

Request for Proposal & Quotation (RFQ)

for

EMF Test Equipment for RF Networks

Description of goods: EMF Test Equipment for RF Networks

Request for quotation Ref. No.: MM-PTD -42545-GO-RFQ/EMF Testing Equipment/2018-2019

Date: 30-1-2019

To: List of Suppliers

Gentlemen/Ladies

Subject: SUPPLY AND DELIVERY OF EMF TEST EQUIPMENT.

1. You are invited to submit your price quotation (s) for the supply of the following items:
(a) EMF Test Equipment for RF networks.
2. Detailed information on technical specifications and required quantities is contained in **Annex-1**
3. The Ministry of Transport and Communications (MoTC) has received a credit (hereinafter called Credit) from the International Development Association (IDA) towards the “Telecommunications Sector Reform Project (TSRP)”. The MoTC intends to apply a portion of this Credit to eligible payments under the contract for which this invitation for quotations is issued. You will be aware of the provisions on fraud and corruption stated in the specific clauses in the Bank’s Guidelines.
4. Price quotations will be evaluated and contracts awarded to the firm offering the lowest evaluated cost of the goods with the minimum requirement of the system as described in Annex-1.
5. Your quotation in the required format (Attachment to Purchase Order) should be addressed and submitted to:

Street Address:-

Director General

Posts and Telecommunications Department.

Ministry of Transport and Communications

Office Building Number 2

Nay Pyi Taw

Myanmar

Attention: Director General

Telephone: +95 67 407438

Email: monitoringptd2018@gmail.com

6. The quotation in duplicate and in English language, should be accompanied by adequate technical documentation and catalogue(s) and other printed material or pertinent information (in English language) for each item quoted, including names and addresses of firms providing services facilities in Myanmar if applicable.
7. The deadline for receipt of your quotation (s) by the Purchaser at the address indicated in Paragraph 5 is:

Date of deadline: (4th March 2019)

Time of deadline: 1300 hours at local time

8. Your quotation(s) should be submitted as per the following instructions and in accordance with the Terms and Conditions of supply in the attached draft Purchase Order.
9. Quotations will be delivered to the address as described in paragraph 5. One original hard copy and four (4) hard copies of quotations and two (2) **searchable** softcopies (word or PDF format) must be included in sending quotations. If something of error is found in softcopy, hard copy will be considered as the right one.
10. Other Conditions of Supply are as follows:

(i) **PRICES** should be quoted in **USD**.

(ii) **PAYMENT** for your invoice will be made 100% against delivery of all goods.

But, the winner bidder (the contractor) must propose to deliver onsite training for five (5) PTD staffs in Naypyitaw in two (2) days off site and three (3) days onsite depending on the practical measuring. The cost for accommodation, meal and other incidental expenses for Trainees must be included in the proposal.

(iii) **DELIVERY**, prices should be quoted for delivery DDP Nay Pyi Taw including all kinds of taxes, i.e, withholding taxes, commercial taxes and other necessary taxes.

(iv) **EVALUATION AND AWARD OF PURCHASE ORDER**: Offers will be determined to be substantially responsive to the technical specifications as mentioned in Annex 1 will be evaluated by comparison of their prices. The technical specification and guarantees shall be signed properly and filled by the supplier.

The bidder must mention Comply/Not-Comply/Partial-Comply and show related supported documents for checking and comparing. In case, the bidder cannot provide the prove / the evidence with necessary documents, the point will be converted to “Not Comply” or “Partial-Comply”.

The bidder must provide the description of architecture of system and brief of list items that belong to offered system. The detail of number of required devices are mentioned in detail list of Specification table.

The award will be made to the firm who meets most of the required standards of technical points and capabilities and offering the lowest evaluated price. [Please note, the bidder must be substantially responsive to the technical specifications]

(v) **VALIDITY OF THE OFFER**: Your quotation(s) must be valid for a period of **90 days** from the date of receipt for quotation(s) as indicated in Paragraph 7 of this Invitation to Quote.

(vi) **DELIVERY SCHEDULE**: within four (4) weeks after announcement of wining bidder.

(vii) **WARRANTY** of Goods offered should be covered by Manufacturer's warranty for at least 12 months or as per requirement stated in Annex 1, whichever is longer duration, from the date of delivery to purchaser.

(viii) **MANUALS** for the equipment should be accompanied by adequate technical documentation and catalogue(e) and other printed material or pertinent information (in English language) for all items quoted, including names and addresses of firms providing services facilities in Myanmar as necessary.

(ix) **ONSITE TRAINING** on use of the system will have to be provided as mentioned in paragraph 10(ii) above.

