Table of Contents

1  Market & Technology Trends
2  New Technologies in xDSL world
3  Testing equipment for xDSL and copper
Market and Technology Trends

Market Trends
VDSL2 and FTTx

Global Market Share by technology Q4 2012

- FTTH 3.00%
- FTTx (inc. VDSL2) 17.78%
- Cable Modem 19.19%
- DSL (inc. ADSL, ADSL2+, SDSL) 56.95%
- Other (inc. Wireless and sat) 3.08%

Source: Point-Topic Q4 2012

27.5% growth YoY
FTTx strategy. Market trends

› Bring fiber closer to the customer's premises
› Optimize the use of xDSL technology
› Compensate current copper limits

“Deploying VDSL2 vectoring from the street cabinet (FTTN / FTTcab) is a factor of 3 cheaper than FTTH, and FTTdp is up to 50% cheaper”

Source: Alcatel-Lucent Bell Labs

Timeline

Speed

DSL / FTTx Speeds are Increasing

1Gbps
500 Mbps
250 Mbps
100 Mbps
50 Mbps
25 Mbps
10 Mbps
5 Mbps

ADSL
ADSL2+
VDSL2
Bonding
Vectoring
G.Fast


Today

Standard Ratified
Mass Deployment Starts
Bonding
Optimize the use of xDSL technology

- Defined in ITU-T G.998.1 and G.998.2
- Supports both ADSL2+ and VDSL2
- **Combines 2 wire pairs** to: Increase capacity and extend reach
- Deliver from CO/LE (MDF) as well as from street cabinet/remote (FTTx)

---

**Premium Package**
- 3 HD: 21 Mbps
- 3 SD: 4 Mbps
- HSI: 5 Mbps
- **30 Mbps**

**Basic Package**
- 1 HD: 7 Mbps
- 2 SD: 4 Mbps
- HSI: 3 Mbps
- **14 Mbps**
**G.INP**

**Improved Impulse Noise Protection per pair**

- Mitigation of impulse noise by what of physical layer retransmission
- Performed at the DSL physical layer resulting in low latency
- Compensate about up to 10ms of noise burst

**G.Vectoring**

**Compensate current copper limits**

- Defined in ITU-T G.993.5
- **Self-FEXT** (far-end crosstalk) cancellation in both directions
- Measures FEXT noise on every line of the binder
- Increases performance up to 90%
- Shorter cable length, higher performance
Value Proposition

MaxTester 600 and FTB-600

Adherence to latest DSL standards
- ADSL2+ and VDSL2 Bonding with Broadcom chipset
- G.Vector and G.INP compliant
- Supports ADSL2+ ATM/PTM and VDSL2 single-pair testing for hybrid networks
- Member of Broadband Forum, ITU-T, and UNH IOL DSL Consortium

Consolidated multi-layer testing approach
- All key testing needs—DSL, copper and triple-play
- Simple graphical view and fault diagnosis for copper and DSL
- IPTV analysis with MS Mediaroom support
- VoIP call generation & with MOS/R-factor measurement

Increase deployment efficiency (OPEX)
- SmartR™ test suite makes everyone a copper test expert
- Automated test profiles – reduced training required
- Pass/Fail indicators – eliminate guesswork and reduce install time
- Integrated Web Browser – quick access to link verification
- FTB-600 supports EXFOConnect
Simplifying Copper Testing
Smarter testing really!

Working smarter, not harder.

Pair Detective
- Optimized fault identification through automated analysis
- Guidance on probable issues for faster and comprehensive interpretation

FaultMapper
- Automated copper pair analysis with fault location
- Intuitive schematic/graphical presentation of the copper loop

Easier, yet much more powerful Copper testing.

MaxTester 600 Series
For Copper, DSL, and Triple-play Installations
MaxTester 600 Family
Copper, DSL, and Copper/DSL

Dedicated Point Solution
Perfect for the tier-1 technician performing installation and service turn-up.

MaxTester
Installation & Repair
- Large 6” color and sunlight viewable display
- IP 54 rated against dust and water ingress
- Solid, reliable test set

MAX-610 Copper
- Innovative wideband tests for VDSL2 pairs with Pair Detective & Fault Mapper. Single ended testing plus traditional multi-meter, narrowband tests
- Ease of use, simple GUI, field ruggedness

MAX-630 DSL
- New features available to support new generation xDSL technologies (Bonding, Vectoring, G.INP, PTM)
- Market leading Broadcom chipset

MAX-635 Copper/DSL
- DSL & Copper testing brought to the MaxTester. Perfect fit for all Copper & DSL testing needs at a cost effective price.
- SmartR intelligent and automated copper testing

MaxTester 600 DSL / Triple Play Capabilities
Latest DSL chipset inside

MAX-630 MAX-635
- ADSL2+ & VDSL2 single pair
- Up to VDSL2 17a bonding
- PTM and ATM transport support
- INP & G.INP support for noise mitigation
- G.Vector compliant

