# AXS-200/610

## part of the SharpTESTER Access Line

NETWORK TESTING–ACCESS


### Identify copper problems affecting triple-play quality

- Visual reports, graphs and histograms, displaying signal and noise issues
- 30 MHz spectrum analysis for VDSL2 and video prequalification and troubleshooting
- Single-ended tests minimizing repair time and costs
- Automated clear, pass/fail results speeding up and simplifying test cycles

FROST & SULLIVAN

2009 BEST PRACTICES AWARD

GLOBAL HANDHELD xDSL TEST EQUIPMENT PRODUCT LINE STRATEGY OF THE YEAR AWARD

Next-Generation Network Assessment

EXFO

EXPERTISE REACHING OUT

# Locate, Interpret and Repair Local Loop Faults with Ease

## Ensure QoS for Triple-Play Deployments

For many telcos, the launch of ADSL technology has gone quite smoothly; however, preparing the copper loop plant for triple-play services is another story–let alone deploying IPTV over the latest DSL, VDSL2. EXFO's AXS-200/610 Copper Test Set enables field technicians to view the entire VDSL2 spectrum in order to identify and find disturbances and signal issues that affect voice and video delivery over the last mile. It also offers an extensive range of single-ended tests that help field technicians quickly locate and repair the faults that affect quality of service (QoS).

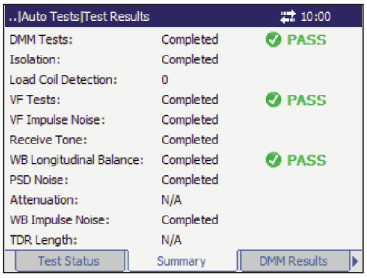
# Easy operation. Clear results. A straightforward test solution.

## 30 MHz Advanced Local-Loop Testing

Thanks to a 30 MHz bandwidth and wide dynamic range, the AXS-200/610 can test the local loop for almost every service that can be carried. Loop qualification becomes simple with the AXS-200/610's service-specific automated tests, reference cursors, specific noise filters and specialized loop evaluation algorithms. This unit is ideal for VDSL2, ADSL2+, ADSL2, ADSL, G.SHDSL, HDSL, HDSL2, T1/E1 and ISDN.

## Prequalification in Seconds with the Automated Test Pass/Fail Indication

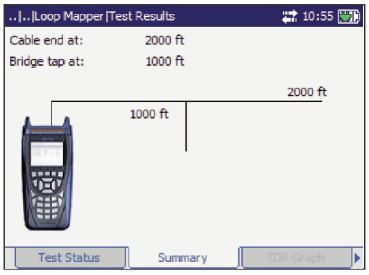
Providing complete feedback for quick pass/fail analysis thanks to its Auto Test feature, the AXS-200/610 simplifies the technician's job. This convenient, single-ended test tool allows for fast cable assessment to determine whether or not it is acceptable for VDSL2 and ADSL2+ services, based on predefined pass/fail criteria.




*Auto-test screen.*

## No More Guesswork with the Loop Mapper

The AXS-200/610's convenient and powerful Loop Mapper tool simplifies the detection of faults, bridge taps or cable ends. By automatically selecting the time-domain reflectometer (TDR) and/or the frequency-domain reflectometer (FDR), based on the current line conditions, Loop Mapper displays a straightforward wiring diagram that contains distances, for easy interpretation.



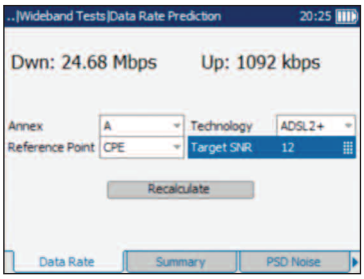

*Loop Mapper Test Results screen showing bridge tap.*

## Single-Ended Video and Data Rate Analysis

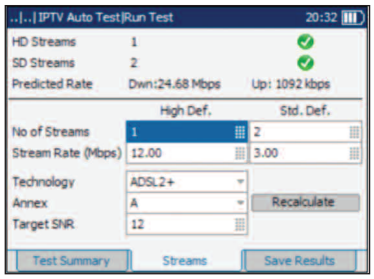
The AXS-200/610 single-ended video and data rate analyzer software option allows you to determine the xDSL data rates that a copper loop will support, prior to connecting/provisioning the circuit. With this new feature, you can evaluate a circuit's ability to carry ADSL2+ bit rates at the CO or the customer premises and find out how many IPTV channels can be supported during the pre-deployment stage.