Please fill and sign the attachment to the Purchase Order and return the same to the Purchaser

11. Further information can be obtained from:

U Zarne Aung

Director

Posts and Telecommunications Department

Phone: +959 540 0056

Email: uzarne@yahoo.com

12. It is necessary **to confirm** by email or Fax the receipt of this invitation wherever you got it via the website or email in advance and whether you will submit or not the price quotations once you get this invitation.

INTERNATIONAL SHOPPING

Draft Purchase Order

(To fill in after award contract)

Purchase Order No. _____

Date of Purchase Order _____

Name of the Purchaser _____

Complete Postal Address of Purchaser _____

Telephone No. _____

Fax No. _____

Subject: SUPPLY OF EMF TEST EQUIPMENT

TO: {Please insert Supplier's name and address}

Dear Sirs:

Your price quotation No. _____ Dated _____
for the supply of the above goods is accepted by the Purchaser for an amount of _____ as
per the Terms and Conditions described in Attachment 2 to this Purchase Order. Please complete your
supply in accordance with the terms and conditions contained in the attachment to this Purchase Order.

Please acknowledge the receipt within seven (7) days from the date of receipt of this Purchase
Order.

Sincerely,

Purchaser

Terms and Conditions of Supply

Project Name: Telecommunications Sector Reform Project

Description of Goods: EMF TEST EQUIPMENT

Reference No. :

Date:

Purchaser:

1. Prices and Schedules for Supply

Item	Description	Unit	Quantity	Unit Price (including all kinds of taxes)	Total(including all kinds of taxes)	Delivery Time
1	Spectrum Analyzer	Set	2			
2	Isotropic Antennas	Set	2			
3~n	Accessories	Set	2			
	service package & supporting requirement	pack	1			
Total Price						

{Note: In case of discrepancy between unit price and Total derived from unit price, unit price shall prevail}

2. **Fixed Price:** The prices indicated above are firm and fixed and not subject to any adjustment during contract performance.
3. **Delivery Schedule:** The delivery should be completed as per above price schedule.
4. **Payment:** Payment of the contract price shall be made in the currency (USD) of the quotation of the successful bidder within 20 calendar days of receipt of the goods upon submission of an invoice supported by the Acceptance Certificate issued by the purchaser.[Please note that paragraph 10(ii) above].
5. **Testing:** An acceptance certificate shall be issued by the purchaser upon satisfactory completion of tests and inspection as mentioned in the Attachment.
6. **Warranty:** Goods offered should be covered by manufacturer's warranty for at least [12 months] or as per requirement in Attachment 1, whichever is longer, from the date of Acceptance from the Purchaser.[Please, note that paragraph 10(vii) above.]
7. **Required Technical Specifications**
(i) Technical specifications as indicated in Annex 1
The Supplier must confirm compliance with above specifications {In case of any deviations, the supplier has to list all such deviations}.
8. **Failure to Perform:** The Purchaser may cancel the Purchase Order if the Supplier fails to deliver the Goods, in accordance with the above terms and conditions, in spite of being given 14 days notice by the Purchaser, without incurring any liability to the Supplier.

NAME OF THE SUPPLIER _____

Authorized Signature _____

Place:

Date:

General Requirements

1. To be used for measuring EMF emissions in line with ICNIRP and/or (EN50400 and EN50499) standards and provides a basis for ensuring that transmitter systems comply with the applicable limits.
2. Is a precise, easy-to-make on-site measurement and the Software tool, that is running on a PC, supports users by providing automated test sequences, including preconfigured measurement packets, and complies with the detailed technical requirements as stated in below
3. Consists of an Isotropic Antenna detects fields independent of their direction and polarization, and complies with the detailed technical requirements as stated in below
4. Consists of a Spectrum Analyzer connected to a PC to record test results through the interface port USB and/or LAN and/or RS232, and complies with the detailed technical requirements as stated in below

Detailed Requirements:

1. Spectrum Analyzer Requirement

	Parameter	Requirement	Type of requirement
1	Frequency range	9 kHz to 6 GHz	Mandatory
2	Aging rate	< 1 ppm / year	Mandatory
3	Marker resolution	1 Hz	
4	Number of sweep (trace) points	500	
5	Frequency counter resolution	0.1 Hz (low), 0.1 mHz (high)	
6	Frequency span range	9k Hz to 6 GHz	
7	Spectral purity SSB phase noise (f=500MHz/4500MHz, carrier offset 300Khz)	< -100 dBc / Hz	
8	<u>Resolution bandwidth</u>		
8.1	Range (-3dB bandwidth)	10 Hz to 20 MHz	Mandatory (bandwidth high is important for LTE MIMO 4x4)
8.2	Bandwidth accuracy (1Hz ≤ RBW ≤ 300 kHz)	nominal < 5%	
8.3	Bandwidth accuracy (RBW > 300 kHz)	nominal < 10%	
9	Input attenuator range	0 to 40 dB, in 5 dB steps	
10	Reference level setting range	-200 dBm to 30 dBm	
11	<u>Intermodulation</u>		

