QUALITY OF SERVICE FRAMEWORK IN PAKISTAN

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PTA’S VISION

“Create a fair regulatory regime to promote investment, encourage competition, protect consumer interest and ensure high quality information and Communication Technology Services.”
SEQUENCE

Part-I

• Overview
• Why QoS ?
• QoS Regulatory Framework
• QoS Key Performance Indicators
• Monitoring Techniques
• How We Monitor ?
• Conclusions

Part-II

• Live Demonstration
Telecom Overview: Evolution of Cellular Industry in Pakistan

- **1990**: 2nd Cellular licenses issued to Paktel & Instaphone
- **1992**: Mobilink 3rd Mobile operator (1st GSM)
- **1998**: Ufone: 2nd GSM Operator
  - Through incumbent
- **2004**: Spectrum Auction
  - Mobilink & Telenor & Warid
- **2007**: CMPAK “ZONG” Acquires Paktel
- **2014**: 3G/4G Auctioned
  - 4 x 3G Operators
  - 1x 4G Operator
- **2016**: 850 MHz/4G Auctioned 1x Operator

**Broadband Subscribers**

<table>
<thead>
<tr>
<th></th>
<th>MBB</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29.7 Million</td>
<td>32.7 Million</td>
</tr>
</tbody>
</table>

**Cellular Subscribers**

- 133.5 Million

- Subscriber base is substantially pre-paid dominant representing ~98% of the total market
- ~10% Non-Voice Revenue

**SOURCE**: PTA Data
WHY QUALITY ???

New Technologies / Applications
Increased Consumer Demand

Network Availability/Coverage/ High throughputs

Challenge
QoS REGULATORY FRAMEWORK IN PAKISTAN

- Laws
- License Terms
- Regulations
- Monitoring Surveys
- Enforcement

The diagram illustrates the components of the QoS regulatory framework in Pakistan, highlighting the interrelations between laws, license terms, regulations, monitoring surveys, and enforcement.
GENERAL QoS REGULATORY FRAMEWORKS

Laws
- Telecom Act
- Telecom Policies

License Terms
- Technical e.g. Call drop, call success rate, connection speed, SMS quality
- Customer focused e.g. Billing accuracy, fault

Regulations
- Definitions of KPIs e.g. ITU, ETSI, National Standards, Industry Standards, Other standardization bodies
- Guidelines for Monitoring Surveys

Monitoring Survey
- Technical e.g. Network auditing, drive tests
- Customer survey e.g. Network auditing, drive tests

Enforcement
- Regulatory notice e.g. Website, Press release, Directive
- Publication e.g. Website, newspaper
- Penalty
- Dispute
Quality Related PTA Regulations

- **2014**
  - Fixed Broadband Regulations

- **2010**
  - Cellular Mobile Network QoS Regulations

- **2009**
  - Telecom Consumers’ Protection Regulations

- **2008**
  - Protection from Health Related Effects of Radio Base Station Antenna Regulations
QoS – Monitoring Techniques

Direct Monitoring
- Technical Surveys
- Opinion Surveys

In-Direct Monitoring
- Complaints / Reporting
- Publication
Key Performance Indicators (KPIs)

Voice
- Call Success
- Call Drop
- Voice Quality

SMS
- SMS Success
- SMS Delivery Time

Data
- Internet Speed
- Round Trip Time
HOW WE MONITOR ???

- **Rules & Regulations**: Consumer centric development of rules/regulations
- **Capacity Building**: 
- **Nationwide Annual QoS Survey**: 
- **Quarterly QoS Surveys**: 
- **Publication**: 
- **Issuance of regulatory directives**
CONCLUSIONS

Consumers
- Cost
- Coverage
- Quality
- Speed

Operators
- Compliance
- Obligations
- Capex/Opex

Regulator
DEMONSTRATION

Voice, SMS and Data Services
THANKS

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## ITU-T RECOMMENDATIONS AND QOS / QOE