Thanks to this industry-leading option, you can:

- Prequalify and validate circuits without having to install terminal equipment
- Reduce the number of false positives (failed installs)
- Decrease the cost of identifying up-sell opportunities (customers wanting newer/faster video and network applications such as ADSL2+ and IPTV)



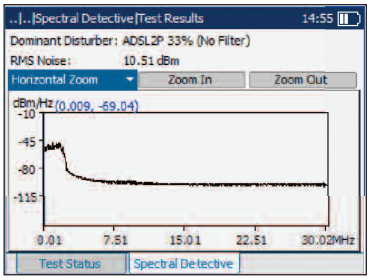

*Data Rate Prediction screen showing the forecasted ADSL2+ data rate.*



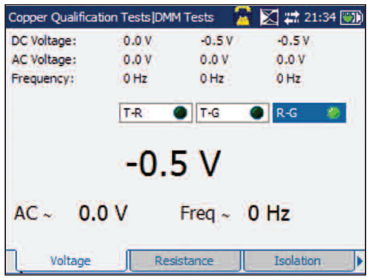

*Run Test screen showing the predicted IPTV channels.*

## Detecting Excessive Spectral Noise

You can count on the AXS-200/610's Power Spectral Density Noise feature to manage the spectrum in your cable bundle. The unit's graphic display helps you determine which service is deployed on the loop and at what power level. This is the best technique to use in identifying signals that are too strong for the bundle, and it is essential in unbundled local loop environments for spectral policing.




