

# Ethernet & IP Network Tester MAKS-EM



Packet network tester and analyzer **MAKS-EM** provides monitoring and diagnostics functionality for IP & Ethernet networks and can easily qualify any link for transmission and quality of service (QoS) parameters. With two 10/100/1000 electrical ports and two SFP slots onboard any simple link, tunnel or interface combination can be tested in different ways and always in accordance with RFC2544 and M.2301.

**MAKS-EM** is certified and listed on the State register of Measuring Equipment of Russia.

The analyzer allows testing data links while commissioning and servicing Ethernet and Gigabit Ethernet networks. **MAKS-EM** is a next-generation test instrument combining handiness, simplicity of operation and versatility. This tester is valuable for technical experts, network adjusters and engineers responsible for transport services as well as service providers and organizations assessing and attesting the required QoS.

## Key Features

- two Ethernet/Gigabit Ethernet interfaces (fully independent);
- traffic generation and analysis at data link, networking and above layers with setting of load, ToS/DSCP prioritization, packet length, source and destination MAC- and IP-addresses and other protocol fields;
- switch-on by pressing button (very short boot time – about 4 seconds!)
- counters for received and transmitted data;
- RFC2544-recommended measurements of throughput, back-to-back, latency and frame loss;
- channel integrity and IP routes testing: ping and traceroute support;
- loopback at physical, data link and networking layers, with or without MAC and IP swapping or substitution;
- pass-through connection from one measurement port to another with monitoring and statistics collection;
- traffic filtering at data link and networking layers;
- OAM (Operation, Administration and Maintenance) protocol support;
- cable diagnostics: cable quality, distance to fault, crossover, etc.;
- ARP&RARP support;
- DHCP support;
- MPLS support;
- PDV (Packet jitter) measurement;
- PTP support recommended by IEEE1588;
- BER measurement;
- easily understandable GUI with 3 softkeys
- remote control via USB port, or Web management via auxiliary Ethernet port;
- easily upgradeable firmware;
- English/Russian (more languages to be added shortly) interface and remote control software.

## Distinctive Features

**MAKS-EM** is an ideal cost-effective solution for Ethernet services testing. It is enclosed into a light but rugged case that provides considerable mobility of the device. Since MAKS-EM is an easy-to-use portable device, it is suitable for field operation that can outlive inaccurate operation and falling down from hands or table.

The device loads and configures fast. It has an intuitive user interface not overloaded with settings but providing the user with all necessary control means.

## The Device Provides

- interface managing measurements and operating modes are displayed on coloured screen;
- LED indicators for Link, Receive, Transmit, and running tests status;
- alphanumeric entry from the keypad

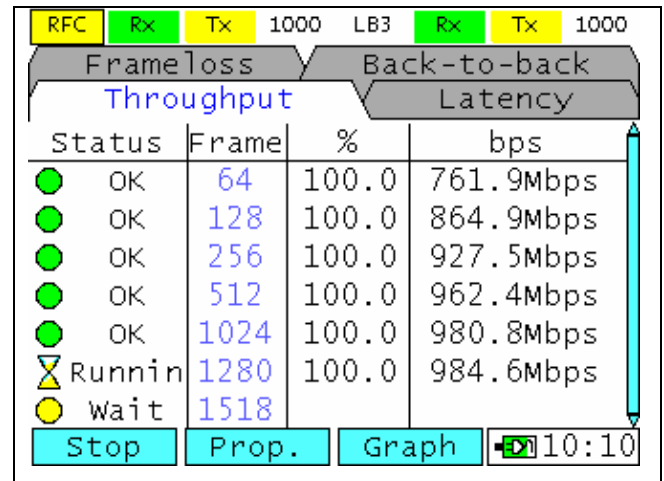


### Testing Capabilities

Using MAKS-EM, you can perform RFC2544 tests consistent with either certain presetting or configured for certain conditions.

