# PERN Updates
GNA-G Community VC Q2 2025

IT Division
Higher Education Commission
Islamabad – Pakistan
http://www.hec.gov.pk

Pakistan Education and Research Network (PERN)- Introduction

- A project of the Higher Education Commission (HEC) is a high-speed data network designed to facilitate communication, collaboration and resource sharing among Pakistani universities and research institutions.

- Sole NREN of Pakistan

- Key Services include
  - **High-Speed Connectivity**: Fast and reliable internet and intranet connectivity
  - **Video Conferencing**: Enabling remote collaboration and communication
  - **Digital Library Resources**: Access to a vast collection of digital resources
  - **Smart Classroom**: e-learning, live virtual classrooms, interactive displays and whiteboards, VDIs
  - **Smart University Project** Blanket Coverage of WIFI: Comprehensive WiFi coverage
  - **Eduroam**: Seamless connectivity across campuses (Educational Roaming)
  - **Cloud Services**: Scalable and secure cloud infrastructure

- Delivered through IP Core (over DWDM TXN for LH and over DF for Metro)

PERN Core Network

- **Edge Sites:** 500 +

(Includes Institutes, Universities, R&D, Post Graduate colleges, etc)

- **Footprint:** 7000+ KMs of OFC Network that spans across 80 cities of Pakistan

- **Core Network BW**: 40G

- **Transmission**: 10G x 4 Lambdas

- **IPLC** : 2.5G

- **Edge sites** : 10G connectivity

- **No. of POP Sites**: 25

PERN Network Topology (HLD)
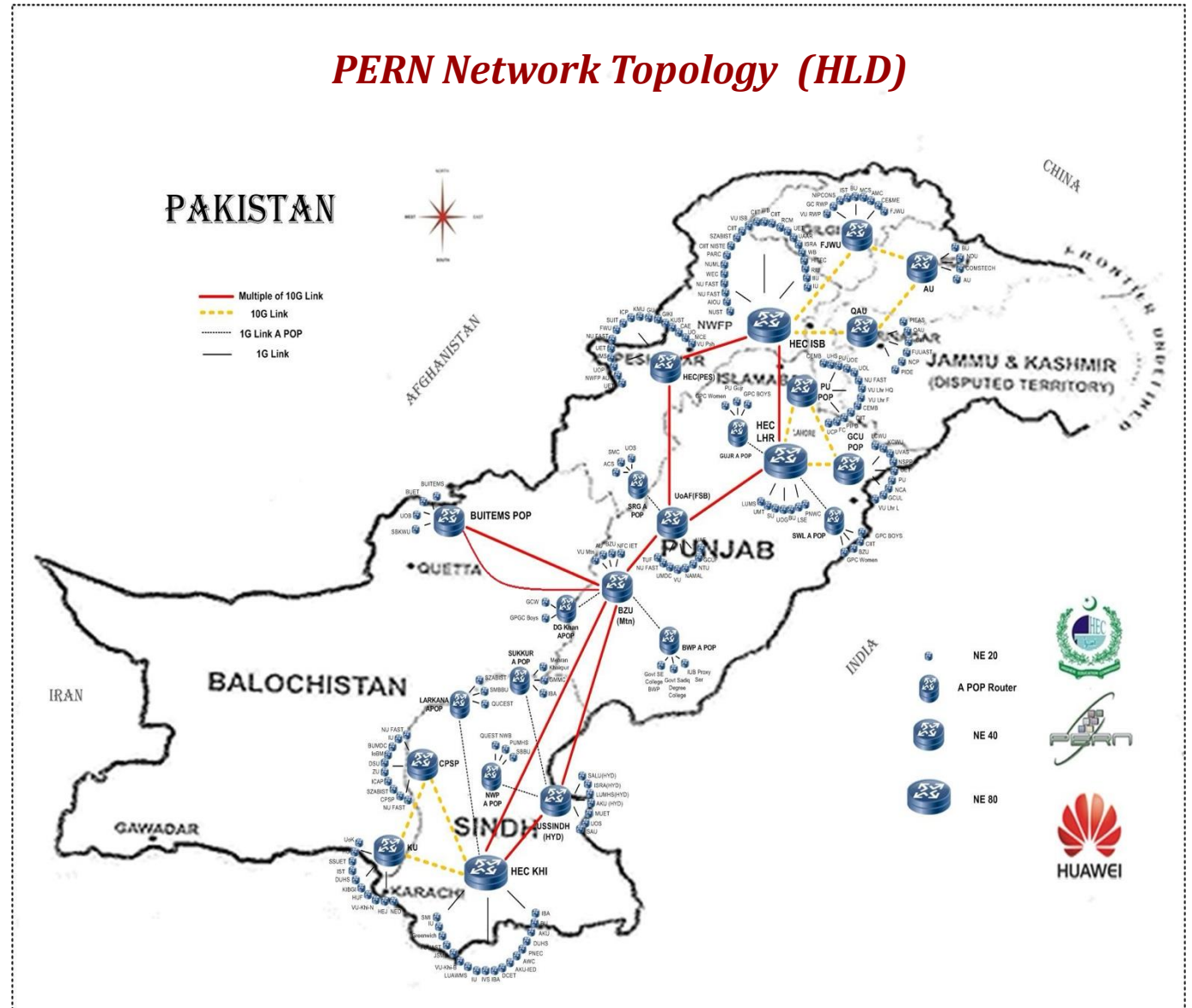
Routing Protocols