*Spectral Detective Test Results screen showing live disturber.*



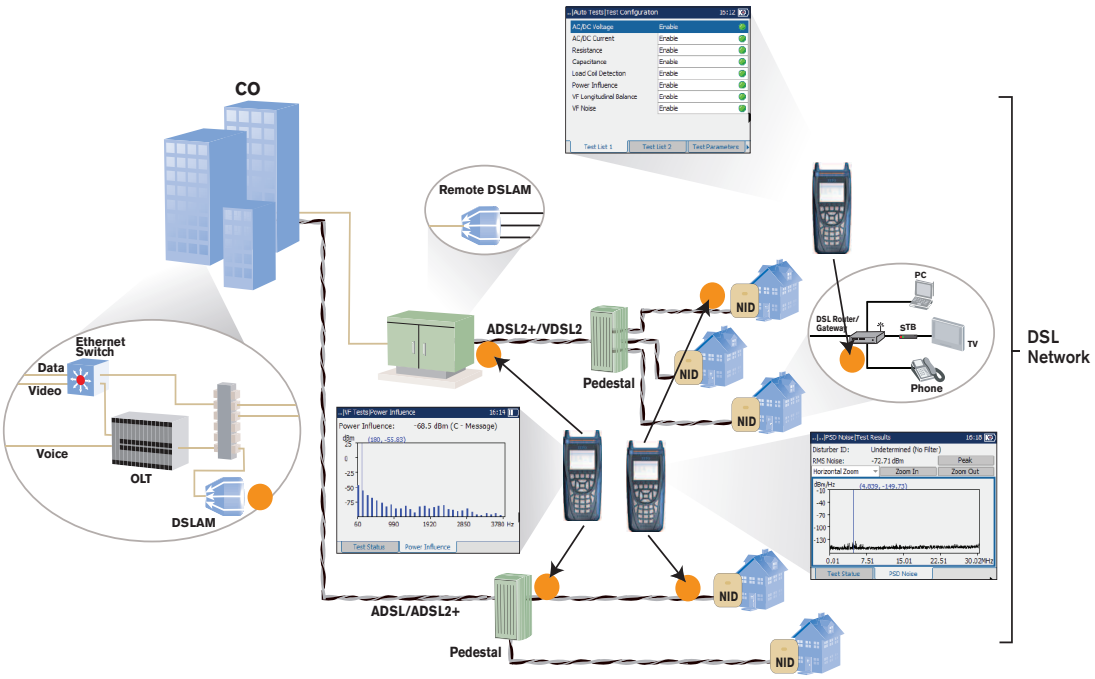

*DMM Tests screen showing capacitive length.*

## Complete Metallic Testing with Digital Multimeter (DMM) and Voice Frequency (VF)

With the AXS-200/610, AC and DC voltage measurements are automatically performed and documented, without having to press countless buttons or having to move the test leads. The AXS-200/610 also measures AC and DC current to offer a complete picture of the electrical stability on the circuit under test. Additionally, the AXS-200/610 measures capacitance and resistance, while providing an automatic conversion of the measured capacitance/resistance into distance values.

## The Essential Triple-Play Last Mile Deployment Tool

The AXS-200/610 is the ideal local-loop prequalification and troubleshooting tool for xDSL services, up to VDSL2. This instrument enables telcos and contractor personnel to identify the causes of unsuccessful triple-play, DSL and/or VF circuit deployment, while helping cable repair crews to locate with precision and to eliminate loop faults. The AXS-200/610 puts an end to the guesswork involved in locating loop faults, freeing up valuable staff and company resources, which saves precious time. Thanks to its single-ended test capabilities, service providers not only see a reduction in CAPEX but also in OPEX–making the AXS-200/610 a money-saving tool.




## Designed to Evolve with Your Network

Providing complete local-loop testing with a bandwidth of up to 30 MHz for copper/DSL/triple-play, the AXS-200/600 series is designed to evolve with your network. Additionally, these units offer accurate ADSL1/2/2+, VDSL2 and Ethernet-based analysis of triple-play services (voice, video and data).

# Specifications [a]

## RECEIVER CHARACTERISTICS [b]

| | |
|---|---|
| Receive frequency | 200 Hz to 10 kHz, resolution 1 Hz |
| Receive frequency | 10 kHz to 20 kHz, resolution 10 Hz |
| Receive frequency | 20 kHz to 30 MHz, resolution 1 kHz |
| Frequency uncertainty (accuracy) | ±0.1 % |
| Receive level (dBm) | −90 to +10 at 100 Ω or 135 Ω ,resolution 0.1 dB<br>−100 to +10 at 600 Ω ,resolution 0.1 dB |
| Level uncertainty (accuracy) | ±1.0 dB for 200 Hz to 20 kHz at 0 dBm<br>±1.0 dB for 20 kHz to 30 MHz at 0 dBm |
| Impedance (Ω ) | 100, 135, 600 and bridging (100 kΩ ) |

## TRANSMITTER CHARACTERISTICS

| | |
|---|---|
| Transmit frequency | 200 Hz to 20 kHz, resolution 1 Hz steps |
| Transmit frequency | 20 kHz to 30 MHz, resolution 1 kHz steps |
| Transmit level (dBm) | −10 to +5 at 600 Ω for 200 Hz to 499 Hz<br>−10 to +10 at 600 Ω for 500 Hz to 20 kHz |
| Frequency uncertainty (accuracy) | The better of ±50 ppm or ±0.5 Hz |
| Level uncertainty (accuracy) | ±0.6 dB 200 Hz to 20 kHz at 0 dBm<br>±1 dB 20 kHz to 2.2 MHz<br>±2 dB 2.2 MHz to 17 MHz<br>±3 dB 17 MHz to 30 MHz |
| Impedance (Ω ) | 100, 135 and 600 |

