



هيئة الاتصالات
والتكنولوجيا المعلومات



PetroMasr Enterprise Infrastructure

Track : Huawei Network Administration (CAI3_ISS5_S1)

Team : Team D

Project Name: PetroMasr Campus Infrastructure & Digital Transformation

Status: Final Release

Date: November 30, 2025

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PetroMasr is a leading petroleum institution dedicated to energy excellence and operational efficiency. The organization is structured to support a vast internal and external ecosystem through state-of-the-art technology.

1.1 Internal Network Device Infrastructure

#	Device Name	VLAN ID / Assignment	Applied Protocols	Gateway
1	ASW1	VLAN 1,10,20,30,40	RSTP STP-Edged Port ETH-Trunk LACP	VRRP 192.168.10.254 192.168.20.254 192.168.30.254 192.168.40.254
2	ASW2	VLAN 1,10,20,30,40	RSTP STP-Edged Port ETH-Trunk LACP	VRRP 192.168.10.254 192.168.20.254 192.168.30.254 192.168.40.254
3	ASW3	VLAN 1,10,20,30,40	RSTP STP-Edged Port ETH-Trunk LACP	VRRP 192.168.10.254 192.168.20.254 192.168.30.254 192.168.40.254
4	DSW1	VLAN 1,10,20,30,50,60	RSTP STP-Edged Port ETH-Trunk LACP SVI , VRRP , DHCP OSPF	192.168.10.1 192.168.20.1 192.168.30.1 192.168.40.1 192.168.50.1 192.168.60.1

5	DSW2	VLAN 1,10,20,30,50,60	RSTP STP-Edged Port ETH-Trunk LACP SVI , VRRP , DHCP OSPF	192.168.10.2 192.168.20.2 192.168.30.2 192.168.40.2 192.168.50.2 192.168.60.2
6	LCSW	VLAN 1, 10,2 0,30,40 , 101	RSTP STP-Edged Port ETH-Trunk LACP SVI , DHCP , OSPF	Secondry Root
7	RCSW	VLAN 1,10,20,30,40	RSTP STP-Edged Port ETH-Trunk LACP SVI , DHCP , OSPF	The Root SW
8	FW	VLAN 1,10,20,30,40	Trust Zone Untrust Zone Delimetrized Zone Rules , Embedded Access List	Deal with ISP
9	AC	VLAN 1,10,20,30,40	WLAN, SSID VAP CAPWAP ,	Provides Wifi

1.2 Internal Operational Pillars

- 1. Human Resources :**
Managing workforce talent and administration **Vlan 10**
- 2. Public Relations :**
Handling corporate branding, and communications **Vlan 20**.
- 3. Finance:**
Managing accounts, investments, and payroll **Vlan 30**
- 4. Support :**
giving support for technical Issues **vlan 40**

1.3 The External Ecosystem

- 1. Co-Stations :**
Affiliated petrol stations requiring supply chain management.
- 2. Investors :**
Shareholders requiring transparency and financial reporting.
- 3. Supplier :**
Partners for logistics, raw materials, and equipment.
- 4. Importers :**
who buy the Product
- 5. External Developer Community:**
Third-party integrators fostering innovation.
- 6. Visitors:**
Landing Page like Achievements

2. Core Architectural Principles

The infrastructure is built upon four non-negotiable pillars to ensure robustness:

- **High Availability (HA):** Redundancy is implemented at
 - A) the ISP level we work on “ **Dual Homed Concept** ”
 - B) The Power of Server Level is uptime in Power-cuttoff by **UPS Devices to Servers**
 - C) The Service of Servers Level is 99.99% up by **WAC Interface Website Mirror**
 - D) The Core , Distribution and access Layer is **Device & Link Redundant both**
 - E) Host Configuration is also in High Availability level by **VRP Technology**
- **Scalability:** A modular design allows for the seamless addition of
 - A) new servers can be added in the future
 - B) new Network Devices in any layer can be added in the future
 - C) new End-Point Devices in Access layer can be added in the future
 - D) Trunking Expansion has been Studied in case of Future Expansion
- **Quality of Service (QoS):**
 - A) Automated Network Configuration Using n8n Workflow.
 - B) prioritization is configured for critical traffic precedence over general usage.
- **Disaster Recovery (DR):**

Comprehensive backup protocols and failover mechanisms (Cloud/On-premise) are in place to restore operations rapidly in case of failure.

3. Internal Network Infrastructure (LAN/WLAN)

The internal network follows a hierarchical model (Access, Distribution, Core):

- **Wired LAN:**
High-speed Gigabit switching connects workstations across all operational floors.
- **VLAN Segmentation:**
Traffic is logically separated by department (HR, Finance, NOC, SOC) to enhance security and reduce broadcast storms.
- **Guest Wi-Fi Wireless LAN (WLAN):**
An isolated VLAN allows visitors to access the internet without compromising the internal corporate network.

4. Local Server Room Infrastructure

The on-premise Data Center is the heart of the campus:

- **Core Switching:**
High-capacity switches aggregating traffic from all edge devices.
- **Power Management:**
UPS systems and backup generators to ensure continuity during power outages.
- **Physical Security:**
Biometric control limited strictly to authorized administrators.

5. ISP Connectivity (WAN)

To guarantee internet persistence, PetroMasr utilizes a **Dual-WAN Strategy**:

- **Primary Link:**
High-speed Fiber connectivity via **Etisalat**.
- **Secondary Link:**
Redundant connectivity via **Vodafone**.
- **Load Balancing:**
Traffic is actively distributed between both providers
automatic failover is triggered if one link goes down.

