



Government of Pakistan
PAKISTAN TELECOMMUNICATION AUTHORITY
www.pta.gov.pk

INVITATION TO BID

SUPPLY OF AUTOMATED QUALITY OF SERVICE MONITORING AND BENCHMARKING TOOL

1. Pakistan Telecommunication Authority, a Government organization invites sealed bids from authorized dealers/distributors/ manufacturers, registered with Income Tax and Sales Tax Departments and who are on Active Taxpayers List of the Federal Board of Revenue for Supply of Automated Quality of Service Monitoring and Benchmarking Tool in PTA HQs, F-5/1, Islamabad
2. Bidding document, containing detailed terms and conditions, method of procurement, procedure for submission of bids, bid security, bid validity, opening of bid, evaluation criteria, clarification / rejection of bids, performance guarantee etc. are available at the office of undersigned. Price of the bidding document is Rs. 1,000/- (cash payment non-refundable). Bidding Documents can also be downloaded from www.pta.gov.pk free of cost.
3. The bids, prepared in accordance with the instructions in the bidding documents, must reach at PTA HQs, F-5/1, Islamabad on or before **28th January, 2020 11:00 AM**. Technical bids will be opened on the same day at **11:30 AM**. This advertisement is also available on PPRA website at www.ppra.org.pk.

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Pakistan Telecommunication Authority

BIDDING DOCUMENT

**SUPPLY OF AUTOMATED QUALITY OF SERVICE MONITORING AND
BENCHMARKING TOOL**

Pakistan Telecommunication Authority, Headquarters Building, F-5/1, Islamabad, Pakistan
URL: www.pta.gov.pk

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1. **Introduction**

- 1.1. Pakistan Telecommunication Authority (PTA) (*herein after called the “the Client” which expression shall mean and include, unless the context otherwise requires, its successors in the office and assigns*), is a statutory body established under Section 3 of the Pakistan Telecommunication (Re-organization) Act, 1996 (*herein after referred to as “the Act”*).
- 1.2. The Client intends to procure Goods i.e. Automated QoS Monitoring and Benchmarking Tool, in maximum three units having Data Collection and Data Analysis (*Post Processing*) modules and Related Services incidental thereto, as per detailed in **SECTION 3 & 4** of the Bidding Documents, to:
 - 1.2.1. Benchmark both Voice, SMS and Data QoS KPIs for at least FIVE (5) operators simultaneously and shall have the capability to expand to include more operators, if required.
 - 1.2.2. Measure all the QoS KPIs as mentioned in **PARA 4.3** of the bidding document.
 - 1.2.3. Both Data Collection and Data Analysis units should support all the technologies including but not limited to Global System for Mobile (GSM)/ Code Division Multiple Access (CDMA)/ Wideband Code Division Multiple Access (WCDMA)/ High Speed Download Packet Access (HSDPA)/ High Speed Upload Packet Access (HSUPA)/ High Speed Packet Access+ (HSPA+)/ Long Term Evolution (LTE)/ Voice over Long Term Evolution (VoLTE)/ Long Term Evolution Advance (LTE-Advance) etc. (*i.e. 2nd, 3rd & 4th Generation wireless technologies*) in all bands/spectrum, carrier aggregation in contiguous/noncontiguous bands/technologies and should be upgradeable to 5G, as and when required by the Client.
- 1.3. Bids are invited on the basis of the terms and conditions illustrated in Bid document, for which the bidders shall submit the detailed technical proposal for provision of Automated QoS Monitoring and Benchmarking Tool. The bidders shall have proven expertise in measuring and benchmarking service quality of mobile services and proven success in providing Automated QoS Monitoring and Benchmarking Solution.
- 1.4. The bidder shall also provide evidence of selling its Automated QoS Monitoring and Benchmarking Tool to at least **TWO (02)** telecom regulators and at least **FIVE (05)** Telecom Vendors/Operators across the world as per format mentioned at **Annex 1.D**

2. Instructions to the Bidders

2.1. General Instructions

- 2.1.1. The bidders (both local and international having presence in Pakistan through joint venture/ consortium/ authorized agent/ dealer) having valid NTN/GST/Registration being on Active Tax Payer List of FBR are invited.
- 2.1.2. The bidder should submit Technical Proposal and Financial Proposal, in separately marked sealed envelopes as per rule 36 (b) of Public Procurement Rules 2004 available on www.ppra.org.pk and as per details outlined in **SECTION 3&4** of the Bid document.
- 2.1.3. The bidder may request a clarification of any of the Bid documents not later than **06 DAYS** before the proposal submission due date. Any request for clarification must be sent in writing by paper mail, facsimile, or electronic mail to the Client's address given below:

Director (Enforcement-Wireless)
Pakistan Telecommunication Authority
PTA HQs, F-5/1, Islamabad Pakistan
Email: enf.qos@pta.gov.pk
Tel: +92 (51) 9221444
Fax: +92 (51) 2878139
- 2.1.4. The Client will respond by facsimile or electronic mail to such requests and will publish on Client's website the response (*including an explanation of the query but without identifying the source of inquiry*) for information of all the intending bidders.
- 2.1.5. At any time before the submission of proposals, the Client may, for any reason, whether at its own initiative or in response to a clarification requested by the prospective bidder, amend the Bid documents. Any amendment shall be issued in writing through addenda. The Client shall advertise the addenda in the same manner as original advertisement. The addenda shall be considered an integral part of the Bid documents and will be binding. The Client may at its sole discretion extend the deadline for the submission of proposals.
- 2.1.6. The costs of preparing the proposal and of negotiating the contract, including visit(s) to the Client, are not reimbursable as a direct cost of the assignment.
- 2.1.7. The Client is not bound to accept any of the proposals submitted, however, upon request, ground of rejection of bid, shall be communicated to the bidder.
- 2.1.8. The bidder is requested to submit proposals in English language.
- 2.1.9. While preparing the bid, the bidder shall consider Recommendations of the International Telecommunication Union (ITU) related to service quality and standards adopted by the European Telecommunication Standardization Institute (ETSI) (i.e. ETSI 102 250 etc.). The bidder will also mention the standard being followed in the offered solution.
- 2.1.10. The bidder will nominate a focal person as a liaison officer to act as the primary Point of Contact (PoC) for correspondence with the Client.

2.2. Submission of the Bids

- 2.2.1. The submission and evaluation of bids will be carried out as per rule 36 (b) **"Single Stage - Two Envelope Procedure"** of PPRA Procurement Rules 2004.

- 2.2.2. The original proposal (comprising of Technical Proposal and Financial Proposal) shall be prepared without any inter-lineation or overwriting.
- 2.2.3. An authorized representative of the prospective bidder shall initial all pages of the proposal and sign in full on the last page of proposal, clearly mentioning the full name of the representative. The representative's authorization is to be confirmed by a written power of attorney accompanying the proposal.
- 2.2.4. The bidder shall prepare four copies of the proposal. Each Technical Proposal and Financial Proposal shall be marked "**ORIGINAL**" or "**COPY**". If there are any discrepancies between the original and the copies of the proposal, the original proposal will be taken as the correct one.
- 2.2.5. The original and three copies of the Technical Proposal shall be placed in a sealed envelope clearly marked "**Technical Proposal**". The original and all copies of the Financial Proposal shall be placed in sealed envelope clearly marked "**Financial Proposal**" with the words: "**DO NOT OPEN WITH THE TECHNICAL PROPOSAL**" clearly written on the envelope. Both envelopes shall be placed in an outer envelope and sealed. This outer envelope shall bear:
 - (1). The submission address mentioned at **Para 2.1.3**
 - (2). Clearly marked, "**Bid for Supply of Automated Quality of Service Monitoring and Benchmarking Tool**".
- 2.2.6. The bids shall be submitted in a sealed package in such manner that the contents are fully enclosed and cannot be known until duly opened.
- 2.2.7. The completed Technical and Financial Proposals must be delivered at the submission address mentioned at **Para 2.1.3** by the date **28th January, 2020**. Proposals must be submitted not later than Pakistan Standard Time **1100 hrs.** (PST) of communicated date. Any proposal received after the closing time for submission of proposals shall be returned unopened.
- 2.2.8. Subject to meeting the minimum requirement as set out at **Sub-Para (1) of Para 5.2.1** of the bidding document, evaluation of the technical proposal will start in accordance with **Sub-Para (2) of Para 5.2.1** and at this stage the financial proposal shall remain unopened.
- 2.2.9. The Evaluation Committee constituted by the Client will seek demo as well as presentation from initially qualified bidder(s) through interactive session(s) via physical presence / conference calls etc. as per mutual convenience.

2.3. Bid Security

- 2.3.1. Bid security will be 2% of the bid amount and will be in the shape of pay order / demand draft in favor of Pakistan Telecommunication Authority, Headquarters, Sector F-5/1, Islamabad.
- 2.3.2. If the payment of Bid Security is being made from sources in Pakistan, it should be made only through a Pay Order or Demand Draft, under intimation to the Client before opening of technical proposal.
- 2.3.3. Bid Security shall be attached with the Financial Proposal otherwise proposal will not be evaluated/accepted. The bidder shall submit a certificate with the Technical Proposal regarding attachment of the Bid Security.
- 2.3.4. Bids without bid security will be rejected without any right of appeal.
- 2.3.5. Bid security of successful bidder will be retained till completion of Warranty Period. However, bid security of unsuccessful bidders will be returned after award of contract to successful bidder.

- 2.3.6. The bidder will ensure that Bid Security has been transferred to above account by the final date of submission of proposal.
- 2.3.7. In case of termination of contract due to default/breach of contract by the vendor, the bid security shall be forfeited in favor of PTA.

2.4. Performance Bank Guarantee (PBG)

- 2.4.1. A Performance Bank Guarantee (PBG) from a bank having credit rating of at least AA+ in the prescribed format for an amount equal to **10 PERCENT** of the bid/contract price in **PAK RUPEE** on the date of calling of the guarantee before signing the contract for carrying out the assignment. For the purpose of Bank Guarantee, the bid/contract price will mean the total bid amount as provided in Financial Proposal. On satisfactory completion of assignment, this PBG shall be released.

2.5. Advance Bank Guarantee (ABG)

- 2.5.1. Advance Bank Guarantee (ABG) from a bank having credit rating of at least AA+ in the prescribed format for any amount up to **80 PERCENT** of the bid/contract price in **PAK RUPEE** on the date of calling of the guarantee can be provided if vendor elects to get advance amount from client for carrying out this assignment. For the purpose of Bank Guarantee, bid/contract price will mean total bid amount as provided in Financial Proposal. On satisfactory completion of assignment, this ABG shall be released.

2.6. Technical Proposal

- 2.6.1. The Bidder shall present detailed description of the proposed system, supported by photographs, drawings, brochures, technical characteristics, screenshots for each screen or window of the software applications offered, field Advance, schedule compliance, product description, feature list, environmental conditions, site requirements and sample reports, in such a way to enable the Client to make a clear judgment and evaluation of the Quoted Solution.
- 2.6.2. Technical Proposal shall not include any financial information.
- 2.6.3. Technical Proposal shall be in accordance with Formats attached at **Annexure I**, as per following details:
 - (1). A Covering Letter as per **Annexure I.A**
 - (2). Details of Local Partners / Authorized Dealer/ Supplier as per **Annexure I.B** (i.e. if any).
 - (3). A brief description of the bidder's organization and an outline of recent experience of delivering Automated QoS Monitoring and Benchmarking Tool to Telecom Regulators/Vendors/Operators as per **Annexure I.C**
 - (4). Duly filled Initial Qualification Checklist alongwith supporting documents as per **Annexure I.D**
 - (5). Description, Specification and Working of Quoted Solution including but not limited to details mentioned at **Para 2.6.1** as a separate annex (i.e. **Annexure I.E***)
 - (6). List of QoS KPIs being measured by the Quoted Solution as a separate annex (i.e. **Annexure I.F***)

- (7). Presentation of the Quoted Solution for demonstration both in hard and soft (on USB) form as a separate annex (i.e. **Annexure I.G***)
 - (8). Any other relevant details
 - * *Any suitable format can be used by the bidder*
- 2.6.4. After initial qualification, the bidder will have to demonstrate the quoted system in Islamabad, within **SEVEN (07) DAYS** of the request by the Client. This requirement is part of the technical evaluation of the Bid.

