

SPECIAL REPORT

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## New Perspectives on Test and Measurement

*Compiled by Stephen Hardy*

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# New Perspectives on Test and Measurement

As cable operator networks become more complex, test and measurement capabilities, as well as monitoring and maintenance, become more important.

On the consumer end, services must be delivered to multiple platforms with no degradation of quality. These services likely will include content from a growing variety of sources.

Business services come with their own requirements. As operators expand their addressable markets to include larger enterprises, the variety and complexity of service-level agreements pose new challenges. The evolution toward cloud-based service delivery requires a complementary evolution in network monitoring and troubleshooting.

All of these elements mean that operators must have a firm test and measurement foundation for initial network and service installation. Then service and network monitoring and maintenance capabilities come into play as customers access new services – increasingly through self-service portals.

The articles in this Special Report offer viewpoints that touch on several of these topics.

—Stephen Hardy, editorial director

## Get Full Value from PNM



By Nitish Khullar, product manager, VeEX, Inc.

PNM you say? Most commonly known as “Proactive Network Monitoring,” PNM is making great progress, especially in the

MSO space. Technically, PNM can apply to any technology in the communications space. But thanks to the push by CableLabs, PNM has made a serious impact on the way MSO networks are being monitored and maintained.

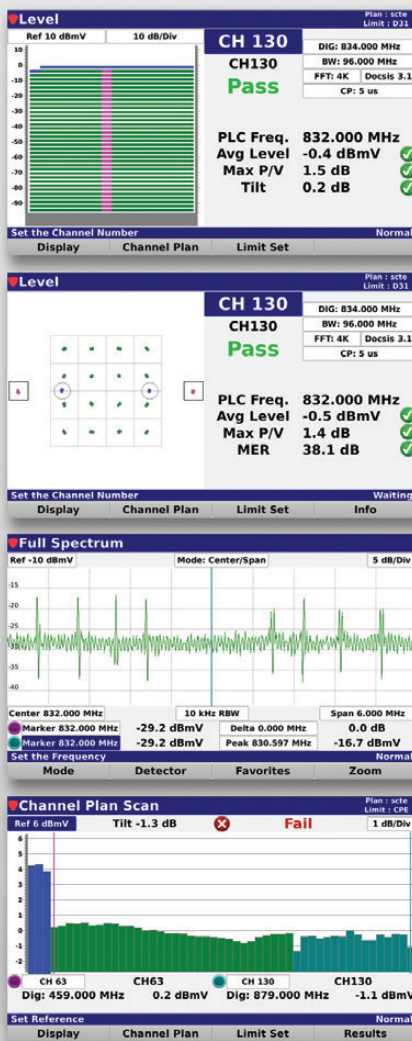
However, there is a misunderstanding that PNM is free. This is because PNM looks like a piece of software that can run on any low-cost server. But to really get the most value out of any PNM tool, the software around PNM and its ability to mine and search for trends, as well as the alarming and reporting, are equally as important. These pieces unfortunately are not free, regardless whether they derive from in-house or vendor development.

Additionally, there is often a forgotten piece—although PNM allows service providers to understand and detect potential problems before they occur, finding the problem is like finding a needle in a hay stack due to the large amount of data collected. Although search algorithms and metrics are improving every

# DOCSIS 3.1 – Ready? Set? Update!

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Trilithic has recently released a **FREE** firmware update for our new DPS family of field analyzers which enables a comprehensive software based testing solution in DOCSIS 3.1 environments.



Designed to protect your past investments in Trilithic field analyzers, this update allows you to test DOCSIS 3.1 signals without spending valuable capital on new or upgraded test equipment until fully certified DOCSIS 3.1 hardware becomes available in late 2016.

