...umění optické komunikace

Testování služeb Triple Play na Ethernetu a xDSL

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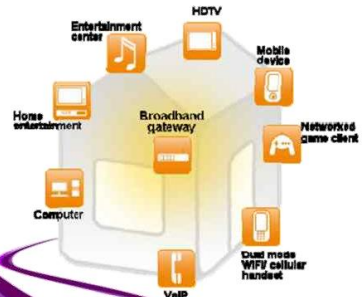
SLUŽBY TRIPLE PLAY
ŠÍŘKA PÁSMA

Triple-Play services require bandwidth from 25 to 100 Mbit/s per user!



research, 2006

Typická šířka pásma na jednoho uživatele: **73 Mbit/s**

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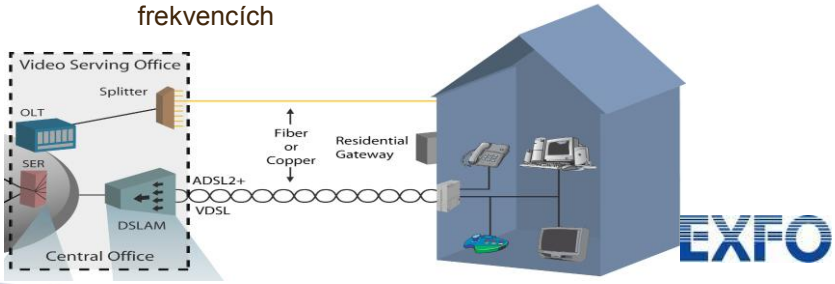
METALICKÉ VEDENÍ

Optické vlákno v „poslední míli“ bude někdy všude???

- ADSL2+ a VDSL2 poskytuje “IP” konektivitu až do domu
  - Služby IP vyžadují větší šířku pásma (IPTV)
    - Větší šířka pásma znamená vyšší frekvence (VDSL2)
      - Metalická kabeláž je více citlivá na šum, na vyšších frekvencích



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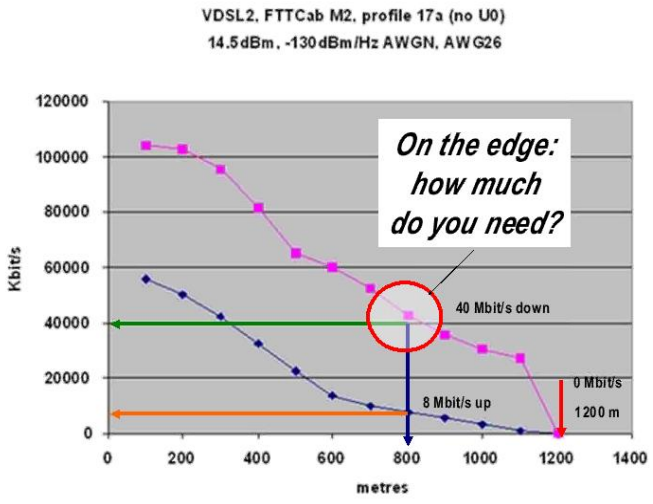
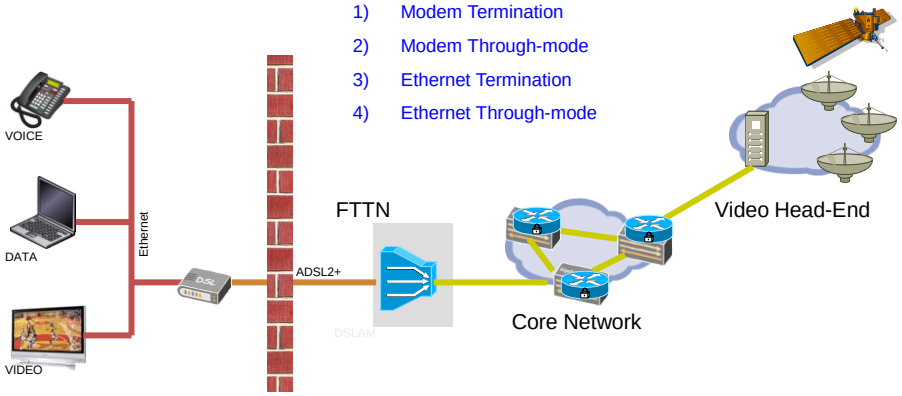
METALICKÉ VEDENÍ



- VDSL2 profile 17a allows 40 Mbit/s on 800 m copper loops (8 Mbit/s up), and is optimized for FTTN deployments
- Profile 17a allows a maximum bandwidth of 100 Mbit/s, on shorter copper loops (250 m)
- Profile 17a uses 17.7 MHz of bandwidth on the physical layer of the copper medium
- Maximum effective copper loop length is 1100 m for ~25 Mbit/s (2 Mbit/s up)

