

## ltest (radio link test)



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### Description

This command is intended for radio link testing. It is recommended for using in the antenna alignment process when establishing a new radio link or for existing radio channel testing.

For successful radio link establishment the following factors have to be considered:


1. It is recommended to start antenna alignment with searching on maximum Tx power. During link operating automatic MINT mechanisms will set the most appropriate bitrate if "*MINT – autobitrate*" mode will be enabled.
2. Current incoming signal level in "*amp/max*" columns must be between 12 and 40 dBm. If it is more than 40 it is recommended to lower Tx power. If maximal signal level is less than 12 it is recommended to lower bitrate or channel width (for example, from 20MHz to 10MHz on the both sides of the radio link). In some cases signal level that is less than 12 may be enough for radio link operation. In this case such parameters as number of retries, number of undelivered packets and number of undelivered acks have to be monitored. If the undelivered packets number and the undelivered acks number is zero, the retries number is small and all these parameters are constant in time then the radio link, most often, will be operating properly.
3. Number of retries value in "*rt%*" columns must be as close to zero as possible.
4. Number of undelivered packets value in "*up%*" columns must be zero; if this value is not zero then the radio link couldn't be exploited.
5. Number of undelivered acks value in "*ua%*" columns must be zero; if this value is not zero then the radio link couldn't be exploit. If this value is constantly not less than 50 then most probably "*distance*". parameter is set with a wrong value. If radio link distance is more than 20 km then "*long*" mode must be enabled.
6. All described parameters must be observed in the both ("*Local*" и "*Remote*") sections of the "*ltest*" command output.

### Syntax:

```
usage: ltest IFNAME target [-r rate[,reply_rate]]
                        [-s packet_size[,reply_size]]
                                -- max 1728
                        [-b]          -- send as broadcast
                        [-p priority] -- set priority (0 to 16)
                        [-align [L[,R]]] -- MIMO antenna alignment mode
                                L,R - local/remote tx antenna
                                (0/1 or V/H)
                        [-evm]        -- display Error Vector Magnitude
                        [-tu [seconds]] -- unidirectional throughput test
                        [-tb [seconds]] -- bidirectional throughput test
                        [-load N[m|k]] -- limit throughput to N:
                                m - Mbps, k - Kbps
                        [-mint]        -- do throughput test through MINT
ltest -key [PASSWORD]
ltest (-disable|-enable)          -- disable/enable ltest
```

### Parameters

Parameter	Description
<b>IFNAME</b>	The radio interface on which testing will be performed.
<b>target</b>	A target device MAC address on the other side of a tested radio link.

<b>-r rate[, reply_rate]</b>	<p>Sets bitrates for transmitting test packets from the local device and toward it. This parameter is optional. There are two situations when these parameters are not configured:</p> <ul style="list-style-type: none"> <li>Local device is tested with its neighboring node, i.e. we can view remote device and "tx/rx bitrate" values for it in a "mint map" command output. In this case "tx/rx bitrate" values from "mint map" command output are taken for "rate" and "reply rate" parameters.</li> <li>Local device doesn't consider remote device as a neighboring node. In this case "rate" and "reply rate" parameters will be equal to minimal possible local device "bitrate" value for current bandwidth (for example, 6 Mbps for 20 MHz bandwidth, 3 Mbps for 10 MHz, 5 Mbps for 5 MHz).</li> </ul>
<b>-s packet_size[, reply_size]</b>	Sets test packet size from the local device and toward it. Test packet size by default is 1024 bytes. Maximal possible test packet size is 1728 bytes.
<b>-b</b>	Transmitting broadcast test packets.
<b>-p priority</b>	Sets the test packets priority in range 0...16.
<b>-align [L,R]</b>	<p>Alignment mode for antenna with MIMO technology. The "L" parameter sets which antenna will be used to transmit test packets from the local device. The "R" parameter sets which antenna will be used to transmit test frames from the remote device on the other side of the link. If "L" and "R" parameters are not specified, the average signal level from all antenna outputs will be displayed.</p> <p>"L" and "R" parameters can have the following values: 0 – antenna with vertical polarization, 1 – antenna with horizontal polarization (or V and H).</p>
<b>-evm</b>	Indicates the measured input signal quality (Error Vector Magnitude). It should be as high as possible. The recommended level is not less than 21.
<b>-tu [seconds]</b>	<p>Unidirectional test: packets are transmitted only from the current side to the specified MAC address.</p> <p>Packet size by default - 1536 bytes (to change packet size use "-s" option).</p> <ul style="list-style-type: none"> <li>"seconds" – test duration in seconds (by default – 5 seconds). Maximum value is – 60 seconds.</li> </ul>
<b>-tb [seconds]</b>	<p>Bidirectional test: packets are transmitted in both directions.</p> <p>Packet size by default - 1536 bytes (to change packet size use "-s" option).</p> <ul style="list-style-type: none"> <li>"seconds" – test duration in seconds (by default – 5 seconds). Maximum value is – 60 seconds.</li> </ul>
<b>-load N[m k]</b>	<p>Limits maximal link testing bandwidth. "N" – bandwidth value:</p> <ul style="list-style-type: none"> <li>"m" – Mbps.</li> <li>"k" – Kbps.</li> </ul>
<b>-mint</b>	<p>Allows to perform testing with such MINT functions enabled as ATPC (Automatic Transmit Power Control) and autobitrate. In this mode the statistic for errors and retries is not available.</p> <p>As the "target" parameter can be specified any MINT node's MAC address including nodes that are not direct neighbors of the current node .</p> <div style="border: 1px solid #f0e68c; padding: 10px; margin-top: 10px;"> <p> <b>NOTE</b></p> <p>Is available only with "-tu" or "-tb" parameter, the "-r" parameter is ignored.</p> </div>
<b>-key [PASSWORD]</b>	Sets password for testing. If a password is set on the testing device, only the device with the same password can be tested with it.
<b>-disable/- enable</b>	Disables/enables ability to perform link test. By default is enabled.