2.7. Financial Proposal

- 2.7.1. In preparing the Financial Proposal, the bidder is expected to take into account the requirements and conditions outlined in the bidding documents. The Financial Proposal should bid in accordance with the table as attached at **Annexure II**. The cost shall be inclusive of all taxes, duties, fees, levies, and other charges imposed under the applicable laws in Pakistan.
- 2.7.2. The proposal must remain valid for a period of **SIX (6) MONTHS** from the date of opening of Technical Proposals. The Client will make its best effort to complete bidding process within this period.
- 2.7.3. The bidder should quote its unit rates + GST charges (if applicable) clearly for each item, in the Financial Proposal and total price of each line item as well as Grand Total. However, contract shall be awarded on consolidated amount / score of the items after evaluation.
- 2.7.4. Bid shall be in **PAK RUPEE** only and inclusive of all applicable taxes i.e. GST, duties etc. as per GOP rules.
- 2.7.5. Bids should be inclusive of transportation/carriage charges and fixing charges and any other cost which is essentially required to complete the job.
- 2.7.6. The Financial Proposal therefore, shall be submitted in the manner of this bid documents as **Annexure II**, comprising the following:
 - (1). A covering letter as attached at Annexure II.A with supporting documents (original and three photocopies along with the soft copy).
 - (2). Quoted Solution Pricing as per Annexure II.B.
 - (3). Bid Security of 2% of total bid following instructions mentioned at **Para 2.3**

3. Supplying Requirements

3.1. Overview of Monitoring Tool

The Client intends to acquire Automated Quality of Service (QoS) Monitoring and Benchmarking Tool directly from system manufacturer. The system shall bear the following specifications:

- 3.1.1. The Capacity to test and benchmark Quality of Service (*QoS*) across number of mobile operators (*i.e. Simultaneous and Continuous Measurement of AT LEAST FIVE MOBILE NETWORKS*), with the objective to reproduce end user experience in different mobile networks, device types and wireless technologies (*i.e. 2G/3G/4G etc.*) operational in Pakistan.
- 3.1.2. It should have the capability to perform field tests, measure, benchmark and report QoS Key Advance Indicators (*KPIs*) as defined in mobile services licensees issued from time to time to Cellular Mobile Operators (*CMOs*) in Pakistan defined in **Para 4.3.1**, PTA service quality regulation (*Cellular Mobile Network Quality of Service (QoS) Regulations 2010*) and subsequent amendments as well as global industry standards and best practices;
- 3.1.3. The systems should be capable to record every detailed measurements of the network while testing; The systems should be able to collect network Advance impact on the user experience;
- 3.1.4. The equipment should be able to determine and plot the route and map it with respect to its GPS co-ordinates. Plotting shall only show the relative movements with reference to a starting reference point. The equipment should be interface-able with off-the-shelf digitized map of the region, at any time in future with minimum hardware and software up-gradation. All instances have to be time and day stamped.
- 3.1.5. The system should have power measurement accuracies of up to $\pm \frac{1}{2}$ dB (min.).
- 3.1.6. The system should have time dependent measurements accuracies of one-second minimum.
- 3.1.7. The specification shall explicitly indicate the minimum and maximum levels which can be measured by such an instrument.
- 3.1.8. The system should have an extension for indoor / walk test service quality and coverage measurement.
- 3.1.9. The system should support measuring audio and videos services, including live streaming as well as social media; including emerging Over-The-Top (OTT) communication services testing.
- 3.1.10. It should have Post Processing Tool with holistic analytics which provides insight into Advance and generates reports as desired by the Client. Details of reports required to be generated is given in **Para 4.2.4**.
- 3.1.11. It should have capability of being upgradable to consider upcoming mobile network technologies and related Advance parameters, such as VoLTE and 5G etc.;
- 3.1.12. It should have capability to measure all wireless technologies.
- 3.1.13. It should have active and optimized Power Control for phone charging.
- 3.1.14. The installation of the QoS system should be in such a way that the set up provides optimal conditions for uninterrupted data collection in a stable environment for reliable test results.

- 3.1.15. Both Data Collection and Data Analysis/Post Processing Tools should support all the technologies including but not limited to GSM/ CDMA/ WCDMA/ HSDPA/ HSUPA/ HSPA+/ LTE/ VoLTE/ LTE-Advance etc. (i.e. 2nd, 3rd & 4th Generation wireless technologies) in all bands/spectrum and carrier aggregation of contiguous/noncontiguous bands/technologies and should be upgradeable to 5G as and when required.

4. **Technical and Functional Specifications**

4.1. **Data Collection Tool**

- 4.1.1. Networks Benchmarking. The equipment should be capable of benchmarking multiple scenarios of **Voice, SMS and Data** services of least **FIVE (5)** networks simultaneously and continuously. Moreover, it should have capability to expand and include more operators, if required.
- 4.1.2. Technology Support. The equipment shall support all major cellular technologies, including but not limited to GSM/ CDMA/ WCDMA/ HSPDA/ HSUPA/ HSPA+/ LTE/ VoLTE/ LTE-Advance etc. (i.e. 2nd, 3rd & 4th Generation wireless technologies) in all bands/spectrum carrier aggregation in contiguous/noncontiguous bands/ technologies and should be upgradeable to 5G, as and when required.
- 4.1.3. Audio /Video Testing. It should support both Perceptual Evaluation of Speech Quality (PESQ) and Perceptual Objective Listening Quality Analysis (POLQA) voice / video quality Mean Opinion Score (MOS) for both narrow and wide band.
- 4.1.4. Application Based Testing. It should support Application based testing like, Facebook, Twitter, Snapchat, WhatsApp, Netflix etc.
- 4.1.5. Device Type Support. It should provide flexibility to support multiple device types of multiple vendors including but not limited to smartphones, modems and minicards etc.
- 4.1.6. Testing Scenario. It should be able to benchmark all possible testing scenarios in auto technology and locked mode. All the technologies 2G/3G/4G and all the bands can be locked also there should be flexibility to lock/unlock any desired technologies. Moreover, the tool should be able to lock and test specific Broadcast Control Channel (BCCH)/ Primary Scrambling Code (PSC)/ Physical Cell Identity (PCI)/ Absolute Radio Frequency Channel Number(ARFCN)/ Universal Mobile Telecommunication Service (UMTS) Absolute Radio Frequency Channel Number (UARFCN)/ Evolved Universal Terrestrial Radio Access (E-UTRA) Absolute Radio Frequency Channel Number (EARFCN) etc.
- 4.1.7. Channel Capacity. It should support minimum 16 handsets for **Voice, SMS and Data** services simultaneously. It should have capability to benchmark data services of all the operators simultaneously without any dependency on Laptop's modem and without any degradation.
- 4.1.8. Equipment Casing. The equipment casing should be compact and capable of holding the mobile handsets securely in such a way that all mobile handsets are equally exposed to the outer environment for fair benchmarking. Most of the cabling should be fixed and reliable. The cabling that need to be done by the end user should be minimum and easy. The tool should be easy to carry around and can be used in any vehicle.
- 4.1.9. Internal Battery Backup. It should have internal battery to keep the measurement running for at least 15 minutes in case there is some issue with the inverter/power supply.
- 4.1.10. DC/AC Power. The tool should have option to operate both at 12V and 220V.
- 4.1.11. System Stability. The system should be highly stable, robust and reliable. No device should get disconnected due to normal jerks in the vehicle. In case of disconnection there should be visual/audio warning and reconnection can be done easily without any interruption in the measurement.

- 4.1.12. User Control. The testing can be done both manually and script based. Scripting should be easy and user friendly and all the options required for making the scripts should be available. Moreover, the scripts can be saved, imported and exported.
- 4.1.13. Log Files. The system should have the capability of:
- (1). Separate log file for each device/handset.
 - (2). Log files should be saved automatically at the desired folder.
 - (3). Multiple options for saving log files e.g. user can defined the size of log file after which new log files starts automatically in sequential manner.
 - (4). Log files should be encrypted and cannot be modified afterwards.
 - (5). Log files should use Time stamp from the satellite using GPS and not from the laptop.
- 4.1.14. Device Configuration. All the devices should be configurable and device configuration can be saved and reloaded.
- 4.1.15. Custom Workspace. User should have the option to create custom workspaces that can be saved and reloaded.
- 4.1.16. Geo Mapping. The system should have ability to load Geo Maps, Google Maps, tab/shape and network files etc.
- 4.1.17. Data Export. Any parameter can be exported in multiple formats like csv, txt, tab, KML/KMZ etc. both as image and point.
- 4.1.18. Drive Test Routes. The system should be capable:
- (1). To record drive test routes and the same can be imported/exported.
 - (2). To provide facility of navigation like Google Maps to cover the imported route in optimized manner.
- 4.1.19. Tool Display. The equipment should be capable to:
- (1). Display, record, pause and replay the measurements.
 - (2). Display the connected Cells and Neighbors on the map and the approximate distance from the serving cell.
 - (3). Indicate the faults in the run time using audio/visual display.
 - (4). Indicate missing neighbors/high device power/high interference etc.
 - (5). Display the progress of testing in the run time.
 - (6). Display and record all layer2/layer 3 messages, measurement reports and events etc.
 - (7). Display all the events / the desired events during the testing on multiple windows and all the windows should be synchronized.
 - (8). Display different parameter in grid and map and the legends should be configurable.
 - (9). Display the status of the connected/disconnected devices.
- 4.1.20. Operation in Extreme Weather Conditions. The equipment should be able to work continuously for long duration without any distortion/ malfunctioning under extreme weather conditions.
- 4.1.21. Power Inverter. A Universal Power Inverter with output voltage range of RMS 230V -12V DC/5V DC which can easily support the load of the desired tool.
- 4.1.22. User Interface. A laptop with high processor speed of minimum i7, 1TB or above hard disk, 16GB or above RAM is required for User Interface.

- 4.1.23. Standard Support. It should support the recommendations and standard of ITU and ETSI standards related to service quality in particular ETSI 102 250 and ETSI TR 103 559.

4.2. Data Analysis / Post Processing Tool

- 4.2.1 Post Processing of RF Data. Post Processing Tool should automatically post-process RF data from a variety of data collection tools (indoor and outdoor). It should be capable of importing and analyzing log files from multiple RF data collection tools being widely used in telecom industry.

- 4.2.2 Standalone System. It should be standalone system that can be installed on any laptop/desktop.

- 4.2.3 Post Processing Capabilities. Post Processing Tool should have the following capabilities:

- (1). Carryout cell level and operator level analysis.
- (2). Support analysis of multiple log files and log files can be arranged in folders/sub folders as per end user requirement.
- (3). Correlate different parameters as per end user requirement. Different type of correlation options should be available.
- (4). Extract user specific portion of log file for detail analysis and layer 2/Layer3 messages can easily be searched, filtered and analyzed.
- (5). Load configuration files, OSS exports, and other data files from multiple vendors (Huawei, ZTE, Nokia, Ericsson, Alcatel etc.) and provide desired analysis accordingly.
- (6). Post processing tool should be able to provide KPIs per technology, if testing is done in auto mode.

- 4.2.4 Report Generation. Post Processing Tool should be able to generate predefined and user-defined reports and templates which can be used to create reports from any log file or multiple log files from multiple data collection tools widely used in the industry for specific needs and to compare KPIs of multiple operators, technologies and timeframes. Following points need to be considered for the reports:

- (1). Built-in Reports. Generate built-in reports for different technologies that can be configured. All the formulae used in the reports and raw files need to be provided.
- (2). Customized Reports. Support making and saving of customized reports as per end user's requirement and there should be possibility of including specific logo/water mark in the reports.
- (3). Customized KPIs. Support defining customized KPIs and inclusion of customized KPIs in the report, whether it is customized report or built in report.
- (4). Geo Maps. Reports should use integrated geo Maps to visualize and analyze the data.
- (5). Exporting KPIs. Reports should display all the RF parameters/KPIs in grid and maps which can be exported in different formats like txt, csv, xlsx, xls, KML/KMZ etc.
- (6). Technology wise Segregation. Reports should be able to provide KPIs per technology, if testing is done in auto mode.

- (7). Visual Effects. Generated reports should contain graphs, bar charts, tables, maps with different KPIs/events being displayed. The reports and can be extracted in different formats like pdf, word and excel etc.
 - (8). Benchmarking Reports. There should be pre-defined reports for Benchmarking purpose providing comprehensive comparative analysis of multiple operators covering all technologies for voice, SMS and data services. Technology wise as well as overall Benchmarking of the operators will be required.
 - (9). KPIs Formulae & International Standards. All the Formulae used in all the reports need to be provided and should be in accordance with the ITU/ETSI/3GPP etc., standards related to service quality. There should be option to modify the formulae as required after discussion with the end user.
 - (10). Required KPIs. It should provide all the major KPIs related to coverage & quality that is measured for GSM/ CDMA/ WCDMA/ HSPDA/ HSUPA/ HSPA+/ LTE/ VoLTE/ LTE-Advance (i.e. 2nd, 3rd & 4th Generation wireless technologies) and all frequencies allocated to the operators. All relevant KPIs for all services ,voice, data, SMS, MMS, FTP/Http (UL / DL), Video Streaming, Web Browsing, Ping, Social networking (YouTube, Snap Chat, WhatsApp, Twitter, Instagram, etc.) need to be covered in the reports.
- 4.2.5 Reported KPIs. The Data Analysis/Post Processing Tool should be able to:
- (1). Report the KPIs defined in **Para 4.3**, with possibility of including/removing KPIs as desired.
 - (2). Configure customized thresholds values for each KPI/parameter.
 - (3). Provide summary of all the desired KPIs of each operator for number of events below/above thresholds in a single report.
- 4.2.6 Analysis of Abnormal Events. The Post Processing Tool should be able to:
- (1). Perform detailed analysis of abnormal events like Drop Call, Blocked Call, Handover Failure, Inter System Handover Failure etc., with needed recommendations.
 - (2). Identify problematic areas like low coverage, low quality areas, high interference, Pilot Pollution etc.
- 4.2.7 Coverage KPIs. It should be able to provide KPIs related to network coverage and quality measured in 2G, 3G and 4G technologies.
- 4.2.8 List of Supported KPIs. The bidder should provide the list of KPIs for all services (voice, data, SMS, MMS, FTP, UL / DL), Streaming Video, Web Browsing, Ping, Social networking (YouTube, Snap Chat, WhatsApp, Twitter, Instagram etc.), that will be reported by Post Processing Tool.

