



**Pakistan Education & Research Network**

# PERN Updates

GNA-G Community VC Q2 2025

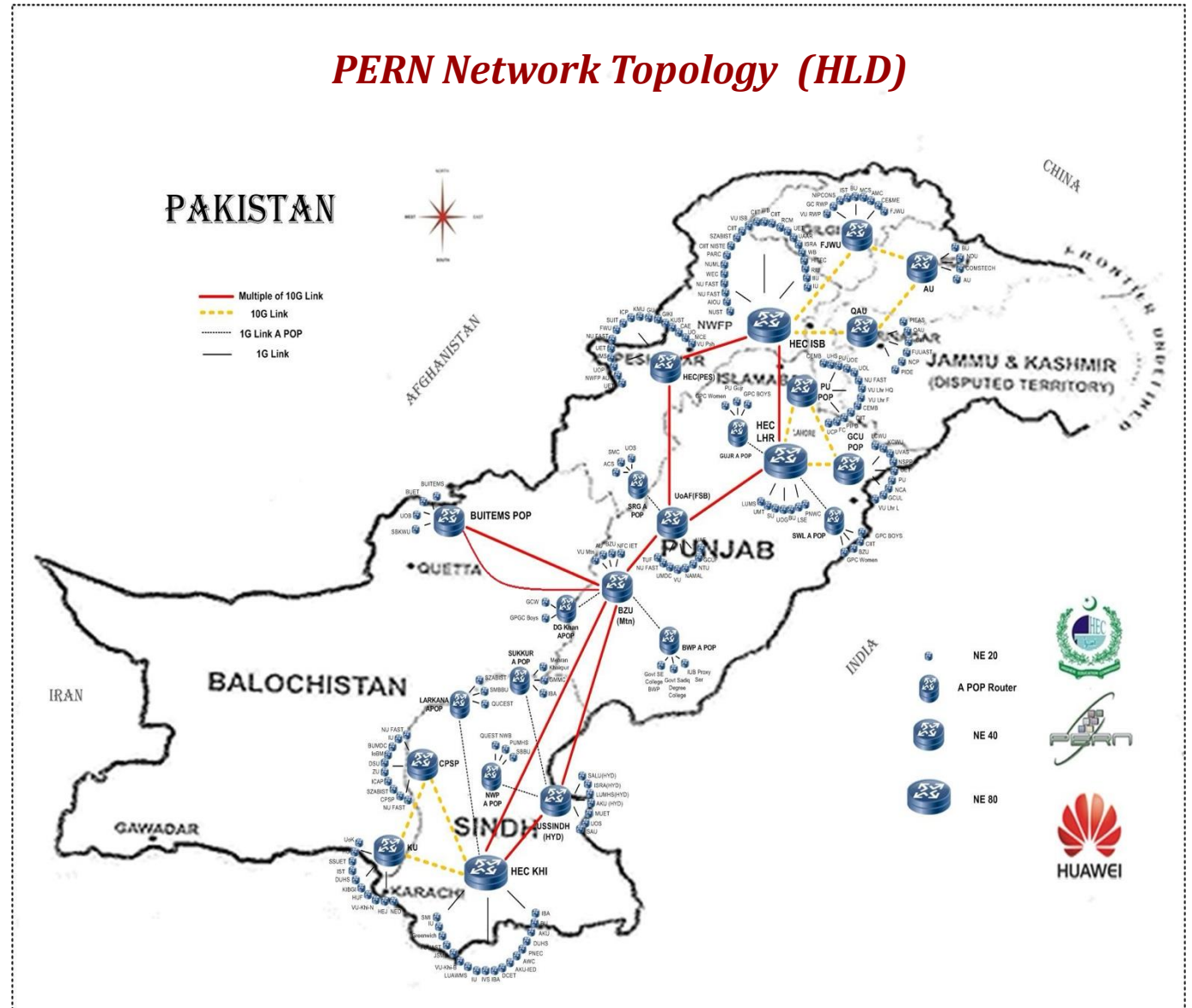
IT Division  
Higher Education Commission  
Islamabad – Pakistan  
<http://www.hec.gov.pk>