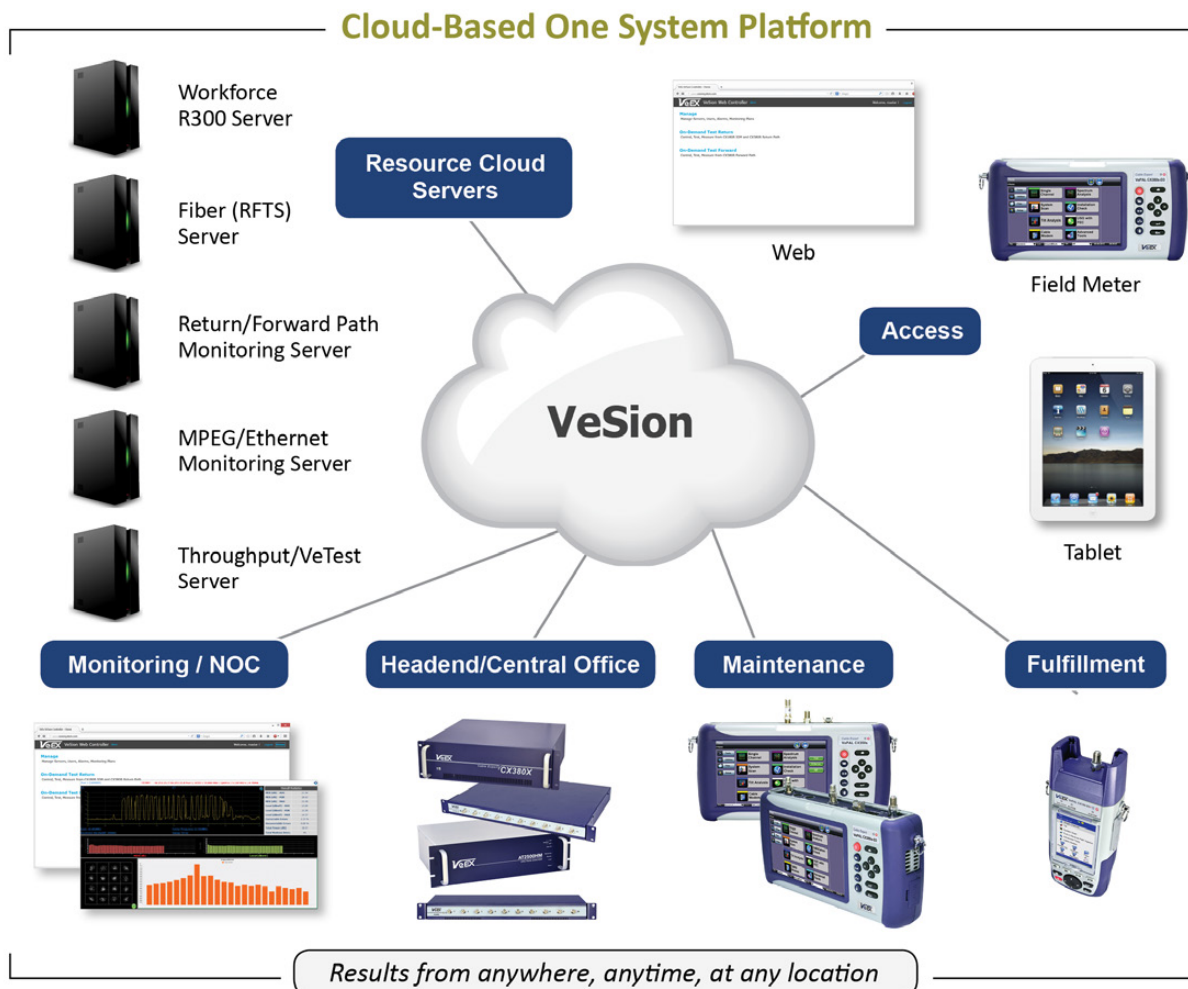
Additionally, this update will simplify the daily life of your technicians by providing them measurement tools that they already understand which results in reduced operational expenses related to the downtime spent re-training your technicians for DOCSIS 3.1 technology.

- DOCSIS 3.1 level measurements & full channel plan scans
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innovative technology to keep you a **step ahead**



Proactive Network Maintenance (PNM) capabilities work best when fully integrated into an operator's existing monitoring architecture.

day, one is still faced with trends and potential undetected problems rather than the Holy Grail of solving it all.

PNM makes a lot of sense as an additional source of data that enriches existing monitoring platforms and field service tools. PNM is not a menu option, but rather an additional topping. If your link to your end device collecting PNM data (i.e., residential gateway) is broken or too noisy to retrieve the data, then PNM will be blind, including your support team trying to identify and locate the problem.

Based on our experience, we have seen that if PNM is used in conjunction with an existing monitoring platform and fully integrated with field tools, the added value is tremendous (see figure). This includes return on investment (ROI) measured by outage reductions, repeat truck roll reductions, and overall service/repair ticket reductions.

In conclusion, PNM has become one of the most significant advances in test and measurement in the last few years and provides tremendous value to the overall network maintenance puzzle. It is, however, not an OR but an AND



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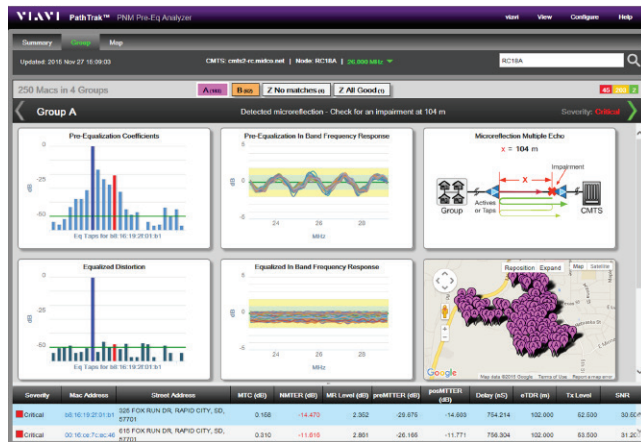
Help field technicians fix problems right—the first time—with a user-friendly interface and OneCheck™ automated tests. And, future-proof modularity ensures years of top performance and value.

