

No. B.V-7/2013-14-C (QRs)-(6)  
भारत सरकार/Government of India  
गृह मंत्रालय/Ministry of Home Affairs  
पुलिस आधुनिकीकरण प्रभाग /Police Modernization Division  
संभरण-I डेस्क /Prov.I Desk

26, Man Singh Road, Jaisalmer House  
New Delhi, the 25 November, 2014

To,

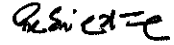
DsG: AR (through LOAR), BSF, CISF, CRPF, ITBP, SSB, NSG & BPR&D.

**Subject: QRs and Trial Directives of Hand Held BIT Error Rate Instrument with Datacom & Ethernet Testing Facilities.**

The QRs and Trial Directives in respect of Hand Held BIT Error Rate Instrument with Datacom & Ethernet Testing Facilities as per Annex-I and Annex-II respectively have been accepted by the Competent Authority in MHA.

2. Concerned CAPF will be accountable for correctness of the QRs.
3. Henceforth, all the CAPFs should procure the above item required by them strictly as per the laid down QRs.

Yours faithfully,



(P. K. Srivastava)

Under Secretary to the Govt. of India

Tel: 23381278

Encl: As above.

Copy forwarded to SO (IT), MHA, with the request to host the QRs and Trial Directives of Hand Held BIT Error Rate Instrument with Datacom & Ethernet Testing Facilities the website of MHA (under the page Organizational Set up- Police Modernization Division-Qualitative Requirements-communication equipments), soft copy is being sent through email.

  
(R K Soni)

Section Officer (Prov.I)

Copy to: DDG (Procurement), MHA.

Annex-I 16

**REQUIREMENTS/TECHNICAL SPECIFICATION OF HAND HELD BIT ERROR RATE INSTRUMENT WITH DATA  
COM AND ETHERNET TESTING FACILITIES**

S I No.	Specifications
	<b>GENERAL</b>
1	i) The analyzer shall be housed in a robust chassis with Li-Ion battery pack. The Instrument shall operate on this battery pack and also shall be able to work with an external AC adaptor.
	ii) The weight of the Instrument should be less than 1 kg inclusive of battery
	iii) The instrument should have High resolution color touch-screen.
	iv) It should be possible to upgrade the Instrument through Ethernet port and to connect with a network or PC
	v) The instrument should be supplied with a report generating tool.
	vi) The Instrument must perform remote testing and monitoring
	vii) The instrument should have USB memory stick support and FTP upload capability for test, result storage and file transfer respectively.
	viii) The Instrument will have test solution for E1, T1, DS3, E3 & Datacom networks transporting legacy as well as for Ethernet and IP testing.
	<b>TECHNICAL SPECIFICATION : Electrical</b>
2	i) The instrument should have Dual RJ45 (120Ω balanced) interface for line rate 2.048 Mbit/s with line code HDB3 & AMI and must have provision to have an option of having the same for line rate 1,544 Mbit/s with line code AMI & optionally B8ZS
	ii) The instrument shall have BNC (75Ω unbalanced) interface for line rate 2.048 Mbit/s with line code HDB3 & AMI and provision to have options of having the same for line rate 34.368 Mbit/s with line code HDB3 and for line rate 44.736 Mbit/s with line code B3ZS must be available.
	iii) The instrument shall have receiver Sensitivity for 2.048 Mbit/s (E1) as ≤ 26dB (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode.
	iv) The instrument shall have receiver Sensitivity for 34.368 Mbit/s (E3) as ≤ 26dB (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode.
	v) The Instrument shall have provision for having option of receiver Sensitivity for 1.544 Mbit/s(DS1) as ≤ 26dB (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode
	vi) The instrument shall have provision for having option of receiver Sensitivity for 44.736 Mbit/s (DS3) as ≤ 26dB (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode.
	vii) The instrument shall have receiver Sensitivity for 2.048 Mbit/s (E1) as ≤ 6dB (cable loss) in case of Terminal mode.
	viii) The instrument shall have receiver Sensitivity for 2.048 Mbit/s (E1) as ≤ 6dB (cable loss) in case of T Bridge mode.
	<b>CLOCK SYNCHRONIZATION</b>
3	i) The Instrument shall recover the clock from incoming signal and shall have Internal clock synchronization capability with ± 3.5 ppm stability as per ITU-T G.812.
	ii) The Instrument shall have provision for external reference via RX2 balanced and AUX RX unbalanced for Signals 1.544 Mbit/s (B8ZS) and 2.048 Mbit/s (HDB3).
	iii) The Instrument shall be able to offer Transmit Frequency Offset up to 25000 ppm in steps of 0.1 ppm for electrical interfaces.
	<b>TEST PATTERNS-</b> The Instrument shall be able to generate following test patterns.
4	i) PRBS: 2 <sup>11</sup> -1, 2 <sup>15</sup> -1, 2 <sup>20</sup> -1, 2 <sup>23</sup> -1, 2 <sup>31</sup> -1: normal or inverted
	ii) Fixed: 0000, 1111, 1010, 1000 and 1100
	iii) User programmable word: user defined up to 24 bits