# 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)

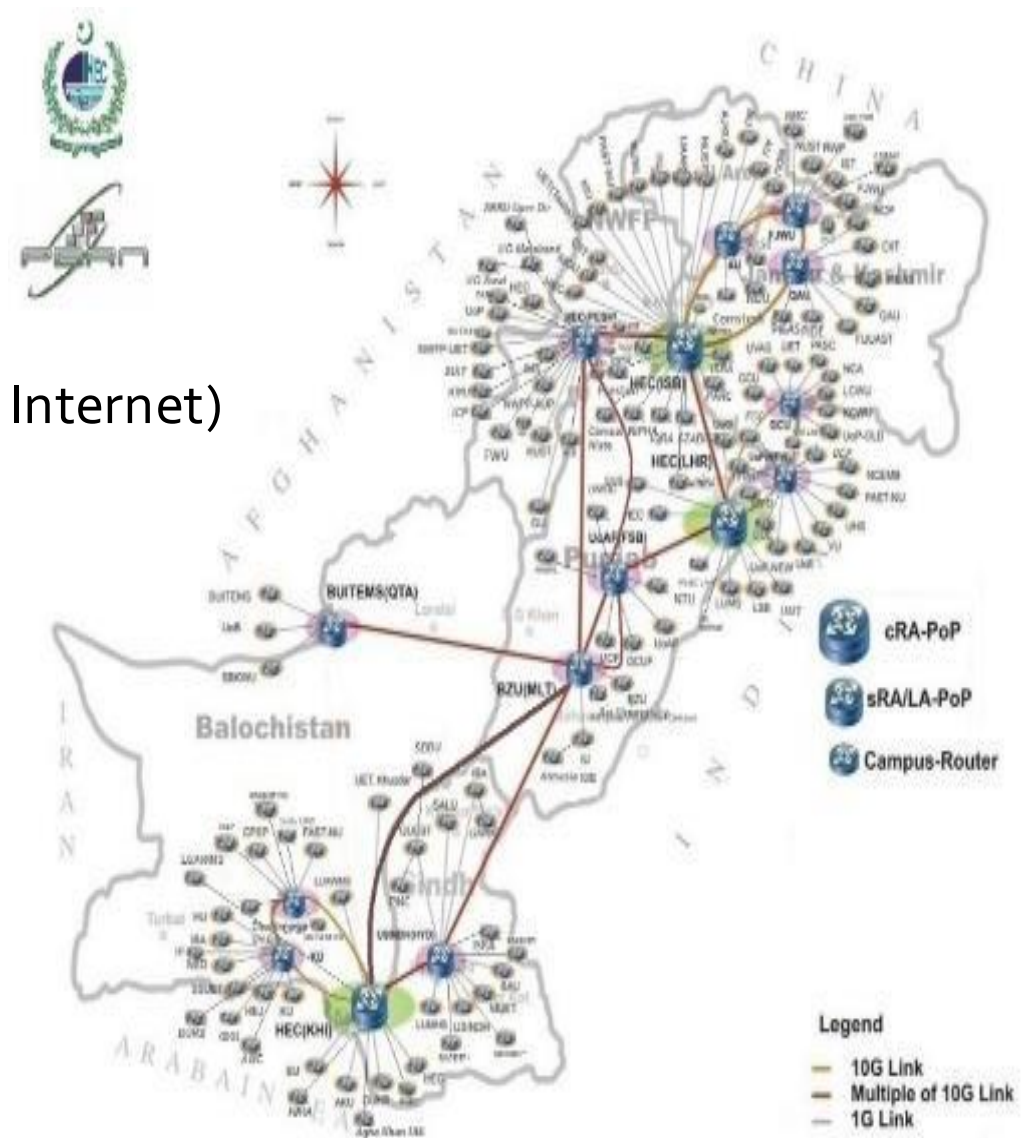
# PERN Core Network

- **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