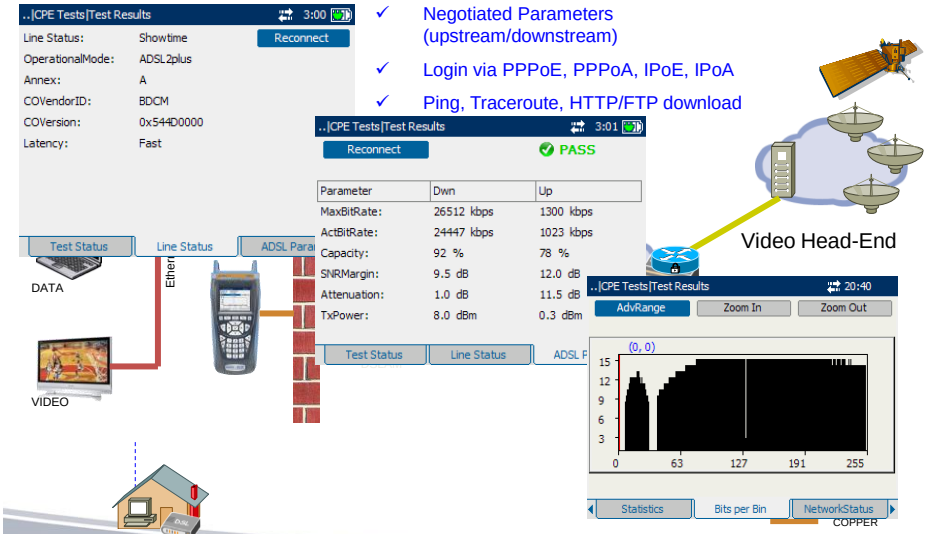
TESTOVÁNÍ

1) Modem Termination
2) Modem Through-mode
3) Ethernet Termination
4) Ethernet Through-mode



MODEM TERMINATION

- ✓ Negotiated Parameters (upstream/downstream)
- ✓ Login via PPPoE, PPPoA, IPoE, IPoA
- ✓ Ping, Traceroute, HTTP/FTP download



MODEM THROUGH MODE

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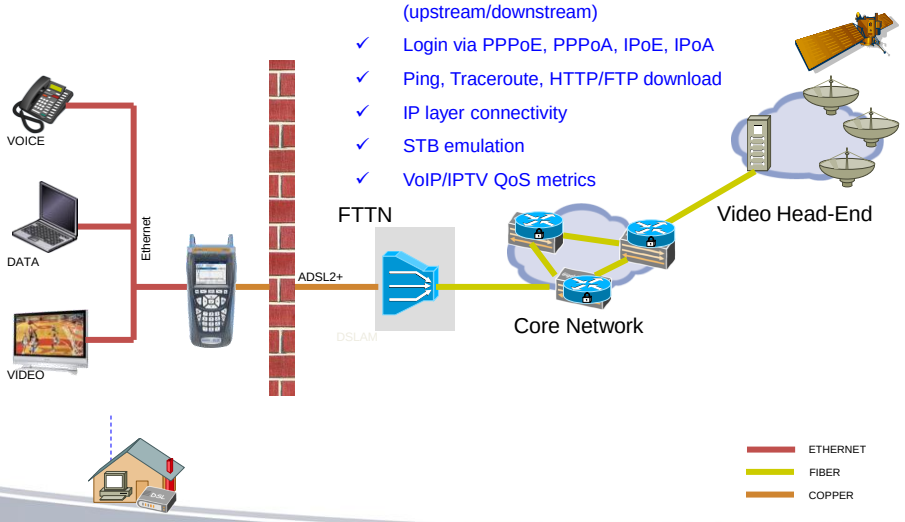
- ✓ IP layer connectivity
- ✓ STB emulation
- ✓ VoIP/IPTV QoS metrics



