

Terms of Reference

The Republic of the Union of Myanmar

Provision of Consulting Services to Verify the Network Performance of the Mobile Operators Network (C1.1.17)

Background

The Government of the Union of Myanmar (Government) has undertaken telecommunications sector reforms in order to: (i) increase by tenfold access to quality telecommunication services; (ii) make services affordable for its citizens; and (iii) develop the required ICT infrastructure in Myanmar that will facilitate inclusive growth and poverty reduction.

With the reform process undertaken in the Telecom Sector, Myanmar Post Telecommunication (MPT)'s long lasting monopoly is being replaced by a competitive market structure consisting of multiple operators. Telenor Myanmar Limited and Ooredoo Myanmar were awarded Nationwide Telecommunications Services Licenses. The Nationwide Telecommunications Services License holder shall fulfill the Minimum Geographic Coverage Commitments for mobile Voice and mobile Data as well as the Quality of Service (QoS) Commitment.

Given that the regulator needs to ensure that the Licensees (three operators) have fulfilled the commitments of their licenses, there is need to do the drive test and QoS measurement.

The Government has received support under the World Bank financed Telecommunications Sector Reform Project to procure the required equipment and to hire the consultants for the drive test and QoS measurement. The activity described in these Terms of Reference is to support PTD to analyze whether the licensees meet their Geographic Coverage commitment and QoS commitment.

Objective

The main objective of this assignment is to provide support to Post and Telecommunications Department (PTD)to:

- (i) Consolidate the coverage map for each region of Myanmar in consultation with operators.
- (ii) Conduct the drive test to verify the coverage commitment and QoS commitments on a sample basis.

- (iii) Analyze the test results to PTD and advise PTD officials on how to mainstream such enforcement in their work.
- (iv) Present the test results to the operators and recommend remedial measures if the operators have not met their coverage and quality of services commitments.
- (v) Train at least 5 staff from PTD.

Summary of Tasks

The consultant will support PTD to undertake the following tasks as part of the engagement:

Activity (A): Prepare a detailed coverage map of each operator's mobile network (both voice and data over 2G and 3G technologies) based on the data acquired from the operators.

Activity (B): Prepare a training program for PTD staff for them to become fully competent in monitoring and enforcing coverage and QoS commitment of licensees.

Activity (C): Conduct the Drive Test in selected areas across the country (not more than 40 cities or towns and highways between states and regions) to verify the geographic coverage commitment for both voice and data networks of the operators (2G and 3G) networks. When the drive tests and QoS tests are being conducted, at least 5 staff from PTD will accompany the consultants and will be fully involved in the testing. The consultant will provide on the job training and will also be responsible for the costs of travel, accommodation and food for PTD staff. All drive tests will be conducted in coordination with the operators.

Activity (D): QoS Measurements for 2G and 3G Network in cities as indicated in Annex 1.

Activity (E): Conduct Analysis and prepare a detailed report of the Drive Test and QoS measurement. Conduct a discussion with each operator on the findings of the test and agree on remedial measures so that operators can take necessary steps to meet their obligations within a given time frame.

The detail requirement (Test scenarios and KPI for QoS) for the drive test is mentioned in Annex 2.

Deliverables and Proposed Payment Schedule

This consultancy is tightly scheduled to be completed within a 4 weeks from the date of signing the agreement between PTD and the Consultant. The following table provides a summary of the main deliverables required and estimated timing:

Activity	Date	Deliverable	
		#	Description
B	Contract signing + 2 days	1	Inception Report that includes approach for assignment + preparation of detailed training plan.
A+C+D	Contract signing + within 10 days	2	Consolidate Detailed Coverage map of each state and region for each operator in consultation with operators. Provides reports on the Drive Test (Raw Data Log files) (QoS Index Calculation Results) (Final Reports with analysis)
E	Contract signing + 14 days	4	Presentation to PTD the Operators and final report on remedial measures and time lines.

All deliverables will be sent to the PTD. Electronic copies will suffice. All deliverables must be in English. Final approval of all outputs and deliverables, linked to payments to the consultant, is the responsibility of MOTC.