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functionality, that when properly integrated, provides immediate ROI and advanced visibility into the network's health. We should see even more PNM-driven tools with the deployment of DOCSIS 3.1 and the added PNM functionalities.

## Gigabit to the End User: The Race Is On



By Sameh Yamany, CTO, Viavi Solutions

I recently attended Mobile World Congress in Barcelona, where Vittorio Colao, Vodafone Group CEO, spoke about “the gigabit society.” To answer consumers’ calls for rich multimedia services without limitations, communications service providers in every sector are racing to deliver 1-Gbps connectivity to end users. This trend crosses wireless (5G, 802.11ac) and wireline (DOCSIS 3.1, FTTH, PON) domains. In their most recent “Quarterly Access Report,” Dell’Oro Group concluded that the broadband access market—comprising cable, DSL, and PON technologies—[generated record revenue of over \\$12 billion in 2015](#), with half of that coming from PON. Furthermore, according to the same

report, new technologies such as DOCSIS 3.1 will add more fuel to the growth in this market in 2016.

From my unique vantage point working with leading network equipment manufacturers and service providers across technologies, I can clearly see the challenges the industry will be facing throughout the network. Here are the principal ones.

**Core and metro networks.** As access speeds cross the gigabit threshold, capacity will need to increase correspondingly at all aggregation layers as well as in the backbone. 100G metro networks are coming into view, and service providers are working with their ecosystems to accelerate 400G in the core. Optical fiber test systems need to be rapidly put in place for higher speed interfaces to make it from lab to production, and field teams need to be equipped with tools to manage speeds that only recently were confined to the core.

“Field technicians need to be equipped with instruments compliant with DOCSIS 3.1 that can also simplify the installation and service process.”

**Network visibility to keep up with evolving architectures.** Service providers are slowly but surely adopting NFV and SDN to enable more flexible and agile network architectures for converged services that increase efficiency and respond to demand challenges more dynamically. Networks will ultimately be distributed across

# Migrating to DOCSIS 3.1?



## It Doesn't Have to be an Upstream Battle

As DOCSIS 3.1 technology evolves, Cable Operators must face major deployment challenges that can affect service delivery and reliability. More than ever, MSOs must fully characterize every aspect of the cable network, from the headend to the home.

Whether it is OFDM, RFoG or HFC Upgrades, contact VeEX to discover how migration to DOCSIS 3.1 doesn't have to be an upstream battle.



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**DOCSIS 3.1** solutions



**Offering performance analysis and troubleshooting to successfully install and maintain DOCSIS 3.1, the cloud-enabled Viavi OneExpert CATV handheld tester gives you complete fulfillment and service testing. Watch the video to learn more about how solutions from Viavi can help your business with its rollout of DOCSIS 3.1 to consumers.**

a hybrid design consisting of legacy physical, virtual, and cloud environments. It will be essential for operators to be able to have a comprehensive, integrated, and real-time view of network performance, states, and issue root causes.

**Installation and provisioning tools.** For a technology to truly enter the mainstream, it needs to be deployed efficiently on a wide scale. Take DOCSIS 3.1, for example. Major MSOs are experiencing significant success in market trials, and are announcing plans to launch services more widely in 2016. To do so, their field technicians need to be equipped with instruments compliant with DOCSIS 3.1 that can also simplify the installation and service process for this new and complex technology.

## Getting Proactive about Network Maintenance



By Monta Monaco Herson, Contributing Writer

Proactive network maintenance (PNM) is more abstract than reacting to a crisis, and therefore,

cable operators must have operational practices in place to ensure that once PNM tools are purchased they are used successfully, their benefits are tracked, and the organization is achieving the expected ROI.

“Cable operators have been reactive since day one,” said Brady Volpe, president and founder of the **Volpe Firm**. “They know how to fight fires very well. What they want is for the fires not to start. If they see a glowing, they want to make sure it is extinguished before the flame ignites.”

Businesses need to have an organizational buy-in to PNM, which means making sure it is understood by not only the people using it, but also throughout other divisions, such as the IT department responsible for the backend and the CFO in charge of budgetary things. Two key metrics are truck rolls and CSR calls, both of which can demonstrate success, and also be used to develop PNM training programs and encourage continued investment in these programs, Volpe said.