ETHERNET TERMINATION

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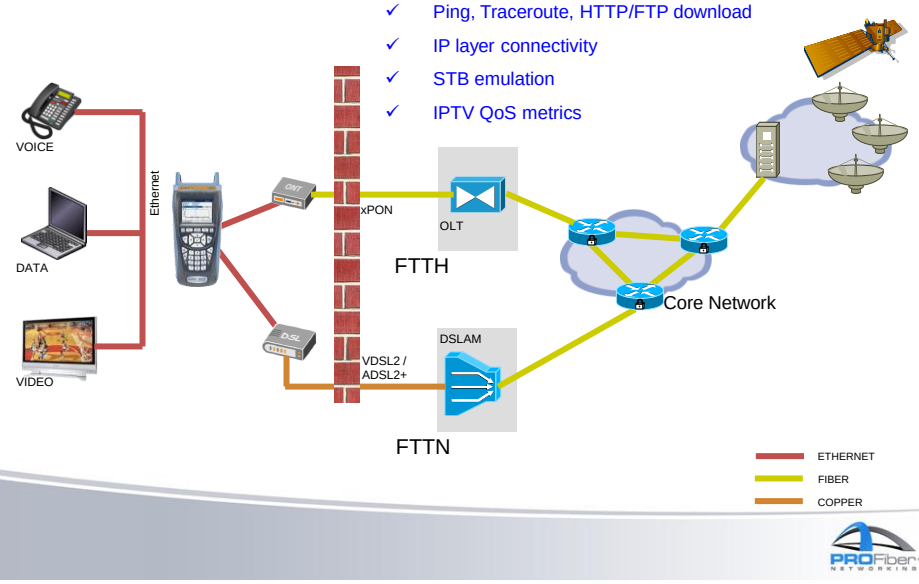
- ✓ IPTV QoS metrics



ETHERNET THROUGH MODE

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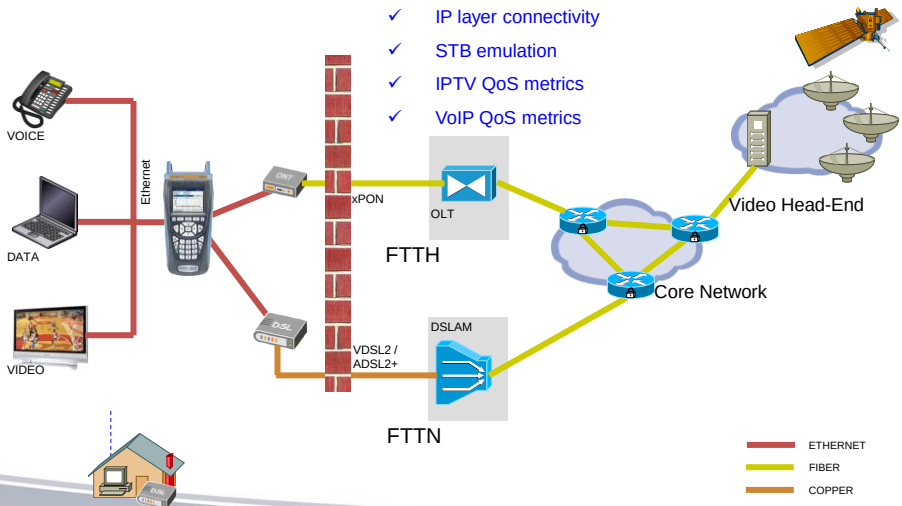
- ✓ VoIP QoS metrics



Testování

IPTV Service testing
- MPEG2/4 TS, WM9/VC-1
- Bandwidth usage
- IGMP and STB Info
- IGMP Emulation
- Packet Loss, Jitter counter and Graph
- Zap Time
- QoS Pass/Fail Indicators

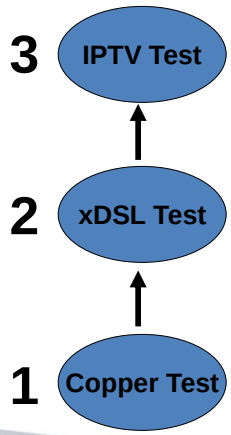
VoIP Service Testing
- Monitors SIP, MGCP, SCCP
- ATA/Phone initialization
- Call Flow
- Codec indicator,
- Packet Loss, Jitter, Delay counter and Graph
- QoS Pass/Fail Indicators

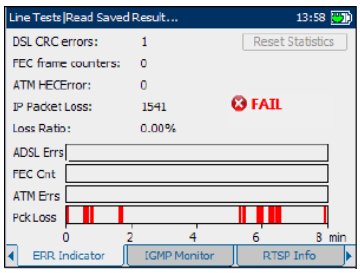
Data Service Testing
- Tx / Rx counters
- PING, Traceroute, Webpage Download Speed
- ATM Setup & Statistics – VPI/VCI, OAM Loopback

ADSL2+ Service Verification
- Attenuation
- Transmit (Tx) power
- Signal-to-noise ratio (SNR) margin
- Bit rates Actual and Maximum (upstream/downstream)