# Routing Protocols

- EBGW 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

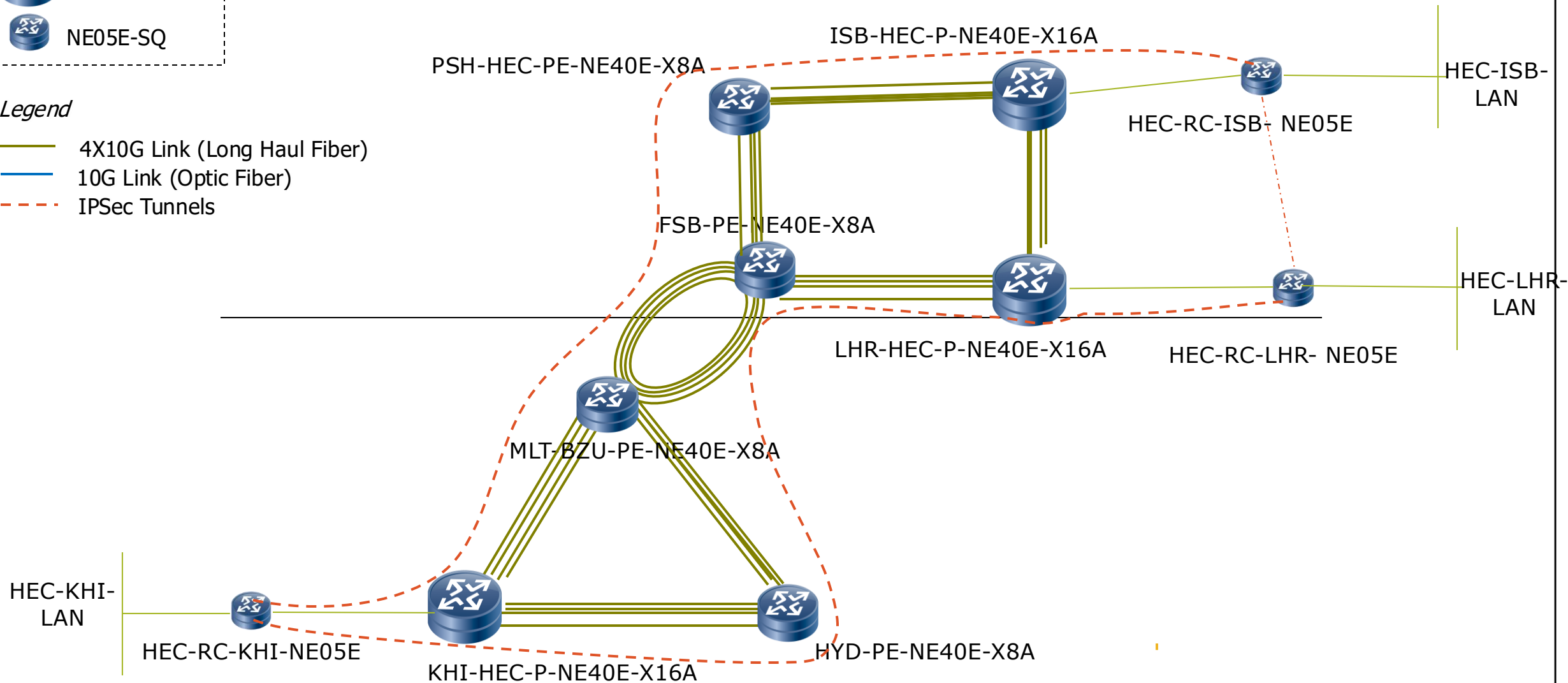


# PERN IP Network Topology (LLD)



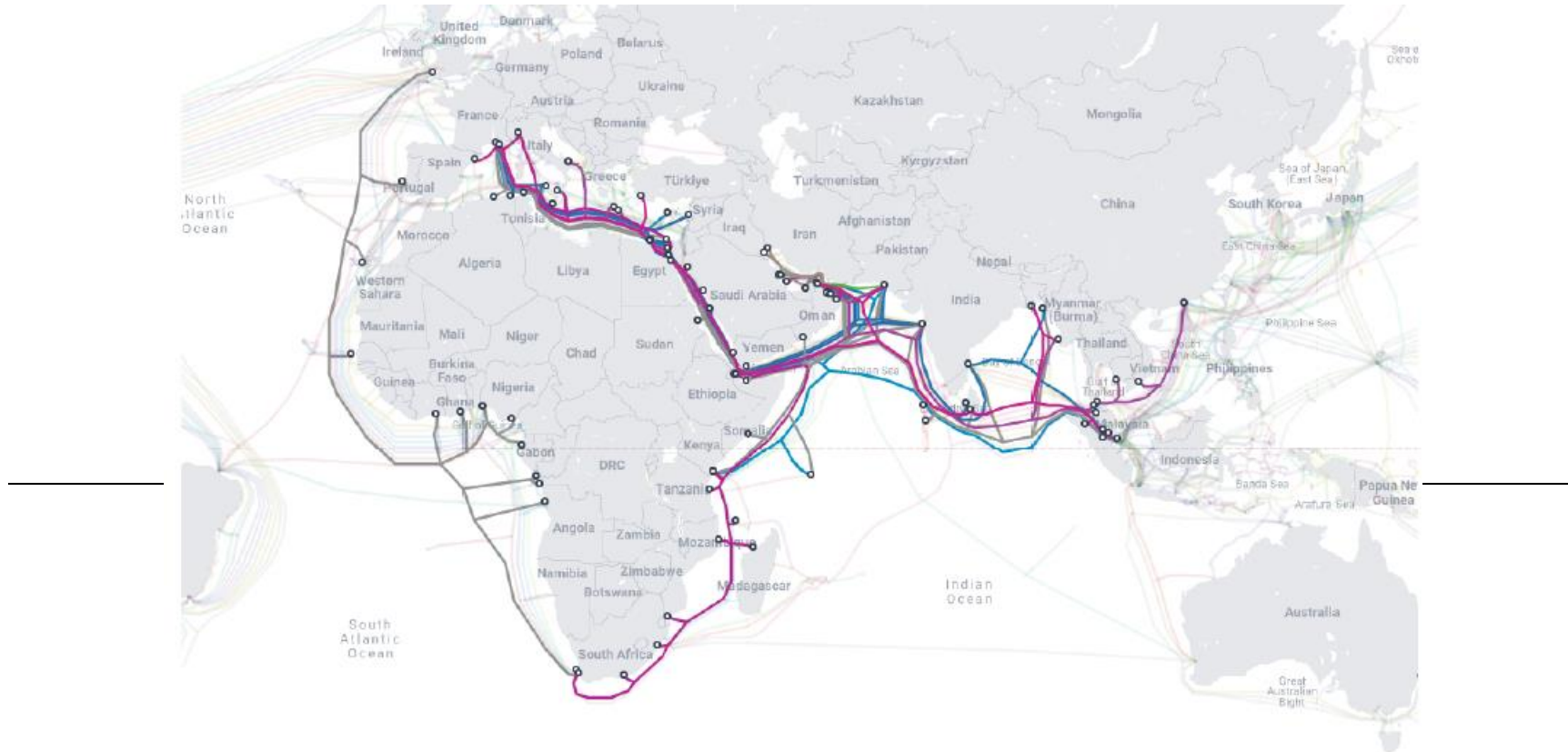