- EBGP with

1. TEIN/IPLC 2.5Gbps (19,000+ R&E Routes)

2. PTCL 50 Gbps (IP Transit Provider - Commodity Internet)

3. Transworld 50 Gbps (Commodity Internet)

4. IXP-Islamabad 10Gbps (IX-connectivity)

5. IXP-Karachi 10Gbps (IX-connectivity)

- IGP: ISIS for reachability of infrastructure routes

- IBGP among RR & RR-clients for service routes
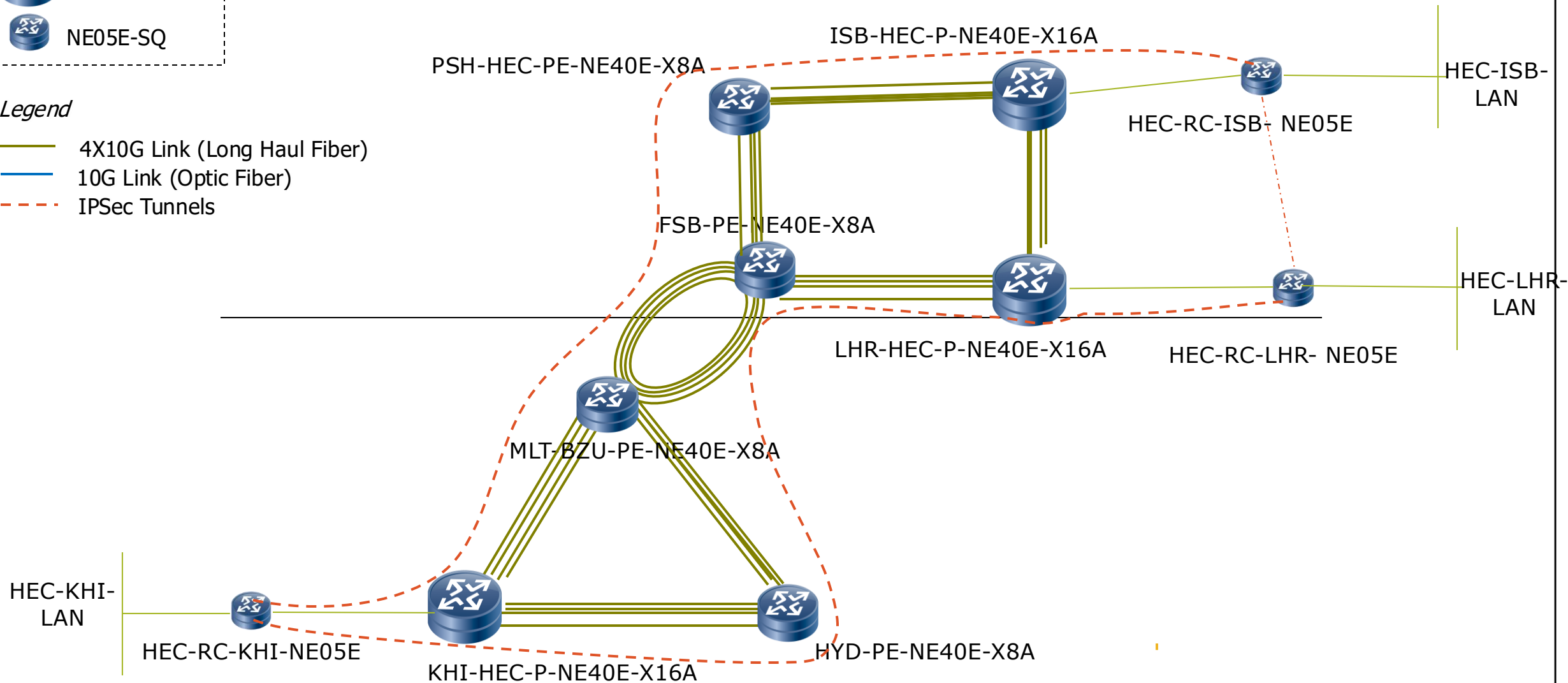
- MPLS for TE & VPNs

