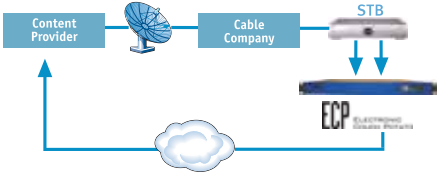


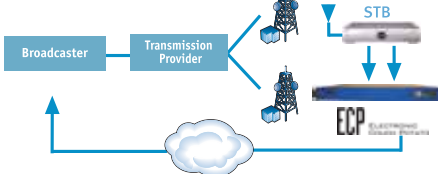
CONTENT PROVIDER AUDIT

Many content providers have implemented strict service level agreements with the cable and satellite companies reselling their content. While those cable and satellite companies are obliged to maintain a certain level of quality of service, content providers rarely have a direct mechanism to see what exactly is happening to their content once passed to the cable operator.



TRANSMITTER VERIFICATION

Terrestrial broadcasters and transmission operator can also benefit from the remote visibility provided by the ECP. For example proper content transmission to remote, isolated, and unattended locations can be automatically confirmed with the ECP.



NORTH BOUND INTERFACE

From the Consolidator, the system also provides an open specification “northbound interface” for easy and efficient integration into upper layer management systems. Alarms are delivered via multi-target SNMP TRAPS while content rich information is provided by an XML-based API.

SPECIFICATIONS

<b>System Interfaces</b> <ul style="list-style-type: none"><li>Management Port<ul style="list-style-type: none"><li>10/100/1000 Base-T</li><li>RJ-45 Copper Connector</li></ul></li><li>2x USB 2.0 Connector</li></ul> <b>Mass Storage</b> <ul style="list-style-type: none"><li>160 GB SATA HDD</li></ul>	<b>Electrical Charateristics</b> <ul style="list-style-type: none"><li>Power Input<ul style="list-style-type: none"><li>100-240 V AC; 50/60 Hz</li></ul></li><li>Current Requirement<ul style="list-style-type: none"><li>0.5A at 240 V AC Max (excludes IEC outlet power)</li><li>48 V DC option available</li></ul></li></ul>	<b>Power Interfaces</b> <ul style="list-style-type: none"><li>IEC inlet &amp; outlet (ECP only)</li><li>Max power output 500 V AC</li></ul> <b>Interfaces - SD Model</b> <ul style="list-style-type: none"><li>1x Composite Video</li><li>1x Stereo Audio (RCA)</li><li>1x Infrared contoller interface</li></ul>	<b>Interfaces - HD Model</b> <ul style="list-style-type: none"><li>HDMI audio/video (no HDCP)</li><li>1x Component video</li><li>1x Composite video</li><li>1x L/R analog audio</li><li>1x Infrared controller interface</li></ul> <b>Mechanical Characteristics</b> <ul style="list-style-type: none"><li>1RU 19 inch rack-mountable</li><li>Operating Temperatures<ul style="list-style-type: none"><li>+10°C to +40°C</li></ul></li><li>Storage Temperature<ul style="list-style-type: none"><li>0°C to +50°C</li></ul></li></ul>
--	---	---	--