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5	<b>ERRORS :-</b> i) It shall be possible to insert Code, FAS, CRC, EBIT, Bit errors for line rate 2.048 Mbit/s (E1) with Single or continuous rate ( $1 \times 10^{-3}$ to $5 \times 10$ ).
	ii) Instrument shall have provision for having options of Code, FAS, Bit, Frame, CRC error insertion for line rate 1.544 Mbit/s (DS1), Code, FAS, 2M FAS, 2M, Bit errors insertion for line rate 34.368 Mbit/s (E3) and Code, FAS, MFAS, P/C-Parity, Bit errors insertion for line rate 44.736 Mbit/s (DS3) on Single or continuous rate ( $1 \times 10^{-3}$ to $5 \times 10$ ).
	iii) Instrument shall be able to measure Code, FAS, CRC, EBIT and Bit errors on line rate 2.048 Mbit/s (E1) and Code, FAS, Bit errors 34.368 Mbit/s (E3)
	iv) Instrument shall have provision for having options for measuring Code, FAS, Bit, Frame, CRC errors on line rate 1.544 Mbit/s (DS1), for measuring Code, FAS, MFAS, P/C-Parity, Bit errors on line rate 44.736 Mbit/s (DS3).
6	<b>ALARMS &amp; PERFORMANCE ANALYSIS</b>
	i) The Instrument shall generate test Results for Error count for ES, %ES, SES, %SES, UAS, %UAS, EFS, %EFS, AS, %AS, and rate for all events i.e. errors, alarms and pointer events.
	ii) The instrument shall support performance analysis measurement as per standard and criteria below:- a) ITU-TG.821 or better recommendation for EB, BBE, ES, EFS, SES, UAS; HRP of 1% to 100%
	b) ITU-T G.826 recommendation for EB, BBE, ES, EFS, SES, UAS; HRP of 1% to 100%
	c) In service measurement (ISM) using FAS, CRC or Code (DS1 or E1)
	d) Out of Service measurement (OOS) using bit errors (TSE)
	e) ITU-T M.2100 recommendation: ES, EFS, SES, UAS with HRP 1% to 100%
f) The Instrument shall support generation of LOS, AIS, LOF, RDI alarms on line rate 2.048 Mbit/s (E1) with Static (Enable/Disable) mode.	
7	<b>FUNCTIONS AND MEASUREMENTS :-</b> i) The Instrument shall support following operating Modes. a> Terminate mode, b> Monitor mode, c> Intrusive Thru mode & d> Bridge mode for DS1 & E1
	ii) The Instrument shall support Unframed or Framed with/without CRC Signal structure as per ITU-T G.704 (PCM30, PCM30C, PCM31, PCM31C) on line rate 2.048 Mbit/s (E1)
	iii) The Instrument shall have provisions for having an option to support Test signal in $N \times 64$ kbit/s, $N \times 56$ kbit/s where $N=1$ to 24
	iv) The Instrument shall have provisions for having an option to support Unframed or Framed M13 and C-bit parity signal according to ITU-T G.751 on line rate 44.736 Mbit/s (DS3).
	v) Pulse Mask Analysis on E1, T1, DS3, E3 for bit rates 2.048 Mbit/s (E1) and 34.368 Mbit/s (E3) shall be available in Non-Intrusive mode with the display of Pulse shape with Conformance mask as per G.703
	vi) Pulse Mask Analysis on DS3/DS1 (T-Carrier) shall be available with Conformance masks G.703, ANSI T1.102, T1.403, and T1.404 where ever applicable.
	vii) The Instrument shall have provision to support ISDN Primary Testing Options with Bidirectional monitoring and call analysis ETSI (Euro - ISDN) NT and TE emulation Voice and data call setup and receive Via Headset for B-channel talk/listen supporting multirate $N \times 64k$ data call.
8	<b>JITTER ANALYSIS: -</b> The Instrument shall have options for DS1/E1 Jitter Analysis, DS1 Wander Analysis and DS3/E3 Jitter Analysis.
	<b>DATACOM SPECIFICATIONS :-</b> i) The Instrument shall have datacom Interface via adaptors RS-449 (422 and 423), X.21, RS-232, V.35 and V.36 serial interface.
9	ii) The Instrument shall have DTE, DCE Emulation modes for all interfaces and Bi-directional data in Service transmission monitoring
	iii) The Instrument shall support Block error measurement feature
	iv) The Instrument must be able to support single and multiple error insertion for bit error(s) of rates ( $1E-3$ through $1E-9$ )
	v) The Instrument shall support In-band or Out-of-band flow control.
	vi) The Instrument shall have measurements as per ITU-T G.821 analysis with error type reports.

