunnels that cause packet drops or QoS violations, and ensuring efficient bandwidth usage through stripping unnecessary encapsulation layers before traffic reaches analytics tools.

3. **Regulatory Compliance & Data Integrity**
   The system enhances security and compliance by supporting lawful interception through decryption and reconstruction of tunneled traffic, auditing encapsulation integrity to block unauthorized tunneling (such as rogue VPNs), and ensuring GDPR/ETSI compliance through comprehensive logging of encapsulated data flows.

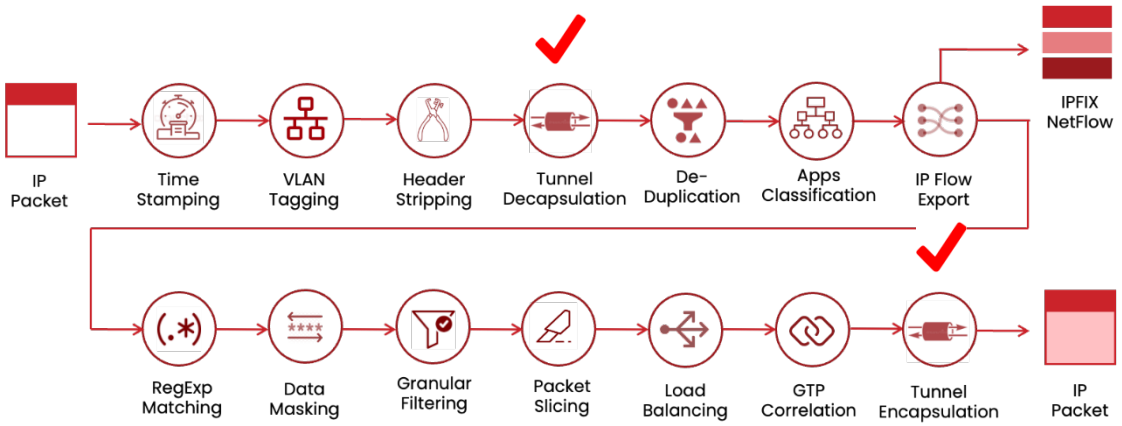
How NEOX Delivers Tunnel Encapsulation & Decapsulation

NEOX's PacketWolf, PacketLion, and PacketTiger series of Packet Brokers support hardware-accelerated Tunnel Encap/Decap to ensure traffic classification and forwarding.

1. **Wire-Speed Decapsulation**
   The system leverages FPGA/ASIC-powered processing to remove encapsulation headers with sub-microsecond latency while maintaining full performance when handling GTP, IPsec, GRE, VXLAN, and other tunneling protocols.

2. **Intelligent Payload Extraction**
   The system performs intelligent payload extraction by uncovering inner-layer protocols (including HTTP, DNS, and VoIP) for comprehensive deep inspection while simultaneously enabling metadata enrichment with critical parameters like IMSI, IP addresses, and QoS markers to power advanced analytics capabilities.

3. **Smart Forwarding to Security Tools**
   The system intelligently filters and forwards only relevant decapsulated traffic to monitoring probes, slashing processing load on downstream tools by 80% while ensuring that critical security systems like DPI, IDS, and firewalls receive clean, fully inspectable traffic for optimal threat detection and network protection.



Feature	PacketWolf	PacketLion	PacketTiger	PacketTigerVirtual
Tunnel Encap/Decap	✓	✓	✓	✓

