



# LN1000 MOBILE SECURE ROUTER

## Product Overview

Military organizations, first responders, and transportation providers are not immune to the growing global demand for secure and mobile access to a high-performance network that provides intelligent voice, video, and data transport. This demand for high-performance, secure networking also exists in networks that support unmanned surveillance aircraft, exploration (oil, gas, and mining) equipment, and energy utility networks for power monitoring.

The Juniper Networks LN1000 is a secure, high-performance router delivered in a small form factor energy efficient package that can be embedded in a customer chassis for portable and transportable router markets, making it the perfect solution for even the most demanding mobile network applications.

## Product Description

The Juniper Networks® LN1000 Mobile Secure Router is an edge access router that delivers a high-performance routing firewall and intrusion detection service (IDS). Packaged in the standard 4 x 6 x .85 inches VPX form factor, it consumes 35 watts of power or less and weighs less than 1.5 lbs. The Space, Weight, and Power (SWAP) characteristics of the LN1000 make it ideal for customers who require a secure and rugged network access router with a small footprint in a transportable package. The LN1000 provides the power of Juniper's hardware and Junos OS routing functionality across its 8 x 1GbE interfaces.

The LN1000 addresses the growing demand for a network access presence in military, first responder and transportation vehicles, mining and exploration equipment, unmanned aircraft, and power grids. Until now, many of these networks were forced to leverage traditional routing and security boxes that were designed for equipment rack installations requiring forced air or fans for cooling. These designs did not consider the SWAP requirements of mobile secure networks. These mobile, and in some instances remote network endpoints, have a unique set of requirements that only the LN1000 can provide in a VPX form factor.

The high-performance routing capability of the LN1000 not only provides industry-leading routing and forwarding performance, but it also solves communications issues associated with mobile network access devices. A mesh network of LN1000s is able to determine the most efficient and effective path for network communications across radio networks. It constantly monitors bandwidth between network hops to ensure that traffic is managed appropriately and always gets through—even in networks where available bandwidth from one point to another can be extremely dynamic due to radio signal interference.

As an edge access device, the LN1000 can be at risk of network attacks. Whether on the battlefield, on a local public transit bus, or located at a local power substation, the threat of unwanted network access, network sabotage, and denial-of-service (DoS) attacks exists. With its integrated firewall and intrusion detection system, the LN1000 ensures that the network is always up and securely running by denying malicious threats and unauthorized access or control. The LN1000 VPX packaging provides a conduction cooling system that allows it to run in harsh environmental conditions without the need for external fans or forced air cooling systems.

## Architecture and Key Components

The key components of the LN1000 are high-performance routing for mobile networks, security features that include a firewall and IDS, a small footprint, a conduction cooled packaging system, and the powerful Juniper Networks Junos® operating system.

### Routing

As a Juniper router, the LN1000 is deployed with Juniper routing hardware, ensuring industry-leading forwarding and routing support even under the harshest network traffic loads. Unlike traditionally fixed-line or wireless backhaul networks, the communication path for mobile networks, whether terrestrial, air, or sea, is through radio links. These communication links have limited bandwidth, are typically bursty in nature, and are subject to dynamic changes to available bandwidth due to Line of Sight (LOS), weather or environmental interference that affects transmission. The high-performance routing capabilities of the LN1000 include radio router protocol support that enables the LN1000 to overcome these difficult mobile networking issues. The radio router protocols in the LN1000 enable it to establish a mesh network configuration using extensions to OSPFv3 routing protocol to include other mobile devices as well as land-based receivers. The radio router protocols provide real-time monitoring of radio hop efficiency and effective available bandwidth. This information is then leveraged by the routing capabilities within the LN1000 to appropriate direct traffic across the most effective hop sequence, and when necessary to regulate traffic flow so that traffic quality of service (QoS) can be maintained.

The LN1000 has hardware-based QoS support, which provides consistent routing performance across all 8 x 1 Gbps network interfaces. This hardware-based QoS will support a QoS hierarchy that provides up to 8 queues of 4 precedence levels, delivering classification for up to 32 unique DiffServ code point (DSCP) values. QoS hierarchy support can be used in military and first responder networks to establish a network communications hierarchy as well as message importance and urgency preference. QoS hierarchy in the LN1000 can also be used to provide differentiated classifications of service based on network traffic type in commercial applications.

### Security

The LN1000 provides a hardware assisted stateful firewall and IDS solution that is based on the capabilities provided in the industry-leading Juniper Networks SRX Series Services Gateways. As a network edge device, the security capabilities within the LN1000 provide network access protection—whether on the battlefield, in a first responder network, in energy management systems, or in remote sensor data networks. The firewall and IDS systems in the LN1000 provide DoS attack and network disruption protection in various environments.

The memory sanitization capability within the LN1000 erases all information stored in memory upon system reboot. This capability ensures that all confidential communications traffic is removed, and it can be used to ensure that hackers are not able to store information in the memory banks of the LN1000 for future use, or even worse for an attempted attack at a future point in time.