Two measurement ports allow connection to two interfaces at a time and test equipment parameters in the process of data transmission from one port to another. It is also possible to configure testing of a channel up to a remote network node with loopback generation.

RFC2544 standard provides all-round testing and assessment of Ethernet performance parameters. Such test results are of primary importance when a service-level agreement (SLA) with a customer is signed or while troubleshooting and servicing channels and networks.

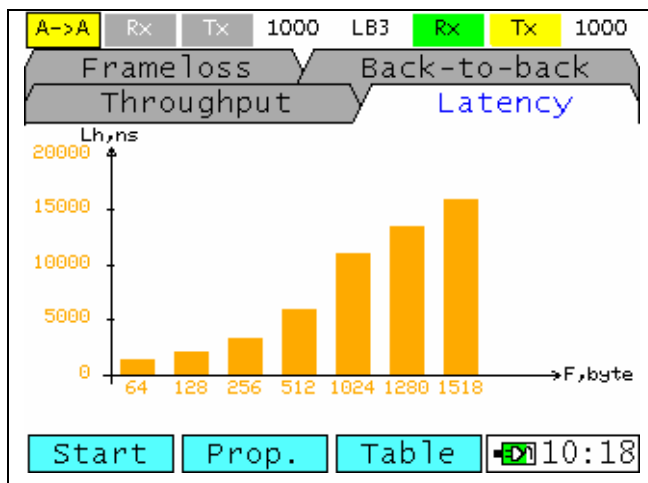


### RFC2544

MAKS-EM offers the possibility of testing Ethernet performance parameters as per RFC2544. The automated test script includes testing of:

- throughput;
- latency;
- frame loss;
- back-to-back.

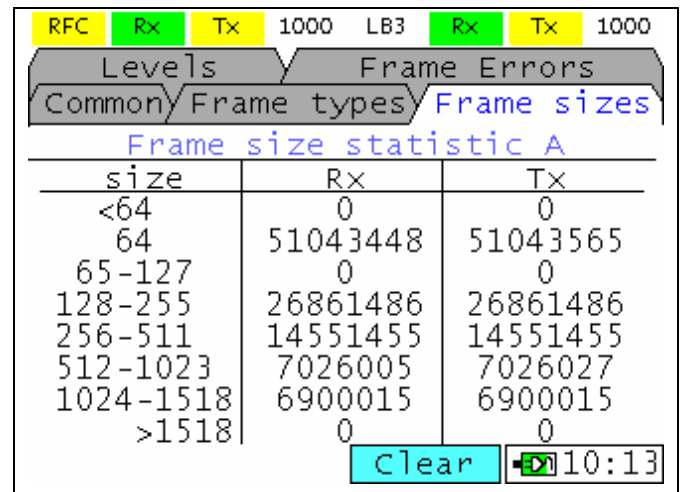
Each test allows checking certain parameters specified in the service-level agreement (SLA). Graphic and tabulated reports generated according to test results can be transferred to PC.



### Test Reports

The following reports are generated:

- real-time results display on-screen;
- real-time display of statistics from beginning of the test up to the moment;
- report generation for the entire test and saving it to flash ROM or PC using remote control software



### Technical Specifications

- 2 x RJ45 10/100/1000BASE-T (Ethernet, Fast Ethernet, Gigabit Ethernet) measurement ports and 2 x SFP 1000BASE-X (Fiber Gigabit Ethernet) ports with operation of any two of these ports at a time;
- RJ45 10/100 BASE-T port for remote control;
- USB port for remote control.

### General Specifications

- battery-powered; external power source and battery charger: 220 to 230 V, 50 to 60 Hz;
- operation temperature: 0°C to +40°C;
- dimensions: 196 x 100 x 40 mm;
- weight 0.6 kg (without case and cables)

# Package Network Loopback Tool MAKS-EMB



MAKS-EMB is designed for use during Ethernet, Fast Ethernet and Gigabit Ethernet networks maintenance and repair.

