



Pakistan Education & Research Network (PERN)



Developments in PERN (2019 – 21)

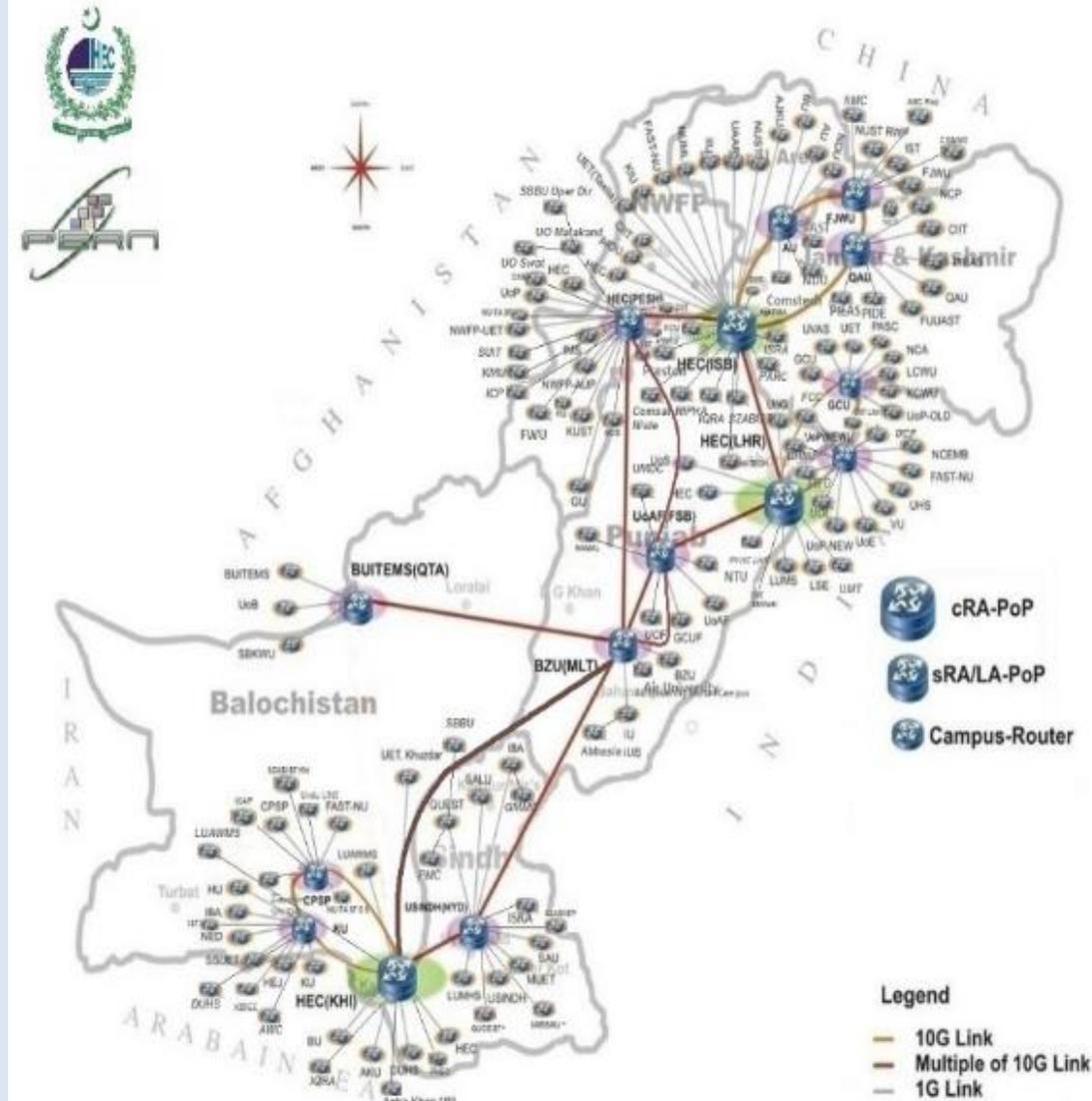


• CURRENT STATUS

- **301** Institutions connected in **48** Cities
 - 179 Main Universities
 - 72 Sub Campuses
 - 50 Colleges
- **35** Gbps Internet Bandwidth
- **23** POPs in HEC / Universities
- **9** Gbps of Core Intranet Bandwidth Utilization
- IPLC capacity of **1** Gbps with avg. utilization of **800** Mbps