4.3. QoS KPI & RF Parameters

Following is the list of QoS KPIs/ parameters which has to be provided in addition to other RF related KPIs/parameters for voice, SMS and Data services for all technologies (2G/3G/4G) by both Data Collection and Post Processing Tool:

4.3.1 NGMS Licensed QoS KPIs

- (1). Network Downtime

- (2). Grade of Service
- (3). Service Accessibility
- (4). Call Connection Time
- (5). Call Completion Ratio
- (6). Mean Opinion Score (Average of A2B and B2A, POLQA/PESQ)
- (7). Inter System Handover
- (8). SMS Success Rate
- (9). SMS End-to-End Delivery Time
- (10). Data Throughput (3G & 4G)
- (11). Signal Strength (RSCP & RSRP)
- (12). RAB/E-RAB Setup Success Rate
- (13). Session Abnormal Release Rate

4.3.2 **Other QoS KPIs**

- (1). Drop Call Rate (DCR)
- (2). Inter System Handover Success Rate (CS)
- (3). Inter System Handover Success Rate (PS)
- (4). Call Setup Success Rate (CSSR)
- (5). 2G Signal Strength RxLev (No of samples in customizable Bins)
- (6). 2G Signal Quality RxQual (No of samples in customizable Bins)
- (7). 3G Signal Strength RSCP (No of samples in customizable Bins)
- (8). 3G Signal Quality Ec/No (No of samples in customizable Bins)
- (9). 4G Signal Strength RSRP (No of samples in customizable Bins)
- (10). 4G Signal Quality RSRQ (No of samples in customizable Bins)
- (11). Number of Call Attempts
- (12). Number of Calls Established
- (13). Number of Calls Dropped
- (14). Number of Calls Blocked
- (15). Number of Soft Handover Failures
- (16). Number of Hard Handover Failures
- (17). Number of Intra RAT Handover Failures
- (18). Number of Inter RAT Handover Failure
- (19). Number of Intra Frequency Handover Failures
- (20). Number of Inter Frequency Handover Failures
- (21). Number of Total Handover Attempts
- (22). CSFB Call Setup Time/Call Connection Time
- (23). End-to-End SMS Delivery time
- (24). SMS e2e Delivery Success Rate
- (25). SMS Send Success Rate
- (26). SMS Receive Success Rate
- (27). SMS Send time
- (28). SMS attempts
- (29). Number of SMS attempts
- (30). Number of successful SMS
- (31). RLC Data Throughput (DL/UL)
- (32). MAC Throughput (DL/UL)
- (33). Application Throughput (DL/UL)
- (34). Modulation Scheme(DL/UL)
- (35). User Data Throughput (DL/UL)
- (36). CQI
- (37). SINR
- (38). Session Abnormal Release Rate

- (39). RAB Setup Success Rate
- (40). E-RAB Setup Success Rate
- (41). Round Trip Time (Latency)
- (42). Web Page Access Success Rate
- (43). Web Page Completion Success Rate
- (44). Web Page Download Time
- (45). Packet Loss
- (46). Jitter
- (47). FTP Throughput (DL/UL)
- (48). HTTP Throughput (DL/UL)
- (49). Streaming Service Non-Accessibility
- (50). Streaming Service Access Time
- (51). Streaming Reproduction Cut-off Ratio
- (52). Streaming Reproduction Start Failure Ratio
- (53). Streaming Reproduction Start Delay
- (54). Streaming Setup Success Rate
- (55). Streaming Completion Success Rate
- (56). Streaming Audio Quality
- (57). Streaming Video Quality
- (58). Streaming Audio/Video De-Synchronization
- (59). VoLTE Setup Success Rate
- (60). VoLTE Call Setup Time /Call Connection Time
- (61). VoLTE Call Completion Success Rate

4.4. General Design Requirements

The general design requirements and applicable standards for all electrical, electronic, mechanical and other equipment to be provided by the Bidder for the installation and operation of Testing/Measuring facilities are given below:

4.4.1 Technical Standards

- (1). The components used in the Systems shall be designed so as to comply with any set of the international standards. It must be most stringent, latest and of highest Advance requirement
- (2). The Bidder shall state the standards the proposed equipment is compliant with.

4.4.2 Environmental Conditions

- (1). The Equipment and Software shall be designed and installed so as to perform reliably and efficiently under local climatic conditions in Pakistan:
- (2). The Advance of the Equipment and Software shall be guaranteed under the operating conditions given in table below:

Ambient temperature	-20° C to +60° C
Relative humidity	95 % at +45 °C
Atmospheric pressure	90 to 110 kPa
Altitude	> 3000 meters

- (3). The Bidder shall indicate the international specifications the equipment is compliant with.
- (4). The Equipment shall be designed and installed so as to dissipate heat generated in normal operating conditions, in other words, they must be

designed to operate with natural convection, within the limits and the conditions of temperature and relative humidity defined above.

4.4.3 Mechanical Characteristics

- (1). The weight of the various fully equipped system shall be stated by the Bidder.
- (2). The components of the equipment which can be removed shall be carefully handled.
- (3). The equipment shall be capable of withstanding road bumps and sudden jerks.
- (4). Normal handling during installation and storage shall not have any adverse effects upon the equipment.
- (5). The packaging for shipping and for storage of spares shall be sufficient to protect any fragile or delicate equipment from normal handling and shipping.
- (6). Mechanical shocks during the operation & maintenance (connection of apparatus, switching on and off of the unit, opening and closing of the sub-racks doors, etc.), shall not induce perceptible operation perturbations.
- (7). The components subject to an accidental reversal of polarity shall be identified.
- (8). The mechanical design of the equipment will be such as to avoid the accumulation of dust and air particles.
- (9). The Equipment shall be protected against harmful ambient conditions such as animals, insects, dust, etc., during transport, storage, installation and normal day to day operations.
- (10). The Bidder will provide a catalogue with complete details explaining the mechanical construction of the equipment.

4.4.4 Electromagnetic Environment

- (1). The mechanical design of the Testing/ measuring equipment must be fully compatible with the International Recommendations with regards to the electromagnetic compatibility (*EMC*), electrical discharge (*ESD*) & SAR. The Bidder shall indicate the international specifications the equipment is compliant with.
- (2). Immunity to Electromagnetic Pulses of Nuclear Origin. Immunity to electromagnetic pulses of nuclear origin will be proposed as an option. Documents supplied to PTA should indicate the resistance of the equipment to pulses of nuclear type. The hardware configuration used to obtain the results claimed must be described.

4.4.5 Physico-Chemical Environment

- (1). All the materials made of plastic, rubber, electrical insulating, etc., will be of good quality. The different plastic or rubber parts shall not be degraded by the climatic conditions in Pakistan. The use of inflammable or organic material will be minimized and the materials used for the equipment shall comply with a minimal inflammable class.

4.4.6 Electrostatic Environment

- (1). The Bidder shall indicate the international specifications the equipment is compliant with. The hardware must assure this electrostatic compatibility for rugged and casual usage.

4.4.7 Immunity to Rapid Transitory Electric Perturbations

- (1). The Bidder shall indicate the international specifications the equipment is compliant with.

4.4.8 Power Supply

- (1). Power chargers shall be provided to be used while drive testing in a car or any other battery is made by means of any device chosen by the Manufacturer; this device shall be described by the Bidder.
- (2). Power converters shall be provided with a thermal release protection in case of overheating.
- (3). Moreover, they shall be designed to provide an alarm in overheating conditions (*provisionally*).
- (4). Particular precautions shall be taken to protect the equipment against dangerous high-frequency return paths, excess-voltages and excess-currents.
- (5). The choice of wire and cabling, the layout of the cabling and equipment shall be such that fire shall not propagate beyond the disconnected devices, fuses and circuit breakers.

4.4.9 Software License

- (1). Both Data Collection and Post Processing Tools should be standalone systems.
- (2). Initial validity of the outdoor/indoor/data analysis/post processing tool and all other software including third party software and proprietary software should be at least **FIVE (05) YEARS** and should be extendable on mutual consent basis.
- (3). New updates regarding any software need to be provided free of cost within the validity period of the license Competency & Expertise.
- (4). The bidder shall provide all the expertise to the Client in installation and working of the tool and all its functionalities.

4.5. Other Requirements

4.5.1 Warranty and Technical/Hardware Support

- (1). The successful bidder shall provide free of cost maintenance and technical support services during the **Warranty Period** of **THREE (03) YEARS** starting from the date of issuance of Final Acceptance Certificate (FAC) of the system by the Client.
- (2). The period for correction of defects in the warranty period is thirty (30) days from the return date of the defective equipment in the supplier's premises. Including transport, the repair time duration shall not exceed forty five (45) days.
- (3). Warranty Certificate shall be provided on the stamp paper duly notarized along with the Warranty Cards duly stamped by the company.
- (4). Any part or item of the equipment becomes faulty in the Warranty Period will be replaced with the genuine product at the cost of the bidder and no payment shall be made by the Client in this regard.
- (5). Maintenance Contract will be executed with the Supplier/Vendor for the system beyond the Warranty Period.
- (6). The successful bidder will support systems for fault diagnostics, troubleshooting and upgrades should be well timed and easily accessible with resources to work 24x7 on high severity request for initial period of three (03) years.

- (7). Local technical support shall be made available with required technical expertise.
- (8). The successful bidder shall carry sufficient inventories to assure ex-stock supply of consumable spares. Other spare parts and components shall be supplied as promptly as possible, but in any case within two (2) months of placing the order.

4.5.2 Intervention Procedures during the Warranty Period

Following a serious malfunction, the Client may call for an intervention by e-mail or letter:

- (1). The Bidder must intervene within one week.
- (2). This delay is defined from the time of receipt of the written request of the Client.
- (3). Interventions are possible at any time from 0900hrs to 1700hrs from Monday to Friday (*Pakistan Standard Time*).
- (4). Interventions at other times must be arranged by telephone between the Supplier/Vendor agent and the Project Manager of the Client.
- (5). During the Warranty Period, the following procedures are applicable:
 - (a). Interventions concerning parts of the contracted hardware that are under guarantee shall not be billed.
 - (b). On the other hand, interventions to deal with malfunctions caused by a non-respect of the operating instructions, vandalism, accidents, lightning, fire or other unpredictable causes and which do not involve the responsibility of the Bidder are billable.
 - (c). The Bidder cannot refuse to intervene.

4.5.3 Maintenance Agreement (after the Warranty Period)

- (1). As an option, the Bidder must state the price of Maintenance Agreement for the Client's services covering the hardware in operation, after the expiry of Warranty Period, with mutual consent.

4.5.4 Insurance

- (1). The successful bidder shall be responsible for provision of equipment/system which is insured/ free of cost until the Final Acceptance Certificate (FAC) of the equipment is issued by the Client.

4.5.5 Related Services

Related Services to be provided are:

- (1). Advance of on-site assembly and start-up of the supplied equipment;
- (2). Furnishing of tools required for assembly and maintenance of the supplied equipment;
- (3). Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied Equipment;
- (4). Supervision and repair of the supplied Equipment, for a period of time agreed by the parties, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract;
- (5). Training of the Client's personnel, on-site, in assembly, start-up, operation, maintenance of the supplied Equipment.

4.5.6 Trainings and Documentation

- (1). Free of Cost Training. The successful bidder shall provide the necessary user trainings free of cost prior to product delivery and ongoing training as upgrades are implemented to the staff of the Client.

Training will give the participants an overview of the solution, help them become familiar with its capabilities, and allow them to practice using the solution with generic exercises.

- (2). Training Modules. Training shall be organized in modules, and materials will be produced for each module with an overview, sample exercises and possible solution demonstrations for at least **TEN (10) PERSONS**. Training modules shall include but not limited to:

- (a). Solution Overview
- (b). Parameter Setting and Services Testing
- (c). Post processing and Report Generation
- (d). Diagnostics and Troubleshooting
- (e). Any other Module

- (3). Documentation. The successful bidder shall supply adequate technical and operations documentation for all the parts of the complete solution. The documentation describing the actual version of the supplied system should be delivered electronically as well as hard copies and shall be in English.

4.5.7 Confidentiality, Ethics and Code of Conduct

- (1). The bidder shall undertake to maintain complete confidentiality of all the information, facts, proceedings, decisions, and documents etc. provided to the Client.

5. Evaluation of the Proposals

5.1. Evaluation Process

- 5.1.1. The proposal shall be evaluated in 2 phases: (1) Technical Evaluation and (2) Financial Evaluation.
- 5.1.2. After the deadline for submission of proposals, Technical Proposals shall be opened by the Client on 1130 PST on **28th January, 2020** at the Client HQs, F-5/1, Islamabad, Pakistan.
- 5.1.3. Technical Proposal shall be evaluated in accordance with **Para 5.2.**
- 5.1.4. Financial Proposals shall remain sealed and deposited with Director (Enforcement) of PTA. Upon completion of evaluation of Technical Proposals, the Financial Proposal of qualified bidders will be opened in accordance with **Para 5.3.**
- 5.1.5. During evaluation of the bids, the Client may, at its discretion, ask the Bidder for a clarification of its bid. The request for clarification and the response shall be in writing, and no change in the prices or substance of the bid shall be allowed, offered, or permitted.

5.2. Evaluation of Technical Proposals

- 5.2.1. The evaluation committee, appointed by the Client will evaluate each Technical Proposal by assessing the documents submitted with technical proposal based on the following Evaluation Criteria.
 - (1). The bidder has to comply with the minimum mandatory requirements as set out at **Annexure I.D.**
 - (2). The initially qualified bidders as per **Sub-Para (1) of Para 5.2.1** will further be evaluated as per criteria defined below.