## Legend

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



# PAKISTAN SUBMARINE CABLE MAP (COMMODITY INTERNET PAKISTAN)

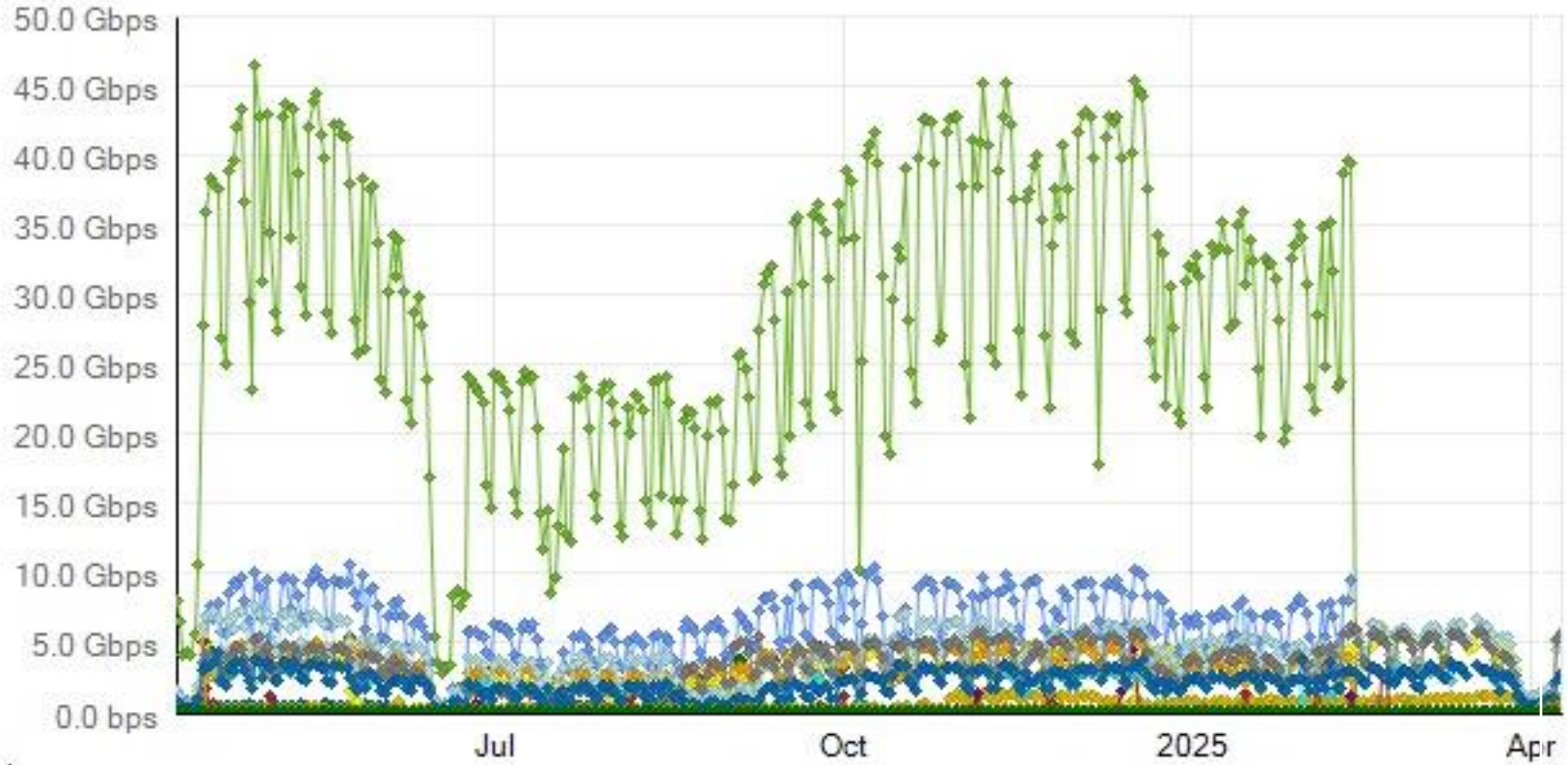
## Landing Stations in Pakistan (PTCL, TWA, Cybernet)