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ETHERNET SPECIFICATIONS	
10	i) The Instrument shall have Single 10/100/1000 Base-T Ports RJ45 connector electrical Ethernet interfaces with IEEE 802.3 compliant
	ii) The Instrument shall have Modes of Operation 1> Terminate 2> Monitor 3> Pass through and 4> Loop back operation modes.
	iii) The Instrument must provide loop back on layer one for all incoming traffic and on layer 2 and layer 3 for all unicast traffic.
	iv) The Instrument should be able to do measurement of bit, RCR, symbol IP checksum, Jabbar Frames, run frames, collisions , late collisions error and must detect LOS , patterns LOS, service disruption alarms.
TRAFFIC GENERATION	
	i) The Instrument must offer Configurable MAC, Ethernet Type, VLAN, MPLS, IP, and UDP header fields.
	ii) The Instrument must have Jumbo Frame Support (10,000 bytes) as well as Fixed, multiple, and random frame size generation capabilities.
	iii) For each user configured traffic stream it shall be possible to add up to 3 VLAN & MPLS TAGS using the tester.
11	iv) The Instrument shall support RFC2544 Compliance Testing with automated tests having configurable threshold values and maximum transmit bandwidth settings. It will include Throughput, Latency, Frame Loss, and Back-to-back (burst) tests for Frame sizes: 64, 128, 256, 512, 1024, 1280, and 1518 bytes including 2 user configurable frames.
	v) The Instrument must present Frame/Packet Statistics for Multicast, broadcast, unicast, pause frames, frame size distribution, bandwidth utilization, frame rate, line rate, data rate, frame loss, frame delay variation.

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Approved/ Not Approved

(Pranay Sahay, IPS)  
DG, CRPF

*Pranay Sahay*

**TRIAL DIRECTIVE OF HAND HELD BIT ERROR RATE INSTRUMENT WITH DATA COM AND ETHERNET TESTING FACILITIES**

Trial of equipment will be conducted by a Board of Officers in the presence of Vendor or representative of Firms to assessed the actual performance of the equipment.

2) All parameter / Specifications mentioned in the QRs will be checked by board of officers by ascertaining /verifying following checks.

- i. Physical Checks: In this category specifications of the equipment will be checked physically as per QRs.
- ii. Functional Check: - The vendors will show the all features/ configuration of the equipment to the board of officers during trials.
- iii. Submission of certificates :- Specification which can not be checked due to lack of testing facilities/ expertise, a certificate of test shown against each will be provided by vendor/firm during technical and physical trial.