MAKS-EMB can function either in its basic Loopback modification or in extended Analyzer modification. MAKS-EMB can operate either in combination with Tester and Analyzer MAKS-EM as a loopback tool or as a self-sustained Ethernet/Gigabit Ethernet tester. Remote control is conducted via PC connected to the tool via a USB port or Ethernet and test results are displayed on PC screen.

It will be expedient to use the tool as an independent analyzer if metrological characteristics are not required, for example at package networks operation.

MAKS-EMB is powered from a power unit or PoE from additional RJ45.

## Key Features (Basic Loopback Modification)

- loopback at physical, data link, networking and other layers, with or without MAC and IP swapping or substitution;
- received and transmitted traffic statistics collection and display;
- input traffic filtering at data link and networking layers;
- OAM (Operation, Administration and Maintenance) protocol support;
- remote control via USB port, or Web management via auxiliary Ethernet port;
- ARP (Address Resolution Protocol) support;
- DHCP (Dynamic Host Configuration Protocol) support;
- MPLS (Multi-Protocol Label Switching) support;
- upgradeable firmware;
- English/Russian remote control software.

## Additional Features (Analyzer Modification)

- Ethernet/Gigabit Ethernet interface testing;
- traffic generation and analysis at data link, networking and above layers with setting of load, ToS/DSCP prioritization, packet length, source and destination MAC- and IP-addresses and other protocol fields;
- throughput, back-to-back, latency and frame loss measurements as per RFC2544;
- channel integrity and IP routes testing: ping and traceroute support;
- cabling diagnostics: cable quality, distance to failure, crossover, etc.;
- PDV (Packet Delay Variation) measurement;
- BER (Bit Error Rate) measurement;

## The Device Provides

- LED indicators for Link, Receive, Transmit, and running modes;
- loopback activation from keypad and remotely;
- Ethernet/Gigabit Ethernet modes switching.