Legend
— 10G Link
— Multiple of 10G Link
— 1G Link

cRA-PoP

sRA/LA-PoP

Campus-Router
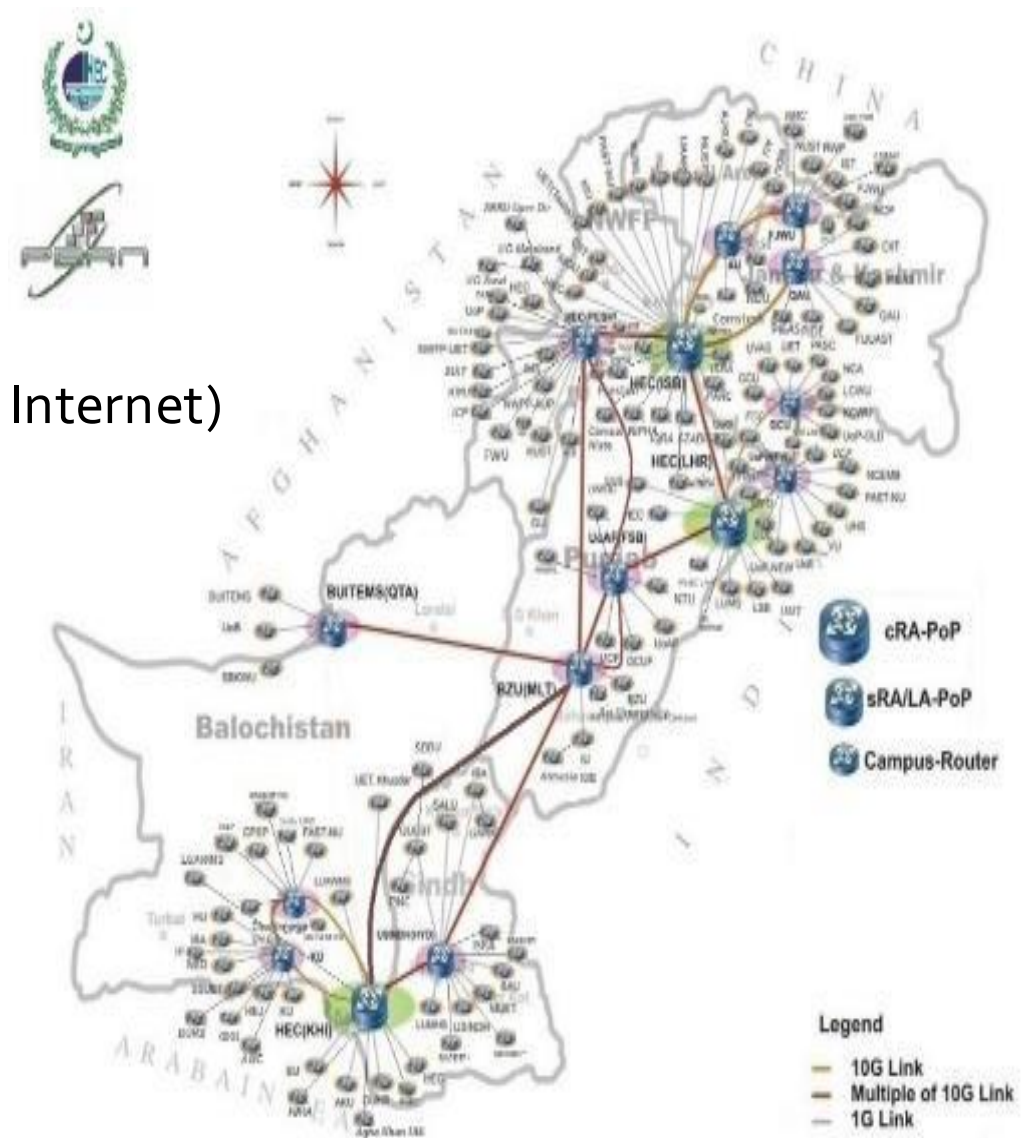
PERN IP Network Topology (LLD)

