8-LAN NETWORK APPLIANCE REFERENCE PLATFORM

Mini-ITX Reference Configuration for Firewall, Gateway, Routing, and Edge Networking

This document defines a network-focused Mini-ITX reference architecture for security appliances, industrial gateways, routing, firewall, and edge-networking projects. The values below reflect the currently published Mini ITX Board reference-platform specification. Exact processor, Ethernet controller mix, port speed, power input, cooling, storage, and enclosure details are confirmed at project level.

Document ID	MIB-RP-NW8-001
Revision	Rev 1.0
Issue Date	July 2026
Document Type	Reference Platform Brief
Reference Role	8-LAN network appliance / gateway platform
Form Factor	Mini-ITX reference architecture
Status	Reference configuration - project-specific confirmation required

1. Platform Purpose

The 8-LAN Network Appliance Platform is intended as a starting point for systems where network-interface density is more important than display or general-purpose desktop I/O. The published reference platform targets firewall, gateway, routing, networking, and security-appliance use cases.

It is not a fixed production SKU. Processor family, Ethernet controllers, storage, expansion, cooling, power input, and enclosure design may change according to throughput, software stack, port-speed, thermal, and deployment requirements.

2. Published Reference Configuration

Processor	Intel Atom / Core options
Networking	Up to 8 x Ethernet
Storage	NVMe / SATA options
Expansion	M.2 / PCIe options
Cooling	Fanless / active options
Power	Project dependent
Best-Fit Applications	Firewall / gateway / networking

3. Network Architecture Considerations

Design Area	Reference Position	Project Confirmation Required
Ethernet density	Up to 8 Ethernet ports	Final populated port count
Controller mix	Project-selectable	Controller vendor/model, lane allocation, driver support
Port speed	Not fixed by the reference brief	1GbE / 2.5GbE / higher-speed requirement
Segmentation	Multi-port network appliance role	WAN/LAN/management/HA segmentation
Bypass / special functions	Not assumed	Define only if project requires and hardware

		supports it
Expansion	M.2 / PCIe options	NIC, storage, wireless, accelerator, or other module

4. Processor Selection

The current reference page lists Intel Atom / Core options rather than one fixed CPU. This is appropriate for a network appliance because the processor must be selected against expected packet rate, encryption or VPN workload, firewall rules, IDS/IPS functions, virtualization, storage services, and software architecture.

- Use lower-power processor options when fanless operation and low enclosure heat are primary constraints.
- Use higher-performance Core-class options when application workload, encryption, virtualization, or inspection depth requires more compute.
- Confirm the selected processor against the final Ethernet-controller count and PCIe lane demand.
- Do not publish a throughput claim until the exact CPU, NICs, software stack, packet size, rule set, and test method are defined.

5. Ethernet Controller and Lane Planning

An eight-port appliance is constrained by more than connector count. Each controller needs a compatible host interface, sufficient PCIe bandwidth, driver support, board power, and thermal headroom. The final architecture should therefore document the controller topology rather than only the number of RJ45 ports.

Check	Why It Matters	Evidence to Retain
Controller model	Determines driver, offload, speed and operating behavior	BOM / configuration record
PCIe routing	Multiple NICs compete for finite processor/chipset lanes	Block diagram / schematic record
Port speed	Higher link rates increase bandwidth and thermal load	Approved project specification
Simultaneous traffic	Single-port testing does not validate an 8-port appliance	Multi-port traffic test
Driver version	Driver behavior can affect stability and performance	OS / driver record
Thermal load	Dense controllers add heat near the I/O area	Thermal log in final enclosure

6. Storage and Expansion

The reference platform lists NVMe / SATA storage and M.2 / PCIe expansion options. Final use depends on whether the appliance needs local logs, packet capture, container images, virtual machines, wireless/cellular connectivity, additional NICs, or other project-specific modules.

- Define boot-storage interface and capacity before board selection.
- For sustained logging or packet capture, select storage based on write workload and thermal behavior, not capacity alone.
- Confirm whether an M.2 socket is routed for PCIe, SATA, USB, or a specific key type.
- Reserve sufficient PCIe resources for both Ethernet and expansion requirements.