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

- HEC ISB POP New NE40E-X16A-02 - GigabitEthernet1/1/6 · \*\*\* HEC ISB POP - PIE - 9Gb - Primary Link - 203.135.4.221 \*\*\*
- HEC ISB POP New NE40E-X16A-02 - GigabitEthernet2/1/11
- HEC ISB POP New NE40E-X16A-02 - GigabitEthernet2/1/6
- HEC RC LHR POP NE40E-X16A - Eth-Trunk31 · \*\*\* HEC LHR POP - TW - 17Gb - Primary Link - 117.20.21.61 \*\*\*
- HEC RC LHR POP NE40E-X16A - GigabitEthernet6/0/4 · \*\*\* HEC LHR POP - PIE - 10Gb - Primary Link - 221.120.208.6 GTN-[DF]
- HEC RC LHR POP NE40E-X16A - GigabitEthernet6/0/5 · \*\*\*Eth-Trunk31 - HEC LHR POP - TW - 17Gb Link\_1 - Primary Link \*\*\*
- HEC RC LHR POP NE40E-X16A - GigabitEthernet7/0/4 · \*\*\* HEC LHR POP - PIE - 10Gb - Backup Link - 119.156.27.50 BKP-(CTH)
- HEC RC LHR POP NE40E-X16A - GigabitEthernet7/0/5 · \*\*\*Eth-Trunk32 - HEC LHR POP - TW - 17Gb Link\_1 - Backup Link \*\*\*
- HEC RC LHR POP NE40E-X16A - GigabitEthernet7/0/7 · \*\*\*Eth-Trunk32 - HEC LHR POP - TW - 17Gb Link\_2 - Primary Link \*\*\*
- HEC RC PSH POP NE40-X8A - GigabitEthernet1/0/0 · ===== PTCL PIE LINK =====
- HEC RC PSH POP NE40-X8A - GigabitEthernet1/0/0.556 · \*\*\*\* HEC PSH POP - PIE 5Gb Link - 202.125.154.162 \*\*\*\*
- UAF POP - NE40E-X8A-01 - GigabitEthernet1/0/0 · \*\*\* TO PTCL LINK \*\*\*
- UOS HYD POP - GigabitEthernet1/1/7 · \*\*\*\*\* TO PTCL-LINK \*\*\*\*\*PTCL Link\*\*\*\*\*