<table>
<thead>
<tr>
<th>Category</th>
<th>ITU-T Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective assessment of voice quality</td>
<td>P.85, P.800, P.805, P.806, P.810, P.830, P.835, P.840, P.851, P.880, P Suppl. 24, P Suppl. 25</td>
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<tr>
<td>Objective assessment of voice quality</td>
<td>P.862, P.862.1, P.862.2, P.862.3, P.863, P.863.1</td>
</tr>
<tr>
<td>Hands free Communications and User Interfaces in Vehicles</td>
<td>P.1100, P.1110</td>
</tr>
<tr>
<td>QOS FOR MOBILE SERVICES</td>
<td>E.804</td>
</tr>
<tr>
<td>TRAFFIC MANAGEMENT</td>
<td>Y.1221, Y.1222, Y.1223, Y.1530, Y.1531, Y.1542</td>
</tr>
<tr>
<td>BITRATE MEASUREMENT OF INTERNET CONNECTIONS</td>
<td>currently available as working draft under Question 15/11</td>
</tr>
</tbody>
</table>
### Categories of Potential QoS Parameters

<table>
<thead>
<tr>
<th>Preliminary information on ICT services</th>
<th>Contractual matters between ICT service providers and customers</th>
<th>Provision of services</th>
<th>Service alteration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical upgrade of ICT services</td>
<td>Complaint management</td>
<td>Commercial support provided by service provider</td>
<td>Technical support provided by service provider</td>
</tr>
<tr>
<td>Documentation of services (operational instructions)</td>
<td>Cessation of service</td>
<td>Network/Service management by customer</td>
<td>Charging and billing</td>
</tr>
</tbody>
</table>

For details of QoS parameters that have been identified as being potentially useful for comparison of SPs' performance levels, please read ITU-T Recommendations E.803.
QoS KPIs FOR FIXED SERVICES

Network Availability
Link Speed
Service Availability
Bandwidth (D/L & U/L)
Retainability
Round Trip Time
Customer Service Complaints
Billing Complaints
Service Provisioning Complaints
Faults Incidence Ratio
Faults Clearance Ratio
Billing Error Ratio
Enquiry Response Time

Specific for Broadband
Specific for Voice
## QOS KPIS FOR 2G

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Standard Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Downtime</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>Grade of Service</td>
<td>≤ 2%</td>
</tr>
<tr>
<td>Call Connection Time</td>
<td>≤ 5 Seconds</td>
</tr>
<tr>
<td>Call Completion Ratio</td>
<td>&gt;98%</td>
</tr>
<tr>
<td>Mean Opinion Score (MOS)</td>
<td>&gt; 3</td>
</tr>
<tr>
<td>Service Accessibility</td>
<td>97% (3Years)</td>
</tr>
<tr>
<td></td>
<td>&gt;98%</td>
</tr>
<tr>
<td>SMS Success Rate</td>
<td>&gt; 99%</td>
</tr>
<tr>
<td>SMS End to End Delivery Time</td>
<td>≤ 12 Seconds</td>
</tr>
</tbody>
</table>
## ADDITIONAL QOS KPIS FOR 3G/4G

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
<th>Standard Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Data Throughput</td>
<td>Refers to Download speed</td>
<td>3G - 256 kbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4G - 2Mbps</td>
</tr>
<tr>
<td>Signal Strength ((RSCP – 3G))</td>
<td>Received Signal Code Power ((RSCP)) denotes the power measured by a receiver.</td>
<td>-100 dBm</td>
</tr>
<tr>
<td>((RSRP – 4G))</td>
<td>Used as an indication of signal strength.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimum outdoor signal strength must be achievable with 90% confidence within the areas defined in Rollout.</td>
<td></td>
</tr>
<tr>
<td>Session Abnormal Release Rate</td>
<td>Shows how often an end-user abnormally looses an E-RAB during the time the E-RAB is used.</td>
<td>&lt; 2%</td>
</tr>
</tbody>
</table>
Impact of 3G/4G on Changing the Dynamics of Telecom and IT Sector in Pakistan

- Distant video surveillance
- Global roaming
- High quality wireless sound
- Mobile TV
- High quality games
- Video-on-Demand (VOD)
- Mobile video conferences
- Remote control of household appliances using a mobile device
- Multi-channel hi-fi TV broadcasts
- 3G: Third generation of mobile telecommunications (600-800 Kbit/sec)
- 4G: Fourth generation of future mobile telecommunications (1 Gbit/sec)

Expected Impact

- Modernization of existing mobile networks
- Growth of device market
- Innovative Apps development
- Digitization impact on Social & Economical sectors e.g. E/M governance, E-Education