Pixelmetrix Corporation

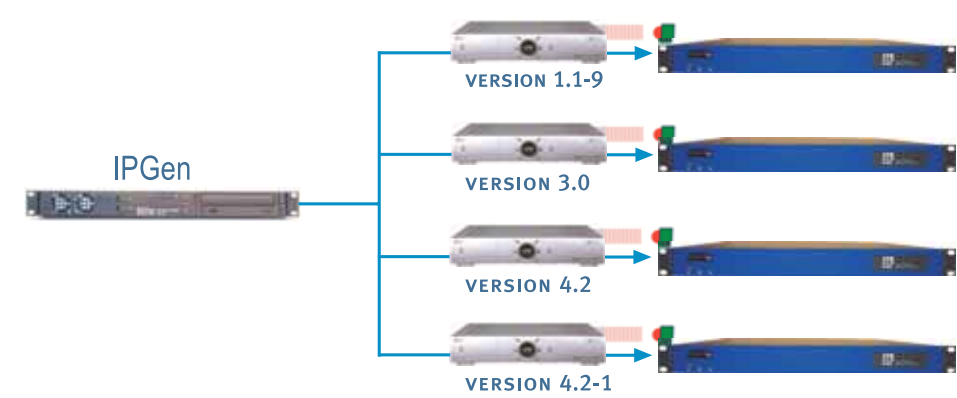
<b>The Americas</b> 10097 Cleary Blvd Suite 114 Ft Lauderdale, FL 33324 United States of America Tel: +1 954 472 5445	<b>Asia Pacific</b> 31 Kaki Bukit Road 3 #07-03 Techlink Singapore 417818 Tel: +65 6547 4935	<b>Europe</b> Montnegre 18-24 Local 2, Baixos o8o29 Barcelona, Spain Tel: +34 93 539 6819
---	--	---

www.pixelmetrix.com

Ref: PPN30233  
Copyright © 2013 Pixelmetrix Corporation. All rights reserved.  
All other products or service marks are the property of their respective owners.  
Preventive Monitoring, DVStation, DVStation-Remote, DVStation-Pod, DVStation-IP3, DVStation-MiniP3, DVStor2, IPGen, DVProbe, DPI Auditor, EndGame, Electronic Couch Potato, ECP Consolidator, Consolidator, ConsolidatorPlus, OTT Media Grinder and Pelican, are trademarks of Pixelmetrix Corporation.  
Data subject to changes without prior notice.

AUTOMATED TESTING

The flexible program-driven architecture of the ECP lends itself well to automated test environments. Routine and repetitive tasks can be automated and thus eliminating human error and uncertainty. Set top box regression testing, evaluating middleware upgrades, or even comparing performance between different STB models all become repeatable and deterministic.



PROFESSIONAL SERVICES

Swift productivity gains can be achieved by using Pixelmetrix Professional Services to build and integrate fully-automated service and quality broadcast monitoring systems.

Our personnel are trained to deliver tailored solutions which meet your time to market requirements and smooth your introduction of new digital broadcast services.

We can help you build applications to generate more revenues or add significant cost savings.

We are active in the following service categories:

- Requirement Definition and Analysis
- Project Development and Management
- Technology Consultancy and Review
- Training Services

So whether you would like to outsource a complete project implementation or just help you get started – we are ready.

Distributor Contact



WWW.PIXELMETRIX.COM



Electronic Couch Potato™ (ECP)

INTRODUCTION

All types of digital and analog television operators, as well as content providers, are interested in measuring and monitoring end-users’ true Quality of Experience (QoE). The Electronic Couch Potato™ is a true service assurance tool enabling operators to monitor and measure Quality of Experience from end-users’ perspective. Monitoring key television parameters after the STB makes the deployment of the ECP independent of any encryption systems and proprietary protocols employed in service operations.



Monitoring and measuring true end-user Quality of Experience enables television and operators to enhance their competitive position, optimize service delivery, and troubleshoot end-user problems - all while controlling OPEX.

The ECP also provides end point visibility to content providers who are interested in seeing what happens to their content after being re-broadcast by the cable or satellite operator.

Expanding on the Pixelmetrix philosophy of providing end-to-end visibility, the Electronic Couch Potato™ (ECP) monitors key television parameters

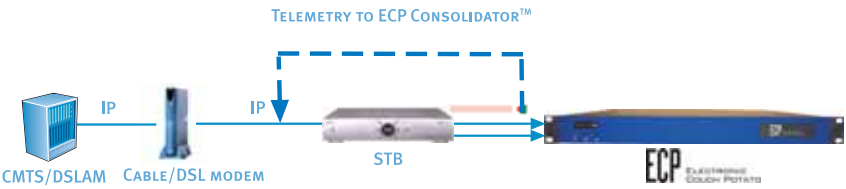
KEY FEATURES

- Reports freeze frame, blackout, moving image, macro blocking, audio tone, audio silence on STB-decoded video
- Identify blocking and video quality artifacts with VQI™, the Video Quality Index
- Controls STB through built-in IR controller to emulate the end-user channel change
- Telepresence: Live service thumbnails and streaming of content from remote site to user PC
- ECP Consolidator™ software controls and correlates multiple end points
- Flexible architecture supports user-programmable test scenarios
- Remote STB reboot (hard and soft) STB from central NOC location