Legend:
- NE40E-X16A
- NE40E-X8A
- NE05E-SQ

- 4X10G Link (Long Haul Fiber)
- 10G Link (Optic Fiber)
- IPSec Tunnels

ISB-HEC-P-NE40E-X16A
PSH-HEC-PE-NE40E-X8A
HEC-RC-ISB- NE05E
HEC-ISB-LAN
FSB-PE-NE40E-X8A
HEC-LHR-LAN
LHR-HEC-P-NE40E-X16A
HEC-RC-LHR- NE05E
MLT-BZU-PE-NE40E-X8A
HEC-KHI-LAN
HEC-RC-KHI-NE05E
KHI-HEC-P-NE40E-X16A
HYD-PE-NE40E-X8A

PAKISTAN SUBMARINE CABLE MAP (COMMODITY INTERNET PAKISTAN)

Landing Stations in Pakistan (PTCL, TWA, Cybernet)
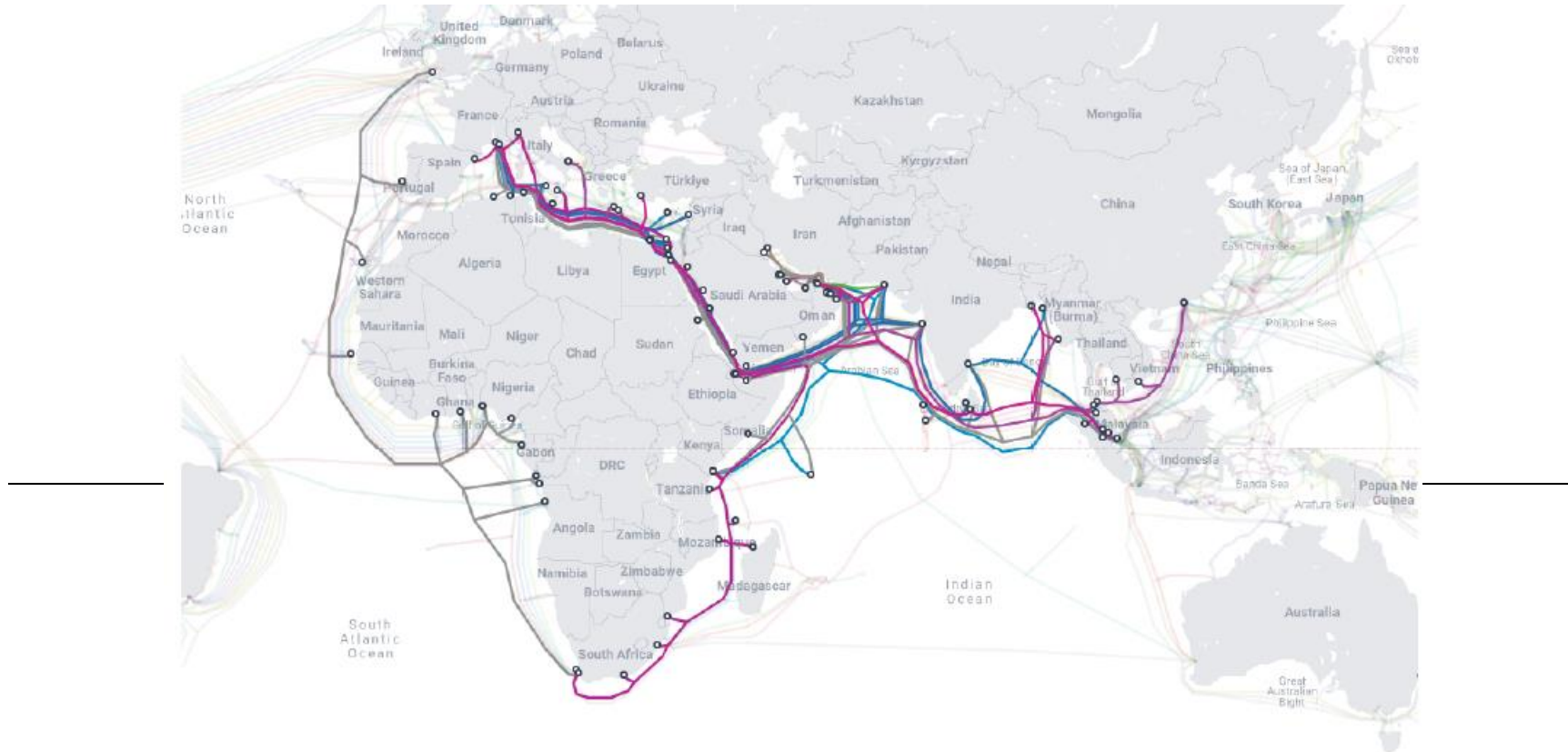
Africa-1 (2026)	Asia Africa Europe-1 (AAE)	IMEWE	PEACE Cable	SeaMeWe-4	SeaMeWe-5	SeaMeWe-6 (2026)	Transworld (TW1)
PTCL	PTCL TWA	PTCL	Cybernet	PTCL TWA	TWA	TWA	TWA