11.1	Second harmonic intercept (RF attenuation=0dB, RF preamplifier=OFF, fin=20 MHz to 1.5 GHz)	40 dBm	
11.2	Third-order intercept (RF attenuation=0dB, RF preamplifier=OFF, signal level 2 x -20dBm, fin= 300 MHz ≤ fin < 3.6 GHz)	>10 dBm or <-60dBc	
12	Units of level axis	dBm, dBmV, dBμV, V, W	
13	<u>Sweep time</u>		
13.1	Range (0Hz Span)	100 us to 1000s	
13.2	Range (10 MHz ≤ Span ≤ 600MHz)	20 ms to 1000s	
14	<u>Displayed average noise level</u> (RF attenuation=0 dB, termination=50 Ω, RBW=100 Hz, VBW =10Hz, sample detector, log scaling, track generator off, normalized to 1 Hz, Preamplifier=ON)		
14.1	100 kHz to 1 MHz	<-133 dBm	
14.2	1 MHz to 10 MHz	<-157 dBm	
14.3	10 MHz to 1 GHz	<-161 dBm	
14.4	1 GHz to 2 GHz	<-159 dBm	
14.5	2 GHz to 5 GHz	<-155 dBm	
14.6	5 GHz to 6.5 GHz	<-151 dBm	
14.7	6.5 GHz to 8 GHz	<-147 dBm	
15	Provide measurement of LTE downlink pilot channel and/or EVM	Yes	
16	Provide measurement of WCDMA downlink pilot channel and/or EVM	Yes	
17	Safety	IEC 61010-1, EN 61010-1, UL 61010-1 , CAN/CSA-C22.2 No. 61010.1-04	
18	EMC	in line with European EMC Directive 2004/108 /EC including - EN 61326 class B (emission) - CISPR 11/EN 55011/group 1 class B (emission) - EN 61326 table 2 (immunity, industrial) field strength: 30 V/m: 30 MHz to 2 GHz 3 V/m: 2 GHz to 2.7 GHz	
19	Weight	< 3 kg	
20	Operating time with new, fully charged battery	> 2.5 hr	
21	Internal battery charging cycles	>500	

2. Isotropic Antenna Requirement

	Parameter	Requirement	Type of requirement
1	Frequency range (Can be combined by two or more different antennas)	9 kHz to 6 GHz	mandatory
2	Minimum detectable field strength	0.2 mV/m	mandatory
3	Isotropy		
3.1	9 kHz to 200 MHz	$\leq \pm 1.37$ dB	
3.2	200 MHz to 3 GHz	$\leq \pm 2.1$ dB	
3.3	3 GHz to 6 GHz	$\leq \pm 3.0$ dB	
4	Mechanical design	Radome protection against mechanical damage and environment hazards	
5	Measurement by isotropic reception due to orthogonally arranged antenna elements that are electronically switched	Yes	
6	Can be mounted on a tripod during measurement	Yes	

3. System software requirement

	Parameter	Requirement
1	Setup the measurements of EMF on total emissions, individual radio services or individual frequencies	Yes
2	Provides overview of total emissions together with individual transmitter / radio services	Yes
3	Cover the requirements of ICNIRP and/or EN50400 and EN50499	Yes
4	Measures the maximum and average value of signals in line with ICNIRP measurement interval	Yes
5	Predefined measurement packet for FM, DVB-T/T2, DAB, GSM, WCDMA, LTE, WIFI, DECT	Yes
6	New services measurement, that have not been defined, can be added	Yes
7	Report is created and saved automatically after measurement is completed for immediate on-site evaluation	Yes
8	Multiple bands and technologies can be measured in a single test run	Yes
9	Graphical presentation of overview results	Yes
10	Measurement results are accessible in Microsoft Excel for customizing test report	Yes
11	Supports Windows operating system	Yes

GENERAL REQUIREMENTS		
1.	Training	Training for five PTD staff at least three (5) days in Myanmar
1.1	Onsite training & doing acceptance test	Full training for about five (5) PTD staffs in Naypyitaw in two (2) days off site and three (3) days onsite depending on the practical measuring. The cost for their accommodation, meal and other incidental expenses must be included in the proposal (it should be factored into price of equipment).
2	Warranty and Technical Support	≥ 1 years
3	On-site support	The bidder has to be able to provide a local support team to field for 24/7 and if it is needed to resolve the problem technically by responding within one (1) day. Your Engineer must be able to go on site together with PTD engineer during the warranty period and the cost for their accommodation, meal and other incidental expenses must be included in the proposal (it should be factored into price of equipment).