DSL Testing
- Bits/Bin, Hlog/Bin, SNR/Bin, QLN/Bin

Data Testing over DSL and Ethernet
- Login, Ping, Traceroute, FTP
- Web browser

IPTV Testing over DSL and Ethernet
- STB Emulation (Join/Leave)
- Multiple channel analysis

VoIP Testing over DSL and Ethernet
- SIP G.711 call generation/analysis
- MOS/R-factor scoring
MaxTester 600 Copper Capabilities

Copper testing made “smarter”

Traditional 'basic' Features:
› Multimeter (DMM) - Voltage, Resistance/Shorts, Capacitance/Opens, Current
› Voiceband testing – Metallic Noise, Balance, TX/RX Tone
› POTS dialer

MAX-610
MAX-635

SmartR™
› Automated loop diagnostics
› Graphical Fault Locator

Fault-Finding Features:
› Automatic TDR
› Resistive Fault Locator (RFL)

Wideband Noise / Frequency tests:
› PSD Noise
› Impulse Noise
› Longitudinal Balance

FTB-600 Series
Advanced Modular Test Solution
### FTB-600 Series

**Copper, DSL, and Copper/DSL**

#### Advanced Troubleshooting

Perfect for the expert Engineer or Technician performing troubleshooting of copper, DSL, and triple play issues.

- Large 7” color touch screen and sunlight viewable display
- FTB-1 platform supports optical and transport/datacom modules
- FTB-1 platform supports GigE, Wi-Fi, Bluetooth, GPS, 3G/Aircard

#### FTB-610 Copper

- Innovative wideband tests for VDSL2 pairs with Pair Detective & Fault Mapper. Single ended testing.
- Auto-TDR and Manual TDR for new and advanced troubleshooters alike

#### FTB-635 Copper/DSL

- DSL & Copper testing brought to the FTB-600 Series. Perfect fit for all Copper & DSL testing needs at a cost effective price.
- SmartR™ intelligent and automated copper testing

---

### FTB-600 DSL+ Capabilities

Latest DSL chipset inside

- ADSL2+ & VDSL2 single pair
- Up to VDSL2 17a bonding
- PTM and ATM transport support
- INP & G.INP support for noise mitigation
- G.Vector compliant

#### DSL Testing

- Bits/Bin, Hlog/Bin, SNR/Bin, QLN/Bin

#### Data Testing over DSL and Ethernet

- Login, Ping, Traceroute, FTP
- Web browser

#### IPTV Testing over DSL and Ethernet

- STB Emulation (Join/Leave)
- Multiple channel analysis
- Live video preview

#### VoIP Testing over DSL and Ethernet

- SIP G.711 call generation/analysis
- MOS/R-factor scoring
FTB-600 Copper Capabilities

Navigate/View Copper results in great clarity and accuracy

Traditional 'basic' Features:
› Multimeter (DMM) - Voltage, Resistance/Shorts, Capacitance/Opens, Current
› Voiceband testing – Metallic Noise, Balance, TX/RX Tone
› POTS dialer

SmartR™
› Automated loop diagnostics
› Graphical Fault Locator

Fault-Finding Features:
› Manual, Automatic, & XTALK TDR
› Resistive Fault Locator (RFL), K-test
› 500V Isolation Resistance/Leakage

Wideband Testing:
› PSD Noise w/mask overlay and disturber ID
› Impulse Noise Count & Histogram
› Longitudinal Balance to 30 MHz

Product Positioning
**Product Position**

Value whenever the customer needs it

<table>
<thead>
<tr>
<th>Dedicated Point Solution</th>
<th>Field-Modular Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>★ Cost optimized</td>
<td>★ Multi skilled work force</td>
</tr>
<tr>
<td>★ Rugged for OSP (IP54 rated)</td>
<td>★ Advanced copper features</td>
</tr>
<tr>
<td>★ Easy Pass/ Fail testing</td>
<td>★ Advanced Fault Finding</td>
</tr>
<tr>
<td>★ Every day copper repairs</td>
<td>★ Asset management</td>
</tr>
<tr>
<td>★ Latest DSL technologies</td>
<td>★ Floating Option Licensing</td>
</tr>
<tr>
<td>★ Triple Play (browser, IPTV, VoIP)</td>
<td>★ Multi-codec VoIP emulation</td>
</tr>
</tbody>
</table>

**FTB-1 / 600 series**

<table>
<thead>
<tr>
<th>MAX-600 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>★ Installation &amp; Repairs</td>
</tr>
<tr>
<td>★ Cost optimized</td>
</tr>
<tr>
<td>★ Rugged for OSP (IP54 rated)</td>
</tr>
<tr>
<td>★ Easy Pass/ Fail testing</td>
</tr>
<tr>
<td>★ Every day copper repairs</td>
</tr>
<tr>
<td>★ Latest DSL technologies</td>
</tr>
<tr>
<td>★ Triple Play (browser, IPTV, VoIP)</td>
</tr>
</tbody>
</table>

**Thank You!**

Jana Korcevska  
Sales Engineer Access Networks  
Jana.korcevska@exfo.com