PERN
INTERNET
TRAFFIC
UTILIZATION
(AGGREGATE)
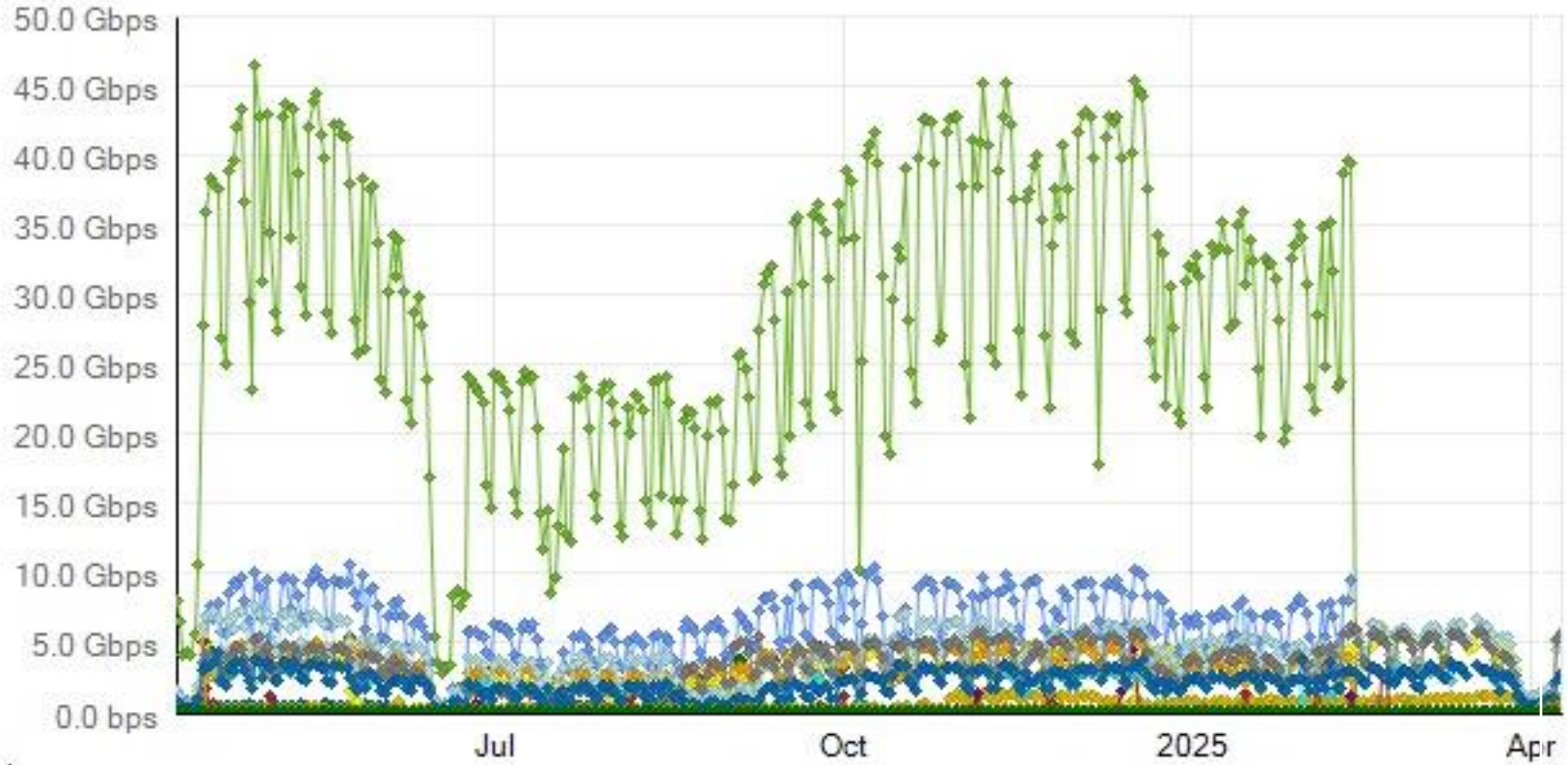
PERN Connectivity with TEIN*CC

- PERN has successfully deployed eduroam in 100+ HEIs. eduroam allow students, researchers and staff from participating institutions to obtain Internet connectivity across campus and internationally as well. PERN users now can access the wireless Internet at all eduroam enabled sites nationally and Internationally.

Collaboration Project:

- PERN did a collaboration project with AARNet Australia for the deployment of eduroam in Pakistan under TEIN funded project "**Extending eduroam in the Asia Pacific**".

- The XeAP project provided the guidance and assistance (including provision of hardware and software) to deploy eduroam in five 'XeAP Target Countries' in the APAC region. The deployment will be comprised of the country's NREN becoming the NRO and an institutional participant, and 3 institutions within the country becoming institutional participants.

PROGRESS:

- PERN has successfully deployed eduroam in 100+ HEIs.
- Pakistan now is active member of 89 countries with the facility of Educational Roaming.
- Redundant National Roaming Servers (2 NRS) are configured to provide failover in case of outage.
- Successfully paired with ETRL (Europe Top Level Radius Servers).
- The Servers are successfully integrated with PERN Active directory