Minimum Qualifications Requirements of the Consulting firm:

- The Consultant’s team is expected to be a firm or joint venture of firms and will be selected based on its experience and capacity in carrying out this type of work.
- Its knowledge of, and experience in, Benchmarking of the Mobile Networks, particularly familiar with the use of Nemo Drive Test Tool.
- The Consultant’s team at least should consist of 5 personnel with skills and experience in type of work.
- The consultant’s team shall perform the test together with engineers and staffs from PTD and shall provide on job training to them.
- The consultant’s team shall take responsibility of the test’s result and shall reach to resolution with the operator if there are any disputes from operators with the result.

Annex -1

The selected consulting firm shall perform the following test cases. Please note that TID 15, TID 16 shall be shifted to auto-frequency mode once PTD issue the 1800 frequency to operators and shall be measured in the next fiscal year and shall be required only when and where corresponding LTE coverage exists. PTD shall require operators to provide LTE coverage areas on a Quarterly basis.

Test Scenarios		
Test ID	Test Scenario	Description
TID 1	Coverage	2G Idle Mode
TID 2	Coverage	3G Idle Mode
TID 4	Voice	2G Short Call
TID 5	Voice	2G Long Call
TID 6	Voice	3G Short Call
TID 7	Voice	3G Long Call
TID 10	Voice	Automode MOS
TID 13	Data	3G FTP Download >10MB
TID 14	Data	3G FTP Upload > 5MB
TID 15	Data	LTE FTP Download >10MB
TID 16	Data	LTE FTP Upload >5MB
TID 17	Voice	LTE CSFB
TID 18	Scanner	GSM 900, UMTS 900, UMTS 2100, LTE 1800, LTE 2100, LTE 2600, CDMA (450 & 800)

Table 1. Required Drivetest Measurement Cases

All test devices and equipment shall support the following systems and related frequencies: GSM 900, UMTS 900, UMTS 2100, LTE 1800, LTE 2100, and scanning on CDMA 450, CDMA 800 and LTE 2600. CDMA 800 drivetest measurement may be optional as required by PTD to measure in specified areas.

All testing may be conducted during the period from 7 o'clock in the morning to 10 o'clock in the evening.

Supplier shall report the following KPIs and corresponding plots for quality benchmarking among all operators.

Service ID	Service	KPI
SID 1	Voice Accessibility	Call Setup Success Rate, Call Setup Time
SID2	Voice Retainability	Drop Call Rate, Handover Success Rate
SID3	Voice Quality	MOS, BER, BLER
SID4	Data Accessibility	PS Setup Success Rate, PDP Context Activation Time, Ping Time
SID5	Data Quality	DL/UL Throughput (Peak and Average), DL BLER
SID6	CSFB	LTE Circuit-Switched Fall Back
SID7	IRAT	3G to 2G Redirection Success Rate
SID8	2G Coverage	RxLev: >= -75dBm, -75dbm to -90dBm, -90dBm to -100dBm, <-100dBm
SID9	2G Quality	RxQual: 0-2, 3-4, 5-7
SID10	3G Coverage	RSCP: >=-85dBm, -85dBm to -95dBm, -95dBm to -100dBm, <-100dBm
SID11	3G Quality	Ec/No: >= -7dB, -7dB to -12dB, <-12dB
SID12	LTE Coverage	RSRP: >=-80dBm, -80dBm to -90dBm, -90dBm to -100dBm, <-100dBm
SID13	LTE Quality	RSRQ: >=-10dB, -10dB to -15dB, <-15dB
		SNR: >=20dB, 13dB to 20dB, 0dB to 13db, <0dB
SID 14	GSM C/I Index	GSM C/I: >12db, 9dB to 12dB, <9dB
SID 15	UMTS CQI Index	UMTS CQI: 0-8, 9-19, 20-30
SID 16	LTE CQI Index	LTE CQI: 0, 1-6, 7-9, 10-15

Table 2. Required KPIs

Supplier shall additionally provide the following plots.

- Scatter plots for signal coverage (Rxlev, RSCP, RSRP) vs. UL/DL throughput
- Scatter plots for signal quality (RxQual, Ec/Io, SINR) vs. UL/DL throughput
- Best Server Coverage
- Best Server Quality
- Pilot pollution plots
- Uplink UE Transmit Power (TX)
- BCCH Frequency, UARFCN distribution
- CQI
- PCI dominance
- Event plots (Drop, Setup fail, Handover fail, Re-direction fail, etc.)
- Serving Technology (GSM900, UMTS900, UMTS2100, LTE 1800, LTE2100, CDMA 800)