

# FOX-450M

All-in-One Multimedia Service Test Set – Professional, up to 10Mbps



FOX-450M is a comprehensive multimedia test set. Not only is it a consolidation of DSL modem, IP PING and Metallic Testing, but also a perfect handheld test set for qualifying IPTV performance (QoS) both inside and outside a premise site, MDF, Cross-Box, Remote DSLAM or Central Office by measuring and analyzing the parameters of video transport quality such as Jitter, package loss, transmission speed and MDI-DF adopting IneoQuest intelligence, transport stream quality (ISO TR101 290) and network configuration. The hardware (FOX-450MH) is capable to process data stream up to 10Mbps that can meet most High Definition IPTV applications.

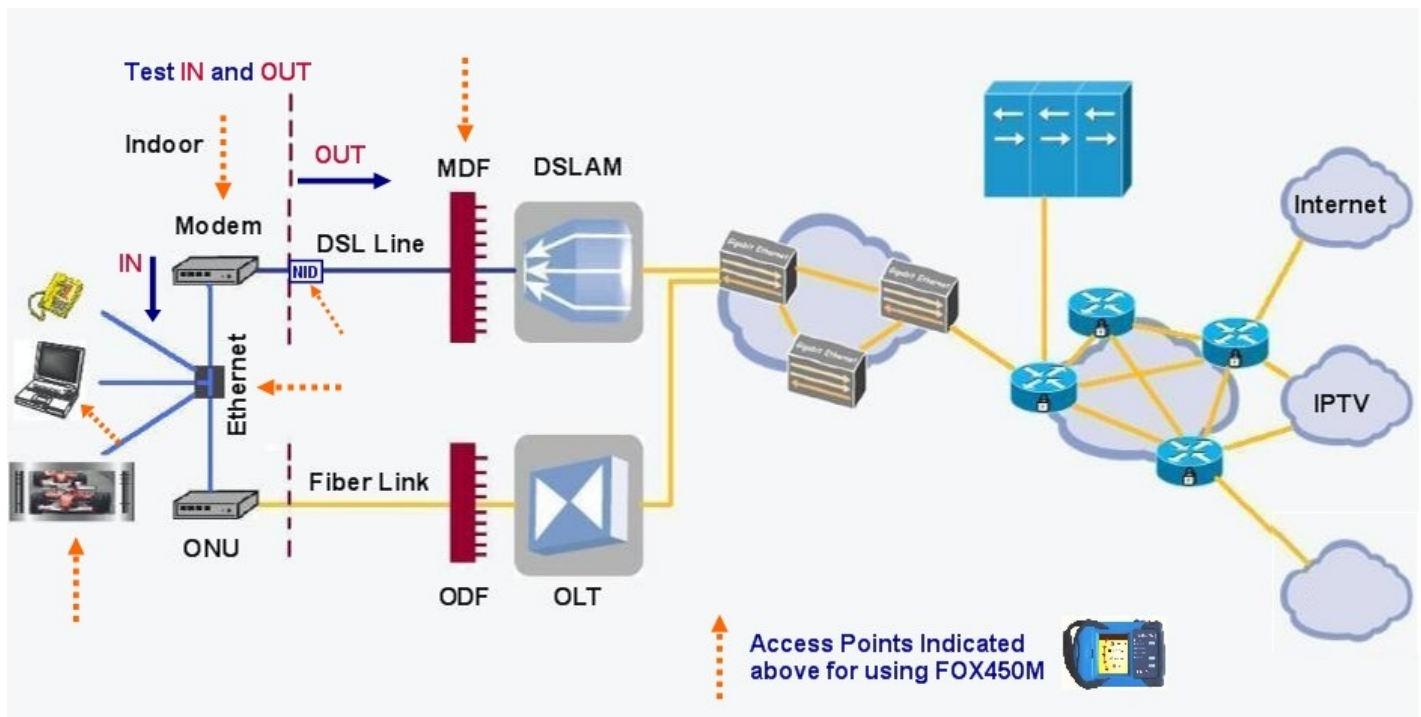
FOX-450M allows technicians and engineers to test outside the customer premises over ADSL1/2/2+ (WAN side) or inside the customer premises over Ethernet (LAN side) to resolve performance issues. It also allows technicians and engineers to pre-set up criteria for easy and intuitive view of physical layer conditions and quality of service.