THE ELECTRONIC COUCH POTATO™ (ECP)

The ECP is a “programmable test robot” which drives a STB using a built-in IR controller and analyses the decoded signal from a consumer grade STB to fully and truly evaluate the output audio and video signals. With a flexible user-programming environment built on the TCL language common in automated test environments, the ECP is a flexible and future-proof platform for verifying the decoded analog audio and video from the STB. The ability to program each ECP for a well-defined, customized and repeatable operation within the network is a key advantage in today’s complex and rapidly changing environment.

Each ECP reports measurements to a central Consolidator. Multiple service quality parameters relating to decoded audio and video are intuitively centrally presented on multiple remote client consoles.



The ECP Consolidator can remotely control, configure and manage large numbers of ECPs spread across the delivery network.

Without the ECP, operators have no reliable way of knowing 'what the picture looks like' at a remote site without actually dispatching personnel to the site. To assist operators in this complex and frequently changing environment, the ECP provides a comprehensive suite of tools which can be accessed either manually or via the automatic test script execution environment.

Live service thumbnails display and the ability to stream content from the ECP to the Consolidator are the operators helpdesk toolsets provided by the solution.

In its default state, each ECP scans through the programed channels looking for errors; tiling, freeze, black screens as well as audio problems. As it scans each channel a high resolution thumbnail is acquired and these thumbnails are displayed in a visual mosaic on the ECP Consolidator GUI. In addition, any ECP in the network can stream live audio and video to your PC for direct, visual confirmation of a television service.

Each ECP comes preloaded with a standard library of test scripts which can be assigned to specific channels and executed during the scanning operation. However, the extensive automation and customization potential of the ECP also means that you can customize the test script behavior to meet your own specific requirements.





The ECP Consolidator™

A population of ECPs deployed throughout the network are configured, managed and controlled by the ECP Consolidator™. The Consolidator also provides intelligent presentation of information reported by each ECP.

The Consolidator provides the service operator with a real time view of the overall performance of all services in the network. It is designed to assist the operator to drill down to the core of the problem in the shortest possible time by filtering results received from ECPs deployed in a specific geographic location (by country, city or area) or based on the priority of alarms.

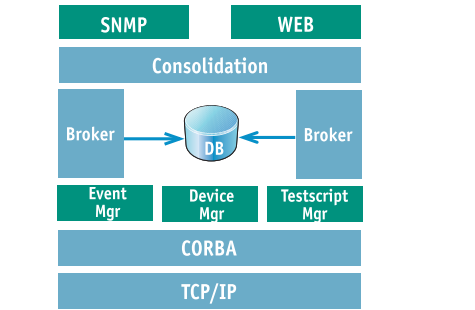
The services status dashboard reports the number of ECPs reporting errors on each channel providing the operator a quick view of health of services in the network. Each alarm is easily viewable from the service dashboard of the consolidator reporting the time, location of the ECP and the particular test that failed on the ECP.