Pakistan`s 1ˢᵗ Internet Exchange Point (PKIX) hosted by PERN/HEC

- **Overview**
  - Pakistan`s First Internet Exchange Point has been inaugurated in the premises of HEC (HEC Cloud Data Center) by Honorable State Minister, Ms. Anusha Rehman.
  - Nine Carriers are part of PKIX so far, namely, Wateen, Telenor, PERN, WiTribe, Qubee, Nayatel, Cybernet, Multinet and PTCL
  - PKIX hosting in HEC shows confidence of Pakistan Telecommunication Authority and National Telecom Carriers on the commitment of HEC
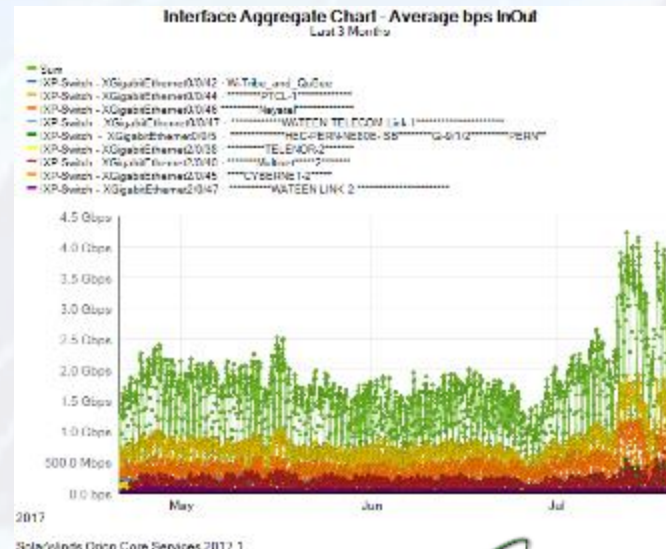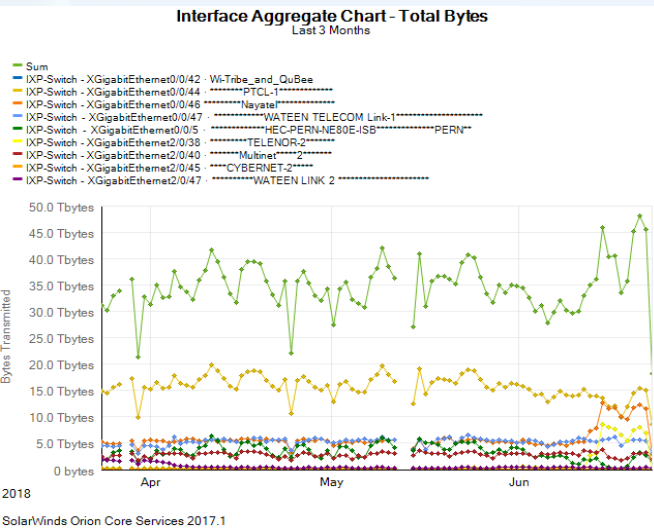
▶ **Statistics**

- PKIX is functional with 100% uptime since January 2017.
- Average Consolidated Traffic Rate up to **4.5Gbps**.
- Average Traffic Volume Per day up to **2.4 TBytes.**
- The 2ⁿᵈ IXP is also being hosted in HEC Karachi Datacenter since December 2018

# HEC Cloud Data Center upgraded to TIER-III in 2025 in NED Karachi & UET Lahore

|	
Total No of cores	20,000
Total Storage capacity	20PB
No of RAM	300 TB
Total No of Cloud Hosts	4000 - 6000
Total Virtual Desktop	100,000
No of racks	80 IT Racks (upgradeable upto 480 IT Racks) HPC is in planned services

This data center will be hosting the following services.