Domain	Field	Marks	Criteria
Data Collection Tool	Alarms and Notification of Failure events like Call drop, blocked call etc.	1	Yes/No
	Carrier aggregation	3	3G Carrier Aggregation =1; LTE Intra Band Carrier aggregation =1; LTE Inter Band Carrier aggregation =1;
	Carrier (ARFCN/UARFCN/EARFCN) Locking	3	One Mark each for 2G,3G &4G carrier locking
	Displaying high interference & Pilot Pollution	1	Yes/No
	Displaying missing neighbors	1	Yes/No
	Distance from Serving cells	1	Yes/No
	Equipment casing	5	Compactness =1, Exposure of all handset equally to the outer environment =2; Protection &

Domain	Field	Marks	Criteria
			stability of Mobile handsets/equipment =2
	Geo Mapping	1	Yes/No
	Internal Battery Backup	5	Backup < 15 min = 0, Backup ≥15 & <30 min = 2 Backup ≥30 min = 3
	Mini Card support	1	Yes/No
	PCI Locking	1	Yes/No
	PSC locking	1	Yes/No
	Route Navigation	1	Yes/No
	Time stamp from the satellite using GPS	2	Yes/No
	Video Testing	5	Video testing possible = 2 marks; Video KPI available as defined in SECTION 4 of bidding document = 3 marks
	VoLTE	5	VoLTE testing possible = 2 marks; VoLTE KPI available as defined in SECTION 4 of bidding document = 3
Data Collection Tool Total		37	
Experience	Experience of Key team members for installing, troubleshooting and providing after sales services	3	Exp ≥ 5 year =1; Exp ≥10 =2; Exp ≥15 = 3
	Experience of providing Similar Tools: Industry Side (>5)	3	Disqualified if <5; One mark for each additional
	Experience of providing Similar Tools: Regulator Side (>2)	3	Disqualified if <2; One mark for each additional
	Experience of the experts in Drive Testing and RF Planning & Optimization	3	Exp ≥ 5 year =1; Exp ≥10 =2; Exp ≥15 = 3
Experience Total		12	
Post Processing Tool	Analysis of Abnormal events (Call drop, Blocked call, Handover Failure, Inter system Handover Failure, Recommendation)	5	One Mark for each
	Application testing	5	One Mark for one application
	Benchmarking Reports	5	Availability of Benchmarking Report =2; All Licensed KPIs available in a single Benchmarking Report = 3
	Extracting specific portion of log file	1	Yes/No
	Inclusion of Geo Maps in the reports	1	Yes/No
	Organization of Log files in Post Processing unit	5	Log files can be arranged in folders/sub folders =2; Complete Folder can be loaded into the Post Processing Unit along with

Domain	Field	Marks	Criteria
			sub folders having names as set =3
	Setting thresholds for KPIs in customized reports	1	Yes/No
	Setting thresholds for KPIs in pre-defined reports	1	Yes/No
	Summary of KPIs breaching set threshold (i.e. Percentage of samples breaching threshold or No of calls breaching threshold)	1	Yes/No
	Technology wise segregation in reports	3	Yes/No
	Video streaming	1	Yes/No
	Visual effects in Reports	2	Availability of data in Graphical format like Bar chart, line chart, pie chart etc. in the report =1; Availability of data in tabular format in the reports = 1
Post Processing Tool Total		31	
Practical Demonstration	Data Collection Unit	5	To be assessed by the Committee
	Data Processing Unit	5	
	KPIs & Reports	5	
Practical Demonstration Total		15	
Proposal Submission	Proposal Submission	5	Proposals properly marked & sealed =1; Proposal properly arranged with page numbers =1; All required Annexures filled as per desired format =2; soft copies provided =1
Proposal Submission Total		5	
Total		100	

- 5.2.2. A bidder will be declared technically qualified if it meets the required minimum specifications of the system defined at **sub-Para (1) of Para 5.2.1** above and obtains at least 80% marks in Technical Evaluation as per evaluation criteria mentioned at **Sub-Para (2) of Para 5.2.1**.

5.3. Evaluation of Financial Proposals

- 5.3.1. After Technical Proposal Evaluation is completed, the Client shall notify the bidder whose proposals did not meet the minimum qualifying marks (80%) or were considered nonresponsive to the minimum specification defined at **Sub-Para (1) of Para 5.2.1** of the bidding document, indicating that their Financial Proposals will be returned unopened. The Client shall simultaneously notify the bidder(s) securing the minimum qualifying marks during Technical Evaluation, indicating the date and time set for opening the Financial Proposals. The opening date shall be informed in advance. The notification may be sent by courier

- letter/electronic mail/ facsimile etc. The list of successful bidders of technical evaluation shall be uploaded on the Client's website (www.pta.gov.pk).
- 5.3.2. The Financial Proposals shall be opened in the presence of the authorized representatives of the successful bidders of Stage 1 who choose to attend.
- 5.3.3. The name of the bidder, the technical evaluation scores, and the financial bid shall be read aloud and recorded. The Client shall prepare minutes of the financial bid opening session.
- 5.3.4. The contract shall be awarded to the bidder with the lowest financial bid. In case two or more bidders quote same bid, the contract shall be awarded to the bidder securing highest marks in Technical Evaluation.

5.4. Disqualifications

- 5.4.1. Offers are liable to be rejected if; there is any deviation from the instructions as laid down in the bidding document.
- 5.4.2. Partial pricing of Quoted Solution shall not be accepted as contract will be awarded to a single successful bidder.
- 5.4.3. Splitting of bid in parts is not allowed.
- 5.4.4. Financial bid is submitted without 2% bid security or
- 5.4.5. Offers are received after specified date and time.
- 5.4.6. GST and NTN certificates are not attached.
- 5.4.7. Details Local Representation is not provided
- 5.4.8. Supplier is not authorized dealer/distributor from the manufacturer of the equipment
- 5.4.9. If there is any overwriting and cutting in the submitted Technical and Financial Proposals

6. Award of Contract

The contract shall be awarded to the bidder selected after technical & financial evaluation. The assignment is expected to commence immediately upon Effective Date of Contract.

6.1. The Letter of Intent (LoI)

- 6.1.1. The Client shall issue a Letter of Intent (LoI) to the selected bidder immediately upon acceptance of the bid. The selected bidder, within 07 days of the issuance of the LoI, will sign the contract after fulfilling all the formalities/pre-conditions mentioned in the Letter of Intent. The selected bidder shall commence the assignment on receipt of LoI and as per schedule given in the contract.

6.2. Corrupt or Fraudulent Practices

- 6.2.1. The Client requires that Bidders/Suppliers/Contractors observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Client defines, for the purposes of this provision, the terms set forth below as follows:

“**Corrupt and Fraudulent Practices**” includes the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official or the supplier or contractor in the procurement process or in contract execution to the detriment of the procuring agencies; or misrepresentation of facts in order to influence a procurement process or the execution of a contract, collusive practices among bidders (prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the procuring agencies of the benefits of free and open competition and any request for, or solicitation of anything of value by any public official in the course of the exercise of his duty;

- 6.2.2. Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;
- 6.2.3. Will declare a firm ineligible, either indefinitely or for a stated period of time, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for any contract within Pakistan.

Annexure I: List of Technical Proposal Forms

Annexure I.A

Covering Letter

[Location, Date]

To:

Director (Enforcement-Wireless)

Pakistan Telecommunication Authority

PTA HQs, F-5/1, Islamabad, Pakistan

Sir,

I/We, the undersigned, offer to provide the Automated QoS Benchmarking tool capable of simultaneous and continuous monitoring and benchmarking of at least five (5) mobile operators in accordance with your Bidding Document and our Proposal. I/We hereby submit our Proposal which includes separately sealed **Technical Proposal** and **Financial Proposal** along with 2 % Bid Security in a sealed envelope.

I/We, undertake that all requirements mentioned at **SECTION 3&4** of the Bidding Document have been fully responded in the Technical Proposal.

Our Proposal is binding upon us and cannot be modified after the submission and that we are willing to demonstrate our tool in Islamabad as required by PTA.

I/We understand you are not bound to accept our Proposal.

Yours,

Authorized Signature:

Name and Title of Signatory:

Name of Firm:

Address:

Cell:

Tel:

Fax:

Email:

Annexure I. B Details of Local Partners/Authorized Dealers/Supplier

General: < In addition to the questions and forms in this section, take as much space as desired for your responses. >

Number of Local Partners/Authorized Dealers/Supplier in Pakistan: _____

Using the format below, provide information on each local partner/authorized dealer/supplier of your tool in Pakistan

Name of firm of Local Partner/Supplier/Dealer

Address

NTN Number

Name listed in ATL (YES/NO)

Date of Engagement with the Bidder's Firm

Nature of engagement with the Bidder's Firm

Name of Clients being Served in Pakistan by the
above mentioned local Partner/Supplier/Dealer

Areas (Region) of Pakistan being served by the local
partner/Authorized dealer/Supplier

Registration Documents as a Firm/Company

Details of POCs for Local Partner/Authorized Dealer/Supplier

#	Name	Designation	CNIC	Mobile Number	Landline Number	Email

Bidder's Name: _____

Signature:

Date:

Annexure I. C The Bidder Firm's References

Supply of Similar Tools to Other Regulators/Vendor/Operators That Best Illustrate Expertise

General: < In addition to the questions and forms in this section, take as much space as desired for your responses. >

.

Using the format below, provide information on each assignment for which your firm/entity, either individually or as a corporate entity was legally contracted.

Name of Client	
Type of Client (Regulator/Vendor/Operator)	
Country	
Type of Tool Provided with Version	
Quantity of tools provided	
Date of Provision of Equipment	
Details of Service Provided, if any	

Firm's Name: _____

Annexure I. D Initial Qualification Check List

Part A) General Requirement

- 1 Firm has to produce Sales Tax and Income Tax Registration. Enclose Documentary proof
- 2 Firm is on Active Tax Payers List of FBR. Documentary proof is to be attached.
- 3 Firm has to produce authorised dealer/ distributor certificate from the manufacturer. Enclose Documentary proof.
- 4 Affidavit that firm/company has never been black listed from any Govt. /Semi Govt./ Autonomous body. . Enclose Documentary proof.
- 5 Certificate that Bid security is enclosed with the financial bid.
- 6 Minimum 5 years of relevant experience of firm/company. Documentary proof is to be attached.
- 7 Provision of Similar Tool to at least 2 or more Regulators as per below table and the documentary proof is to be attached.

	Regulator 1	Regulator 2
Name of Regulator		
Country of Regulator		
Date of Supply of Automated QoS Tool		
Number of Data Collection Units provided		
Number of Post Processing Units provided		
Number of Handsets supported by the Outdoor Unit Provided		
Number of Operators to be Benchmarked Simultaneously		
Supported Technologies to be benchmarked		
Brief description of Supplied QoS Tool		

- 8 Provision of Similar Tool to at least 5 or more Operators/Vendors (O/P) as per below table and the documentary proof is to be attached.

	O/P 1	O/P 2	O/P 3	O/P 4	O/P 5
Name of Operator/Vendor					
Country of Operator/Vendor					
Date of Supply of Automated QoS Tool					
Number of Data Collection Units provided					

Number of Post Processing Units provided					
Number of Handsets supported by the Outdoor Unit Provided					
Number of Operators to be Benchmarked Simultaneously					
Supported Technologies to be benchmarked					
Brief description of Supplied QoS Tool					

Part B) Technical Requirement

S/N	Category	YES/NO
0		
1	Support 5 Operator simultaneously for voice, SMS & Data testing	
2	ETSI Standards being followed particularly 102 250 being followed	
3	Licensed KPIs defined in bidding document can be measured	
4	Generation of DT maps using GPS	
5	Tool Capable of Indoor testing	
6	License KPIs can be reported using Post processing Tool	
7	Measurement of 2G/3G/4G technologies simultaneously	
8	Support PESQ and POLQA	
9	Support minimum 15 handsets/Cards	
10	Tool can operate at 12 V DC and 220 V AC	
11	Script making for testing	
12	Availability of Separate log file for each handset/Minicard	
13	Encryption of Log file	
14	Data export in csv/tab/kmz/kml etc.	
15	Measurement recording, pause & replay	
16	Display of measurement progress	
17	Recording of Layer2/layer 3 messages , events etc.	

- 18 Availability of Power inverter
- 19 Laptop Requirement defined in bidding document fulfilled
- 20 Availability of Cell Level & Operator Level Analysis
- 21 Support for the analysis of Multiple log file simultaneously
- 22 Availability KPI per Technology in auto mode testing
- 23 Availability of Pre-defined reports
- 24 Provision of Customized report
- 25 Provision of Licensed KPI available in Report(s)

Annexure II. List of Financial Proposal Forms

Annexure II.A Financial Proposal Submission Form

[Location, Date]

To:

Director (Enforcement-Wireless)

Pakistan Telecommunication Authority

PTA HQs, F-5/1, Islamabad Pakistan

Sir,

I/We, the undersigned, offer to provide the *Automated QoS Monitoring and Benchmarking Tool in* accordance with your Request for Proposal and our Proposal (Technical and Financial Proposals). Our attached Financial Proposal is for the sum of [Amount in words and figures]. The amounts are inclusive of all applicable taxes in Pakistan.

Our Financial Proposal shall be binding upon us and will remain valid for **ONE HUNDRED & EIGHTY (180) DAYS** from the date of submission i.e. _____

We understand you are not bound to accept our Proposal.

Yours,

Authorized Signature:

Name and Title of Signatory:

Name of Firm:

Address:

Cell:

Tel:

Fax:

Email

Annexure II.B Pricing of Quoted Solution (Hardware/Software/O&M)

Sample detail of the equipment is given, however, the bidder can include the details as per the nature of the solution

Item	Description	Qty.	Unit Price	Total Price
Hardware for Handset	Model of Handset and brief Description	48	x	48x
GPS	Model, Manufacturer detail etc.	3	y	3y
Equipment Casing		3	z	3z
Software for Handset, if any		48		
Software for the Data Collection Tool		3		
Power Solution for Data Collection Unit & Charging of laptop and Handsets		3		
Laptop with Power Supply		3		
Software for Data Analysis Unit		3		
Connecting Cables for the Handsets		48 x set		
Maintenance Agreement (After Expiry of Warranty Period)				
-				
TOTAL				
Name of Bidder ----- ----- Signature of Bidder ----- -----				

ANNEXURE III: CONTRACT AGREEMENT

SUPPLY OF AUTOMATED QUALITY OF SERVICE MONITORING AND BENCHMARKING TOOL

Between

Pakistan Telecommunication Authority (PTA)

and

----- Name of bidder

Date: _____

(This Contract is signed in two sets of original, one each for both the parties)

Annexure III.A Form of CONTRACT

Lump-Sum

THIS Supply and Related Service/Maintenance Agreement (the “Agreement”) for **the supply and procurement of an** Automated QoS Monitoring and Benchmarking Tool is made on this day _____ 2019;

By and Between

Pakistan Telecommunication Authority, a statutory body established under Pakistan Telecommunication (Re-organization) Act, 1996, having its principle office at PTA H/Q, F-5/1, Islamabad (hereinafter referred to as “Client” which expression shall where the context admits include its administrators and assigns) of the One Part

And

_____ through
Mr.....
bearing CNIC having place of
business
at.....
..... hereinafter referred to as “**the Supplier/Vendor**,” which expression shall
where the context so allows include his/its successors-in-interest, executors, administrators, heirs and
permitted assigns) of the **Other Part**

(If when and where applicable the Party of the One Part and Party of Other Part shall hereinafter be collectively referred to as ‘Parties’ and individually as ‘Party’ as the context of this Agreement requires).