# PERN INTERNET TRAFFIC UTILIZATION (AGGREGATE)



20:24

# PERN Connectivity with TEIN\*CC

**TEIN**  
Connecting  
Asia and Europe's  
Research and Education  
Communities  
[www.tein.asia](http://www.tein.asia)

**TEIN Project Partners**

AF Afghanistan	IN Indonesia	NZ New Zealand
AU Australia	JP Japan	PK Pakistan
BD Bangladesh	KR Korea	PH Philippines
BH Bhutan	LA Laos	SG Singapore
CA Cambodia	MM Myanmar	SL Sri Lanka
CH China	MO Mongolia	TW Taiwan
HK Hong Kong	MY Malaysia	VN Vietnam
IN India	NP Nepal	

The following links are fully financed/co-financed by the link owners whose support is gratefully acknowledged.

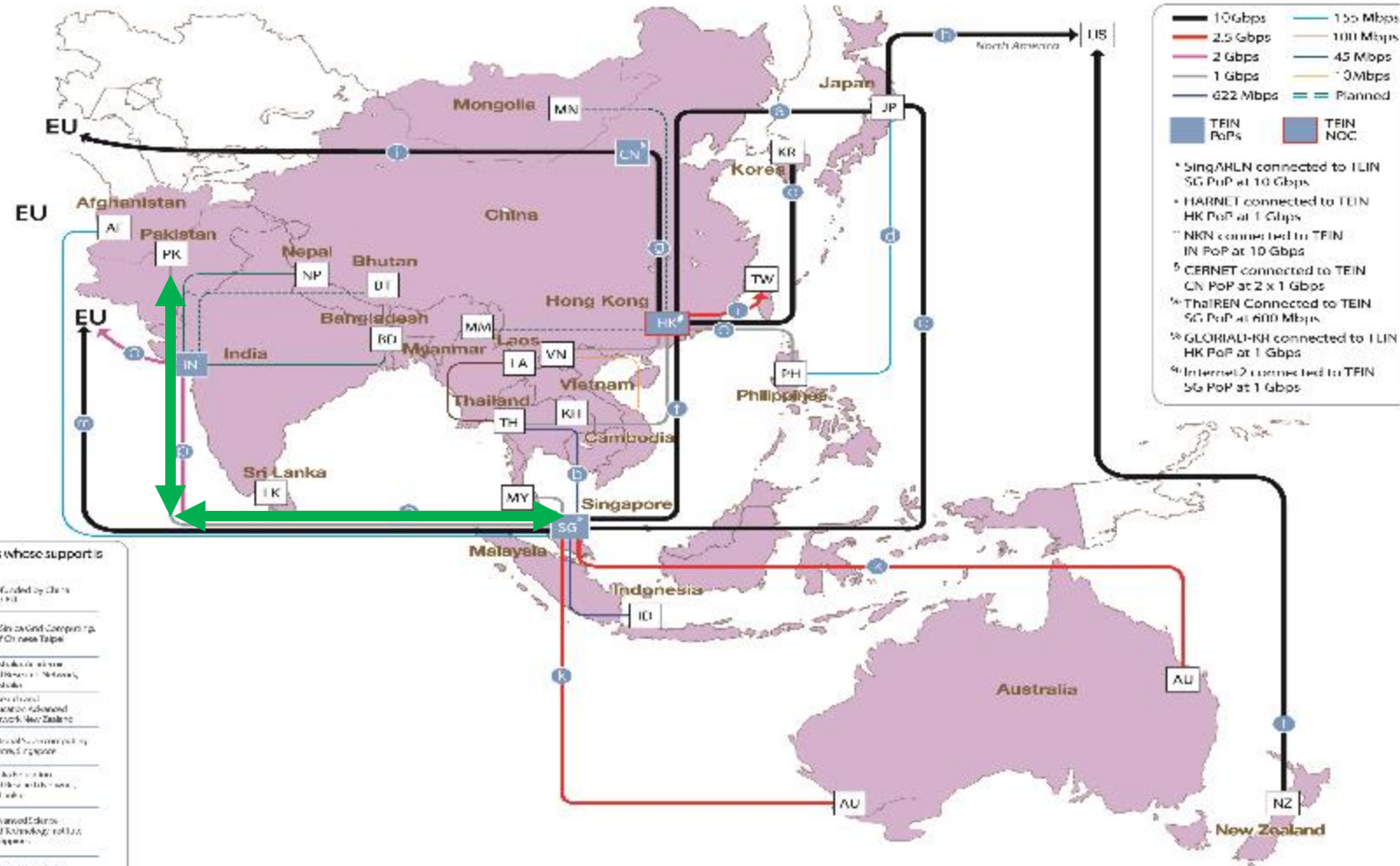
<b>a</b> NICT National Institute of Information and Communications Japan	<b>i</b> ORIENT Oriented Research and Education Network
<b>b</b> NICT National Institute of Information and Communications Japan	<b>j</b> ORIENT Oriented Research and Education Network
<b>c</b> NII National Institute of Informatics Japan	<b>k</b> QARNET Queensland Advanced Research Network
<b>d</b> MARS National Institute of Informatics Japan	<b>l</b> REANZ Research and Education Advanced Network New Zealand
<b>e</b> NIA National Institute of Informatics Agency South Korea	<b>m</b> RARE Research and Education Advanced Network
<b>f</b> NICT National Institute of Information and Communications Japan	<b>n</b> LEARN Learning and Education Research Network
<b>g</b> NICT National Institute of Information and Communications Japan	<b>o</b> LEARN Learning and Education Research Network
<b>h</b> NICT National Institute of Information and Communications Japan	<b>p</b> LEARN Learning and Education Research Network