SI No	Tender QRs/ Specifications	Trial/ Testing methodology
1.	<p><b>GENERAL</b></p> <p>i) The analyzer shall be housed in a robust chassis with Li-Ion battery pack. The Instrument shall operate on this battery pack and also shall be able to work with an external AC adaptor.</p> <p>ii) The weight of the Instrument should be less than 1 kg. inclusive of battery.</p> <p>iii) The instrument should have High resolution color touch-screen LCD</p> <p>iv) It should be possible to upgrade the Instrument through Ethernet port and to connect with a network or PC</p> <p>v) The instrument should be supplied with a report generating tool</p> <p>vi) The Instrument must perform remote testing and monitoring</p> <p>vii) The instrument should have USB memory stick support and FTP upload capability for test result storage and file transfer respectively.</p> <p>viii) The Instrument will have test solution for E1, T1, DS3, E3 &amp; Datacom networks transporting legacy as well as for Ethernet and IP testing.</p>	<p>Physical test : to be verified by BOOs.</p> <p>Physical test (By using weighing machine, machine either operated electrical or manual)</p> <p>Functional check by performing touch operation</p> <p>Functional test by live demonstration of the equipment.</p> <p>Checked by testing a circuit and generating the report</p> <p>Functional test by live demonstration of the equipment.</p> <p align="center">-do-</p>
2.	<p><b>TECHNICAL SPECIFICATION : Electrical</b></p> <p>i) The instrument should have Dual RJ45 (120Ω balanced) interface for line rate 2.048 Mbits with line code HDB3 &amp; AMI and must have provision to have an option of having the same for line rate 1.544 Mbits with line code AMI &amp; optionally B8ZS</p> <p>ii) The instrument shall have BNC (75Ω unbalanced) interface for line rate 2.048 Mbits with line code HDB3 &amp; AMI and provision to have options of having the same for line rate 34.368 Mbits with line code HDB3 and for line rate 44.736 Mbits with line code B3ZS must be available.</p>	<p>Functional test by live demonstration of the equipment in various mode</p> <p>Physical test :- To be checked physically by BOOs</p>

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<p>iii) The instrument shall have receiver Sensitivity for 2.048 Mbits (E1) as <math>\leq 26\text{dB}</math> (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode.</p> <p>iv) The instrument shall have receiver Sensitivity for 34.368 Mbits (E3) as <math>\leq 26\text{dB}</math> (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode.</p> <p>v) The instrument shall have provision for having option of receiver Sensitivity for 1.544 Mbits(DS1) as <math>\leq 26\text{dB}</math> (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode</p> <p>vi) The instrument shall have provision for having option of receiver Sensitivity for 44.736 Mbits (DS3) as <math>\leq 26\text{dB}</math> (20dB resistive, 6dB cable loss) in case of Monitor (PMP) mode.</p> <p>vii) The instrument shall have receiver Sensitivity for 2.048 Mbits (E1) as <math>\leq 6\text{dB}</math> (cable loss) in case of Terminal mode.</p> <p>viii) The instrument shall have receiver Sensitivity for 2.048 Mbits (E1) as <math>\leq 6\text{dB}</math> (cable loss) in case of T Bridge mode.</p>	<p>CEM Certificate or Test certificate of any Govt / Govt approved/International accredited laboratory to be produced by supplier or To be verified from technical data sheet of the instrument.</p>
<p><b>CLOCK SYNCHRONIZATION</b></p> <p>i) The instrument shall recover the clock from incoming signal and shall have Internal clock synchronization capability with <math>\pm 3.5</math> ppm stability as per ITU-T G.812.</p> <p>ii) The Instrument shall have provision for external reference via RX2 balanced and AUX RX unbalanced for Signals 1.544 Mbits (B8ZS) and 2.048 Mbits (HDB3).</p> <p>iii) The Instrument shall be able to offer Tx Frequency Offset up to 25000 ppm in steps of 0.1 ppm for electrical interfaces.</p>	<p>Functional test by live demonstration of the eqpt. by recovering clock from incoming signal</p> <p>Functional test by live demonstration of the equipment</p> <p>Functional test by live demonstration of the eqpt. by selecting Tx Frequency Offset up to 25000 ppm in steps of 0.1 ppm</p>
<p><b>TEST PATTERNS</b> The Instrument shall be able to generate following test patterns:-</p> <p>i) PRBS: 2<sup>n</sup>-1-1, 2<sup>n</sup>-5-1, 2<sup>n</sup>-20-1, 2<sup>n</sup>-23-1, 2<sup>n</sup>-31-1: normal or inverted</p> <p>ii) Fixed: 0000, 1111, 1010, 1000 and 1100</p> <p>iii) User programmable word: user defined up to 24bits</p>	<p>Functional Test by selecting Home Screen-&gt;Setup-&gt;Signal-&gt;Pattern and generation of various test pattern</p> <p>Functional Test by selecting Home Screen-&gt;Setup-&gt;Signal-&gt;Pattern and generation of various test pattern and selecting up to 24 bits.</p>
<p><b>ERRORS :-</b></p> <p>i) It shall be possible to insert Code, FAS, CRC, EBIT, Bit errors for line rate 2.048 Mbits (E1) with Single or continuous rate (1 x 10<sup>-3</sup> to 5 x 10)</p>	<p>Functional Test by selecting Home Screen-&gt;Errors/Alarms-&gt;select Error type</p>
<p>ii) Instrument shall have provision for having options of Code, FAS, Bit, Frame, CRC error insertion for line rate 1.544 Mbits (DS1), Code, FAS, 2M FAS, 2M, Bit errors insertion for line rate 34.368 Mbits (E3) and Code, FAS, MFAS, P/C-Parity, Bit errors Insertion for line rate 44.736 Mbits (DS3) on Single or continuous rate (1 x 10<sup>-3</sup> to 5 x 10).</p>	