WHEREAS

- A. Client is desirous of procuring an Automated QoS Monitoring and Benchmarking Tool (Hereinafter referred to as “**System**”).
- B. The Supplier/Vendor is a _____ (*details of incorporation*) which represents to the Client that it has the relevant expertise and holds valid and subsisting licenses/permissions, authorizations/approvals required from the Government of Pakistan, and that it has the requisite expertise and resources to provide top quality system and incidental services works as per Bidding Documents/ technical Specification/BoQ to the Client in accordance with highest industry standards and satisfaction of the Client. The Contractor undertakes that the Services shall be provided only through the staff/ labour/ workforce that has the requisite expertise and experience in this regard.
- C. Upon the basis of the representations and warranties of the Supplier/Vendor contained herein, the Client wishes to appoint the Vendor/Supplier to provide the System and Related Services at _____ the quoted price of _____ Rs. _____ inclusive of all taxes.

NOW THEREFORE, for the consideration provided herein the representation and warranties, covenants, conditions and promises contained herein below and intending to be legally bound, the Client and Supplier/Vendor hereby agree as follows:

1. Scope of Agreement

- 1.1. Subject to terms and conditions of this Agreement the **Supplier/Vendor** agrees to provide **the system** as per requirements prescribed under **Bidding Documents to this agreement;**

2. Agreement Documents

- 2.1 In this Agreement, except as otherwise provided, the words, expressions and/or phrases shall have the meaning as defined in the Agreement and documents. The following documents shall be deemed to form, and be read and construed as and integral part of this Agreement:

- (1). Invitation to bid
- (2). Bidding documents
- (3). Bill of Quantity (BoQ)
- (4). General conditions of Contract/ Special Stipulations.
- (5). Addenda and Corrigenda, if any, issue by the clients and duly accepted by the contractor at the signing of the Contract.
- (6). Bid security
- (7). Advance Bank Guarantee
- (8). Performance Bank Guarantee
- (9). Form of Agreement/ Contract Agreement
- (10). Clients order to commence the work.
- (11). Limit of Bank Guarantee.
- (12). Any Correspondence by the Client/Contractor mutually accepted by the Client and the Supplier/Vendor.

3. Terms

- 3.1. Upon signing of this Agreement the Supplier/Vendor shall be obligated to start work on specified location by Client within **07 days** and complete it within projected time **..... Calendar days**. In case of failure the Client will be entitled to deduct any amount payable to the Supplier/Vendor and assign the work to any other Supplier/Vendor at its discretion.

4. Definitions

- 4.1. "Applicable Law" means the laws and any other instruments having the force of law in Pakistan from time to time.
- 4.2. "BIDDING DOCUMENTS" means the documents issued by the Client on _____, **2020** for acquiring **Automated QoS Monitoring and Benchmarking tool**.
- 4.3. "Client" means "Pakistan Telecommunication Authority", purchasing the Goods and Related Services, as specified in the CONTRACT.
- 4.4. "CONTRACT" means the CONTRACT Agreement signed by the Parties and all the attached documents listed in its General Conditions (GC), Special Conditions (SC), and the Appendices.
- 4.5. "CONTRACT Documents" means the documents listed in the CONTRACT Agreement, including any amendment thereto.
- 4.6. "CONTRACT Price" means the total price payable to the Supplier as specified in CONTRACT, subject to such additions and adjustments thereto or deductions there

from, as may be made pursuant to the CONTRACT for provision of Automated QoS Monitoring and Benchmarking Tool.

- 4.7. "Day" means calendar day unless provided otherwise.
- 4.8. "Effective Date" means the date on which this CONTRACT comes into force and effect pursuant to Clause 2.1 of GC.
- 4.9. "GC" mean the General Conditions of this CONTRACT.
- 4.10. "Party" means the Client or the bidder, as the case may be, and "Parties" means both of them.
- 4.11. "Goods" means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Client under this CONTRACT.
- 4.12. "Related Services" means the services incidental to the supply of the goods, such as insurance, installation, training and initial maintenance and other such obligations of the Supplier under this CONTRACT.
- 4.13. "Supplier/Vendor" means the natural person, private or joint venture, consortium, or a combination of the above, whose bid to perform the CONTRACT has been accepted by the Client.

5. Law Governing Contract

5.1. This CONTRACT shall be construed and enforced according to the Laws of Pakistan.

6. Language

- 6.1. This CONTRACT has been executed in English language, which shall be the binding and controlling language for all matters relating to the meaning or interpretation of this CONTRACT.

7. Joint Venture, Consortium or Association

- 7.1. If the Supplier/vendor is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Client for the fulfilment of the CONTRACT and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The lead company serving as the authorized representative shall be responsible for the complete delivery of the solution. The composition or the constitution of the joint venture, consortium, or association shall not be altered without the prior consent of the Client.

8. Interpretation

- 8.1. The headings in this Contract are for reference purposes only and shall not affect the meaning or construction of the clauses to which they relate.
- 8.2. Any reference in this Contract to the singular shall include reference to the plural and vice versa unless the context otherwise requires.
- 8.3. References to clauses and Appendices are references to clauses and Appendices to this Contract, unless the context otherwise requires.
- 8.4. References to any statute, statutory instrument, regulation, legislation or ordinance (whether of Federal or Provincial level) shall be interpreted as a reference to the same as amended by any subsequent variation, modification or re-enactment.
- 8.5. In the event of any conflict or inconsistency between the clauses and Appendices of this Contract, the former shall prevail.

9. Entire Agreement

- 9.1. The CONTRACT constitute the entire agreement between the Client and the Supplier/vendor and supersedes all communications, negotiations and agreements (whether written or oral) of the parties with respect thereto made to the effective date of CONTRACT.

10. Fraud and Corruption

- 10.1. Supplier is under obligation to avoid and refrain from any fraudulent or corrupt practices directly or indirectly as defined under this CONTRACT. However, if the Client determines that the Supplier/vendor or any of its personnel has engaged in corrupt, collusive, coercive, obstructive or continued delaying practices, in completing for or in executing the CONTRACT, then the Client may, after giving **FIFTEEN (15) DAYS** notice to the Supplier, terminate the CONTRACT, and the provisions of **GC Clause 16.5** shall apply as if such expulsion had been made under **Sub-Clause (3) of GC Clause 16.5.1**.
- 10.2. For the purposes of this Sub-Clause, the terms set-forth below are defined as follows:
- 10.2.1. “**Corrupt and Fraudulent Practices**” includes the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official or the supplier or contractor in the procurement process or in contract execution to the detriment of the procuring agencies; or misrepresentation of facts in order to influence a procurement process or the execution of a contract, collusive practices among bidders (prior to or after bid submission) designed to establish bid prices at artificial, non-competitive levels and to deprive the procuring agencies of the benefits of free and open competition and any request for, or solicitation of anything of value by any public official in the course of the exercise of his duty;

11. Notices

- 11.1. All notices, requests or consents required hereunder shall be in writing and shall have been properly served, delivered by hand, sent by mail, facsimile or telex or any other electronic means to the addresses given below, as applicable, or such different address as a Party may designate from time to time. Any notice, request or consent by mail shall be sent through Registered Post or Courier Services as the case may be. Any notice shall be deemed to have been given:
- on the day it is delivered, if delivered by hand;
 - the day it is sent, if sent by facsimile, e-mail or telex;
 - 5 days after the date of posting, if sent by registered post/courier.

The addresses are:

Client:	Pakistan Telecommunication Authority, PTA Head Quarters Building, F-5/1, Islamabad, Pakistan.
Attention:	Director (Enforcement-Wireless), PTA
Tel:	+92-51-9221444
Fax:	+92-51-2878139
Email	enf.qos@pta.gov.pk

Bidder: _____
Authorized Representative: _____
Attention: _____
Tel: _____
Fax: _____
Email: _____

12. Waiver

- 12.1. No failure by either party to exercise any right or remedy available to it hereunder nor any delay to exercise any such right to remedy shall operate as a waiver of it nor shall any single or partial exercise of any right or remedy preclude any other or further exercise thereof or the exercise of any other right or remedy.

13. Severability

- 13.1. If any provision of this Contract shall be found by any Court, Arbitrator or Administrative body of Competent Jurisdiction to be invalid or unenforceable, such provision shall be deemed to have been deleted without affecting the remaining provisions of this Agreement.

14. Settlement of Disputes

14.1. Amicable Settlement of Disputes

- 14.1.1. Any dispute between the Parties as to matters arising pursuant to this CONTRACT that cannot be settled amicably within **FIFTEEN (15) DAYS** after receipt by one Party of the other Party's request for such amicable settlement may be submitted by either Party for settlement in accordance with the provisions specified in the **GC Clause 17**. In such case the parties will go for arbitration proceedings in accordance with the provisions of the Arbitration Act, 1940 of Pakistan at Islamabad.

14.2. Dispute Resolution

- 14.2.1. If the parties are unable to reach an amicable settlement of a dispute under this contract, the parties agree that this dispute resolution mechanism shall be settled by arbitration in accordance with the provisions of the Arbitration Act, 1940 of Pakistan, at Islamabad Pakistan.

15. Taxes and Duties

- 15.1. The Supplier shall pay all taxes, duties, fees, levies and other impositions levied under the applicable Laws of Pakistan, the amount of which is deemed to have been included in the CONTRACT Price and any taxes, duties, fees, levies and other impositions that may be levied by the Government after the signing of this CONTRACT, otherwise if not included, same shall be deducted (if required) from the payments of bidder, or payable by them as per applicable laws of Pakistan for the time being enforced. Client will deduct the applicable taxes and duties as per law prevalent at the time of payment which may differ from the amount at the time of CONTRACT as per **GC Clause 23.2**.
- 15.2. The bidder shall be liable to pay all taxes and duties in accordance with the laws of Islamic Republic of Pakistan.

16. Commencement, Completion, Modification and Termination of CONTRACT

16.1. Effectiveness of CONTRACT

- 16.1.1. The Commencement date of this CONTRACT shall be the date of execution of this contract. The Effective Date is _____, 201x.

- 16.2. Delivery of Goods
- 16.2.1. The Automated QoS Monitoring and Benchmarking Tool shall be delivered by the Supplier within **TWELVE (12) WEEKS** from the Effective Date.
- 16.3. Expiration of CONTRACT
- 16.3.1. The contract will remain effective till Warranty Period defined in **GC Clause 19.4.2** unless terminated earlier pursuant to **GC Clause 16.5.**
- 16.4. Modifications or Variations
- 16.4.1. Any modification or variation of the terms and conditions of this CONTRACT, including any modification or variation in supply of Goods and Related Services, may only be made in writing and mutual consent of the Parties. However, each Party shall give due consideration to any proposals for modification or variation made by the other Party.
- 16.5. Termination
- 16.5.1. By the Client
- The Client, in the following circumstances may terminate this contract by giving a notice in writing, for a period of **FIFTEEN (15) DAYS** unless otherwise required:
- (1). If the Client is not satisfied with the standard of Automated QoS Monitoring and Benchmarking Tool, it may by written notice require the bidder to remedy any defective item within 15 days of the receipt of such a notice. The Client, however, may terminate this CONTRACT with immediate effect if it is not satisfied with the standard of any such remedial work under taken by the Bidder.
 - (2). If the Supplier becomes insolvent or bankrupt.
 - (3). If the Supplier or any of its personnel, in the reasonable judgment of the Client supported by evidence, has engaged in corrupt , fraudulent, collusive, coercive or obstructive practices as defined in **GC Clause 10.2**, in competing for or in executing the CONTRACT.
 - (4). If the Advance in whole or part of any obligation under this CONTRACT is prevented or delayed by the reasons of Force Majeure defined in **GC Clause 18** for a period exceeding **NINTY (90) DAYS**.
 - (5). If the Supplier fails to comply with any final decision reached as a result of arbitration proceedings pursuant to **GC Clause 14.2**, hereof.
 - (6). If the Client, in its sole discretion and for any reason whatsoever, decides to terminate this CONTRACT.
- 16.5.2. By the Supplier/Vendor
- The Supplier, by giving a notice in writing, may terminate this CONTRACT, by not less than **FIFTEEN (15) DAYS** written notice to the Client, such notice to be given after the occurrence of any of the events specified below in this GC:
- (1). If the Client fails to make payments due to the bidder pursuant to this CONTRACT and not subject to dispute pursuant to **GC Clause 14.1** hereof within one month after receiving written notice from the bidder that such payment is overdue.
 - (2). If the Advance in whole or part of any obligation under this CONTRACT is prevented or delayed by the reasons of

Force Majeure defined in **GC Clause 18** for a period exceeding **NINTY (90) DAYS**.

- (3). If the Client fails to comply with any final decision reached as a result of arbitration pursuant to **GC Clause 14.2** hereof.

16.6. **Sanctions**

- 16.6.1. The Client will sanction the Supplier/Vendor, including declaring the Supplier ineligible, either indefinitely or for a stated period of time, to be awarded any CONTRACT if it at any time determines that the bidder has, directly or through an agent or its personnel, engaged in corrupt, fraudulent, collusive or coercive practices in competing for, or in executing, this CONTRACT;

17. Force Majeure

- 17.1.1. If at any time, during the continuance of this contract, the Advance in whole or in part, by either party, of any obligation under this is prevented or delayed, by reason of war, or hostility, acts of the public enemy, civic commotion, sabotage, Act of State or direction from Statutory Authority, epidemic, quarantine restriction, strikes and lockouts, fire, floods, natural calamities or any act of GOD (*hereinafter referred to as "Event"*), provided notice of happenings of any such Event is given by the affected party to the other, within 21 Calendar days from the date of occurrence thereof, neither party shall, by reason of such event, be entitled to terminate this contract, nor shall either party have any such claims for damages against the other, in respect of such non-Advance or delay in Advance provided the contract shall be resumed as soon as practicable, after such Event comes to an end or ceases to exist. The decision of the Government as to whether the service may be so resumed (and the time frame within which the service may be resumed) or not, shall be final and conclusive, provided further that if the Advance in whole or part of any obligation under this contract is prevented or delayed by reason of any such event for a period exceeding **NINTY (90) DAYS** either party may, at his option terminate the contract.

18. Obligations of the Supplier

18.1. **Standard of Advance**

- 18.1.1. The Supplier shall provide the Goods and perform the Related Services, with due diligence, skill, professionalism efficiency with professional standards, observing sound management practices, materials and methods. The Supplier shall always act, in respect of any matter relating to this CONTRACT. And shall at all times support and safeguard the Client's legitimate interests in any dealings with third Parties.