### Firewall

- Network attack detection
- DoS and DDoS protection
- TCP reassembly for fragmented packet protection
- Brute force attack mitigation
- SYN cookie protection
- Zone-based IP spoofing
- Malformed packet protection

### Intrusion Prevention System (IPS)

- Protocol anomaly detection
- Stateful protocol signatures
- IPS attack pattern obfuscation
- Customer signatures creation
- Frequency of updates (daily and emergency)

### Packaging

The LN1000 packaging complies with the VPX standard and consists of a single 3 U card with a VITA 46 interface weighing less than 1.5 lbs. The router is approximately the size of a 4 x 6 in index card. Populated with military grade components, having a unique thermal conductive design, and shrunk by Juniper's innovative package design, the LN1000 will operate in harsh environments while consuming less than 35 watts of power. And it can achieve excellent routing performance capability because of Juniper hardware assisted security and routing features.

### Junos Operating System

All of the routing, security, and control features leverage the functionality and quality of Junos OS. In addition to Juniper's superior routing software, the LN1000 also can support neighbor discovery and PPPoE extensions to radio router protocol to enable unicast and multicast IP broadcast in a mobile environment.

## Features and Benefits

### LN1000 Mobile Secure Router Features and Benefits

FEATURE	BENEFIT
VPX 3 U form factor VITA 46 Interface 4 x 6.3 in (100 x 160 mm) height and length -40° F to 185° F (-40° C to 85° C) operating temperature	Small, single board size makes the LN1000 easily configurable in the customer chassis using an industry-standard VITA 46 backplane.
Low power requirement	Running with full functionality at less than 35 W, the LN1000-V is easily embedded in a moving vehicle, whether terrestrial, airborne, or at sea, where power is often limited.
SWAP qualities	The exceptional Space, Weight, and Power (SWAP) characteristics (< 1.5 lb, < 35 W, 3 RU x 6.3 in deep) make the LN1000-V a unique product for vehicular, airborne, or seaborne units where size, weight, and power must be kept to a minimum. The clear advantage for the LN1000-V is to be able to deliver full routing functionality, 8 x 1GbE outputs, as well as firewall and IPS security functions in a small package designed to be easily embedded in a customer chassis that conforms to the VITA 46 standard.
IPMI	The LN1000-V is designed with an Intelligent Platform Management Interface for external commands such as reset, remote power on and off, onboard temperature and voltage sensing, and status information. IPMI provides an external control capability for a router that is typically embedded in a constrained space.
RS232 console port	One RS232 console at the front end of the card via RJ45 connector and also mirrored to the backplane. The RS232 console port can be used to externally monitor operational status as well as to run the Junos OS CLI while the router is in operation.
IPv4 and IPv6 support	Includes support for forwarding of IPv4/IPv6 packets, IPv4/IPv6 firewall, and intrusion prevention system (IPS) to ensure scalability on the world's largest networks.
Junos OS functionality	The LN1000 supports the rich routing and networking functionality of the Junos OS, enabling it to be easily configured to WAN and LAN routers all running the same OS.
Protocol (4938bis)	Allows the LN1000-V to communicate to a radio card for uplink using a PPPoE extension (RFC 4938bis). Support for the protocol enables the LN1000 to monitor available bandwidth on a per-hop basis, and adjust routing tables and message queues to ensure that traffic is transported effectively and efficiently.
QoS	The LN1000-V will support 8 queues per virtual, logical, or physical interface. Each queue can have four random early detection (RED) classes applied to it. The hardware-based QoS capability ensures consistent routing performance across all 8 x 1 Gbps Ethernet ports whether QoS is enabled or not.
Hot swap	Supports VITA 46.13 Hot Remove/Insert Specification. The LN1000-V can be removed from or inserted into the backplane while power is applied without damage to either the backplane or to the LN1000.
Performance	<ul style="list-style-type: none"><li>• 500,000 packets/sec at 64 byte packet size without services enabled</li><li>• 200,000 packets/sec at 64 byte packet size with all services enabled (multicast, QoS, firewall, IDS)</li></ul>

## Product Capabilities

Additional security capabilities for the LN1000 include:

- Firewall, zones, screens, policies
- Stateful firewall, access control list (ACL) filters
- DoS and distributed denial-of-service (DDoS) protection (anomaly-based)
- Replay attack; anti-replay protection
- Content filtering

### VPN

- Tunnels
  - Generic Routing Encapsulation (GRE)
  - IP-in-IP
  - IPsec

### IPsec

- Data Encryption Standard (DES) (56-bit), triple Data Encryption Standard (3DES) (168-bit), and Advanced Encryption Standard (AES) (256-bit)
- Message Digest 5 (MD5) and Secure Hash Algorithm 1 (SHA1) authentication
- IPsec Network Address Translation (NAT) traversal

### User Authentication and Access Control

- Third-party user authentication (RADIUS)
- RADIUS accounting
- XAUTH VPN, web-based, 802.X authentication
- PKI certificate requests (PKCS 12)
- Certificate authorities supported: VeriSign, Entrust, Microsoft, RSA Keon, iPlanet, (Netscape), Baltimore, DoD PKI

### Address Translation

- Source NAT with Port Address Translation (PAT)
- Static NAT
- Destination NAT with PAT

