Service Quality Assurance for IPTV and Digital Video Services

iTVSense Probes & MiniProbes
iTVSense Probes and MiniProbes are small, portable, and energy efficient devices for monitoring and diagnosing IP and digital media transmission, including Internet/Intranet traffic, IPTV/DVB/OTT streams or SIP/VoIP communication.

**Benefits**

With a measurement capacity of up to 500 Mbits/sec (cca. 50 channels for IPTV, or hundreds of VoIP calls), the MiniProbe is a versatile measurement device for multiple application scenarios, e.g.

- In network aggregation points, i.e. on switch/router ports for monitoring backbone and aggregation routing and switching.
- On an xDSL or GPON DSLAM port, analyzing DSLAM/MSAN behavior. The M-170R ("rugged") variant is specifically designed for street cabinets.
- In the customers' home network, used for analyzing access line or home network quality issues.

With its small size and moderate price tag, the MiniProbe is also an excellent portable tool for field technicians or for temporary, on-demand deployments at customers, (like 72-hour tests).
Operation modes

ITVSense probes may be operated in stand-alone mode (controlled from the Web GUI), or under the central control of an iTVSense server.

**STANDALONE MODE AND WEB GUI**

Probes in stand-alone mode are operated using the MiniProbe Web GUI, a sophisticated, dynamic and bandwidth-economic Web application with the following main functions:

- Probe status overview: identification, system and network status, probe alarms, and measurements overview.
- Detailed measurement charts with
  - Selectable measurements and metrics
  - Selectable time resolution (1 secs - 4 hours)
  - Interactive zoom functions
  - Related alarms indicated on measurement charts.
- Setup screens for
  - Boot and network settings, including VPN interfaces to make probe accessible from external networks.
  - Measurement settings
  - Alarm thresholds defined through profiles.
- IPTV channel definitions, Internet test server lists and/or VoIP peer lists.
- Additional Network and Diagnostic tools like
  - Selective or generic mode packet capture: captured data can be uploaded to a different host in tcpdump format for further analysis. Selective captures only include single channels or directions, while generic mode includes all network data, with custom filter definitions supported.
  - DNS, NTP, Ping, HTTP, FTP availability tests

**CENTRALIZED OPERATION**

Operated under central control, the probe communicates with the iTVSense/PVSR server environment for:

- Downloading measurement configuration from a central repository.
- Serving the iTVSense performance monitoring server with periodic minute-resolution measurement readings.
- Propagating locally evaluated alarms to higher-level services for further processing.
- Serving the iTVSense GUI charts with sub-minute resolution measurement results for on-demand queries.
- Uploading network data, captured by the probe to the iTVSense server.
- In addition to configuration data, centralized operation also allows probe firmware to be downloaded from the central iTVSense system, offering fully automated upgrade management for all probes from a single central location.

In order to enable centralized operation and control in different deployments, probes support several options to provide firewall-transparent access from the management server. These include VPN solutions like L2TP, CiscoVPN or TR-69 type notification based access from the central server.
Service Quality Assurance for IPTV and DVB

Technology Specific Features and Usage

**iTVSense MiniProbes used in IPTV and OTT**

In IPTV service environments, MiniProbes provide the following main monitoring features:

- Measurement of up to 50 channels or VoD streams (including all-HD or mixed SD/HD media) simultaneously.
- Seconds-resolution metrics and minute-based aggregates of standard and custom metrics like bitrate, packet loss, RFC 4445 MDI DF (delay factor), and MLR (media loss rate, a.k.a. "CC error"), PCR jitters and errors, and No Signal conditions.
- Past measurement results stored in non-volatile memory: 60 seconds resolution data stored for up to 168 hours and seconds-level stored for up to 24 hours.
- Alarm definitions based on measured values. In addition to being displayed on the probe Web GUI, alarms may trigger:
  - syslog/snmp alerts sent to external devices
  - automatic data capture enabled for the alarm period

Miniprobes also support the measurement of access to live or pre-recorded OTT content, including Youtube downloads, or services running the HLS or MPEG-DASH adaptive streaming formats.

**iTVSense Miniprobes used for VoIP**

iVoIP measurement functions include:

- SIP-based VoIP call initiation and termination.
- Measurement of success rate, and call quality.
- Measurements provide objective metrics (RTT, loss, jitter, data and encoding errors, etc.) and subjective Mean Opinion based scores (MOS).

**iTVSense Miniprobes used for Internet services**

Internet access measurements: availability, utilization, average/maximum RTT.

- Basic internet service availability tests for DHCP, DNS, NTP, etc.
- Scheduled, periodic download/upload rate tests for selected servers.
- Website and online service availability tests, including replays of simulated or recorded multi-step http/https transactions (like online shopping sessions including catalog, registration/login/logout shopping cart, ordering, payment, etc.)
Specifications

**Monitored data:**
- Network UDP stream packet rate, byte rate, packet loss rate and several jitter metrics
- MPEG Transport Stream packet rates, jitter, packet loss, counter and encapsulation errors. Metrics are provided both as an aggregate and also by individual Mpeg streams (video, audio, control).
- RFC 4445 Media Delivery Index (MDI).
- Multicast join times and zapping time.
- Encoder alarm events
- IPTV server operation, network traffic and stream processing (via SNMP)
- VCAS Server network traffic and stream processing (via SNMP)
- Middleware and VoD service operation, resources and response time, server/OS/Database health.
- DHCP and Boot Image server availability and events
- STB CPU load, memory used and available, network traffic, process count, reboot events and uptimes, process monitoring, STB agent footprint.

**Probe Models and Options**

<table>
<thead>
<tr>
<th>Model</th>
<th>Ethernet Speed</th>
<th>Monitoring Bandwidth</th>
<th>IPTV Channel Capacity</th>
<th>USB 2.0 Port</th>
<th>NVCan Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-170</td>
<td>100baseT</td>
<td>80 Mbps</td>
<td>10 (5xSD + 5xHD)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M-175</td>
<td>100baseT</td>
<td>80 Mbps</td>
<td>10 (5xSD + 5xHD)</td>
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<td>-</td>
</tr>
<tr>
<td>M-180</td>
<td>100baseT</td>
<td>80 Mbps</td>
<td>10 (5xSD + 5xHD)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>M-190</td>
<td>1000baseT</td>
<td>500 Mbps</td>
<td>50 (35xSD + 15xHD)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>M-195</td>
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<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Physical and Environmental Characteristics:**
- Dimensions: 170 x 106 x 31 mm
- Weight: 480 grams
- Power: 6 Watts (typ.)
- Supply: 12-24 VDC (1 Amps max.)
  - 48 VDC available as an option
- Temperature: -10 to +60 degrees Celsius
- Humidity: 80% max.
  - the “M-170R” option is available with increased environmental tolerance