18.2. **Conflict of Interest**

- 18.2.1. The Supplier shall hold the Client's interests paramount, without any consideration for future work, and strictly avoid conflict with other assignments or its own corporate interests.

18.2.2. **Supplier not to Benefit from Commissions, Discount**

The payment of the Supplier pursuant to **GC Clause 24** shall constitute the payment in connection with this CONTRACT, and the Supplier shall not accept for its own benefit any trade commission, discount, or similar payment(s) in connection with activities pursuant to this CONTRACT or to the Related Services or in the discharge of its

obligations under the CONTRACT, and the Supplier shall use its best efforts to ensure that the Personnel, representatives, and agents of any of the Party to this CONTRACT shall not receive any such additional payment(s).

18.3. Confidentiality

18.3.1. Except with the prior written consent of the Client, the Supplier and the Personnel shall not at any time communicate or disclose to any person or entity any confidential information acquired during the execution of this CONTRACT.

18.4. Warranty

18.4.1. The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the CONTRACT.

18.4.2. The Supplier shall provide the maintenance and technical support services free of cost during the warranty period of **THREE (3) YEARS** starting from the date of issuance of Final Acceptance Certificate by the Client.

18.4.3. The period for correction of defects in the warranty period is **THIRTY (30) DAYS** from the return date of the defective equipment in the supplier's premises. Including transport, the repair time duration shall not exceed **FORTY FIVE (45) DAYS**.

18.4.4. Any part or item of the equipment becomes faulty in the Warranty Period will be replaced with the genuine product at the cost of the Supplier and no payment shall be made by the Client in this regard.

18.5. Client Approval

18.5.1. The Supplier shall obtain the Client's prior approval in writing before entering into a subcontract for the delivery of Automated QoS Monitoring and Benchmarking tool.

18.6. Appointment of Liaison Officer

18.6.1. The Supplier shall nominate a focal person as liaison officer to act as the primary point of contact for the Client. The Supplier/Vendor shall provide complete contact details of Liaison officer.

19. Training and Documentation

19.1. Free of Cost Training

19.1.1. The Supplier shall provide the necessary user trainings, free of cost, prior to product delivery and ongoing training as upgrades are implemented. Training will give the participants an overview of the solution, help them become familiar with its capabilities, and allow them to practice using the solution with generic exercises.

19.2. Training Modules

19.2.1. Training shall be organized in modules, and materials will be produced for each module with an overview, sample exercises and possible solution demonstrations for at least TEN (10) PERSONS. Training modules shall include but not limited to:

- (1). Solution Overview
- (2). Parameter Setting and Services Testing
- (3). Post processing and Report Generation
- (4). Diagnostics and Troubleshooting

(5). Any Other Module

19.3. Documentation

19.3.1. The Supplier shall supply adequate technical and operations documentation for all the parts of the complete solution. The documentation describing the actual version of the supplied system should be delivered electronically as well as hard copies and shall be in English.

19.4. Document Prepared by the Supplier to be the Property of the Client

19.4.1. All plans, specifications, designs, reports and other documents, submitted by the Supplier under this CONTRACT shall become and remain the property of the Client with all allied rights and titles, including the Copy Rights and Intellectual Property Rights thereof, and the bidder shall, not later than upon termination or expiration of this CONTRACT, deliver all such documents to the Client, together with a detailed inventory thereof.

20. Technical/Hardware Support

20.1. The Supplier will support systems for fault diagnostics, troubleshooting and upgrades should be well timed and easily accessible with resources to work 24x7 on high severity request for initial period of **THREE (03) YEARS**.

20.2. Local technical support should be available with required technical expertise.

20.3. The Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spares. Other spare parts and components shall be supplied as promptly as possible, but in any case within **TWO (2) MONTHS** of placing the order.

20.4. A separate Service Level Agreement (SLA) will be executed with the vendor for Operation and Maintenance (O&M) of the system beyond the Warranty Period on mutually agreed terms.

21. Software Licenses

21.1. Both Data Collection and Post Processing Tools should be standalone systems.

21.2. Initial validity of the outdoor/indoor/data analysis/post processing tool and all other software including third party software and proprietary software should be at least **FIVE (05) YEARS** and should be extendable on mutual consent basis.

21.3. New updates regarding any software need to be provided free of cost within the validity period of the license Competency & Expertise.

21.4. The Supplier shall provide all the expertise to the Client in installation and working of the tool and all its functionalities.

22. Obligations of the Client

22.1. Assistance and Exemption

22.1.1. The Client shall use its best efforts to ensure that the Government shall provide the Supplier such assistance and exemptions as possible for the Client.

22.2. Change in the Applicable Law related to Taxes and Duties

22.2.1. If, after the date of this CONTRACT, there is any change in Applicable Law with respect to taxes and duties which increases or decreases the cost incurred by the bidder in provide the required tool, then the remuneration and reimbursable expenses otherwise payable to the Supplier under this CONTRACT shall be increased or decreased

accordingly by agreement between the parties, and corresponding adjustments shall be made to the amounts referred to in **GC Clauses 24.2**. The applicable changes will only take effect when reduced to writing and signed by both the parties.

23. Payments to the Supplier

23.1. Lump-Sum Payment

23.1.1. The total payment due to the Supplier, in consideration of the provision of Automated QoS Monitoring and Benchmarking Tool under this Contract, shall not exceed the CONTRACT Price which is an all-inclusive fixed lump-sum covering all costs required to provide QoS tool as specified in Appendix-A and Appendix-B. The CONTRACT Price may only be increased above the amounts stated in **GC Clause 24.2** if the Parties have agreed to additional payments.

23.2. CONTRACT Price

23.2.1. Total Contract price inclusive of all taxes, duties, fees, levies, and other charges imposed under the applicable law in Pakistan in PKR is (Rs _____/- only).

23.3. Payment for Additional Services

23.3.1. For the purposes of determining the remuneration due for additional Goods and Related Services as may be agreed between the parties, a breakdown of the lump-sum price shall be provided.

23.4. Terms and Condition of Payment

23.4.1. All the payments will be made in **PAK RUPEE** and on the recommendation of Director (Enforcement) and issuance of satisfactory completion certificate by Procurement Committee-I (PC-I) after successful delivery of the complete system to Client' head office located in Islamabad.

23.4.2. Payment shall be made after deduction of applicable taxes at source as per Government Rules and penalty (if any).

23.4.3. No mobilization advance shall be paid to the successful bidder.

23.4.4. No claim on Escalation during the currency of contract will be entertained.

23.4.5. The Client shall made the Advance payments to the Supplier as per following schedule upon submission of Advance Bank Guarantee of equivalent amount:

(1). **On Shipment.** Fifty (50) percent of the Contract Price shall be paid on successful delivery of complete equipment at Client's premises and verification by Client according to **GC Clause 27**. Payment will be made within 30 days of Supplier invoice receipt supported by Delivery Note acknowledgment of the Client.

(2). **On PAC.** Thirty (30) percent of Contract Price shall be paid upon submission of invoice supported by Provisional Acceptance Certificate (PAC) issued by Client, within 30 days of receipt of invoice. Procedure of PAC is defined at **GC Clause 28.**

23.4.6. All advance payments will be adjusted, and remaining payment, in case of no advance payments, will be made in following manner:

- (1). **On FAC:** Twenty (20) percent of Contract Price shall be paid upon submission of claim supported by Final Acceptance Certificate (FAC) issued by Client, within 30 days of receipt of invoice. Procedure of FAC is defined at **GC Clause 29.**
 - (2). All remaining payment as per this bid document to complete full payment to the successful bidder in consideration of successful delivery and satisfaction of the Client.
 - (3). Return and release of all Bank Guarantee submitted by the successful bidder for any advance payments received by the bidder through any earlier clause of this bid.
- 23.4.7. The payment shall be made after the conditions listed for such payment have been met, and the Supplier has submitted the invoice with company's stamp to the Client after approval of the reports/deliverables by Client, inclusive of all taxes and duties specifying the amount due. The payment, however, will be made after deduction of all applicable taxes. As per regulation 2(2) of PPRA Eligible Bidders (Tax Compliance) Regulations 2015, payment to the bidder shall be linked with active tax payer status. If a bidder is not ATL, no payment shall be made until the bidder appears on ATL of FBR For the purpose of this contract, payment shall be considered having been made/effectuated, when the Client has delivered irrevocable payment instructions to its bank with copy for information to the bidder.
- 23.4.8. All payments shall be made on submission of a written invoice on Company's letter head duly signed by the Authorized representative, as per procedure laid down in this CONTRACT. The payment shall be due within one month of the receipt of invoice and after deduction of the applicable taxes and any other deduction(s) as per terms of the contract.

24. Performance Bank Guarantee

- 24.1. A Performance Bank Guarantee (PBG) from a bank having credit rating of at least AA+ in the prescribed format for an amount equal to **10 PERCENT** of the CONTRACT price in **PAK RUPEE** on the date of calling of the guarantee before signing the CONTRACT. For the purpose of Bank Guarantee, the CONTRACT price will mean the total amount as provided in **GC Clause 24.2.** On satisfactory completion of assignment, this PBG shall be released. The Proforma of PBG is enclosed at Appendix-D.

25. Advance Bank Guarantee (ABG)

- 25.1. Advance Bank Guarantee (ABG) from a bank having credit rating of at least AA+ in the prescribed format up to a maximum of **80 PERCENT** of the bid/contract price in **PAK RUPEE** on the date of calling of the guarantee can be provided if vendor elects to get advance amount from client for carrying out this assignment. For the purpose of Bank Guarantee, the CONTRACT price will mean the total amount as provided in **GC Clause 24.2.** On satisfactory completion of assignment, this ABG shall be released. The Proforma of ABG is enclosed at Appendix-E.

26. Procedure for Obtaining Delivery Note Acknowledgment

- 26.1. The Client will issue Delivery Note Acknowledgement, on the request of Supplier for the release of payment on delivery by performing the following checks:
- 26.1.1. The delivered system including Data Collection Unit (Indoor/outdoor), Data Processing Unit and supporting equipment like laptop, inverter, mobile handsets, GPS, connecting cables, software licenses, third party software etc. are according to the requirement specified in the bidding documents.
 - 26.1.2. The equipment fulfills all the minimum requirement mentioned at Appendix-B of this CONTRACT.
 - 26.1.3. The Supplier has to perform joint testing along with the Client's representative(s) and need to submit the report to the Client afterwards. The following are to be covered during the testing:
 - (1). The testing will be done in Islamabad using the delivered equipment for one outdoor and one indoor location specified by the Client.
 - (2). Comprehensive Benchmarking testing for all the operators will be done for both indoor and outdoor. The testing route for the outdoor and testing location for indoor will be provided by the Client.
 - (3). All the technologies (2G/3G/4G etc.) will be tested for both indoor and outdoor.
 - (4). Voice, SMS and Data services will be benchmarked for all the operators simultaneously.
 - (5). Supplier has to generate the reports using Post Processing Unit from which all the licensed KPIs of voice, data and SMS services defined at Appendix-B can be determined.
 - (6). The Client will issue the Delivery Note Acknowledgement (DNA) which will state the equipment date after the successful testing and subsequent report provided all the issues found during the testing have been resolved and upon the approval of the Authority.

27. Procedure for Obtaining PAC

- 27.1. Provisional Acceptance Tests (PAT) will be performed by the Client's representative(s) in coordination with the Supplier against each essential requirement for both Data Collection (indoor/outdoor) and Post Processing Tools for the issuance of Provisional Acceptance Certificate (PAC) according to the procedure defined below:
- 27.1.1. Provisional Acceptance tests need to be performed within **FOUR (4) WEEKS** of the issuance of Successful Delivery Certificate by the Client.
 - 27.1.2. Comprehensive Benchmarking Testing will be done by the Client representatives in different cities of Pakistan including AJK & GB. At least **THREE (3)** cities and **SIX (6)** indoor location need to be tested for the purpose of PAT.
 - 27.1.3. The Client will raise the issues (if any) found during the PAT and the Supplier will have to resolve the same within **ONE (1) WEEK**.

- 27.1.4. After **FOUR (4) WEEKS** or at the successful completion of the above mentioned testing, the Supplier will request the Client for the issuance of PAC provided no issue is pending at the bidder's end.
- 27.1.5. The Client will issue the Provisional Acceptance Certificate (PAC) which will state the PAC acceptance date after the successful PAT provided all the issues found during the testing have been resolved and upon the approval of the Authority. The PAC will not be issued if all the issues raised by the Client are not addressed to the satisfaction of the Client.

28. Procedure for Obtaining FAC

- 28.1. Final Acceptance Tests (FAT) will be performed by the Client's representative(s) in coordination with the Supplier against each essential requirement for both Data Collection (indoor/outdoor) and Post Processing Tools for the issuance of Final Acceptance Certificate (FAC) according to the procedure defined below:
 - 28.1.1. Final Acceptance tests need to be performed within **EIGHT (8) WEEKS** of the issuance of PAC by the Client.
 - 28.1.2. Comprehensive Benchmarking Testing will be done by the Client representatives in different cities of Pakistan including AJK & GB. At least **SIX (6)** cities and **EIGHT (8)** indoor locations need to be tested for the purpose of FAT which should be different from the cities and locations done during the PAT.
 - 28.1.3. The Client will raise the issues (if any) found during the FAT and the Supplier will have to resolve the same within **ONE (1) WEEK**.
 - 28.1.4. After **EIGHT (8) WEEKS** or at the successful completion of the above mentioned testing, the Supplier will request the Client for the issuance of FAC provided no issue is pending at the bidder's end.
 - 28.1.5. The Client will issue the FAC which will state the FAC acceptance date after the successful FAT provided all the issues found during the testing have been resolved and upon the approval of the Authority. The FAC will not be issued if all the issues raised by the Client are not addressed to the satisfaction of the Client.

29. Remedial Work and Payment

- 29.1. If the Client is not satisfied with the standard of any part of the Goods and Related Services carried out by the Supplier and requires the Supplier to rectify any defective work or part of any goods and related services, as the case may be, such remedial work or rectification as may be required shall be carried out by the Supplier at its own expense and it shall not be entitled to any additional payments/charges in respect of such remedial work.