7. Cooling Strategy

The published 8-LAN reference platform supports fanless or active cooling options. Which method is appropriate depends on the selected CPU, Ethernet-controller count and speed, storage devices, expansion modules, enclosure, ambient temperature, and sustained traffic workload.

Cooling Option	Suitable Starting Point	Required Validation

Fanless	Lower-power CPU/NIC combinations and conductive enclosure designs	Sustained multi-port traffic in final enclosure
Active	Higher compute or denser thermal configuration	Fan curve, airflow path, failure behavior, acoustics where relevant
Chassis-assisted	Metal enclosure used as heat spreader	Interface pressure, orientation, surface temperature, ambient margin

8. Power Design

The current reference page correctly lists power as project dependent. A network appliance can vary substantially in power demand depending on processor, NICs, link speed, storage, expansion modules, USB devices, and cooling. The final document should therefore specify an actual input architecture only after the board configuration is frozen.

- Define nominal DC input and allowable range for the selected board.
- Verify cold boot, warm reboot, repeated power cycling, and power recovery.
- Test with all populated Ethernet ports linked and the target storage/expansion configuration installed.
- Record actual input voltage and current in the project-specific validation report.

9. Software and Network-OS Validation

- Record operating system or network-appliance software version.
- Record Ethernet driver versions and controller firmware where applicable.
- Verify that all populated ports enumerate correctly.
- Verify intended interface naming and persistence after reboot.
- Test routing, firewall, gateway, or other application functions relevant to the project.
- For virtualization, validate NIC assignment, passthrough, SR-IOV, or virtual-switch behavior only where supported and required.

10. Recommended Validation Scope

Area	Minimum Validation	Evidence
Configuration	Exact board, revision, CPU, NIC controllers, memory, storage, BIOS and OS	Configuration record
Networking	All populated ports link and transfer traffic	Port checklist
Multi-port load	Simultaneous traffic across the required port set	Traffic-test result / log
Thermal	Representative sustained networking workload	Ambient and temperature log
Power	Boot and representative full-system load	Voltage/current record
Storage	Boot and project-relevant read/write workload	Storage test record
Software	Drivers, interface naming and required network functions	Version and functional record
Mechanical	I/O fit, cable access, heatsink/fan and enclosure	Drawing / photo / fit check

11. Throughput Claim Requirements

This reference brief intentionally does not claim firewall, routing, VPN, or packet-processing throughput. Such claims are only meaningful when the test conditions are disclosed.

- Exact CPU and memory configuration
- Exact Ethernet controllers and link speed
- Packet size and traffic direction

- Number of active ports
- Software / OS version
- Firewall rule set or security features enabled
- Encryption / VPN algorithm where applicable
- Test tool and duration
- CPU utilization, packet loss, latency, and thermal condition

12. Known Limitations

- This document defines a reference platform, not a fixed production SKU.
- Up to 8 Ethernet describes the published reference capability; the exact port count and controller mix require project confirmation.
- Port speed is not fixed by the current reference-platform page and must not be inferred.
- Fanless suitability depends on the selected CPU, NICs, storage, enclosure, ambient and workload.
- Power input is project dependent and must be documented for the final board configuration.
- No firewall, routing, VPN, IDS/IPS, or packet-throughput figure is claimed by this brief.
- Reference-platform validation results do not automatically transfer to a modified configuration.

13. Source Basis

Reference Platform Data	MiniITXBoard.com - 8-LAN Network Appliance Platform
Published Reference Values	Intel Atom / Core options; up to 8 Ethernet; NVMe / SATA; M.2 / PCIe; fanless / active; power project dependent
Validation Methodology	MIB-EV-HBK-001 - Mini-ITX Engineering Validation Handbook

14. Related Engineering Documents

MIB-EV-HBK-001	Mini-ITX Engineering Validation Handbook
MIB-EV-CHK-001	System Validation Requirements Checklist
MIB-EV-RPT Series	Project-Specific / Redacted Validation Reports

15. Revision History

Revision	Date	Description	Approved By
Rev 1.0	July 2026	Initial public reference-platform release	

Reference Configuration Statement: This brief reflects the currently published 8-LAN network-appliance reference platform. Final specifications and validation results apply only to the confirmed project configuration. No throughput, port-speed, thermal, or power figure should be treated as a production guarantee unless it appears in the approved project-specific specification or validation report.