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Using numbers from Cox Communications, Volpe said the average truck roll might cost \$75.00 and the average CSR call is around \$8 per call. Volpe’s clients that use PNM for six months to a year find a 10% reduction in truck rolls and a 15% reduction in CSR calls. If an operator has



# 7

## Tools MSOs Need for Successful Gigabit Ethernet Deployments

As the portable world leader in fiber optic deployments, EXFO has compiled a list of items for you to consider equipping your field technicians with in order to achieve the quality-of-experience (QoE) expected by your customers. With proper methods of procedure (MOPs) and efficient test solutions, you can ensure first-time-right deployments and reduced mean time to repair (MTTR).

### THE 7 TOOLS

1

#### A Fiber Inspection Probe—For any technician at any stage of deployment

The probe should provide a fully automated test process and autofocus and analysis capabilities to protect against misinterpretation and prevent false positive results. Opt for a LED pass/fail indicator providing immediate analysis results.



EXFO FIP-435B

2

#### An Intelligent Optical Link Mapper—Enables any technician to characterize deployed fibers

Go for the most reliable and easy-to-use OTDR-based application available. Featuring multipulse acquisition and advanced algorithms to deliver detailed information on every element on the link. Simple, easy-to-use software enables untrained technicians to become test experts in no time.



MAX-700C with EXFO's iOLM

3

#### A CWDM/DWDM OTDR—For construction or troubleshooting of access networks

The unit should provide single-ended troubleshooting of high-value dense/coarse wavelength-division multiplexing (CWDM/DWDM) access links to reduce MTTR and avoid service-level agreement (SLA) penalty fees.



EXFO FTBx-740C

4

#### An Optical Spectrum Analyzer—Enables advanced technicians to check system performances

Select a Pol-Mux OSA for 40G/100G coherent DWDM systems with an in-band method for intelligent setup and analysis on a per-channel basis, a system delivering detailed information about the signal and noise for each channel, and efficient impairment identification.



EXFO FTB-5240BP

5

#### An Intelligent Service Activation Methodology—For Ethernet service activation technicians

Provides fast, simple and accurate validation of SLAs for Ethernet services, improving field technician's efficiency for faster service deployment. Opt for the all-in-one Ethernet/optical solution to speed up and simplify Ethernet/IP/PRI service and physical optical-layer testing.



FTB-700G with EXFO's iSAM

6

#### A Cloud-Based Process Automation Solution—For automated and controlled MOPs

Streamlines and automates complex testing procedures during the construction and service turn-up phases of deployment. High-level automation improves productivity, ensures compliance to operator-specific methods and procedures, and provides relevant analytics for process optimization.



EXFO's TestFlow

7

#### A Node OTDR—For network monitoring and fault-finding

A node OTDR for access network testing enables you to define and test point-to-multipoint (P2MP) fibers and test from the node or central office downstream to any passive-optical-network line type.



EXFO FG-750

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50,000 truck rolls and 350,000 CSR calls per year, the annualized cost avoidance could be just under \$800,000 per year.

“(An operator) can use this as a model if they don’t have PNM to (determine), ‘These are the savings or costs I can avoid if I use PNM.’ If an operator is currently using PNM, they might say, ‘Wow, we should be doing this type of metric tracking to make sure we can ensure continual funding,’” Volpe said.

Volpe suggests identifying PNM champions, who are individuals or teams within an organization, responsible for understanding the core technology application, and might use PNM tools once a day or a few times per week. These folks find opportunities for proactive maintenance, perhaps while out fighting the so-called fires.

“If you have a PNM champion, they would say, ‘I know that down on 5<sup>th</sup> and Main there is an outage, but there also are modems in the area

that PNM applications have identified as having possible issues.’ They are not offline, customers are not complaining, but cable plants don’t get better over time,” Volpe said.

Another best practice is to develop an impairment library. PNM tools might show impairments that were not seen with test and measurement devices. As technicians learn to identify new impairments in ways they have never been able to see them before, they can categorize them and save them in the library to teach others. If they see what a piece of corrupted coax looks like from a PNM standpoint, for example, technicians can rely on this data to identify it better in the future, Volpe said.

DOCSIS 3.1 brings many new capabilities to the PNM arena by way the CMTS and cable modems. Volpe recommends operators invest in DOCSIS 3.1 CMTS even if they are not running it in OFDM mode. Through software upgrades in the PNM server, the new features can be utilized. For example, using a DOCSIS 3.1 CMTS and cable modem, the return path can be swept 24/7.

“A technician doesn’t need to go out in the field. (The operator) can do it in the background. This is more cost savings,” Volpe said.

## Want more info?

[Watch our webcast](#) on “Prepping Your Plant for Tomorrow’s Broadband Services.”