30. Insurance

- 30.1. The successful bidder shall be responsible for free of cost equipment insurance up to the Final Acceptance Certificate (FAC) of the equipment issued by the Client.

31. Good Faith

- 31.1. The Parties undertake to act in good faith with respect to each other's rights under this CONTRACT and to adopt all reasonable measures to ensure the realization of the objectives of this CONTRACT.

32. Relationship/Status of Parties

- 32.1. Nothing in this Contract and no action taken by the Parties pursuant to this CONTRACT shall form, interpreted or construed as creating a partnership, association, or joint venture or other co-operative entity between the parties, nor establish a relationship of agency between the Parties.
- 32.2. The Parties acknowledge that nothing in this CONTRACT shall give rise to the relationship of employer/employee between the Client and the Supplier and /or any authorized representative/personnel and any substitute or replacement or any other persons providing Service to the Client or behalf of the Bidder under this Contract.
- 32.3. Neither Party shall have any right, power of authority to enter into any agreement, or act on behalf of, or to act as or to be an agent or representative of, or to otherwise bind the other Party unless expressly provided in the CONTRACT.

33. Limitation of Liability

- 33.1. Nothing in The aggregate liability of the Supplier to the Client under this CONTRACT for any losses, damages, penalties, costs and professional and other expenses of any nature shall be limited to the value of the CONTRACT.

34. Intellectual Property Rights

- 34.1. The Intellectual Property Rights in all drawings, documents, and other materials containing data and information furnished to the Client by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Client directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

35. Specification and Standards

- 35.1. Technical Specifications and Drawings
- 35.1.1. The Goods and Related Services supplied under this CONTRACT shall conform to the technical specifications and standards mentioned in Appendix-A and Appendix-B of this CONTRACT, and when no applicable standard is mentioned, the standard shall be equivalent or superior to the official standards whose application is appropriate to the Goods' country of origin.
- 35.1.2. The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Client, by giving a notice of such disclaimer to the Client.

36. Packing of the Goods

- 36.1. The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the CONTRACT. During transit, the packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

37. Integrity Pact

- 37.1. [Name of Supplier] hereby declares that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan (GoP) or any administrative subdivision or agency thereof or any other entity owned or controlled by it through any corrupt business practice.
- 37.2. Without limiting the generality of the foregoing [Name of Supplier] represents and warrants that it has fully declared the brokerage, commission, fee etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultations fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP, except that which has been expressly declared pursuant hereto.
- 37.3. [Name of Supplier] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representative or warranty.
- 37.4. [Name of Supplier] accepts full responsibility and strict liability for making and false declaration, not making full disclosure, misrepresenting fact or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP. Notwithstanding any rights and remedies exercised by GoP in this regard,
- 37.5. [Name of Supplier] agrees to indemnify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder's fee or kickback given by [Name of Supplier] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from GoP".

IN WITNESS WHEREOF, the parties hereto set their hands the day, month and year first above written.

For and Behalf of Client.

For and on Behalf of Supplier

By : _____

By: _____

Name: _____

Title : _____

Title : _____

Name : _____

Signature : _____

Signature : _____

Date : _____

Date : _____

Witnesses

1. _____

2. _____

Name _____

Name _____

CNIC _____

CNIC _____

1. Overview of Monitoring Tool

The Client intends to acquire **Automated Quality of Service (QoS) Monitoring and Benchmarking Tool** from the Supplier with following abilities:

- 1.1 Capacity to test and benchmark Quality of Service (QoS) across number of mobile operators (*i.e. Simultaneous and Continuous Measurement of AT LEAST FIVE MOBILE NETWORKS*), with the objective to reproduce end user experience in different mobile networks, device types and wireless technologies (*i.e. 2G/3G/4G etc.*) operational in Pakistan.
- 1.2 Perform field tests, measure, benchmark and report QoS Key Advance Indicators (*KPIs*) as defined in mobile services licensees issued from time to time to Cellular Mobile Operators (*CMOs*) in Pakistan defined in **Para 1.3.1 of Annexure III.C** of the CONTRACT, PTA service quality regulation (*Cellular Mobile Network Quality of Service (QoS) Regulations 2010*) and subsequent amendments as well as global industry standards and best practices;
- 1.3 To record every detailed measurements of the network while testing; The systems should be able to collect network Advance impact on the user experience;
- 1.4 To determine and plot the route and map it with respect to its GPS co-ordinates. Plotting shall only show the relative movements with reference to a starting reference point. The equipment should be interfactable with off-the-shelf digitized map of the region, at any time in future with minimum hardware and software up-gradation. All instances have to be time and day stamped.
- 1.5 Power measurement accuracies of up to $\pm \frac{1}{2}$ dB (min.).
- 1.6 Time dependent measurements accuracies of one-second minimum.
- 1.7 Explicitly indicate the minimum and maximum levels which can be measured by such an instrument.
- 1.8 Extension for indoor / walk test service quality and coverage measurement. Indoor benchmarking solution is not required.
- 1.9 Support measuring audio and videos services, including live streaming as well as social media; including emerging Over-The-Top (OTT) communication services testing.
- 1.10 Have Post Processing Tool with holistic analytics which provides insight into Advance and generates reports as desired by the Client.
- 1.11 Capability of being upgradable to consider upcoming mobile network technologies and related Advance parameters, such as VoLTE and 5G etc.;
- 1.12 Capability to measure all technologies as detailed at **Para 1.15 of Annexure III.B**.
- 1.13 Have active and optimized Power Control for phone charging.
- 1.14 The installation of the QoS system should be in such a way that the set up provides optimal conditions for uninterrupted data collection in a stable environment for reliable test results.
- 1.15 Both Data Collection and Data Analysis units should support all the technologies including but not limited to GSM/ CDMA/ WCDMA/ HSPDA/ HSUPA/ HSPA+/ LTE/ VoLTE/ LTE-Advance etc. (*i.e. 2nd, 3rd & 4th Generation wireless technologies*) in all bands/spectrum and carrier aggregation of

contiguous/noncontiguous bands/technologies and should be upgradeable to 5G as and when required.

Annexure III.C SYSTEM CAPABILITIES

1. Technical and Functional Specifications

1.1. Data Collection Tool

- 1.1.1. Networks Benchmarking. The equipment should be capable of benchmarking multiple scenarios of **Voice, SMS and Data** services of least **FIVE (5)** networks simultaneously and continuously. Moreover, it should have capability to expand and include more operators, if required.
- 1.1.2. Technology Support. The equipment shall support all major cellular technologies, including but not limited to GSM/ CDMA/ WCDMA/ HSPDA/ HSUPA/ HSPA+/ LTE/ VoLTE/ LTE-Advance etc. (i.e. 2nd, 3rd & 4th Generation wireless technologies) in all bands/spectrum carrier aggregation in contiguous/noncontiguous bands/ technologies and should be upgradeable to 5G, as and when required.
- 1.1.3. Audio /Video Testing. It should support both PESQ/POLQA voice / video quality MOS for both narrow and wide band.
- 1.1.4. Application Based Testing. It should support Application based testing like, Facebook, Twitter, Snapchat, WhatsApp, Netflix etc.
- 1.1.5. Device Type Support. It should provide flexibility to support multiple device types of multiple vendors including but not limited to smartphones, modems and minicards etc.
- 1.1.6. Testing Scenario. It should be able to benchmark all possible testing scenarios in auto technology and locked mode. All the technologies 2G/3G/4G and all the bands can be locked also there should be flexibility to lock/unlock any desired technologies. Moreover, the tool should be able to lock and test specific BCCH/ PSC/ PCI/ ARFCN/ UARFCN/ EARFCN etc.
- 1.1.7. Channel Capacity. It should support minimum 20 handsets for **Voice, SMS and Data** services simultaneously. It should have capability to benchmark data services of all the operators simultaneously without any dependency on Laptop's modem and without any degradation.
- 1.1.8. Equipment Casing. The equipment casing should be compact and capable of holding the mobile handsets securely in such a way that all mobile handsets are equally exposed to the outer environment for fair benchmarking. Most of the cabling should be fixed and reliable. The cabling that need to be done by the end user should be minimum and easy. The tool should be easy to carry around and can be used in any vehicle.
- 1.1.9. Internal Battery Backup. It should have internal battery to keep the measurement running for at least 15 minutes in case there is some issue with the inverter/power supply.
- 1.1.10. DC/AC Power. The tool should have option to operate both at 12V and 220V.
- 1.1.11. System Stability. The system should be highly stable, robust and reliable. No device should get disconnected due to normal jerks in the vehicle. In case of disconnection there should be visual/audio warning

- and reconnection can be done easily without any interruption in the measurement.
- 1.1.12. User Control. The testing can be done both manually and script based. Scripting should be easy and user friendly and all the options required for making the scripts should be available. Moreover, the scripts can be saved, imported and exported.
- 1.1.13. Log Files. The system should have the capability of:
- (1). Separate log file for each device/handset.
 - (2). Log files should be saved automatically at the desired folder.
 - (3). Multiple options for saving log files e.g. user can defined the size of log file after which new log files starts automatically in sequential manner.
 - (4). Log files should be encrypted and cannot be modified afterwards.
 - (5). Log files should use Time stamp from the satellite using GPS and not from the laptop.
- 1.1.14. Device Configuration. All the devices should be configurable and device configuration can be saved and reloaded.
- 1.1.15. Custom Workspace. User should have the option to create custom workspaces that can be saved and reloaded.
- 1.1.16. Geo Mapping. The system should have ability to load Geo Maps, Google Maps, tab/shape and network files etc.
- 1.1.17. Data Export. Any parameter can be exported in multiple formats like csv, txt, tab, KML/KMZ etc. both as image and point.
- 1.1.18. Drive Test Routes. The system should be capable:
- (1). To record drive test routes and the same can be imported/exported.
 - (2). To provide facility of navigation like Google Maps to cover the imported route in optimized manner.
- 1.1.19. Tool Display. The equipment should be capable to:
- (1). Display, record, pause and replay the measurements.
 - (2). Display the connected Cells and Neighbors on the map and the approximate distance from the serving cell.
 - (3). Indicate the faults in the run time using audio/visual display.
 - (4). Indicate missing neighbors/high device power/high interference etc.
 - (5). Display the progress of testing in the run time.
 - (6). Display and record all layer2/layer 3 messages, measurement reports and events etc.
 - (7). Display all the events / the desired events during the testing on multiple windows and all the windows should be synchronized.
 - (8). Display different parameter in grid and map and the legends should be configurable.
 - (9). Display the status of the connected/disconnected devices.
- 1.1.20. Operation in Extreme Weather Conditions. The equipment should be able to work continuously for long duration without any distortion/ malfunctioning under extreme weather conditions.

- 1.1.21. Power Inverter. A Universal Power Inverter with output voltage range of RMS 230V -12V DC/5V DC which can easily support the load of the desired tool.
- 1.1.22. User Interface. A laptop with high processor speed of minimum i7, 1TB or above hard disk, 16GB or above RAM is required for User Interface.
- 1.1.23. Standard Support. It should support the recommendations and standard of ITU and ETSI standards related to service quality in particular ETSI 102 250 and ETSI TR 103 559.
- 1.2. Data Analysis / Post Processing Tool
 - 1.2.1. Post Processing of RF Data. Post Processing Tool should automatically post-process RF data from a variety of data collection tools (indoor and outdoor). It should be capable of importing and analyzing log files from multiple RF data collection tools being widely used in telecom industry.
 - 1.2.2. Standalone System. It should be standalone system that can be installed on any laptop/desktop.
 - 1.2.3. Post Processing Capabilities. Post Processing Tool should have the following capabilities:
 - (1). Carryout cell level and operator level analysis.
 - (2). Support analysis of multiple log files and log files can be arranged in folders/sub folders as per end user requirement.
 - (3). Correlate different parameters as per end user requirement. Different type of correlation options should be available.
 - (4). Extract user specific portion of log file for detail analysis and layer 2/Layer3 messages can easily be searched, filtered and analyzed.
 - (5). Load configuration files, OSS exports, and other data files from multiple vendors (Huawei, ZTE, Nokia, Ericsson, Alcatel etc.) and provide desired analysis accordingly.
 - (6). Post processing tool should be able to provide KPIs per technology, if testing is done in auto mode.
 - 1.2.4. Report Generation. Post Processing Tool should be able to generate predefined and user-defined reports and templates which can be used to create reports from any log file or multiple log files from multiple data collection tools widely used in the industry for specific needs and to compare KPIs of multiple operators, technologies and timeframes. Following points need to be considered for the reports:
 - (1). Built-in Reports. Generate built-in reports for different technologies that can be configured. All the formulae used in the reports and raw files need to be provided.
 - (2). Customized Reports. Support making and saving of customized reports as per end user's requirement and there should be possibility of including specific logo/water mark in the reports.
 - (3). Customized KPIs. Support defining customized KPIs and inclusion of customized KPIs in the report, whether it is a customized report or built-in report.
 - (4). Geo Maps. Reports should use integrated geo Maps to visualize and analyze the data.

