Internet Exchange Point

Internet Exchange Points

Delayed Round Trip Time

ISP

IXP

ISP

The Internet

Cost

$ $$ $!
Peering Infrastructure in Pakistan

- PIE
- Peering between PIE and TWA
- Peering at Cybernet Karachi
- Peering at Nayatel Islamabad
- Peering at Brain Tel Lahore
Introductory Session by APNIC and ISOC, at PTA H/Qs Islamabad

- IXP Introductory session by ISOC and APNIC
- Confirmation of support for Pakistan IXP by ISOC
- Commitment from Chairman PTA to support Pakistan IXP
Initial Stakeholders in Pakistan

- All ISPs
- Cellular Mobile Phone Operators
- Regulator (PTA) / Government
- Bandwidth Providers (PTCL + TWA)
- Academia
Follow up Meeting with Stakeholders

- Participation from all stakeholders
- Consensus to establish Pakistan IXP
- Five Working Groups formed
- Call for Volunteers
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Working Group</th>
<th>Title</th>
<th>Headed by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>WG-1</td>
<td>Assessment of establishing IXP and way forward for establishing IXP</td>
<td>Dr. Amir Qayyum (MAJU)</td>
</tr>
<tr>
<td>2.</td>
<td>WG-2</td>
<td>Identifying the benefits of IXP, and making recommendations for the respective public/private organizations to achieve these benefits</td>
<td>Dr. Ihsan Qazi (LUMS)</td>
</tr>
<tr>
<td>3.</td>
<td>WG-3</td>
<td>Analyze commercial aspects of small and large ISPs</td>
<td>Dr. Saad Qaiser (NUST)</td>
</tr>
<tr>
<td>4.</td>
<td>WG-4</td>
<td>Selection of acceptable venue</td>
<td>Mr. Wasi Ullah Khan DG(Coord) PTA</td>
</tr>
<tr>
<td>5.</td>
<td>WG-5</td>
<td>Relevant data collection through concerned organizations</td>
<td>Dr. Zartash Uzmi (LUMS)</td>
</tr>
</tbody>
</table>
Recommendations by Working Groups

- Independent Board of governors
- HEC as neutral venue for IXP
- IXP at Islamabad, Karachi and Lahore
- Fee charging mechanism
- Mirrors of Pakistani popular sites at Pakistan
<table>
<thead>
<tr>
<th>Role</th>
<th>Individual</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISPs</td>
<td>Mr. Maroof Shahani</td>
<td>Cybernet</td>
</tr>
<tr>
<td>Bandwidth Providers</td>
<td>Mr. Amer Tufail</td>
<td>PTCL</td>
</tr>
<tr>
<td>Regulator</td>
<td>Mr. Wasi Ullah Khan</td>
<td>PTA</td>
</tr>
<tr>
<td>Academia</td>
<td>Dr. Zartash Uzmi</td>
<td>LUMS</td>
</tr>
<tr>
<td>Hosting Site</td>
<td>Currently Vacant</td>
<td>HEC</td>
</tr>
<tr>
<td>Cellular Mobile Operators</td>
<td>Currently Vacant</td>
<td>Zong</td>
</tr>
<tr>
<td>ISOC Islamabad Chapter</td>
<td>Dr. Amir Qayyum</td>
<td>CUST/ MAJU</td>
</tr>
<tr>
<td><strong>Selection of venue for Pakistan IXP</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher Education Commission (HEC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenient</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceptable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vast experience of managing PERN</td>
<td></td>
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</tr>
</tbody>
</table>
Benefits of IXP

- Cost Savings
- Lower Latency and Better User Experience
- Local Content Hosting and Content Generation
- Improved Security
- Availability of Services in case of Disruption in International bandwidth
## Comparison of traffic for locally hosted website

