Network Infrastructure Architecture Report

Tech Solutions (SARL)

Version 1.0 — November 24, 2025

Executive Summary

This document provides a complete professional overview of the network infrastructure designed for Tech Solutions (SARL). The architecture simulates a modern enterprise network using GNS3, featuring routed backbone segments, VLAN segmentation, firewall policies, and Linux-based services.

The objective is to model a scalable, secure, and realistic environment for engineering, training, and testing purposes. It provides system engineers and network architects with a clear understanding of the network's logical and physical design, implementation steps, and operational considerations.

Contents

1 Introduction

The Tech Solutions (SARL) network architecture project is a fully simulated enterprise environment developed within GNS3. It includes multi-router infrastructure, departmental VLANs, dynamic routing, and server resources.

The purpose of this report is to present:

- network design principles,
- device roles and interconnections,
- used technologies and protocols,
- deployment and implementation steps,
- configuration and testing methodology.

1.1 Departmental Allocation and Logical Topology

After the integration of the Internet service, the ISP allocated the address space **172.24.0.0/14** to the enterprise. The logical topology and IP allocation for each department are summarized below:

Department	**Local Router**	**Service / VM**	**PC Clients**	**Role in the Enterprise**
Web / Marketing	RZ-1	Web Server	8905	Manages the website and customer-facing interactions
Supervision / IT	RZ-2	Monitoring Server	1465	Monitors server and network performance
Base de données / Gestion	RZ-3	Database Server	489	Centralizes and secures client and internal data
Partage / Collaboration	RZ-4	NFS Server	165	Enables internal file and document sharing

1.2 Subnetting (VLSM) Diagram

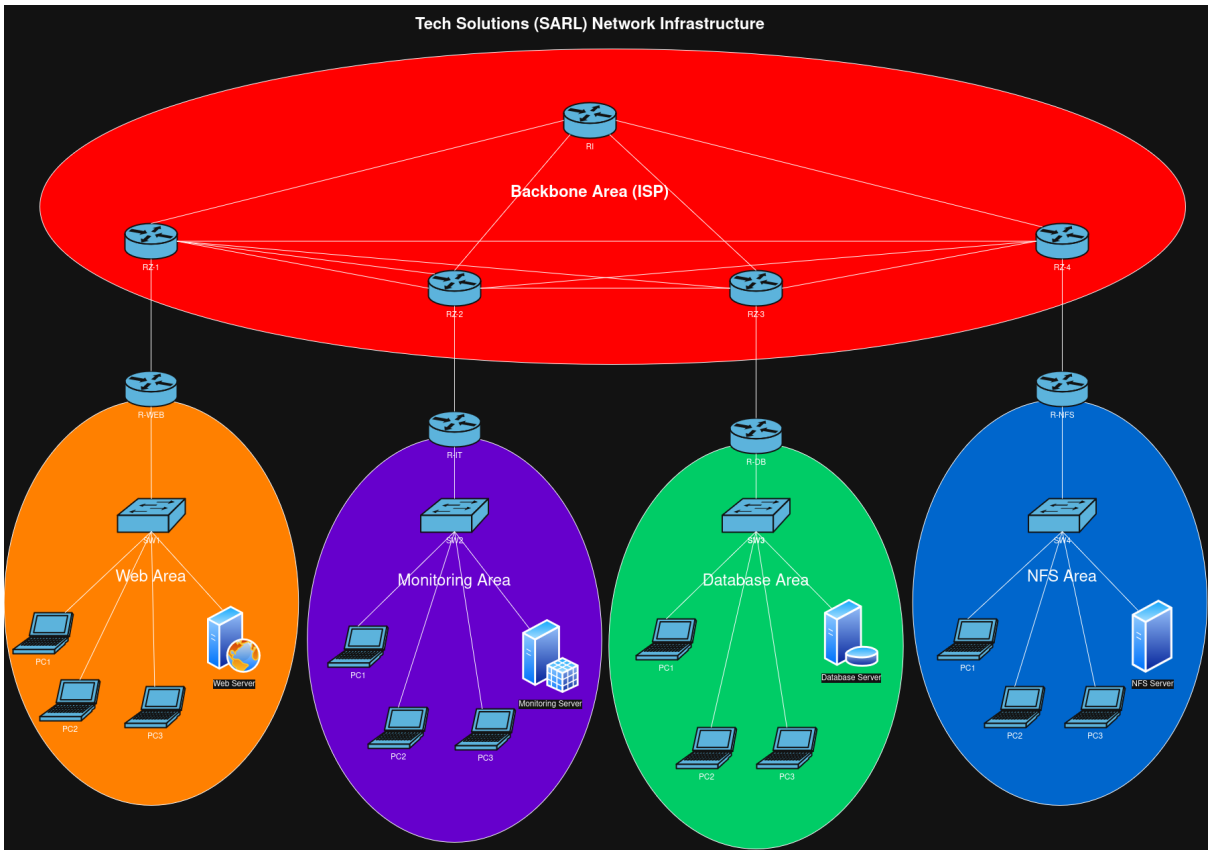
The network 172.24.0.0/14 has 262142 hosts.
Your subnets need 11032 hosts.

NAME	HOSTS NEEDED	HOSTS AVAILABLE	UNUSED HOSTS	NETWORK ADDRESS	SLASH	MASK	USABLE RANGE	BROADCAST
Web	8907	16382	7475	172.24.0.0	/18	255.255.192.0	172.24.0.1 - 172.24.63.254	172.24.63.255
IT	1467	2046	579	172.24.64.0	/21	255.255.248.0	172.24.64.1 - 172.24.71.254	172.24.71.255
DB	491	510	19	172.24.72.0	/23	255.255.254.0	172.24.72.1 - 172.24.73.254	172.24.73.255
NFS	167	254	87	172.24.74.0	/24	255.255.255.0	172.24.74.1 - 172.24.74.254	172.24.74.255

2 Technologies Used

- **GNS3 3.0.5** — Network simulation environment.
- **Cisco Routers (3725/3745)** — Core routing infrastructure.
- **Ubuntu Server 20.04** — Server and network service hosting.
- **OSPF** — Dynamic routing protocol.
- **VLANs** — Logical segmentation and broadcast containment.
- **Nmap & Wireshark** — Analysis and testing tools.
- **ZeroTier** — Potential remote access overlay network.
- **SSH / Telnet** — Device management protocols.

3 Architecture Design



3.1 Core Layer

The backbone contains the primary routing equipment enabling communication between all segments.

3.2 Distribution Layer

VLAN segmentation and policy enforcement occur at this layer.

3.3 Access Layer

End-user devices and servers connect at this level.

4 Implementation Steps

1. Prepare GNS3 environment and import appliance templates.
2. Deploy routers, switches, and servers.
3. Configure VLANs and interfaces.
4. Configure OSPF across backbone routers.
5. Implement ACLs and security policies.
6. Verify connectivity and routing.
7. Test bandwidth, latency, and redundancy.

5 Security Model

Security policies were applied on multiple layers:

- ACLs restricting cross-department traffic.
- VLAN isolation.
- SSH-enabled secure device management.
- Logging and monitoring using Linux servers.

6 Conclusion

This document summarizes the complete network architecture for Tech Solutions (SARL). The simulated environment provides a realistic, scalable, and secure platform for training, experimentation, and enterprise design validation.

End of Report