• PERN3 by 2019-21 Plans:

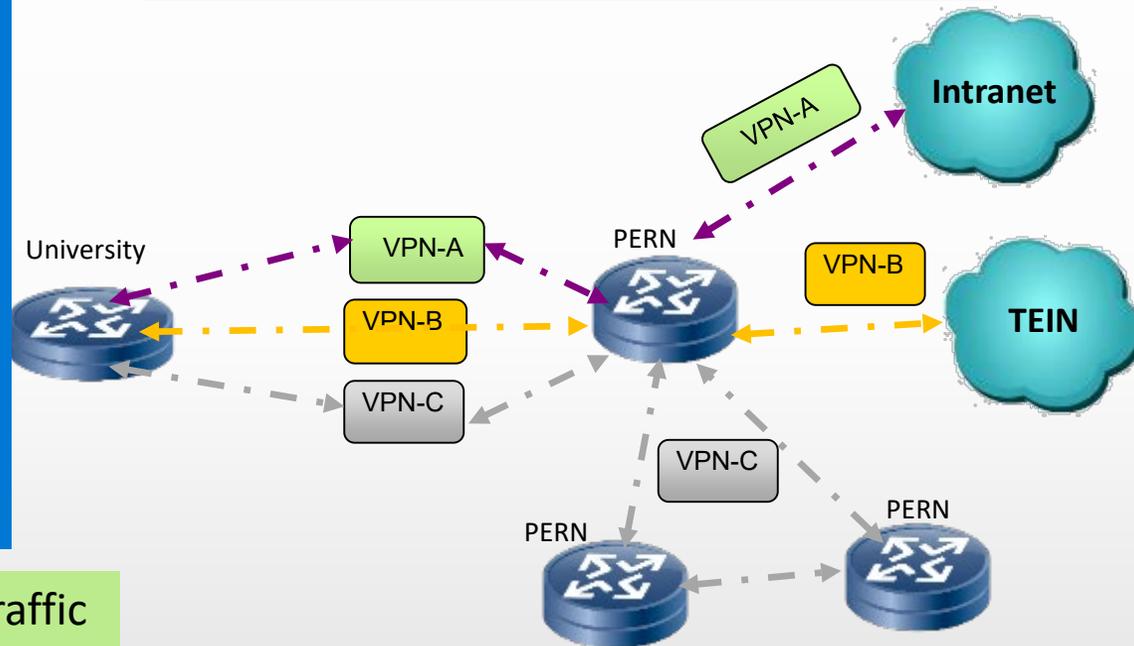
- Upgradation of PERN Backbone to multiple of 10Gbps (x 5) by January 2020
- Up-gradation of Last Mile to 10 Gbps by Jan 2020 along with Campus Equipment
- PERN Footprints to be increased up to 68 Cities
- Managed SOC for Universities
- Upgradation of PERN TEIN Link (1Gpbs to 2.5/5 Gpbs)



PERN Network Overview

- ❖ IPv6 enabled
- ❖ Ipv4 source based routing
- ❖ Dual Stack
- ❖ Multihoming
- ❖ 90% Leased Fiber Coverage
- ❖ DWDM based Network
- ❖ Any Cast routing
- ❖ 100% CIR Bandwidth
- ❖ Core Availability 99.9%
- ❖ less Delay Avg 15ms (300 nodes)
- ❖ MPLS enabled (Each node is 3 hop away)

Dedicated public and private IPv4 & IPv6 pools inter & intra routing



- ❖ **20Mb** intranet charge but no restriction 01G limit
- ❖ Dynamic Configuration for R&E requirement
- ❖ Extended NMS service
- ❖ Backup links with a very minimal cost

VPN-A

Internet Traffic

VPN-B

NREN via TEIN (VC, Grid , cluster , telemedicine , e-agriculture , e-culture

VPN-C

Intranet Traffic (Video Conf, Interuniversity, Cloud, IP Phones, VDI, SEIM etc.