## VF NOISE MEASUREMENT

| | |
|---|---|
| Range (dBm) | 0 to −90, subject to instrument noise floor |
| Uncertainty (accuracy) (dB) | ±1 |
| Filters | None, 3 kHz flat, C-message, psophometric, notched and D filter (IEEE 743-1995) |

## VF IMPULSE NOISE

| | |
|---|---|
| Low threshold (dBm) | 0 to −40, in 1 dB steps |
| Mid threshold | Low threshold plus separation |
| High threshold | Mid threshold plus separation |
| Separation (dB) | 1 to 6, in 1 dB steps |
| Dead time (ms) | 125 |
| Filters | None, 3 kHz flat, C-message, psophometric, notched and D filter (IEEE 743-1995) |
| Counter | Maximum 999 for each threshold |
| Timer | 1 minute to 24 hours, default is 15 minutes |

## POWER INFLUENCE (NOISE TO GROUND)

| | |
|---|---|
| Noise range (dBm) | −60 to +10 |
| Uncertainty (accuracy) (dB) | ±1.0 |
| Level uncertainty (accuracy) (dB) | ±1.0 at −60 dBm |

## VF LONGITUDINAL BALANCE

| | |
|---|---|
| Frequency (Hz) | 1004 |
| Frequency uncertainty (accuracy) | ±50 ppm |
| Level range (dB) | 0 to 80 |
| Level uncertainty (accuracy) (dB) | ±1 |

## TIME-DOMAIN REFLECTOMETRY (TDR)

| | |
|---|---|
| Mode | One shot, continuous (auto-repeat) with cursor and zoom |
| Distance range (m) | 8 to 6000 (25 ft up to 20 000 ft) |
| Pulse width | 15 ns to 20 µ s (auto-selected in auto TDR test) |
| Test signals | Sine wave, compensated sine wave, half-sine wave and square wave |
| Amplitude | 7.5 V p-p on cable, 9 V p-p open circuit |
| Velocity of propagation (VOP) | 0.400 to 0.999 or 120 m/µ s to 299 m/µ s |
| Distance uncertainty [c] (accuracy) (m) | ±(1.4 m + 2 % x distance) or ±(4.5 ft + 2 % x distance) |
| Units | Feet and meters |
| Horizontal scale (m) | Automatic or 30 (100 ft), 300 (1000 ft), 600 (2000 ft), 1500 (5000 ft), 3000 (10 000 ft), 6000 (20 000 ft), 13 500 (45 000 ft) and 15 000 (50 000 ft) |

## FREQUENCY-DOMAIN REFLECTOMETRY (FDR)

| | |
|---|---|
| Distance range (m) | 1.5 to 5000 (5 ft to 18 000 ft) |
| Velocity of propagation (VOP) | 0.400 to 0.999 or 120 m/µ s to 299 m/µ s |
| Distance uncertainty (accuracy) (m) | ±(3, 3 to 1000) ±(15, 1000 to 1500) ±(30, 1500 to 5000) |
| Units | Feet and meters |

## LOAD COIL DETECTION

| | |
|---|---|
| Count | Five |
| Plot (kHz) | Up to 10 |
| Distance range (m) | Up to 8000 (up to 27 000 ft) |

## SINGLE-END FREQUENCY RESPONSE (ATTENUATION)

| | |
|---|---|
| Distance range (m) | 70 to 5000 (200 ft to 16 000 ft) |
| Frequency range | 4.3 kHz to 30 MHz |
| Frequency uncertainty (accuracy) | ±50 ppm |
| Level uncertainty (accuracy) (dB) | 2 dB, 4 dB at 30 MHz |
| Resolution (dB) | 0.1 |
| Horizontal scale (MHz) | ADSL2+ = 2.208, VDSL2-12 = 12, VDSL2-17 = 17.66, VDSL2-30 = 30 |
| Vertical scale (dB) | 0 to +100 |

**NOTE** a. At 23 °C ± 1 °C on batteries, unless otherwise specified.
b. Characteristics are subject to instrument noise floor (approx. −70 dBm). Levels below −70 dBm can be measured using the PSD noise test.
c. Does not include the uncertainty due to VOP.