- (5). Exporting KPIs. Reports should display all the RF parameters/KPIs in grid and maps which can to be exported in different formats like txt, csv, xlx, xls, KML/KMZ etc.
 - (6). Technology wise Segregation. Reports should be able to provide KPIs per technology, if testing is done in auto mode.
 - (7). Visual Effects. Generated reports should contain graphs, bar charts, tables, maps with different KPIs/events being displayed. The reports and can be extracted in different formats like pdf, word and excel etc.
 - (8). Benchmarking Reports. There should be pre-defined reports for Benchmarking purpose providing comprehensive comparative analysis of multiple operators covering all technologies for voice, SMS and data services. Technology wise as well as overall Benchmarking of the operators will be required.
 - (9). KPIs Formulae & International Standards. All the Formulae used in all the reports need to be provided and should be in accordance with the ITU/ETSI/3GPP etc., standards related to service quality. There should be option to modify the formulae as required after discussion with the end user.
 - (10). Required KPIs. It should provide all the major KPIs related to coverage & quality that is measured for GSM/ CDMA/ WCDMA/ HSPDA/ HSUPA/ HSPA+/ LTE/ VoLTE/ LTE-Advance (i.e. 2nd, 3rd & 4th Generation wireless technologies) and all frequencies allocated to the operators. All relevant KPIs for all services ,voice, data, SMS, MMS, FTP/Http (UL / DL), Video Streaming, Web Browsing, Ping, Social networking (YouTube, Snap Chat, WhatsApp, Twitter, Instagram, etc.) need to be covered in the reports.
- 1.2.5. Reported KPIs. The Data Analysis/Post Processing Tool should be able to:
- (1). Report the KPIs defined in **Para 1.3 of Annexure III.C** of the CONTRACT, with possibility of including/removing KPIs as desired.
 - (2). Configure customized thresholds values for each KPI/parameter.
 - (3). Provide summary of all the desired KPIs of each operator for number of events below/above thresholds in a single report.
- 1.2.6. Analysis of Abnormal Events. The Post Processing Tool should be able to:
- (1). Perform detailed analysis of abnormal events like Drop Call, Blocked Call, Handover Failure, Inter System Handover Failure etc., with needed recommendations.
 - (2). Identify problematic areas like low coverage, low quality areas, high interference, Pilot Pollution etc.
- 1.2.7. Coverage KPIs. It should be able to provide KPIs related to network coverage and quality measured in 2G, 3G and 4G technologies.
- 1.2.8. List of Supported KPIs. The bidder should provide the list of KPIs for all services (voice, data, SMS, MMS, FTP, UL / DL), Streaming Video,

Web Browsing, Ping, Social networking (YouTube, Snap Chat, WhatsApp, Twitter, Instagram, etc.), that will be reported by Post Processing Tool.

1.3. QoS KPI & RF Parameters

Following is the list of QoS KPIs/ parameters which has to be provided in addition to other RF related KPIs/parameters for voice, SMS and Data services for all technologies (2G/3G/4G) by both Data Collection and Post Processing Tool:

1.3.1. NGMS Licensed QoS KPIs

- (1). Network Downtime
- (2). Grade of Service
- (3). Service Accessibility
- (4). Call Connection Time
- (5). Call Completion Ratio
- (6). Mean Opinion Score (Average of A2B and B2A, POLQA/PESQ)
- (7). Inter System Handover
- (8). SMS Success Rate
- (9). SMS End-to-End Delivery Time
- (10). Data Throughput (3G & 4G)
- (11). Signal Strength (RSCP & RSRP)
- (12). RAB/E-RAB Setup Success Rate
- (13). Session Abnormal Release Rate

1.3.2. Other QoS KPIs

- (1). Drop Call Rate (DCR)
- (2). Inter System Handover Success Rate (CS)
- (3). Inter System Handover Success Rate (PS)
- (4). Call Setup Success Rate (CSSR)
- (5). 2G Signal Strength RxLev (No of samples in customizable Bins)
- (6). 2G Signal Quality RxQual (No of samples in customizable Bins)
- (7). 3G Signal Strength RSCP (No of samples in customizable Bins)
- (8). 3G Signal Quality Ec/No (No of samples in customizable Bins)
- (9). 4G Signal Strength RSRP (No of samples in customizable Bins)
- (10). 4G Signal Quality RSRQ (No of samples in customizable Bins)
- (11). Number of Call Attempts
- (12). Number of Calls Established
- (13). Number of Calls Dropped
- (14). Number of Calls Blocked
- (15). Number of Soft Handover Failures
- (16). Number of Hard Handover Failures
- (17). Number of Intra RAT Handover Failures
- (18). Number of Inter RAT Handover Failure
- (19). Number of Intra Frequency Handover Failures
- (20). Number of Inter Frequency Handover Failures
- (21). Number of Total Handover Attempts
- (22). CSFB Call Setup Time/Call Connection Time
- (23). End-to-End SMS Delivery time
- (24). SMS e2e Delivery Success Rate

- (25). SMS Send Success Rate
- (26). SMS Receive Success Rate
- (27). SMS Send time
- (28). SMS attempts
- (29). Number of SMS attempts
- (30). Number of successful SMS
- (31). RLC Data Throughput (DL/UL)
- (32). MAC Throughput (DL/UL)
- (33). Application Throughput (DL/UL)
- (34). Modulation Scheme(DL/UL)
- (35). User Data Throughput (DL/UL)
- (36). CQI
- (37). SINR
- (38). Session Abnormal Release Rate
- (39). RAB Setup Success Rate
- (40). E-RAB Setup Success Rate
- (41). Round Trip Time (Latency)
- (42). Web Page Access Success Rate
- (43). Web Page Completion Success Rate
- (44). Web Page Download Time
- (45). Packet Loss
- (46). Jitter
- (47). FTP Throughput (DL/UL)
- (48). HTTP Throughput (DL/UL)
- (49). Streaming Service Non-Accessibility
- (50). Streaming Service Access Time
- (51). Streaming Reproduction Cut-off Ratio
- (52). Streaming Reproduction Start Failure Ratio
- (53). Streaming Reproduction Start Delay
- (54). Streaming Setup Success Rate
- (55). Streaming Completion Success Rate
- (56). Streaming Audio Quality
- (57). Streaming Video Quality
- (58). Streaming Audio/Video De-Synchronization
- (59). VoLTE Setup Success Rate
- (60). VoLTE Call Setup Time /Call Connection Time
- (61). VoLTE Call Completion Success Rate

2. **General Design Requirements**

The general design requirements and applicable standards for all electrical, electronic, mechanical and other equipment to be provided by the Bidder for the installation and operation of Testing/Measuring facilities are given below:

2.1. **Technical Standards**

- 2.1.1. The components used in the Systems shall be designed so as to comply with any set of the international standards described in the Technical Specifications.
- 2.1.2. The Bidder shall state the standards the proposed equipment is compliant with.

- 2.1.3. Where any conflict arises between any of the above described technical standards, the most stringent or highest Advance requirement shall apply.

2.2. Environmental Conditions

- 2.2.1. The Equipment and Software shall be designed and installed so as to perform reliably and efficiently under local climatic conditions in Pakistan:
- 2.2.2. The Advance of the Equipment and Software shall be guaranteed under the operating conditions given in table below:

Ambient temperature	-20° C to +60° C
Relative humidity	95 % at +45 °C
Atmospheric pressure	90 to 110 kPa
Altitude	> 3000 meters

- 2.2.3. The Bidder shall indicate the international specifications the equipment is compliant with.
- 2.2.4. The Equipment shall be designed and installed so as to dissipate heat generated in normal operating conditions, in other words, they must be designed to operate with natural convection, within the limits and the conditions of temperature and relative humidity defined above.

2.3. Mechanical Characteristics

- 2.3.1. The weight of the various fully equipped system shall be stated by the Bidder.
- 2.3.2. The components of the equipment which can be removed shall be carefully handled.
- 2.3.3. The equipment shall be capable of withstanding road bumps and sudden jerks.
- 2.3.4. Normal handling during installation and storage shall not have any adverse effects upon the equipment.
- 2.3.5. The packaging for shipping and for storage of spares shall be sufficient to protect any fragile or delicate equipment from normal handling and shipping.
- 2.3.6. Mechanical shocks during the operation & maintenance (connection of apparatus, switching on and off of the unit, opening and closing of the sub-racks doors, etc.), shall not induce perceptible operation perturbations.
- 2.3.7. The components subject to an accidental reversal of polarity shall be identified.
- 2.3.8. The mechanical design of the equipment will be such as to avoid the accumulation of dust and air particles.
- 2.3.9. The Equipment shall be protected against harmful ambient conditions such as animals, insects, dust, etc., during transport, storage, installation and normal day to day operations.
- 2.3.10. The Bidder will provide a catalogue with complete details explaining the mechanical construction of the equipment.

2.4. Electromagnetic Environment

- 2.4.1. The mechanical design of the Testing/ measuring equipment must be fully compatible with the International Recommendations with regards to the electromagnetic compatibility (*EMC*), electrical discharge (*ESD*) & SAR. The Bidder shall indicate the international specifications the equipment is compliant with.

- 2.4.2. Immunity to Electromagnetic Pulses of Nuclear Origin. Immunity to electromagnetic pulses of nuclear origin will be proposed as an option. Documents supplied to PTA should indicate the resistance of the equipment to pulses of nuclear type. The hardware configuration used to obtain the results claimed must be described.
- 2.5. Physico-Chemical Environment
- 2.5.1. All the materials made of plastic, rubber, electrical insulating, etc., will be of good quality. The different plastic or rubber parts shall not be degraded by the climatic conditions in Pakistan. The use of inflammable or organic material will be minimized and the materials used for the equipment shall comply with a minimal inflammable class.
- 2.6. Electrostatic Environment
- 2.6.1. The Bidder shall indicate the international specifications the equipment is compliant with. The hardware must assure this electrostatic compatibility for rugged and casual usage.
- 2.7. Immunity to Rapid Transitory Electric Perturbations
- 2.7.1. The Bidder shall indicate the international specifications the equipment is compliant with.
- 2.8. Power Supply
- 2.8.1. Power chargers shall be provided to be used while drive testing in a car or any other battery is made by means of any device chosen by the Manufacturer; this device shall be described by the Bidder.
- 2.8.2. Power converters shall be provided with a thermal release protection in case of overheating.
- 2.8.3. Moreover, they shall be designed to provide an alarm in overheating conditions (*provisionally*).
- 2.8.4. Particular precautions shall be taken to protect the equipment against dangerous high-frequency return paths, excess-voltages and excess-currents.
- 2.8.5. The choice of wire and cabling, the layout of the cabling and equipment shall be such that fire shall not propagate beyond the disconnected devices, fuses and circuit breakers.
- 2.9. Software License
- 2.9.1. Both Data Collection and Post Processing Tools should be standalone systems.
- 2.9.2. Initial validity of the outdoor/indoor/data analysis/post processing tool and all other software including third party software and proprietary software should be at least **FIVE (05) YEARS** and should be extendable on mutual consent basis.
- 2.9.3. New updates regarding any software need to be provided free of cost within the validity period of the license Competency & Expertise.
- 2.9.4. The bidder shall provide all the expertise to the Client in installation and working of the tool and all its functionalities.

Annexure III.D PERFORMANCE BANK GUARANTEE

FORM OF PERFORMANCE BANK GUARANTEE

Note: See GC Clause 23

Performance Guarantee for Advance Obligations

Date:-----

_____ *[On a legal document/stamp paper]*

Beneficiary: Pakistan Telecommunication Authority, Headquarters Building, F-5/1, Islamabad, Pakistan.

Date: _____

We, *[name of Bank]* are providing Advance Guarantee for _____ (hereinafter called "the Supplier") have entered into CONTRACT No. *[Reference number of the CONTRACT]* dated *[insert date]* with Pakistan Telecommunication Authority (hereinafter called the "Client"), for the provision of ***Automated QoS Monitoring and Benchmarking Tool*** (hereinafter called "the CONTRACT").

Furthermore, we understand that, according to the conditions of the CONTRACT, a Advance guarantee in the sum of PKR _____ / [PAK RUPEE _____] (*the amount equal to **10%** of the total CONTRACT Price*) is to be made against the Advance obligations of the Supplier.

We *[name of Bank]* hereby irrevocably, unconditionally and continuingly guarantee without recourse to the Client, and undertake to pay to the Client any sum or sums not exceeding in total an amount of PKR _____ / PAK RUPEE _____ only) (*the amount equal to 10% of the total CONTRACT Price*) upon receipt by us of Client's first demand in writing accompanied by a written statement stating that "the Supplier" is in breach of their obligations under the CONTRACT.

This guarantee shall be released after successful completion of the CONTRACT.

[signature(s)]

Endorsed and guaranteed by Commercial Bank in Pakistan

[Bank Stamp & Signature(s)]

Note: All italicized text is for indicative purposes only to assist in preparing this form and shall be deleted from the final product. If the bank guarantee is arranged from a bank outside Pakistan that bank guarantee has to be backed by the bank guarantee of a local bank in Pakistan with a credit rating of at least AA+.

The expiry date of this guarantee will be six months from the start date of the CONTRACT

Annexure III.E ADVANCE BANK GUARANTEE

FORM OF ADVANCE BANK GUARANTEE

Note: See GC Clause 23

Advance Guarantee for Advance Obligations

Date:-----

[On a legal document/stamp paper]

Beneficiary: Pakistan Telecommunication Authority, Headquarters Building, F-5/1, Islamabad, Pakistan.

Date: _____

We, [name of Bank] are providing Advance Guarantee for _____ (hereinafter called "the Supplier") have entered into CONTRACT No. [Reference number of the CONTRACT] dated [insert date] with Pakistan Telecommunication Authority (hereinafter called the "Client"), for the provision of ***Automated QoS Monitoring and Benchmarking Tool*** (hereinafter called "the CONTRACT").

Furthermore, we understand that, according to the conditions of the CONTRACT, a Advance guarantee in the sum of PKR _____ / [PAK RUPEE _____] (the amount upto **80%** of the total CONTRACT Price) is to be made against the Advance obligations of the Supplier.

We [name of Bank] hereby irrevocably, unconditionally and continuingly guarantee without recourse to the Client, and undertake to pay to the Client any sum or sums not exceeding in total an amount of PKR _____ / PAK RUPEE _____ only) (the amount equal to 10% of the total CONTRACT Price) upon receipt by us of Client's first demand in writing accompanied by a written statement stating that "the Supplier" is in breach of their obligations under the CONTRACT.

This guarantee shall be released after successful completion of the CONTRACT.

[signature(s)]

Endorsed and guaranteed by Commercial Bank in Pakistan

[Bank Stamp & Signature(s)]

Note: All italicized text is for indicative purposes only to assist in preparing this form and shall be deleted from the final product. If the bank guarantee is arranged from a bank outside Pakistan that bank guarantee has to be backed by the bank guarantee of a local bank in Pakistan with a credit rating of at least AA+.

The expiry date of this guarantee will be six months from the start date of the CONTRACT