Market Competitive Edge



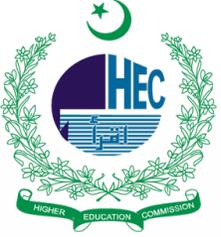
- ❖ *Only Research & Education Network In Pakistan*
- ❖ *Tariff bundled with Educational Services*
- ❖ *Strategic Alignment with Vision of Higher Education*

- ❖ *Bulk Procurement helps to offer the prices at feasible charges*
- ❖ *Supports network settings based on R&E requirements*

- ❖ *Economy of Scale Projects which include Public Private partnerships to help the Institutions to build their ICT infrastructure.*

- ❖ *International Collaboration with NREN's as well as different Consortiums for development of R&E activities*



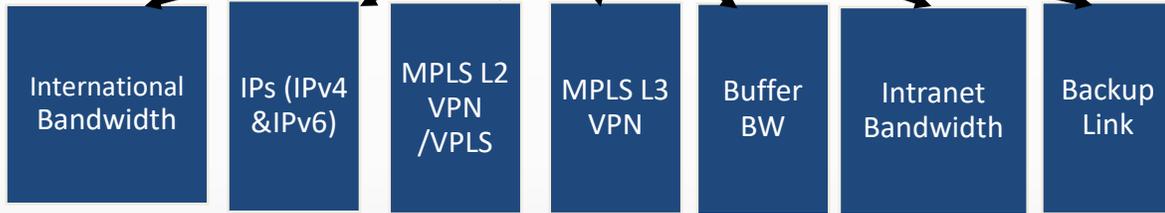


PERN Services



SERVICES

Basic Services



Advance Services

Value Added

R&D

- ❖ Smart & Safe University
- ❖ Safe Campus
- ❖ DNS Service
- ❖ E-Learning
- ❖ Cloud
- ❖ Video Conferencing
- ❖ Anti-plagiarism
- ❖ Software
- ❖ Trainings
- ❖ VPS & Cloud

- ❖ Telemedicine
- ❖ Educational Television
- ❖ Big-Data
- ❖ E-Agriculture
- ❖ E-Culture
- ❖ R&D Centers
- ❖ Virtual Education
- ❖ HPC
- ❖ Event Sponsors

Future Services



- PAAS (ERP, LMS, Module)
- Smart Class Rooms
- One-Card Solution
- Events Management
- Digital Boards
- Business Analytics
- Content Generation (Media)
- Virtual Incubators
- Hosted IT Academies, VDI , Labs