# Specifications (continued)

## POWER SPECTRAL DENSITY (PSD) NOISE MEASUREMENT

| | |
|---|---|
| Test type | Continuous or peak-hold |
| Vertical scale | –10 dBm/Hz to –145 dBm/Hz or +20 dBm to –110 dBm |
| Horizontal scale | 4.3125 kHz to 17 MHz, in 4.3125 kHz steps or 8.625 kHz to 30 MHz, in 8.625 kHz steps |
| Noise filters | None or E, F, G, VDSL2-8, VDSL2-12, VDSL2-17 and VDSL2-30 |

## DSL IMPULSE NOISE MEASUREMENT

| | |
|---|---|
| Threshold | –50 dBm (40 dBrn) to 0 dBm (90 dBrn) in 1 dB steps |
| Counter | Maximum 65 000 |
| Test duration | 1, 5, 10, 15 and 60 min, 24 h or continuous (up to 360 h) |
| Histogram plot interval | 1, 5, 10, 15 or 60 min |
| Uncertainty (accuracy) (dB) | ±2 |

## SWEPT LONGITUDINAL BALANCE TEST

| | |
|---|---|
| Frequency uncertainty (accuracy) | ±50 ppm |
| Level uncertainty (accuracy) (dB) | ±2.0 |
| Vertical scale (dB) | 0 to 80.0 up to 2.2 MHz<br>0 to 60.0 up to 30 MHz |
| Horizontal scale | ADSL/2+: 26 kHz to 2.2 MHz<br>SHDSL: 26 kHz to 1 MHz<br>VDSL/VDSL2-12: 26 kHz to 12 MHz<br>VDSL2-17: 26 kHz to 17.66 MHz<br>VDSL2-30: 26 kHz to 30 MHz |

## DIGITAL MULTIMETER (DMM)

| Measurement | Range | Resolution | Uncertainty (accuracy) |
|---|---|---|---|
| DC voltage | 0 to 200 V | 1 V | the better of ±2 % or ±1 V |
| AC voltage | 0 to 140 Vrms | 1 V | the better of ±2 % or ±1 V |
| Isolation resistance | 0 to 999 MΩ | 3 digits | |
| | 0 to 999 Ω | | the better of ±2 % or ±5 Ω |
| | 1 kΩ to 99 MΩ | | ±(2 % + 1 digit) |
| | 100 MΩ to 999 MΩ | | ±(5 % + 1 digit) |
| | Distance up to 30 000 m (100 000 ft) | | |
| Resistance | 0 to 30 MΩ | 3 digits | |
| | 0 to 999 Ω | | the better of ±2 % or ±5 Ω |
| | 1 kΩ to 30 MΩ | | ±(2 % + 1 digit) |
| | Distance up to 30 000 m (100 000 ft) | | |
| Capacitance | 1 nF to 10 µ F | 3 digits | ±(2 % + 1 digit) |
| | Distance up to 30 000 m (100 000 ft) | | |
| DC current | 0 to 110 mA | 1 mA | ±(2 % + 1 digit) |
| AC current | 0 to 77 mA | 1 mA | ±(2 % + 1 digit) |

## SPECTRAL DETECTIVE

Allows the AXS-200/610 to bridge (high-impedance) onto a live circuit to display a plot of transmitted levels and spectrum (PSD). The Spectral Detective test can be referenced to any user-selected impedance. The impedance reference setting is required to display proper readings in dBm/Hz or dBm.

| | |
|---|---|
| Test type | Continuous or peak-hold |
| Bridging impedance | 15 kΩ |
| Vertical scale | –10 to –145 dBm/Hz or +20 to –110 dBm |
| Horizontal scale | 4.3125 kHz to 17 MHz, in 4.3125 kHz steps or 8.625 kHz to 30 MHz, in 8.625 kHz steps |
| Noise filters | None or E, F, G, VDSL2-8, VDSL2-12, VDSL2-17 and VDSL2-30 |