As of January 2018

**TEIN\*CC**  
TEIN\*CC  
[www.teincc.org](http://www.teincc.org)



TEIN is co-financed by the European Union through the Directorate General for Development and Cooperation EuropeAD



- \* SingAREN connected to TEIN SG PoP at 10 Gbps
- \* HARNET connected to TEIN HK PoP at 1 Gbps
- \* NKN connected to TEIN IN PoP at 10 Gbps
- \* CERINET connected to TEIN CN PoP at 2 x 1 Gbps
- \* ThaiREN Connected to TEIN SG PoP at 600 Mbps
- \* GLORIA-HK connected to TEIN HK PoP at 1 Gbps
- \* Internet2 connected to TEIN SG PoP at 1 Gbps

This map has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of TEIN\*CC and do not necessarily represent the position of the European Union.





- 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:

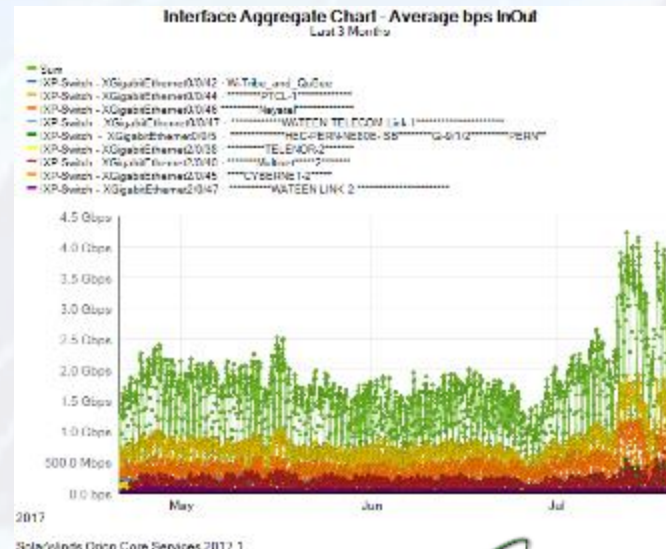
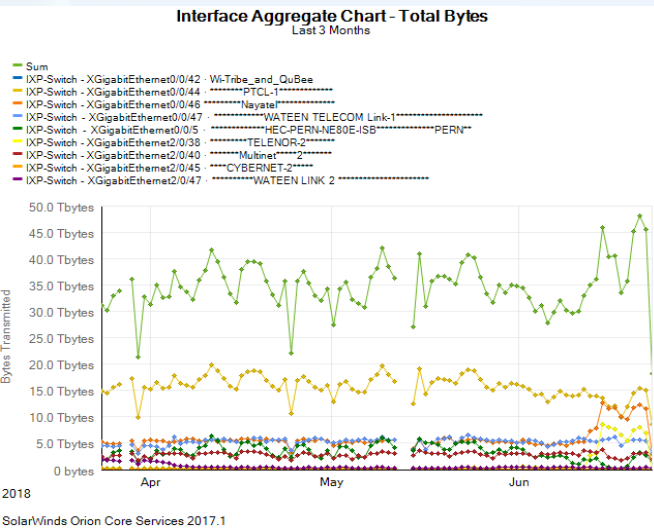
- PERN has successfully deployed eduroam in 100+ HEIs.
- Pakistan now is active member of 89 countries with the facility of Educational Roaming.
- Redundant National Roaming Servers (2 NRS) are configured to provide failover in case of outage.
- Successfully paired with ETRL (Europe Top Level Radius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