## Examples

Start test with default parameters and "000435230a20" neighbouring node MAC address.

```
ltest rf5.0 000435230a20

Unicast test to 000435230A20 via rf5.0 with priority 16
packet size 1024, reply size 1024, bitrate 117000, reply bitrate 130000
rt - retries, up - undelivered packets, ua - undelivered acks
```

local				remote				est.
amp/max	rt%/avg	up%/avg	ua%/avg	amp/max	rt%/avg	up%/avg	ua%/avg	rtt
17/17	0/0	0/0	0/0	17/17	0/0	0/0	0/0	6.3
17/17	0/0	0/0	0/0	17/17	0/0	0/0	0/0	6.9
17/17	0/0	0/0	0/0	17/17	0/0	0/0	0/0	11
17/17	0/0	0/0	0/0	17/17	0/0	0/0	0/0	9.2
17/17	0/0	0/0	0/0	17/17	0/0	0/0	0/0	12
17/17	0/0	0/0	0/0	18/18	0/0	0/0	0/0	9.8

The table contains the following data for the local and remote end of the link:

- "amp/max" – current and maximum incoming signal levels.
- "rt%/avg" – current and average retries number in percent.
- "up%/avg" – current and average undelivered packets number in percent.
- "ua%/avg" – current and average undelivered acks number in percent.
- "rtt" – estimated round-trip time.



NOTE

In software with TDMA technology support, the command display is limited by "amp/max" and "rtt" columns.

```
ltest rf5.0 00043513724f

Unicast test to 00043513724F via rf5.0 with priority 16
packet size 1024, reply size 1024, bitrate 104000, reply bitrate 104000
```

local	remote	est.
amp/max	amp/max	rtt
dB	dB	ms
16/16	16/16	17
17/17	16/16	15
16/17	16/16	15
17/17	16/16	15

Start test where "rate" parameter value is 24 Mbps. The "reply rate" parameter in this case will be set as default.

```
ltest rf5.0 000435135e4e -r 24000
```

Start test using the "-align" parameter. The difference of this output from the standard one is that "ant.amps", column is used instead of "amp/max". The "ant.amps" column indicates signal levels from 0, 1 and 2 antennas divided by ":" correspondingly.


```
ltest rf5.0 000435230a20 -align

Unicast test to 000435230A20 via rf5.0 with priority 0
packet size 64, reply size 64, align, tx antennas: local(all), remote(all)
rt - retries, up - undelivered packets, ua - undelivered acks
```

local				remote				est.
ant.amps	rt%/avg	up%/avg	ua%/avg	ant.amps	rt%/avg	up%/avg	ua%/avg	rtt
40:41:00	0/0	0/0	0/0	41:39:00	0/0	0/0	0/0	9.3
40:41:00	0/0	0/0	0/0	41:39:00	0/0	0/0	0/0	10
40:41:00	0/0	0/0	0/0	41:39:00	0/0	0/0	0/0	8.9
40:41:00	0/0	0/0	0/0	41:38:00	0/0	0/0	0/0	7.4
40:41:00	0/0	0/0	0/0	41:38:00	0/0	0/0	0/0	6.3

The table contains the following data for the local and remote end of the link:

- "ant.amps" – signal to noise + interference levels (CINR) from 0, 1 and 2 antennas.
- "rt%/avg" – current and average retries number in percent.
- "up%/avg" – current and average undelivered packets number in percent.
- "ua%/avg" – current and average undelivered acks number in percent.
- "rtt" – estimated round-trip time.

 **NOTE**

In software with TDMA technology support, the command display is limited by "ant.amps" and "rtt" columns.

```
ltest rf5.0 00043513724f -align

Unicast test to 00043513724F via rf5.0 with priority 0
packet size 64, reply size 64, align, tx antennas: local(all), remote(all)
```

local	remote	est.
ant.amps	ant.amps	rtt
dB	dB	ms
39:35:00	37:33:00	15
39:35:00	36:34:00	15
38:35:00	36:34:00	15
39:35:00	36:34:00	15

```
Start bidirectional link bandwidth test of a local device with a remote device which have "000435230A20" MAC address.

ltest rf5.0 000435230a20 -tb

Bidirectional throughput test to 000435230A20 via rf5.0 with priority 16
packet size 1512, bitrate 117000, reply bitrate 130000

Please wait.....

=====
Direction | Kbit/s | Pkt/s | Retries | Errors | min/avg/max/stddev (usec)
=====
Transmit   | 60285  | 4983  | 0.00%  | 0.00%  | 4/200/7649/661
Receive    | 60287  | 4984  | 0.01%  | 0.00%  | 1/200/13476/712
-----
Total      | 120572 | 9967  |
-----
```