- Virtual Data Centers (VDC)
- Virtual Desktop Infrastructure (VDI)
- Safe Campus Central Solution and Central Survillance
- Unified Communication and Shared Services
- Storage as a Service
- Training as a Service

TIER-III/Rated-3 Certified Data Center (NED Karachi and UET Lahore)
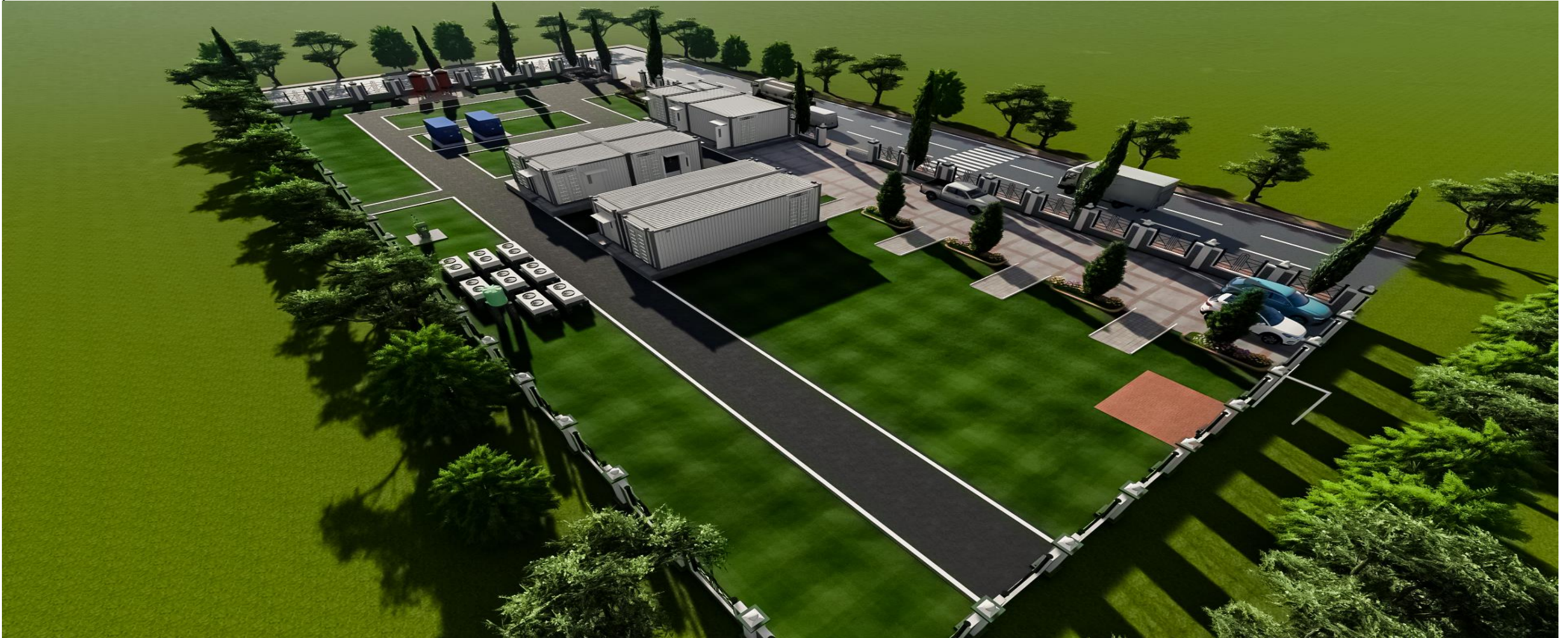
PERN Collaborations & Activities
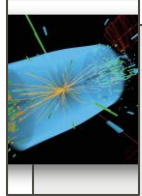
High Energy Physics
- Collaboration of NCP with CERN for LHC Project

Medical
- Telemedicine
- Intelligent Medical Services Over TEIN

E-culture
- Cyber Performance over TEIN Network

Identity & Access Management
- Enabling users to access more services under different federations

Eduroam
- Seamless roaming with single sign-in

Climate Change
- Real-time Spatio-Tempotal Emissions Mapping

Capacity Building
- Campus Network, Network Security, DWDM, Routing Infrastructure

Participated as beneficiary country and lead country in Asi@Connect Call for Proposals of worth about 150 Million PKR

Software Defined Networking
- Open and Federated Future Internet (SDN/NFV/Cloud-integrated) testbed for APAN Members
- Intent Based Networking

Software Defined Optical Networks

Hosted 51st Virtual APAN & 58th APAN Meeting