# Pakistan`s 1<sup>st</sup> 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 2<sup>nd</sup> 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

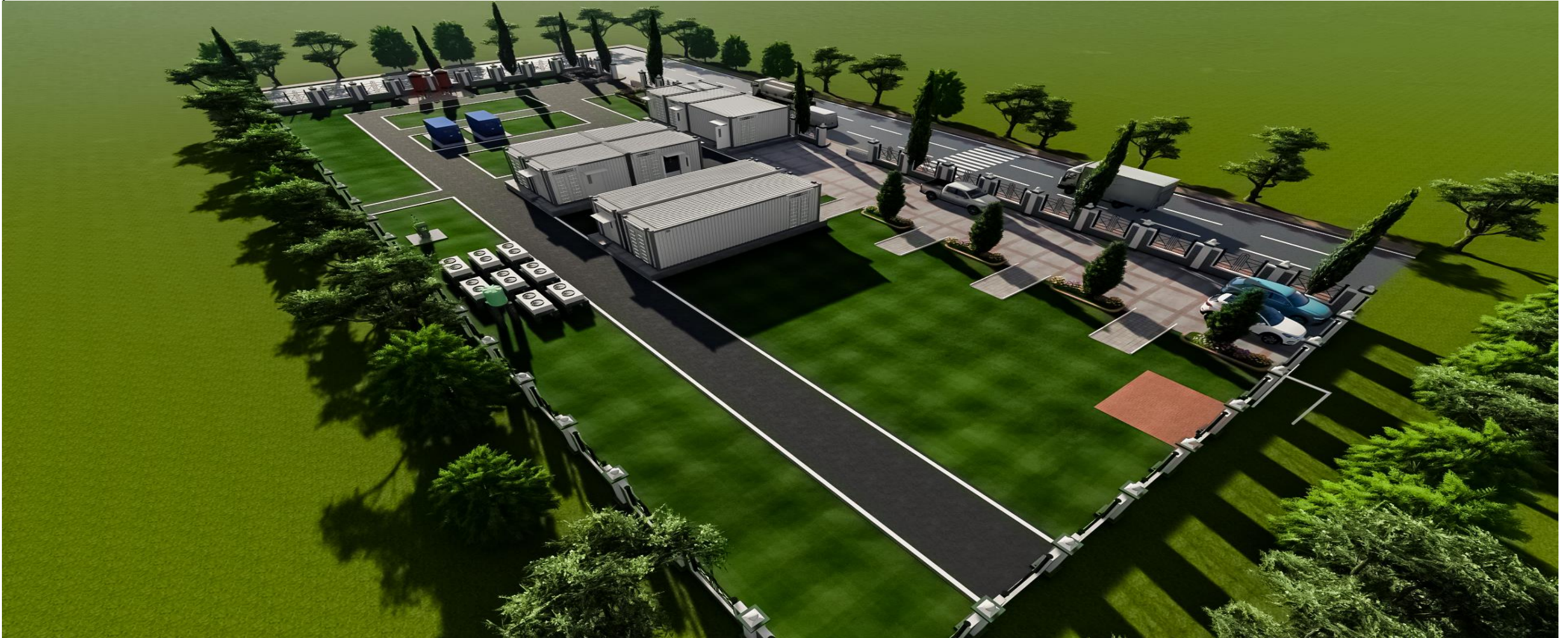
<b>Total No of cores</b>	20,000
<b>Total Storage capacity</b>	20PB
<b>No of RAM</b>	300 TB
<b>Total No of Cloud Hosts</b>	4000 - 6000
<b>Total Virtual Desktop</b>	100,000
<b>No of racks</b>	80 IT Racks (upgradeable upto 480 IT Racks) HPC is in planned services

This data center will be hosting the following services.

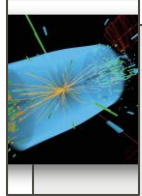
- Virtual Data Centers (VDC)
- Virtual Desktop Infrastructure (VDI)
- Safe Campus Central Solution and Central Surveillance
- Unified Communication and Shared Services
- Storage as a Service
- Training as a Service



# 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-Temporal 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 51<sup>st</sup> Virtual APAN & 58<sup>th</sup> APAN Meeting