Full Blanket Wi-Fi Coverage
Over 36000+ concurrent Users



EduRoam Enabled



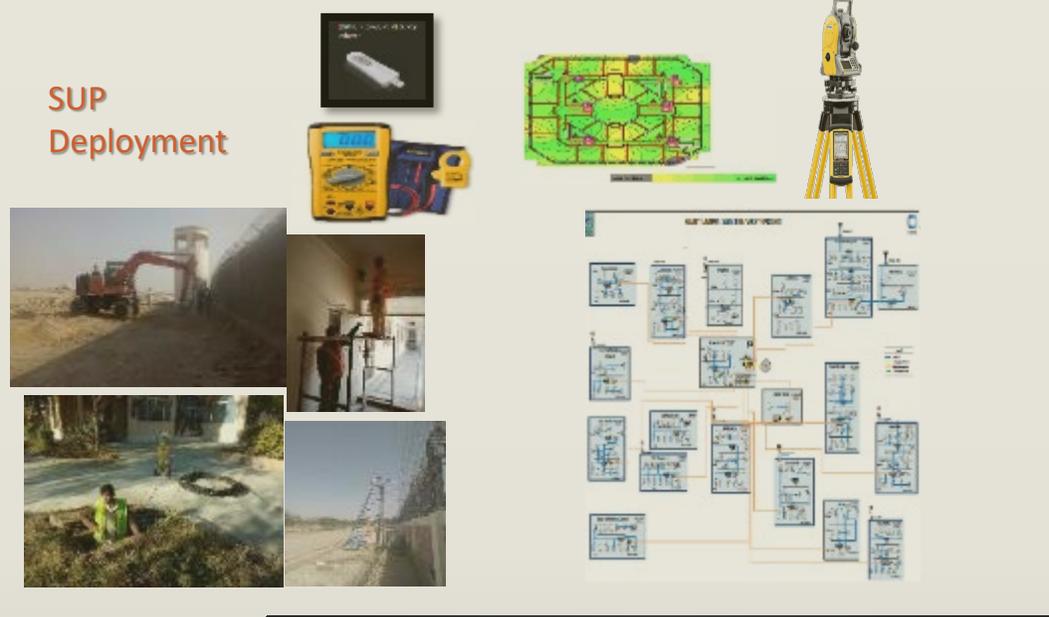
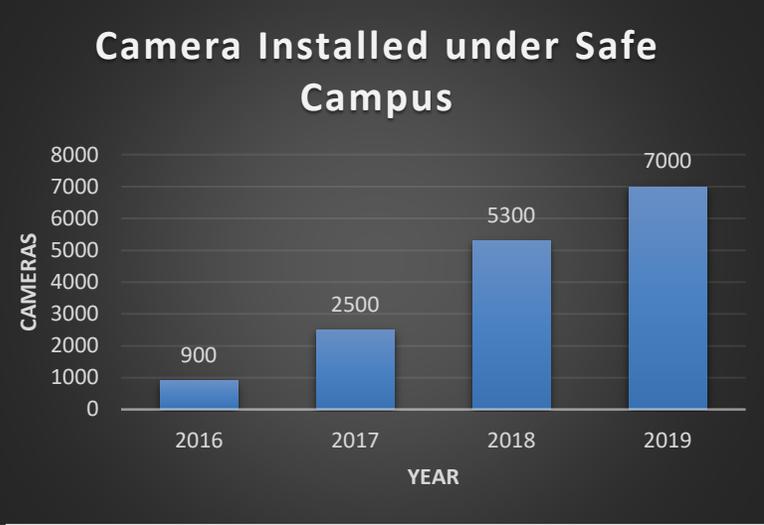
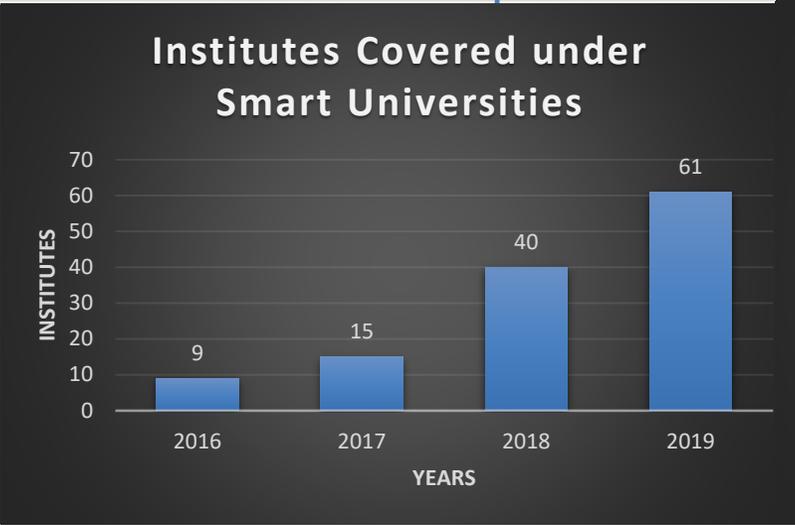
Safe Campus IP Surveillance Camera
Over 7000+ Cameras with Centralize Backups



Safe Campus Deployment

- ➔ Real-time monitoring
- ➔ Video Query
- ➔ Remote patrol
- ➔ Remote Intercom
- ➔ Remote alarm