Recent Events	
2010-03-18 16:40:32	Euronews: CLEAR MOTION PRESENT -
2010-03-18 16:36:12	Ca 5: FREEZE FRAME - SEA 90P 193
2010-03-18 16:30:14	Euronews: MOTION PRESENT - SEA 90P 193
2010-03-18 16:22:21	Euronews: MOTION PRESENT - SEA 90P 193
2010-03-18 15:53:03	Euronews: MOTION PRESENT - SEA 90P 193
2010-03-18 15:50:15	Euronews: CLEAR MOTION PRESENT -
2010-03-18 15:46:45	Ca 5: FREEZE FRAME - SEA 90P 193
2010-03-18 15:47:44	Euronews: MOTION PRESENT - SEA 90P 193
2010-03-18 15:40:04	Euronews: CLEAR MOTION PRESENT -
2010-03-18 15:30:44	Euronews: CLEAR MOTION PRESENT -
2010-03-18 15:37:38	ECP186: TEST DOWNLOAD
2010-03-18 15:27:23	ECP193: ALL_CHANNELS_RESET
2010-03-18 15:27:31	ECP193: ECP REGISTER

EXPANDABLE & FLEXIBLE ARCHITECTURE

Both the ECP and its Consolidator are built upon a stable and robust Linux architecture. That means you can focus on maintaining your own network equipment without worrying about the monitoring equipment.

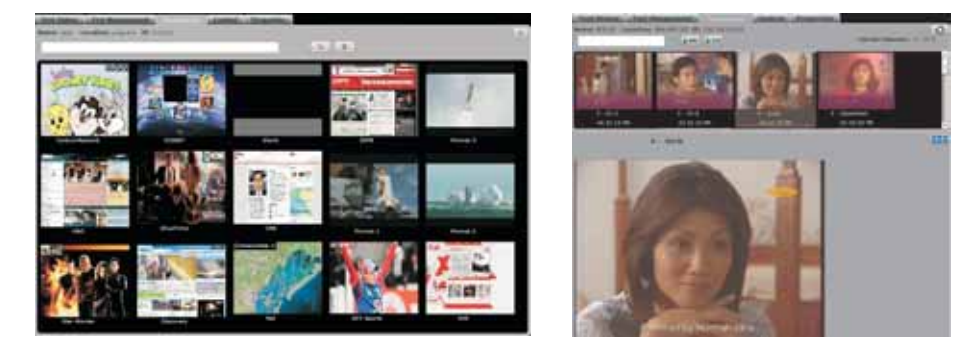
Furthermore, the test script execution environment enables virtually unlimited feature extension through user-defined test scripts.



Finally, the features are further extended through SW updates several times per year. These updates are free during the first year and for all customers with a support agreement.

Thumbnail Display & Clip Recording

As the ECP scans channels it takes a static, high resolution image capture of the channel being scanned. These image captures are assembled by the Consolidator for viewing in either a matrix thumbnail arrangement or a larger, zoomed in view for close inspection.



Furthermore, all captured images are stored on the ECP and are linked back to the alarm logs. Clicking on any error in the log brings you directly to the image sequence that caused the error.

In addition to static image capture, the ECP can record a small QuickTime movie of each scan interval. These too are linked to the alarm log, letting you see and hear what caused the alarm.

TCL TEST SCRIPTS

Essentially a programmable test robot, the behaviour and test criteria of each ECP can be customized through its extensive test scripting environment, based on the TCL language.

The consolidator engine is responsible for the complete management of uploading test scripts to ECPs deployed in the network, and once downloaded, the ECP will autonomously execute the test script and report back the results.

TCL (“Tool Control Language”) is commonly used worldwide as a test language for automation of QA test and verification in telecom and IT labs. Test scripts can perform a wide variety of functions on the ECP, from sending an arbitrary IR command, to making timing measurements, to providing customized user notifications – the applications of TCL are far reaching and powerful.

Of course, there is a library of existing test scripts for ready, out of the box deployment. Source code for all test scripts is provided, so you can customize the behaviour to suit your specific requirements.

Whether you develop your own test scripts or utilize our professional services, the intrinsically expandable nature of the ECP makes it a future-proof investment.