FOX-450M supports TS and ISMA service formats; all major video compression standards MPEG2, MPEG4, H264, AVS and VC-1/WM-9; most common encapsulation formats VLAN, PPP, RTP, RTSP, TCP, UDP, IGMP, etc. It is compatible with major IPTV equipments from Huawei, ZTE, UTStarcom, Alcatel, Lucent, etc.

FOX-450M's 240 x 320 TFT true colors LCD with a touching screen and user-friendly QUI make it so easy to operate, set up parameters and view results intuitively.

## Key Features

- Consolidation of DSL modem, PING and Metallic Testing
- Support three types of emulation:  
Modem emulation (through mode)  
PC emulation  
PC+Modem emulation
- Fast and easy copper loop qualification for ADSL/ADSL2/ADSL2+ services with pass/fail indication and programmable thresholds
- Web Browse - after succeeding in PPPoE/ PPPoA Dial, the user can surf on the internet
- Discovery – search and identify devices on the same LAN
- Simple, affordable IPTV testing over ADSL/ADSL2/ADSL2+ and 10/100Mbps Ethernet with pass/fail indication
- Comprehensive test of IPTV service, monitor the whole process from STB initialization
- Comprehensive analysis of test parameters:  
The quality of video transport and display in real-time curve;  
The quality of Transport Stream (ISO TR 101 290);  
Network configuration.
- Compatible with major IPTV equipments such as Huawei, ZTE, UTStarcom, Alcatel, Lucent, etc.
- Compatible with most common encapsulation formats such as VLAN, PPP, RTP, RTSP, TCP, UDP, IGMP, etc.
- Support TS and ISMA service formats.
- Support all major video compression standards MPEG2, MPEG4, H264, AVS, VC-1/WM-9, etc.
- Support full MDI DF parameters test adopting IneoQuest intelligence
- Capable to process data stream up to 10Mbps to meet High Definition (HD) IPTV application
- Support STB Emulation
- 240 x 320 TFT true colors LCD with a touching screen and WINCE operating system
- Large capability of battery, equipped with power adapters and a vehicular charger



# Simplified IPTV Testing with Intuitive Test Results

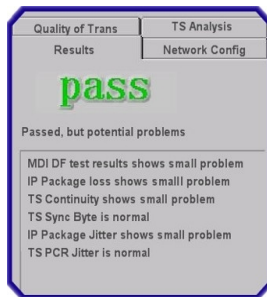
Simple Menu Structure  
Easy Operation



Auto Initialization Test  
checks any possible faults



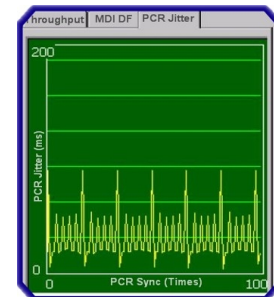
Intuitive Results for all measurement



IPTV QoS test results summary screen

Trans Test Items	Test Results
IP Package	1536
TS Package	10079
Video Package	8727
Audio Package	687
IP Package Jitter	
Max Jitter	21.5 ms
Min Jitter	0.4 ms
Average	6.2 ms
IP Package Loss	
Max Loss	0
Min Loss	0
Average	0.0

Detail Results



Graphic Results

## IPTV Test Functions

### Pre-Setup

FOX450M allows the user pre-setup the following parameters as essential pass/fail criteria for QoS assurance:

- Values of video streaming start and stop.
- PCR interval.
- IGMP latency.
- The transmission rate
- MDI DF.

### IPTV Initialization test

Before starting IPTV testing, FOX450M will do initialization test first to check if any possible fault such as:

- Line
- Modem
- STB
- PPP Login
- IPTV Authentication
- EPG Acquire

Once one of the above faults appears during the process of initialization, FOX450M will show a warning message.