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Test From</th>
<th>Round Trip time for locally hosted websites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>International Route</td>
</tr>
<tr>
<td>1</td>
<td>Cybernet</td>
<td>104 ms</td>
</tr>
<tr>
<td>2</td>
<td>Multinet</td>
<td>130 ms</td>
</tr>
<tr>
<td>3</td>
<td>Nayatel</td>
<td>102 ms</td>
</tr>
<tr>
<td>4</td>
<td>PERN</td>
<td>107 ms</td>
</tr>
<tr>
<td>5</td>
<td>PTCL</td>
<td>103 ms</td>
</tr>
<tr>
<td>6</td>
<td>Telenor</td>
<td>107 ms</td>
</tr>
<tr>
<td>7</td>
<td>Wateen</td>
<td>144 ms</td>
</tr>
<tr>
<td>8</td>
<td>Wi-Tribe</td>
<td>107 ms</td>
</tr>
</tbody>
</table>
Supporting Organizations

ISOC (Capacity Building and Technical Support for Islamabad)

NSRC (Capacity Building)

Huawei Pakistan (Equipment for Islamabad)

ISOC (Capacity Building, Technical Support and Equipment for Karachi IXP)
<table>
<thead>
<tr>
<th>PTCL</th>
<th>Cybernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telenor</td>
<td>Multinet</td>
</tr>
<tr>
<td>Nayatel</td>
<td>Wateen</td>
</tr>
<tr>
<td>Wateen</td>
<td>Connect</td>
</tr>
<tr>
<td>PERN</td>
<td>PERN</td>
</tr>
<tr>
<td>Worldcall</td>
<td>GCS</td>
</tr>
<tr>
<td>Cybernet</td>
<td>Satcom</td>
</tr>
<tr>
<td>Multinet</td>
<td>Telenor</td>
</tr>
<tr>
<td>WiTribe</td>
<td></td>
</tr>
</tbody>
</table>
Status of traffic, Islamabad
Volume of traffic per day, Islamabad

Custom Chart - Network Wide Total Bytes Transferred

All Interfaces on All Nodes
Dec 2 2019, 12:00 am - Jan 1 2020, 12:00 pm

Thursday, Dec 5, 2019 12:00 PM
Total Bytes: 130.0 TB
Total Bytes Trend: 113.6 TB
Total Bytes Percentile 95%: 124.9 TB
<table>
<thead>
<tr>
<th>IXP Participant</th>
<th>Peak Traffic in Gbps</th>
<th>Maximum Volume of data exchanged during one day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2018</td>
<td>2019</td>
</tr>
<tr>
<td>PTCL</td>
<td>3.5</td>
<td>6.5</td>
</tr>
<tr>
<td>NAYATEL</td>
<td>0.883</td>
<td>1</td>
</tr>
<tr>
<td>WI-TRIBE &amp; QUBEEN</td>
<td>0.0246</td>
<td>0.541</td>
</tr>
<tr>
<td>Telenor</td>
<td>0.621</td>
<td>1.12</td>
</tr>
<tr>
<td>CYBERNET</td>
<td>0.1013</td>
<td>0.4926</td>
</tr>
<tr>
<td>WATEEN</td>
<td>1.8468</td>
<td>1.9993</td>
</tr>
<tr>
<td>MULTINET</td>
<td>0.8784</td>
<td>2.2</td>
</tr>
<tr>
<td>PERN</td>
<td>2.3</td>
<td>2.5</td>
</tr>
<tr>
<td>WORLD CALL</td>
<td>0.0075</td>
<td>0.5274</td>
</tr>
</tbody>
</table>
Volume of traffic per day, Karachi

Custom Chart - Network Wide Total Bytes Transferred

All Interfaces on All Nodes

Dec 25 2019, 12:00 am - Jan 1 2020, 12:00 pm

Zoom 1h 12h 24h

Thursday, Dec 26, 2019 12:00 PM

Total Bytes: 581.8 GB
Total Bytes Trend: 468.3 GB
Total Bytes Percentile 95%: 581.8 GB