Best Practices for Tunnel Visibility with NEOX

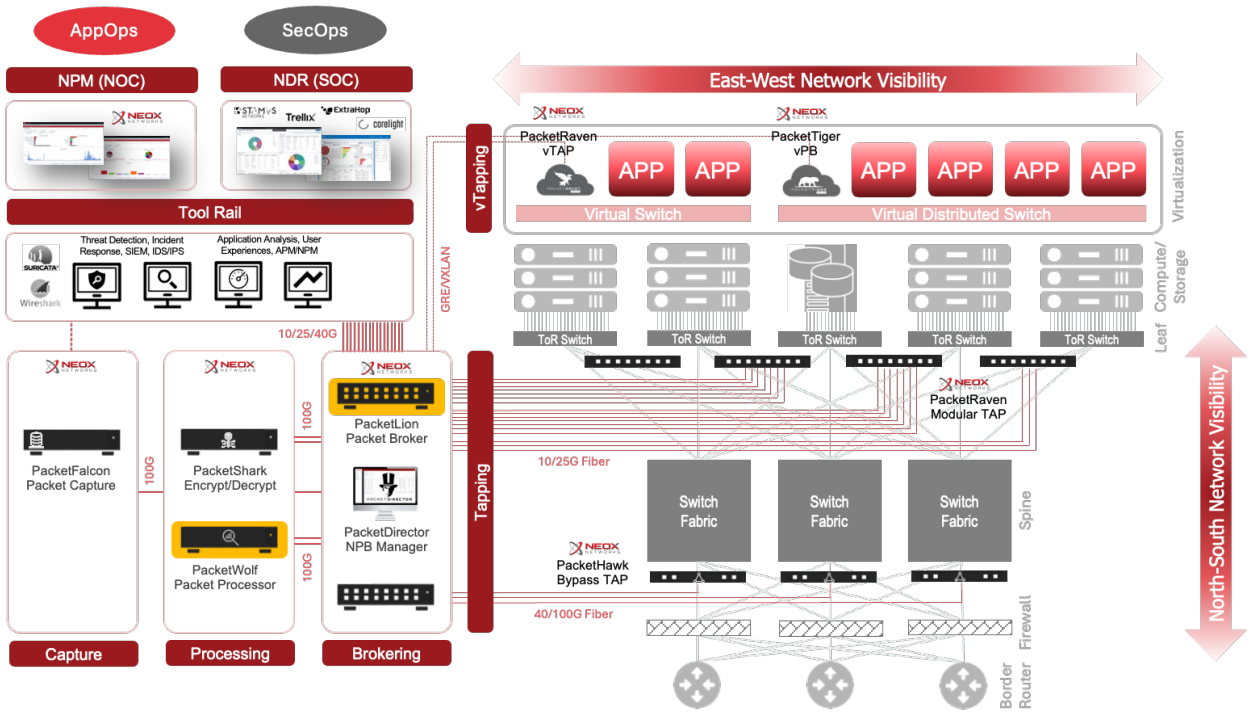
To maximize security and efficiency, we recommend:

- ✓ Deploy NEOX at key chokepoints (Gi/SGi, N6, peering links) to inspect all tunneled traffic.
- ✓ Use PacketTigerVirtual for cloud-native decapsulation in 5G cores and SD-WAN environments.
- ✓ Enable metadata correlation to track subscriber sessions across multiple encapsulation layers.

To help you get the most out of your network, we recommend the following best practices to funnel, consolidate, and process all network traffic to be monitored through one of the two NEOX Packet Broker approaches:

- For better hardware performance, lower latency network, or for a future-proofed scalable visibility approach, deploy a **two-tier visibility architecture**. Use NEOX PacketLion Packet Broker for high-density TAP and tool aggregation, and use NEOX PacketWolf Packet Broker for faster Tunnel Encap/Decap and other packet services operations.

- For a lighter or software-driven approach, consolidate all network traffic to be monitored through a NEOX PacketTiger, and then from there to the tool rail. Same can be achieved in the cloud with PacketTigerVirtual before forwarding traffic to cloud-native monitoring or security tools.



The Future of Network Traffic Brokering Starts Here

As networks adopt more encryption and tunneling, deep packet decapsulation will be essential for security and performance. NEOX is committed to delivering cutting-edge solutions that provide precision, reliability, and scalability.

Ready to Transform Your Network?

Discover how NEOX can elevate your Network Traffic Brokering with advanced Tunnel Encap/Decap technology. Contact Us today or Request a Demo to learn more about our solutions and take the first step toward a smarter, faster, and more secure network.

NEOX – Precision. Performance. Perfected.