## Technical Specifications

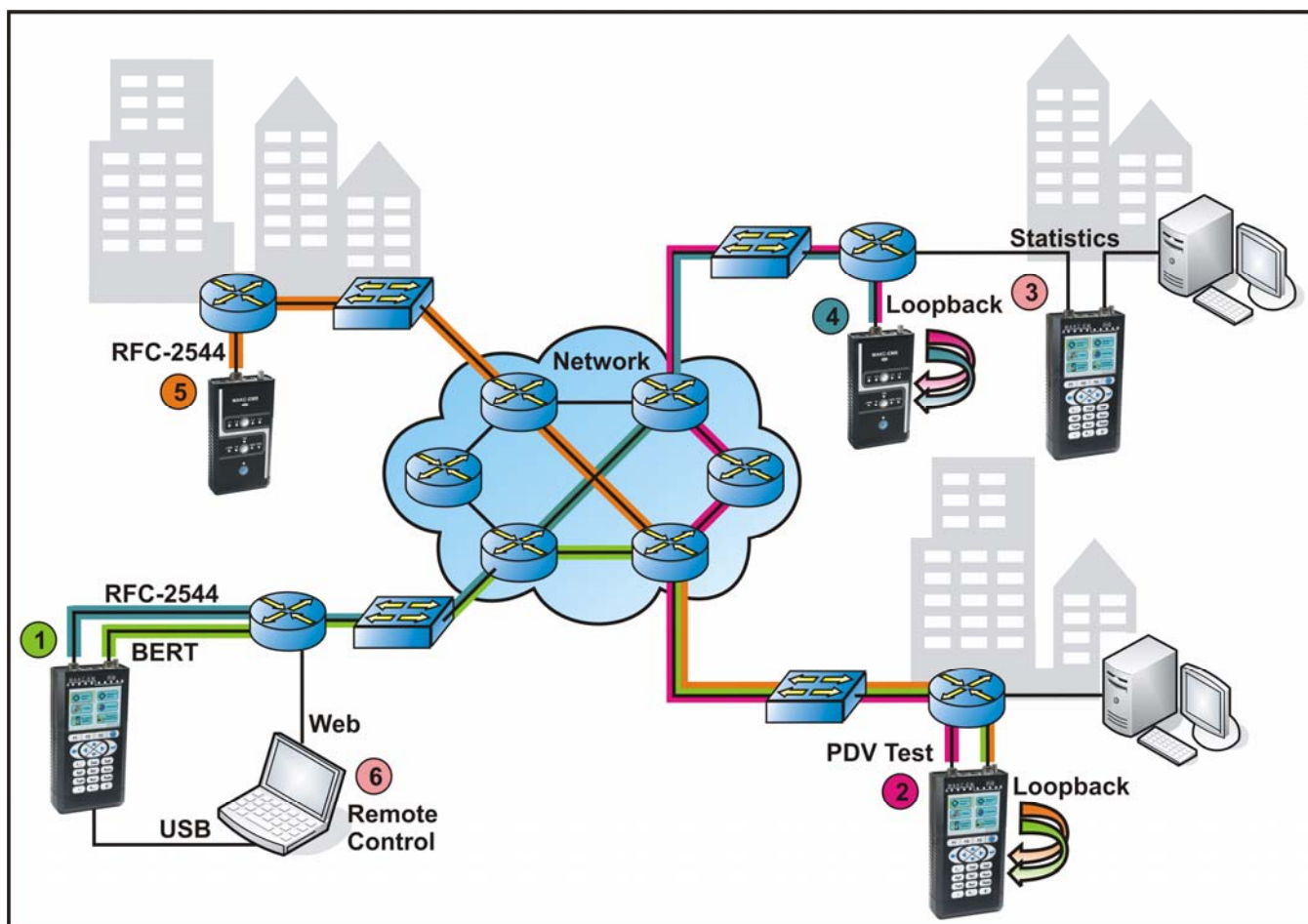
- RJ45 10/100/1000BASE-T (Ethernet, Fast Ethernet, Gigabit Ethernet) measurement port and SFP 1000BASE-X (Gigabit Ethernet) port, with operation of any of these ports at a time;
- RJ45 10/100 BASE-T port for remote control and PoE powering;
- USB port for firmware upgrade and remote control.

## General Specifications:

- power: PoE from second RJ45; external power source (220 to 230 V, 50 to 60 Hz);
- operation temperature: 0°C to +40°C;
- dimensions: 157 × 84 × 31 mm;
- weight 0.3 kg max.

## Examples of MAKS-EM and MAKS-EMB Use for Packet Networks Testing

The picture below shows the possibility of testing individual channels and network sections as well as receipt and logging of the information on quantitative and qualitative channel parameters using a set consisting of MAKS-EM and MAKS-EMB connected to an integrated remote control and test data collection and processing system. The received test data are useful while performing network maintenance, troubleshooting channel performance, checking and considering clients' claims.



1. MAKS-EM in the mode of two channels testing with dropout and distant end loopback;
2. MAKS-EM in non-dropout testing mode with additional channel loading;
3. MAKS-EM in statistics collection and user traffic parameters checkout mode;
4. MAKS-EMB in loopback mode;
5. MAKS-EMB in test traffic generation mode;
6. Remote control of the tool via USB interface and control of any other equipment via auxiliary Ethernet port.

Tester/analyser MAKS-EM is a self-contained device able to operate on battery and perform any network tests without the use of PC. Enabling both MAKS-EM measurement interfaces in transit mode (transit from one port to another), it is possible to get into the gap between two network sections and collect statistics. Two measurement interfaces with independent traffic generators and receivers allow perform two arbitrary tests simultaneously.

MAKS-EMB has one measurement port and can be powered from two alternative sources: mains and PoE. Both devices can be controlled remotely via a USB port or web-controlled.



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