TESTOVACÍ FÁZE

Installation Test Process

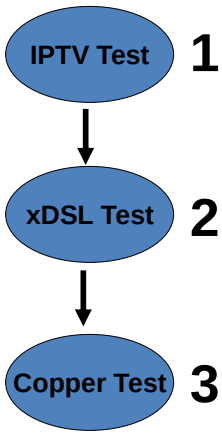




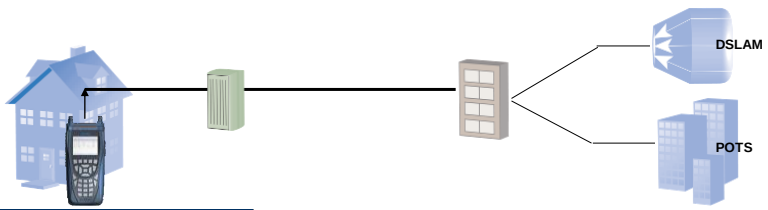
Multi-layer Error Histogram

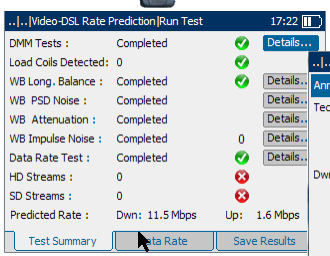
See the problem?

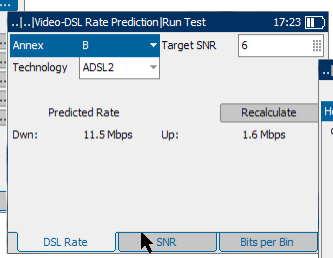
Troubleshooting Test Process

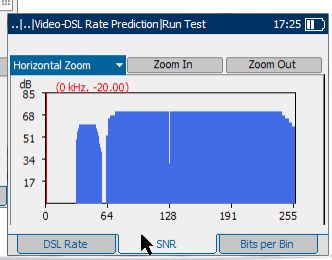


DataRatePrediction

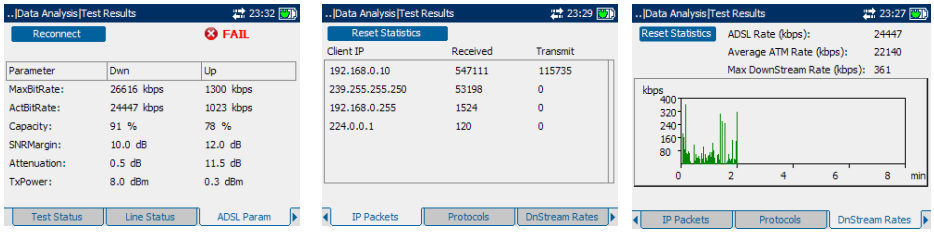








DATA TEST

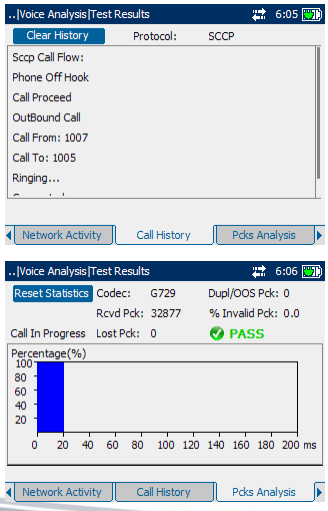


Data tests are used to test connectivity past the ATM layer. To ensure the customer has “sync and surf”, we need to confirm the “surf”!

Vital statistics:

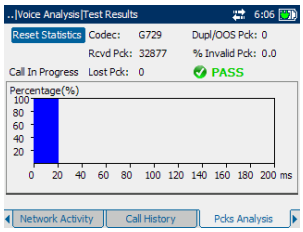
- IP Packet statistics
- Downstream and Upstream rates
- LAN/WAN status
- Ping and TraceRoute

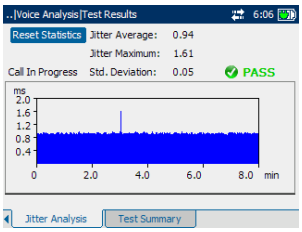
VoIP TESTING

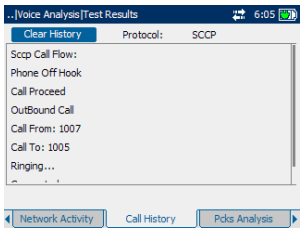


Key VoIP Performance Indicators	
ADSL, ATM, IP Layer Analysis	Up/downstream rates, SNRm, Attn, IP Packet loss
Gateway/ATA Traffic	ATA MAC, IP address, DHCP handshaking
VoIP Call Flow	Incoming/outgoing call handshaking details for each protocol
Jitter Analysis	Plots max jitter for voice conversation
Delay	Plots inter-packet delay distribution