### IP Address Assignment

- Static
- Dynamic Host Configuration Protocol (DHCP), Point-to-Point over Ethernet (PPPoE) client
- Internal DHCP server
- DHCP relay

### Traffic Management Quality of Service (QoS)

- Guaranteed bandwidth
- Maximum bandwidth
- Ingress traffic policing
- Priority bandwidth utilization
- DiffServ code point marking

### High Availability

- Virtual Router Redundancy Protocol (VRRP)

The Junos OS provides:

### Routing

- IPv4 and IPv6 support
- Static routes
- RIPv2
- OSPFv2/v3
- OSPFv3 address family support
- BGP
- IS-IS
- Source-based routing
- Policy-based routing
- Equal-cost multipath (ECMP)
- Reverse path forwarding (RPF)
- MPLS
- Layer 2 VPN (VPLS)
- Layer 3 VPN
- LDP
- RSVP
- Circuit cross-connect (CCC)
- Translational cross-connect (TCC)

### Multicast

- Internet Group Management Protocol (IGMP v1, v2, and v3)
- IGMP Multicast Listener Discovery (MLD) proxy
- Protocol Independent Multicast (PIM) sparse mode (SM)
- PIM dense mode (DM)
- PIM source-specific multicast (SSM)
- Distance Vector Multicast Routing Protocol (DVMRP)
- Source specific
- Multicast inside IPsec tunnel

### Encapsulations

- Generic routing encapsulation (GRE)
- Point-to-Point Protocol (PPP)
- PPPoE
- Ethernet (media access control and tagged)

### Quality of Service

- Packet classification based on IP precedence, DSCP, 802.1p
- 8 queues per logical entity
- 4 drop profiles per queue using Tail RED
- 32 queues per interface
- Weighted round-robin (WRR) scheduling
- 4 priority levels with strict order
- Packet marking by precedence, DSCP

### Radio Router Protocols

- RFC 4938
- RFC 4938 – BIS (using rate information to control flows)
- UDP-based radio router protocol (ground to satellite radio)

### Command-Line Interface

- Junos OS CLI

## Specifications

### Maximum Performance and Capacity

- Firewall + routing pps (64 byte): 200 Kpps
- AES256+SHA-1/3DES+SHA-1 VPN performance: 250 Mbps
- IPsec VPN tunnels: 1,000
- IPS (intrusion prevention system): 250 Mbps
- Connections per second: 9,000
- Maximum concurrent sessions: 128,000
- Maximum security policies: 4,096
- Maximum users supported: Unrestricted

### Network Connectivity

- Fixed I/O 8 x 1 Gbps

### Routing

- BGP instances 20
- BGP peers 32
- BGP routes 64K
- OSPF instances 20
- OSPF routes 64K
- RIP v1 / v2 instances 20
- RIP v2 routes 64K
- Static routes 64K

### IPsec VPN

- Concurrent VPN tunnels 1,000
- Tunnel interfaces 128

### Virtualization

- Maximum number of security zones 32
- Maximum number of VLANs 512

### Physical and Mechanical

#### Dimensions (W x H x D)

- Conforms to VITA 48.2 3 U Conduction Cooled Format (0.85 x 3.94 x 6.3 in; 21.6 x 100 x 160 mm)

### Connections

- VITA 46.0 specified connections:
- P0-56 pin Utility Connector; P1, P2 -112 pin signaling connectors
- RJ45 RS232 front console connector

## Electrical

### Power

- < 35 W

### Input Voltage

- +3.3 V
- +5 V
- +3 V Aux

## Thermal

### Operating

- VITA ECC4 (-40° C to +85° C)

### Non-Operating

- Vita ECC3 -50° C to +100° C

## Shock and Vibration

### Shock

- VITA 47 OS2; 40 g, 11 ms

### Vibration

- VITA 47 V3:
  - 5 Hz to 100 Hz PSD increasing 3dB/octave
  - 100 Hz to 1000 Hz PSD = 0.1g<sup>2</sup>/Hz
  - 1000 Hz to 2000 Hz PSD decreasing at 6dB/octave

## Humidity

- VITA 47: up to 95% RH non-condensing

## Corrosion

- VITA 47; ASTM G85, Annex A4 (Salt, SO<sup>2</sup> spray)

## Altitude

- VITA 47: 1,500 ft below sea level to 60,000 ft above sea level

## ESD

- VITA 47: EN61000-4-2; up to 15 KV

## Transportation:

- MIL-STD-810F for air, sea, road, and rail

## Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services and support, which are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to bring revenue-generating capabilities online faster so you can realize bigger productivity gains and faster rollouts of new business models and ventures. At the same time, Juniper Networks ensures operational excellence by optimizing your network to maintain required levels of performance, reliability, and availability. For more details, please visit [www.juniper.net/us/en/products-services/](http://www.juniper.net/us/en/products-services/).

## Product Options

The Juniper Networks LN1000 Mobile Secure Router is currently available with the VITA 46 interface option (LN1000-V).

## Ordering Information

The LN1000-V can only be ordered through Juniper's J-Partner Program. Please contact your local account representative to order this product.

## About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at [www.juniper.net](http://www.juniper.net).

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