EMF Testing In Myanmar 2015

Background:

RF EMF exposure measurements of radio base stations in Yangon

Introduction

This report present a short summary of the radio frequency (RF) electromagnetic field (EMF) exposure measurements for radio base station (RBS) sites conducted in Yangon from March 7th to March 9th 2015. The assessment was performed by Davide Colombi and Jaroslav Kazejev from Ericsson Research (Stockholm, Sweden) with the cooperation of officials from the Postal and Telecommunication Department of the Ministry of Communications and Information Technology. Measurements were conducted in the vicinity of 13 different RBSs belonging to different operators (Telenor, MPT, Ooredoo and YTP) selected to be representative for the majority of BS installation in Myanmar (both tower and rooftop).

Measurement equipment

Two instruments were used during measurements:

- The broadband field meter NBM 550 manufactured by Narda Safety Test Solutions.
- The frequency selective meter SRM 3006 manufactured by Narda Safety Test Solutions.

The NBM 550 and SRM 3006 were equipped with electric field probes for measurements in a frequency range of 100 MHz – 6 GHz and 420 MHz – 60 GHz, respectively.

Site description

An overview of the properties for the selected RBS sites is given in Table 1.

Table 1 Overview of the selected site in Yangon

Site No.	Type	Technologies Installed
1	Tower	GSM 900, WCDMA B1, CDMA 450, CDMA 800
2	Tower	GSM 900, WCDMA B1, CDMA 450, CDMA 800
3	Rooftop	GSM 900, WCDMA B1, CDMA 450, CDMA 800
4	Rooftop	GSM 900, WCDMA B1
5	Tower	GSM 900, WCDMA B1
6	Tower	GSM 900, WCDMA B1
7	Tower	GSM 900, WCDMA B1
8	Rooftop	GSM 900, WCDMA B1
9	Tower	GSM 900, WCDMA B1
10	Rooftop	GSM 900, WCDMA B1

11	Rooftop	GSM 900, WCDMA B1
12	Rooftop	GSM 900, WCDMA B1, CDMA 450, CDMA 800
13	Rooftop	WiMax

Measurements procedure

EMF exposure levels were assessed using the following procedure (using the Narda SRM 3006 frequency selective meter)

1. Field strength measurements were conducted over the entire frequency range of the instrument's probe (broadband measurements) by slowly sweeping the instrument around on site in extensive areas where the maximum level of exposure was expected.
2. For the location where broadband measurements reported maximum field strength the exposure level was assessed at three different heights from the ground (1.1 m, 1.5 m and 1.7 m).
3. In correspondence of the height reporting the largest measured power density (W/m^2), measurements were conducted for a long time interval (larger than 6 minutes) and the maximum and average value, S_{max} stored using a max-hold trace together with the average, S_{avg} , over 6 minutes.

The results obtained in this way are presented in Table 2. In addition to this, measurements were conducted with the NBM 550 in different locations around the site to evaluate the level of exposure in a larger frequency range (100 MHz – 60 GHz).

Results

The maximum measured power density in the 13 sites in Yangon obtained as described in Section 4 is provided in the table below.

Table 2 Maximum measured power density for the selected RBS sites in Yangon.

Site No.	S_{max} (W/m^2)
1	0.0132
2	0.0082
3	0.0003
4	0.0013
5	0.0022
6	0.0006
7	0.0011
8	0.0106
9	0.0002
10	0.0652
11	0.0503
12	0.0209
13	0.0236

Conclusion

EMF exposure measurements for 13 RBS sites have been conducted in Yangon during March 2015. For all sites the results show that the exposure levels for the general public are well-below the limits published by ICNIRP [1] (endorsed by the WHO) and adopted in Myanmar. On average the power density was found to be less than 1% of the ICNIRP reference levels for the general public.

The levels of exposure measured are comparable to those observed in other countries and mentioned by the WHO [2].

References

[1] ICNIRP, "Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)," *Health Physics*, vol. 74, pp. 494 – 522, 1998.

[2] WHO, "Electromagnetic field and public health, Base stations and wireless technologies," online backgrounder, 2006, www.who.int/peh-emf/publications/facts/fs304/en/