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iii) Instrument shall be able to measure Code, FAS, CRC, EBIT and Bit errors on line rate 2.048 Mbit/s (E1) and Code, FAS, Bit errors 34.368 Mbit/s (E3)	
iv) Instrument shall have provision for having options for measuring Code, FAS, Bit, Frame, CRC errors on line rate 1.544 Mbit/s (DS1), for measuring Code, FAS, MFAS, P/C-Parity, Bit errors on line rate 44.736 Mbit/s (DS3).	
<b>ALARMS &amp; PERFORMANCE ANALYSIS</b>	
i) The Instrument shall generate test Results for Error count for ES, %ES, SES, %SES, UAS, %UAS, EFS, %EFS, AS, %AS, and rate for all events i.e. errors, alarms and pointer events.	Functional Test selecting Home Screen->Errors/Alarms->select Alarm type
ii) The Instrument shall support performance analysis measurement as per standard and criteria below:- a) ITU-TG.821 or better recommendation for EB, BBE, ES, EFS, SES, UAS; HRP of 1% to 100%	Functional test by selecting Home Screen->Setup->Measurement->Analysis->Performance->Select G.821 or G.826
b) ITU-T G.826 recommendation for EB, BBE, ES, EFS, SES, UAS; HRP of 1% to 100%	Functional test by selecting Home screen->Setup->Signal->Pattern->uncheck Out of Service box
c) In service measurement (ISM) using FAS, CRC or Code (DS1 or E1)	Functional test by live demonstration of the instrument
d) Out of Service measurement (OOS) using bit errors (TSE)	Functional test by live demonstration of the instrument in enable and disable mode.
e) ITU-T M.2100 recommendation: ES, EFS, SES, UAS with HRP 1% to 100%	
f) The Instrument shall support generation of LOS, AIS, LOF, RDI alarms on line rate 2.048 Mbit/s (E1) with Static (Enable/Disable) mode.	
<b>FUNCTIONS AND MEASUREMENTS</b>	
i) The Instrument shall support following operating Modes. a> Terminate mode, b> Monitor mode, c> Intrusive Thru mode & d> Bridge mode for DS1 & E1	Functional test by selecting Home screen->Setup->Signal->Interface->mode-> select desired mode.
ii) The Instrument shall support Unframed or Framed with/without CRC Signal structure as per ITU-T G.704 (PCM30, PCM30C, PCM31, PCM31C) on line rate 2.048 Mbit/s (E1)	Functional test by selecting Home screen->Setup->Signal->payload->Framing-> select desired framing type
iii) The Instrument shall have provisions for having an option to support Test signal in N x 64 kbit/s, N x 56 kbit/s where N=1 to 24	Functional test by selecting Home screen->Setup->Signal->Payload->select Nx64 or Nx56
iv) The Instrument shall have provisions for having an option to support Unframed or Framed M13 and C-bit parity signal according to ITU-T G.751 on line rate 44.736 Mbit/s (DS3).	Functional test by live demonstration of the equipment