6. Cloud Hosting Strategy

A Hybrid Cloud model is employed using **AWS (Amazon Web Services)**:

- **Scalable Hosting:**
Public-facing web portals are hosted on AWS to handle variable traffic loads.
- **Storage & Backup:**
AWS S3 is utilized for secure, off-site data archival.
- **Connectivity:**
A secure Site-to-Site VPN connects the on-premise infrastructure to the AWS VPC.

7. Web Interface Architecture

The digital gateway to PetroMasr is a unified Web Platform. This platform serves as the primary interface for all stakeholders, bridging the gap between the physical network and user operations.

It is divided into :

- 1) Internal Portals (Intranet)
- 2) and External Portals (Extranet).

First Internal Portals Specifications (Intranet)

A. NOC Portal (Network Operations Center)

- **Function:** Dashboard for
 - 1) monitoring physical network
 - 2) Configuring physical network
 - 2) health
 - 3) bandwidth usage
 - 4) ISP status
 - 5) device uptime
- **User:** Network Engineers.
- **Credentials :** noc@petromasr.com , demo123

B. Super-Admin Portal

- **Function:**
The "Master View" with full system privileges audit log review
- **User:** CIO / Head of IT.
- **Credentials :** superadmin@petromasr.com , admin@2025

C. SOC Portal (Security Operations Center)

- **Function:** Dashboard for
 - 1) Security Operations Center
 - 2) hub for XDR alerts
 - 3) firewall logs,
 - 4) intrusion detection,
 - 5) and threat intelligence.
 - 6) End-Point Security
- **User:** Cybersecurity Engineer .
- **Credentials :** soc@petromasr.com , demo123

D. Legal Portal

- **Function:**
 - 1) Legal and compliance Management
 - 2) Management and Contract
- **User:** Legal Department.
- **Credentials :** legal@petromasr.com , demo123

E. DBA-Admin Portal

- **Function:**
 - 1) Management of SQL Databases Types
 - 2) Management of NoSQL Databases Types
 - 3) Query Emulation Connected in php Backend
 - 4) Fetch Tables in Database run Joins and all CRUD Operations
 - 6) Replica the Master node or Slaves
- **User:** Database Administrators.
- **Credentials :** dba@petromasr.com , demo123

F. Employee Portal

- **Function:**
 - 1) Profile Managements
 - 2) Payroll
 - 3) Promotions
 - 4) Compliance
 - 5) KPIs
- **User:** General Staff (PR, Support, etc.).
- **Credentials :** employee@petromasr.com , demo123

G. Sys-Admin Portal

- **Function:** Dashboard for
 - 1) Management of server
 - 2) hardware Health
 - 3) Virtual Machine provisioning
 - 4) OS patching
 - 5) Active Directory control.
 - 6) Group Policy Management
 - 7) Synchronize Cloud Services
 - 8) Applying Roles , Features and Services
 - 9) Windows Deploy and Update Services
 - 10) Database Servers , Clusters and Slaves
 - 11) DMSS Camera Server Management
 - 12) Print Server Management
 - 13) FTP Server Management
 - 14) File Share Management
 - 15) Storage Server Management
 - 16) Backup Management
- **User:** System Administrators.
- **Credentials :** sysadmin@petromasr.com , demo123

H. HR Admin Portal

- **Function:**
 - 1) Management of employees
 - 2) records
 - 3) recruitment workflows
 - 4) attendance
 - 5) payroll data.
- **User:** Human Resources Department.
- **Credentials :** hr@petromasr.com , demo123

I. Finance Portal

- **Function:**
 - 1) Fund Management
 - 2) payable/receivable
 - 3) general ledger
 - 4) and financial reporting.
- **User:** Finance Department.
- **Credentials :** financemgr@petromasr.com , demo123

Secondly External Portals Specifications (Extranet)

A. Investors Portal

- **Function:**
 - 1) View financial dashboards
 - 2) quarterly reports
 - 3) track ROI/Stock performance.
- **User:** Shareholders and Board Members.
- **Credentials :** investor@funds.com , demo123

B. Importers Portal

- **Function:**
 - 1) Track shipment schedules
 - 2) upload customs documentation logistics.
- **User :** international User Importer the buy patrol products
- **Credentials :** importer@global.com , demo123

C. Suppliers Portal

- **Function:**
 - 1) Submit tenders
 - 2) view inventory requirements
 - 3) manage digital invoicing.
- **User:** Equipment and Material Vendors.
- **Credentials :** supplier@acme.com , demo123

E. Co-Stations Portal

- **Function:**
 - 1) Report fuel inventory levels,
 - 2) request supply trucks,
 - 3) submit daily sales figures.
- **User:** Petrol Station Managers.
- **Credentials :** Co-Stations@petromasr.com , demo123

F. Visitors Portal

- **Function:**
Visitor pre-registration
- **User:** Campus Guests and Public Visitors.
- **Credentials :** <https://PetroMasr.com>

8. Automation & Workflow (n8n)

To streamline operations, **n8n Workflow Automation** is integrated into the backend:

- **Operational Triggers:**
Automated workflows when changes are made via the web portals
- **Cross-Platform Integration:**
Connecting on-premise data with Cloud services seamlessly.

Conclusion & Vision

To Digital Egypt Pioneers Initiative ,

We present this comprehensive technical documentation for the **PetroMasr Infrastructure Project**, meticulously designed to meet the highest global standards in networking, cybersecurity, and software engineering.

This document represents more than just a technical blueprint; it is a testament to the **immense effort, dedication, and precision** invested by the team to create a robust digital foundation for the organization.

A Call for Support: We earnestly request your continued support and adoption of this project. Beyond its technical value, this infrastructure serves as a **vital platform for empowering youth**. By implementing this advanced system, we create a fertile environment for young engineers and developers to innovate, create, and lead.

Investing in this project is an investment in the next generation of talent, providing them with the opportunity to excel and drive our nation's technological future forward.