POWER RELAY

Complete power control of STB and ECP from Consolidator Engine™ supports both “soft reboot” via IR Command and “hard reboot” via built-in power relay within every ECP. Both the soft and hard reboot feature can be manually initiated via the user interface or automatically under program control.

```
TCL Code Fragment

# TestAllChannelsRandomly.tcl
# This script scans channels randomly.
# Run indefinitely
while { 1 } {

    # Randomly choose a channel from the channel list
    set index [expr int(floor(rand()*10)) % $num_channels]
    set channel [lindex $channels $index]

    # Retrieve all the tests assigned to $channel
    set tests [ecp_getchanneltests $channel]

    # Get the channel number assigned to $channel
    set channel_num [ecp_getchannelinfo num $channel]

    foreach test $tests {
        # Run the assigned test
        set ret [ecp_test $test]

        # If the return value of test is not 0,
        # generate an error.
        if {[lindex $ret 0] > 0} {
            ecp_genalarm $ret $test $channel
        }
    }
}
return -code ok;
```



TELEPRESENCE

Telepresence provides the flexibility to start live, full motion display of a particular TV channel (audio and video) to a remote web browser client for full visibility into the health of services in the network.

Video streaming bandwidth can be easily set from kbps to high quality Mbps. The audio is efficiently encoded in AAC format. The ECPallows streaming in both Multicast mode and simultaneously up to 10 unicast sessions for a single channel.

For complete remote verification of television, including selection of VOD titles and EPG inspection, the ECP features multiple remote control plug-ins which fully replicate the user experience.

The remote control can be further customized to support proprietary commands such as activating the STB diagnostic mode – perfect for remote troubleshooting.

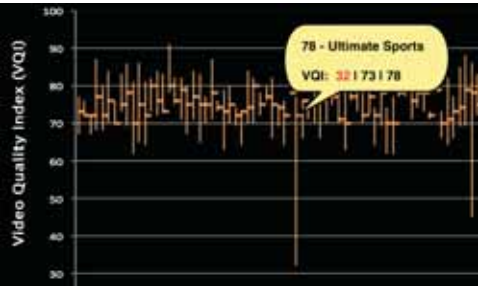


VIDEO QUALITY INDEX™ (VQI)

The VQI option for the ECP automatically identifies the most common blocking and pixelization artifacts resulting from network/transmission impairments.

Results are combined to a single, integrated score – the Video Quality Index. Historical min, max and average VQIs are maintained for each channel.

Alarm thresholds can be set or customized plus the VQI test can be included or omitted on a channel-by-channel basis. Supports video encoded with either MPEG-2 or H.264.



AUTOMATED CHANNEL PACKAGE AUDIT

Multi-region networks with central headends and a greatly increased universe of channel options has made it difficult for multi-channel operators to prove to content owners that the correct channels appear in the correct tiers.

The ECP can eliminate time-consuming and error-prone manual scanning by human operators, and automatically validate channel tiering.

Deployed at a central or regional headend, the ECP continuously scans through all channels and reports any channels that are there but not supposed to be, as well as channels that are not there but are supposed to be.

Furthermore, operators can use the remote telepresence feature to remotely view the channels for positive confirmation.

Automating this important task frees up operations personnel to focus on more pressing responsibilities.



ADULT PIN CODE VERIFICATION

Preventing sexually explicit adult content from inadvertently reaching children is a legal requirement in many countries. In these places, the viewer must first input a password before being able to view such content.

Validating compliance to such regulations until now has needed expensive and time-consuming manual verification. However, now, by building on the programmable test scripting ability of the ECP combined with zoned image detection, validation can be fully automated.

In this ECP application, the ECP is set to scan through the channels. "Normal" channels are checked as usual for visual and/or audio impairments, while adult channels are first validated that the password prompt dialog is displayed.

The test script goes on to input the password via the IR controller and thereafter confirms that video and audio comes out of the STB.



HD/SD SCREEN SECTIONS

Video tests can be constrained to specific sub-sections of the screen area. For example, the ECP can be configured to check for a freeze frame condition on only the stock ticker of a business channel.

HD content can be transmitted in a number of aspect ratios and formats, such as 4:3, 16:9 letterbox, etc. This means the position of a screen section might change depending on the output format.