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<p>v) Pulse Mask Analysis on E1, T1, DS3, E3 for bit rates 2.048 Mbits (E1) and 34.368 Mbit/s (E3) shall be available in Non-Intrusive mode with the display of Pulse shape with Conformance mask as per G.703</p>	<p>Functional test by selecting Home screen-&gt;E1 tools-&gt; Pulse Mask Analysis</p>
<p>vi) Pulse Mask Analysis on DS3/DS1 (T-Carrier) shall be available with Conformance masks G.703, ANSI T1.102, T1.403, T1.404 where ever applicable.</p>	<p>Functional test by selecting Home screen-&gt;DS3/DS1 tools-&gt; Pulse Mask Analysis</p>
<p>vii) The Instrument shall have provision to support ISDN Primary Testing Options with Bidirectional monitoring and call analysis ETSI (Euro - ISDN) NT and TE emulation Voice and data call setup and receive Via Headset for B-channel talk/listen supporting multirate N x 64k data call.</p>	<p>Functional test by selecting Home screen-&gt;Additional test-&gt;ISDN Testing</p>
<p>8. <b>JITTER ANALYSIS</b> :- The Instrument shall have options for DS1/E1 Jitter Analysis, DS1 Wander Analysis and DS3/E3 Jitter Analysis.</p>	<p>Functional test by selecting Home screen-&gt;E1 tools-&gt; Jitter Analysis</p>
<p>9. <b>DATAKOM SPECIFICATIONS</b></p>	
<p>i) The Instrument shall have datacom Interface via adaptors RS-449 (422 and 423), X.21, RS-232, V.35 and V.36 serial interface.</p>	<p>Functional test by selecting Home screen-&gt;Setup-&gt;Signal-&gt;Hierarchy-&gt;Network Type-&gt; Datacom.</p>
<p>ii) The Instrument shall have DTE, DCE Emulation modes for all interfaces and Bi-directional data in Service transmission monitoring</p>	<p>Home screen-&gt;Setup-&gt;Signal-&gt;Hierarchy-&gt;Interface-&gt;select desired interface -do-</p>
<p>iii) The Instrument shall support Block error measurement feature</p>	<p>-do-</p>
<p>iv) The Instrument must be able to support single and multiple error insertion for bit error(s) of rates (1E-3 through 1E-9)</p>	<p>-do-</p>
<p>v) The Instrument shall support In-band or Out-of-band flow control.</p>	<p>-do-</p>
<p>vi) The Instrument shall have measurements as per ITU-T G.821 analysis with error type reports.</p>	<p>Functional test by selecting Home Screen-&gt;Setup-&gt; Measurement-&gt;Analysis-&gt; Performance-&gt;Select G.821</p>
<p>10. <b>ETHERNET SPECIFICATIONS</b></p>	
<p>i) The Instrument shall have Single 10/100/1000 Base-T Ports RJ45 connector electrical Ethernet interfaces with IEEE 802.3 compliant</p>	<p>Physical test</p>
<p>ii) The Instrument shall have Modes of Operation 1&gt; Terminate 2&gt; Monitor 3&gt; Pass through and 4&gt; Loop back operation modes.</p>	<p>Functional test by selecting various mode of operations.</p>

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iii) The Instrument must provide loop back on layer one for all incoming traffic and on layer 2 and layer 3 for all unicast traffic.

iv) The Instrument should be able to do measurement of bit, RCR, symbol IP checksum, Jabbar Frames, run frames, collisions, late collisions error and must detect LOS, patterns LOS, service disruption alarms.

**11. TRAFFIC GENERATION**

i) The Instrument must offer Configurable MAC, Ethernet Type, VLAN, MPLS, IP, and UDP header fields.	Functional test by configuring in different mode.
ii) The Instrument must have Jumbo Frame Support (10,000 bytes) as well as Fixed, multiple, and random frame size generation capabilities.	Functional test by configuring in Jumbo frame.
iii) For each user configured traffic stream it shall be possible to add up to 3 VLAN & MPLS TAGS using the tester.	Functional test by configuring in 3 VLAN & MPLS TAGS using the tester.
iv) The Instrument shall support RFC2544 Compliance Testing with automated tests having configurable threshold values and maximum transmit bandwidth settings. It will include Throughput, Latency, Frame Loss, and Back-to-back (burst) tests for Frame sizes: 64, 128, 256, 512, 1024, 1280, and 1518 bytes including 2 user configurable frames.	Functional test by configuring in RFC2544 mode and test in Throughput, Latency, Frame Loss, and Back-to-back (burst) tests for Frame sizes: 64, 128, 256, 512, 1024, 1280, and 1518 bytes including 2 user configurable frames.
v) The Instrument must present Frame/Packet Statistics for Multicast, broadcast, unicast, pause frames, frame size distribution, bandwidth utilization, frame rate, line rate, data rate, frame loss, frame delay variation.	Functional test by configuring in different mode.

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 (Shailendra Kumar, Major Comdr, CRPF)

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