## STRESS/LEAKAGE (ISOLATION RESISTANCE)

| | |
|---|---|
| Source | 100 VDC, current safely limited to < 1.0 mA |
| Range (MΩ ) | 0 to 999 auto-ranging |
| Resolution | 3 significant digits |
| Uncertainty (accuracy) | 0 to 999 Ω , the better of ±2 % or ±5 Ω<br>1 kΩ to 99 MΩ , ±(2 % + 1 digit)<br>100 MΩ to 999 MΩ , ±(5 % + 1 digit) |
| Soak timer (s) | 1 to 99 |

## RESISTIVE FAULT LOCATION (RFL)

| | |
|---|---|
| Test type | Single pair and separate good pair |
| Fault detection (MΩ ) | 0 to 20 |
| Resolution | 3 digits |
| Loop resistance (kΩ ) | 7 maximum |
| Multiple cable sections | Five (includes gauge and temperature setting) |
| Fault location | *Total resistance, near-end to fault resistance, fault to strap resistance (four significant digits)<br>*Total length, distance to fault, distance from fault to strap (3 ft/1 m resolution) |
| Uncertainty (accuracy) | The better of 0.2 Ω or ±2 % |

# AXS-200/610
## 30 MHz Copper Test Set

## GENERAL SPECIFICATIONS [a]

| | | |
|---|---|---|
| Module size (H x W x D) | 283 mm x 125 mm x 92 mm | (11 1/8 in x 4 15/16 in x 3 5/8 in) |
| Module weight (with battery) | 1.2 kg | (2.6 lb) |
| Temperature | | |
| operating | 0 °C to 50 °C | (32 °F to 122 °F) |
| storage | –20 °C to 60 °C | (–4 °F to 140 °F) |
| Humidity | 5 % to 95 % relative, non-condensing | |
| Power supply | Input: 100-240 VAC at 1.8 A, 50 Hz to 60 Hz<br>Output: 18-24 VDC at 3.33 A to 2.50 A, 60 W | |
| Battery | Internal rechargeable Li-Ion battery, with battery state indication | |
| Test connections | Five-color banana for T, R, G, T1 and R1<br>RJ-45 for ADSL2+ and Ethernet 10/100 WAN<br>RJ-45 for Ethernet 10/100 LAN | |
| Differential voltage protection | 125 VRMS or 400 VDC max | |
| Common mode voltage protection | 1000 VRMS | |
| Self-test | Routine on power-up | |
| Voltage detection | > 20 V will trigger alarm message | |
| Results storage | 128 MB | |
| Languages | English, French, German, Spanish, Chinese (Simplified) | |

## STANDARD ACCESSORIES

Hand strap, Certificate of Compliance
ACC-5COLR: 5-color 4 mm banana connector
ACC-STRAP: RFL strap

**Note**

a. Specifications based on 24 AWG (0.5 PE mm) cabling and subject to change without notice.

## ORDERING INFORMATION

**AXS-610-XX**

**Model**
AXS-610 = 30 MHz Copper Test Set

**Software option**
00 = Without software upgrade
ADSL2+DRP = ADSL2+ rate prediction
VDSL2WB = 30 MHz wideband option
LOOPMAPPER= Loop Mapper functionality

Example: AXS-610-VDSL2WB

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EXFO is certified ISO 9001 and attests to the quality of these products. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. EXFO has made every effort to ensure that the information contained in this specification sheet is accurate. However, we accept no responsibility for any errors or omissions, and we reserve the right to modify design, characteristics and products at any time without obligation. Units of measurement in this document conform to SI standards and practices. In addition, all of EXFO's manufactured products are compliant with the European Union's WEEE directive. For more information, please visit **www.EXFO.com/recycle**. **Contact EXFO for prices and availability or to obtain the phone number of your local EXFO distributor.**

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