### IPTV video stream detection

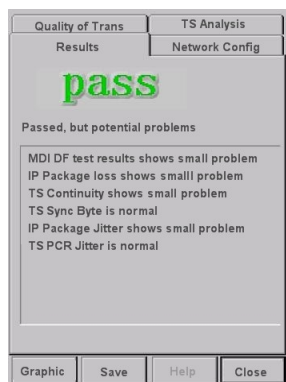
After passing the IPTV initialization, FOX450M will display information of the detected video streaming automatically such as the video streaming encapsulation format, network configuration parameters and more. It can detect and display up to 10 video streams.

## IPTV Quality Analysis

### Overall of Video Quality of service

After completing the measurements and analysis, FOX450M will provide a summary of Video Quality of Service. Even though the results may show PASS, it may still points out some potential problems for the user to consider.

Also, the user can simply click on each individual category to view the details of each measurement and analysis results including graphic results.



## Detail of Video Quality Measurement and Analysis

### Quality of Video Transport

- Number of IP package.
- Number of TS package.
- Number of Video package.
- Number of Audio package.
- IP package Jitter.
- IP package loss.
- Transmission speed of IP package.
- Video transmission speed
- Audio transmission speed

### Measurement and Analysis of Video Stream

(ETSI TR 101 290 TS measurement compliance).

- Video/Audio PID
- PAT/PMT PID
- TS Sync Loss
- Sync Byte Error
- PAT error
- Continuity count error
- PMT error
- Transport error
- CRC error
- PCR error
- PTS error

### Network Configuration Test

- Service format - TS, ISMA
- Encapsulation format - TCP, UDP, RTP, RTSP, VLAN, PPP and etc.
- MDI DF - RFC4445
- Source IP
- Source MAC
- Source Port
- Dest IP
- Dest MAC
- Dest Port
- VLAN priority
- VLAN ID
- PPP Version
- PPP Type
- IP TOS/IP TTL
- RTP Type
- User name and password in PPP dial.

### Graphic Results

FOX450M can also display test results of PCR Jitter, MDI DF and Throughput in graphic.



# Comprehensive xDSL and LAN Access Testing

## xDSL Test

FOX450M emulates DSL CPE modem and PC to perform physical layer, network layer and application layer test. It also allows the user to pre-setup criteria to further analyze the DSL line condition and score quality of service.

It includes the tests below:

### DSL Layer Test

Perform fast synchronization test at customer's premises; determine whether rates promised are rates delivered; confirm parameters for ADSL/ADSL2/ADSL2+. FOX450M will display bits per tone in graphics after successfully linking up with DSLAM.

### Noise Margin Curve

FOX450M can measure the real time up/down stream noise margin changes and display in graphics. The results reflect the DSL line stability against environment changes. It is a helpful parameter for troubleshooting an unstable DSL service.

### Verification ATM Mapping

ATM loopback functionalities.

### PPP dialing

The user can fulfill PPPoE (or PPPoA) dialing through a PPPoE (or PPPoA) test account. After successful dialing, it will obtain local/destination IP, DNS server IP and subordinate IP address, and PPP LED will be shining. 7 VPI/VCI groups are preset for the user to select conveniently and they are also user-definable. And the user may also select and set PAP, CHAP, MS-CHAP and MS-CHAP V2 authorization method.

### Network Layer Test

Verifying connectivity to the Internet via tests of IP Ping, Ipconfig, Tracert and Route.

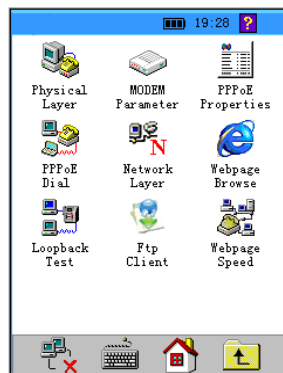
### Web Speed

### Webpage Browsing Test

### FTP Client

## Modem emulation

FOX450M can replace the user Modem completely. The user could take FOX450M as a DSL modem to do PPP dial and log into the Internet and determine if the customer modem works properly. FOX450M will also provide link parameters and statistics.



## LAN Test

FOX450M emulates PC to perform PPPoE dial test, network layer and application layer test of LAN.

It includes the below tests:

### LAN port PPPoE Dial

Verify if Broadband IP or LAN performs normally. And the user may also select and set PAP, CHAP, MS-CHAP and MS-CHAP V2 authorization method.