VoIP METRICS



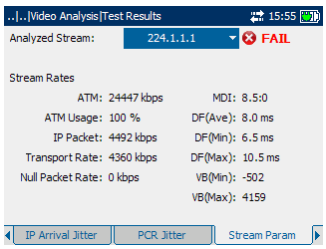


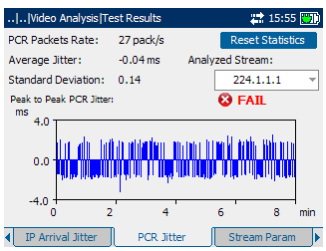


We can monitor call flow of SIP based VoIP calls

Other protocols such as SCCP and MGCP can be detected under the Data Analysis test

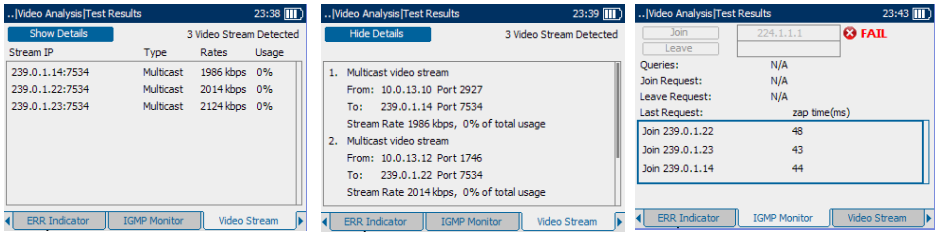
IPTV TESTING





Key IPTV Performance Indicators	
ADSL, ATM, IP Layer Analysis	Up/downstream rates, SNRm, Attn, ATM errors, IP Packet loss
Bandwidth Usage per Channel	Multicast IP address, Stream rate, bandwidth utilization
IGMP Packet Statistics	Queries, reports, join/leave requests
STB Traffic	STB MAC and IP address, DHCP handshaking, Ethernet verification
IP Packet Loss	Indicates errored and out of sequence packets. Loss ratio considered for QoS metrics
Jitter	Indicates max stream jitter
Zap Time	Time duration for channel change
PCR Jitter	Jitter indication for MPEG Program Clock Reference (PCR)
PID Info	Indicates consistency of Video Stream. Video and Audio bit rate and packet loss for a specific stream
MDI (option)	Based on RFC 4445. Provides an indication of expected video quality based on network level (IP) measurements

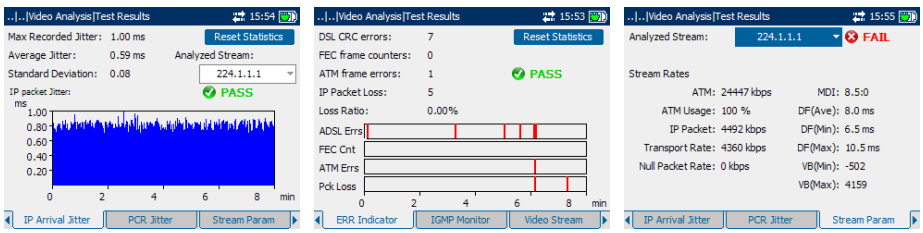
VIDEO STREAM INFORMATION



Vital statistics provided by the AXS-620:

- Stream IP address AND port ID
- Stream Rate and Bandwidth utilization
- IGMP Zap Time – time required to join and leave IGMP streams

IPTV



3 VERY powerful IPTV Diagnostic screens:

IP Arrival Jitter – jitter measurements for the arriving IP video stream packets

Multi-layer Error Histogram – the ultimate finger pointer! (more about this later!)

Stream Parameters – MDI analysis

A wealth of IPTV information in single screen representation!

IPTV

Parameter	Acceptable	Marginal	Unacceptable	
MDI – Delay Factor	9 to 15 * de-jittering of STB allows for higher DF	15 - 50	> 50	ms
MDI – Media Loss	0	.02 to .05	> .05	Frames per second
Packet Jitter	< 5	5 – 20	> 20	ms
Packet Loss	< 0.1	0.1 to 0.2	> 0.2	%
Zap Time	< 100	100 – 249	> 250	ms
PCR Jitter	0	1 - 9	> 10	ms

KOMPLEXNÍ TESTOVÁNÍ

- Fyzické parametry
- DSL technologie (VDSL2, ADSL2+)
- Služby (Triple Play)

Řada AXS-600
3 měření v jednom přístroji

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