SUP Deployment



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



Overview

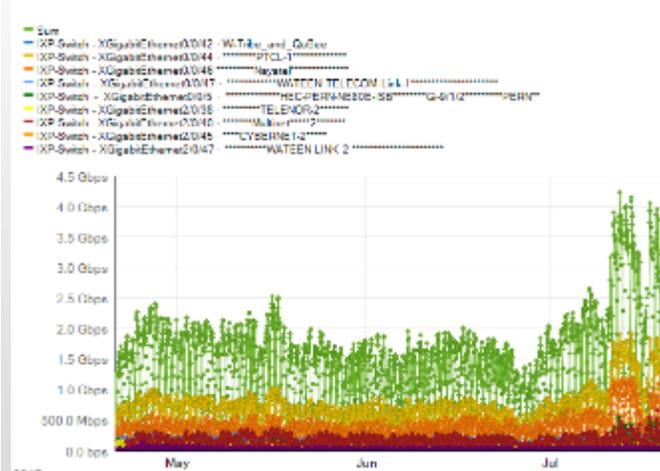
- Pakistan`s First Internet Exchange Point was inaugurated in the premises of HEC in 2017
- Pakistan`s Second Internet Exchange Point is recently launch in HEC Karachi Office.
- Nine Carriers are part of PKIX so far, namely, Wateen, Telenor, PERN, WiTribe, Qubee, Nayatel, Cybernet, Multinet and PTCL



Interface Aggregate Chart - Total Bytes
Last 3 Months



Interface Aggregate Chart - Average bps InOut
Last 3 Months



Statistics

- PKIX is functional with 100% uptime since January 2017.
- Average Consolidated Traffic Rate up to **8 Gbps.**
- Average Traffic Volume Per day up to **3.4 TBytes.**

SolarWinds Orion Core Services 2017.1





World Bank – Higher Education Development Project



- World Bank has approved a total of \$400 Million to HEC
- \$120 Million for R&D grants
- PERN is provided \$50 Million under this program for
 - PERN connectivity to 300 nominated Colleges nationwide
 - Upgradation of PERN Backbone to 100Gbps and last mile to 40Gbps by 2022
 - Eduroam extension to these colleges
 - Video conferencing extension to 300 colleges
 - Network Monitoring facility extension in 300 colleges.
 - Establish eduCloud
 - Expansion of smart classrooms to colleges
- Digitization of the Universities (LMS, ERP, CMS, etc.)
- Strengthening of National HPC Centers developed in different universities



China-Pakistan Economic Corridor (CPEC)



- In talks with Government of China on a \$14 Million grant for establishment of Interactive Smart Classrooms in 50 Universities
 - The smart classrooms will be based on interactive video conferencing solution.
 - The solution will be delivered through HEC cloud Platform.
 - 3000 – 5000 VDIs will be deployed under this project replacing obsolete computing facilities at colleges.



ASI@CONNECT 3rd CALL FOR PROPOSALS



• Application Proposals (10)

- Software Defined Optical Networks (SDON) Training and Research Laboratory for TEIN NRENs by **SEecs, NUST & TeCIP Institute Scuola Superiore Sant'Anna Pisa**
- Cyber Performance, Collaborative Production, Streaming and Archive by **Australia National University & PERN**
- Connecting the unconnected Internet for underserved rural schools by **BUIITEMS, Quetta**
- DSRP: Data Science Research Platform based on High-speed Network Infrastructure for Asian Countries by **SIUT, Peshawar and Jeju National University, Jeju, Korea**
- IoT based Air Pollution Monitoring System by **BUIITEMS**
- Framework for studying user behavior of PERN by **UET Lahore**
- SDN based content-centric architecture for sensors-as-a-service (SCAS) in complex heterogeneous IoT Networks by **UET Lahore**
- Execution of Interactive Online Cybersecurity and Privacy Awareness Training Program for Students by **RIU, Islamabad**
- Development of Wireless System for Education, Communication and Social Uplift of Rural Community by **UET Lahore**
- Network Capacity Enhancement through Technology Exchange and Professional Training by **NU FAST Karachi**

▶ Awarded Projects (3)

- ▶ Software Defined Optical Networks (SDON) Training and Research Laboratory for TEIN NRENs amounting Euro 175,000
- ▶ Cyber Performance, Collaborative Production, Streaming and Archive amounting Euro 190,000
- ▶ Connecting the unconnected Internet for underserved rural schools amounting Euro 190,000



Asi@Connect Launch in Pakistan