### Data Rate and Through Put

After successful PPP dialing, FOX450M can display data rate and through put of the link.

### Network Layer Test

Ping, Ipconfig, Tracert and Route.

**Fixative IP** – search for devices on the same LAN. It will display both IP address, host name and MAC address.

### Web Speed

### Webpage Browsing Test

### FTP Client

## Copper Testing

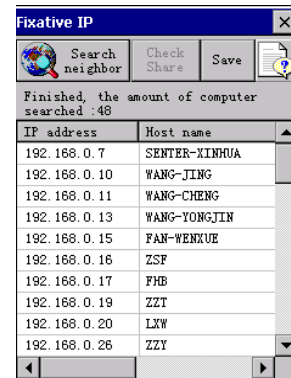
FOX450M can measure AC/DC Voltage, Capacitance, Loop Resistance and Insulation Resistance for basic line troubleshooting. It also estimates loop distance.

### Indicate Line Voltage

For safety purposes, when line voltage greater than 80VDC or 50VAC is detected, FOX250 will display warning message and the voltage indicator LED will be turned on informing the technician of the loop condition.

## Data storage, file transfer and management software

FOX450M can save results including line parameters, channel bit chart and error test to built-in 20Mb memory or external memory stick via a USB port or upload them to a PC via the unit's LAN port for records or further analysis. Test results can be transferred to other PCs on the same LAN. Using the software all parameters can be preset before passing the test set to the technician for test campaign and collecting test results after. Technicians do not have to worry about setting the unit at all, thus increasing test efficiency significantly.



## Specifications

### ADSL/ADSL2/ADSL2+

Emulations	ATU-R modem/Through mode PC Emulation Modem+ PC
Standards	ITU G.992.1 (G.dmt) ITU G.992.2 (G.lite) ITU G.992.3 (ADSL2) ITU G.994.1(G.hs) ANSI T1.413 issue #2 ITU G.992.5 (ADSL2+) Annex L
Rates Supported	Downstream: up to 24Mbps Upstream: up to 1.2Mbps
Physical Layer	Max bit rates
Features Supported	Actual bit rates Mode: Fast/Interleaved Capacity Attenuation (0 ~ 63.5dB) Noise margin (0 ~ 32dB) Output power DSL Connection Mode Noise Margin Curve Time of Measurement Number of Connection Determine quality of service: Excellent, good, ok or poor
ATM Layer	VPI/VCI Configuration - 7 pre-set groups and user definable VC-Mux and LLC Multiplexing ATM PING (OAM Loopback)
Protocols Supported	PPPoE (RFC2516) with PAP, CHAP, MS-CHAP, MS-CHAP V2 PPPoA (RFC2364) Ethernet over ATM/Bridge (RFC1483)
IP PING	WAN and LAN PING IP address or URL Package Size, Test Times, Delay
Ipconfig	TCP/IP, DHCP, DNS Setup, IP/Netmask/Gateway
Tracert	IP address, Name, Hops, Delay Support IPv4 and IPv6
Route	Print, Add, Delete or Change route
Web Speed	IP Address and URL Time and Rates
IE Webpage Test	IP Address/URL IE window
FTP Client	IP Address/URL File, Time and Rates
Discovery	Search and identify the IP address, name, host and MAC address of devices in the same Local Area Network
Errors Measurement	LOS - Loss of Signal CRC - Cyclic Redundancy Check HEC - Header Error Correction FEC - Forward Error Correction NCD - No Cell Delineation OCD - Out of Cell Declination

### Copper Testing

Test Type	Test Range	Accuracy
DC Voltage	0 ~ 100 VDC	±2%
	100 ~ 200 VDC	± 5%
	200 ~ 400 VDC	±5%
AC Voltage	0 ~ 100 VAC	±2%
	100 ~ 400 VAC	±5%
Loop Resistance	0 ~ 100Ω	±3%
	100 ~ 500Ω	±3%
	500 ~ 2000Ω	±2%
	2000 ~ 20KΩ	±2%
Capacitance	0 ~ 10 nF	±2 nF
	10 ~ 1000nF	±2%
Loop Distance Estimation	Based on the value of Loop Resistance or Capacity under condition of clean cable.	
Insulation Resistance @100V	0 ~ 1.0 MΩ	±0.1 MΩ
	1.0 ~ 50 MΩ	±10%

### Certificate CE

**Note:**

The above specifications subject to change without notice

### IPTV over ASDL and Ethernet Testing

Physical-layer Supported	ADSL/ADSL2/ADSL2+ 10/100Mbps Ethernet
Video Compression Formats	MPEG2, MPEG4, H264, AVS, VC-1/WM-9
Video Streaming Control	Video streaming detection Detect and display up to 10 IPTV channels Channel Joins/Leaves
Operation Mode	Through-Mode Stand-alone with STB emulation
Graphic Results	MDI DF Throughput PCR Jitter
Transmission Encapsulation Format	Transport Stream (TS) Internet Streaming Media Alliance (ISMA)
Network Encapsulation Format	TCP, UDP, RTP, RTSP, VLAN, PPP and etc.
Package Analysis	Total IP Package, count Transport Stream Package, count Video Package, count Audio Package, count
IP Video QoS Parameters	IP Package Jitter (Max, Min and Average) IP Package Loss (Max, Min, Average and total) <b>Zip Time:</b> Programmable for repeating and auto tests among multi channels, and display the values in Max/ Min/Average IP Package Transmission Speed PCR Jitter (Max, Min and Average) MDI DF (Delay Factors in MDI test defined in RFC4445) Transport Stream Sync Loss Sync Byte Error PAT Error Transport Stream Continuity Error PMT Error Transmission Error CRC Error PCR Error PTS Error
QoS Results	Pass/Fail messages and summary
Video Data Rates	Video Transmission Speed Audio Transmission Speed Data Transmission Speed
PID Analysis	Video PID Audio PID PAT PID PMT PID

### General

Display	240x320 TFT true color LCD, touch screen, WinCE
Software	Remote Management software allows user to preset parameter and upload test results via Ethernet port.
Memory	20M
Interfaces	RJ11 and 2 PIN connector - DSL and DMM Test Port 10/100Mbps Ethernet Ports - LAN and through mode testing RJ45 Ethernet - Comm Port USB - software upgrade, keyboard and external memory
LED	Ethernet Link - Status/Data xDSL Act - Data/PPP xDSL Link Status - Negotiating/Training or Linked up Power Status
Power Supply	Rechargeable 7.4V, 2700mAh Li-Ion Operating time (approx.) - 8 hrs (typical measurement) AC adapter (110 ~ 250VAC, 50/60Hz)/output 7.4V Vehicle power adapter (Optional) Power Management - auto power off and low battery warning 1 minute before shutting down.
Temperature (Operation)	0 ~ 40°C
Temperature (Storage)	-20°C ~ 70°C
Time and date	Setup with built-in clock and calendar
Relative Humidity	up to 85% (non-condensing)
Dimension (mm)	176 (L) x 130 (W) x 60 (H)
Weight (w/Battery)	<700g
Max Test Distance	6.5km

## Standard Accessories

Direct Ethernet cable	1 piece
Test Cable	1 piece
LCD Protection Cover	1 piece
Touch screen stick	1 piece
Li-Ion rechargeable battery	1 pack
AC/DC Power Adapter	1 piece
User manual	1 hard copy
Management software	1 CD
Soft carrying case	1 case
Handle	1 piece
Vehicle power adapter	Optional

## Related Products

FOX-100	Wire tracker
FOX-150 series	Telephone line & service test sets
FOX-250	DMM and ADSL2+ tester
FOX-450B	Advanced DMM and ADSL2+ tester
FOX-450V	Advanced DMM and VDSL2 tester
FOX-600CQM	Cable Qualification Test Set

## Product Models

<b>FOX450M</b>	ADSL2+ and Copper Testing package
<b>FOX450MS</b>	FOX-450M and Standard Definition IPTV (3Mbps) test package
<b>FOX-450MH</b>	FOX-450M and High Definition IPTV (10Mbps) test package

## Ordering Information

### FOX-450MX

#### X – Model type

None – ADSL2+ and Copper Testing Package

S – FOX-450M and Standard Definition IPTV package

H – FOX-450M and High Definition IPTV package