

CM Sweep with Modem Quality of Service Feature

Introduction

In almost all field applications where sweep is needed, operators that are sweeping have always relied on out-of-band sweeping when it comes down to their cable modems. Of course, injecting sweep carriers into the channels where your modems are present will potentially incapacitate those active modems trying to reach the headend. As upstream bandwidth continues to fill, operators now have to reduce the number of upstream sweep points, severely affecting the resolution of the upstream frequency response.

So the question becomes: How does the operator properly sweep the upstream, if there is no room to insert their sweep carriers? The answer: Trilithic's CM Sweep with Modem Quality of Service. The CM Sweep feature allows the cable modem to launch back to the headend in a bonded 4x solution, or potential DOCSIS 3.1 solution, as shown in the screen below. This gives the operator the ability to finally sweep inside their upstream modem channels and look for potential gain and tilt issues that otherwise may be hiding.

In short, this style of sweep transmission also looks at a new metric called, "MQS" or Modem Quality of Service, which allows the operator to see the "Quality" of each upstream as a total "MQS" in dB. The higher the "MQS" score means that the equalizer is working harder, so there are potentially more impairments in the path of the specific cable modem. Under 1 dB "MQS" is considered an excellent value, while some impairments could give you a value as high as 6 dB showing certain impairments in the upstream.

As seen in *Figure 1*, the raw CM sweep trace allows the operator to identify impairments before the CM reference has been applied (up to 85 MHz). By using this application in this manor, it allows the end user to set modem transmit levels across the bandwidth, but more importantly allows the user to see any potential impairments before the reference is applied, so they can fix these impairments then take the reference and set up the amplifiers to match the node.

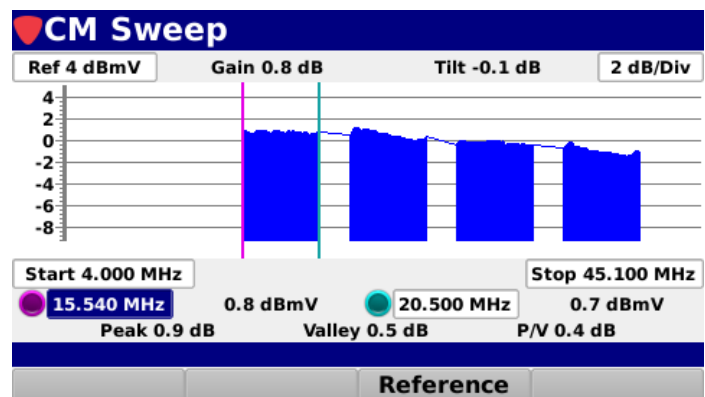


Figure 1

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Application Note

New DSP Family

The CM Sweep also allows the user to save a reference at the node, then bring up this reference to compare at the any point in the system (preferably the next active amplifier).

As seen in *Figure 2*, the CM Sweep allows the end user to see gain and tilt based on the marker settings once a reference is applied. This also allows the user to see their “MQS” score, which is highlighted in yellow.

The final key to this is looking at the overall “MQS”, which is shown in the upper right of the screen. This “MQS” score is the summation of all the cable modem channels seen in the return path.

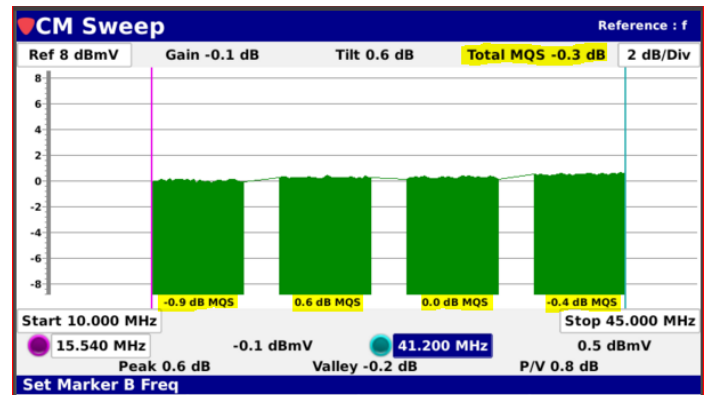


Figure 2

Upstream Linear Distortion Comparison

As seen in *Figures 2–5*, the UP-LD (Upstream Linear Distortions) screenshots can be used as reference. In utilizing these with the CM Sweep, the operator can almost pinpoint in-band problems.

At a quick glance, the operator is able to see the overall health of the upstream channels, individually. This feature will tell the operator at a very high level how all the upstream channels are performing, so decisions can be made to either save the reference and move on, or look deeper into the individual carriers. Using the UP-LD feature, the operator has the ability to see the Pre-Equalized Adaptive EQ, Group Delay, and In-Channel Frequency Response to investigate further.

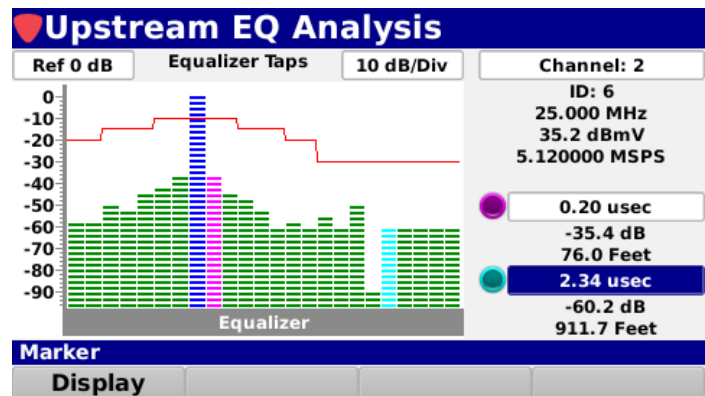


Figure 3

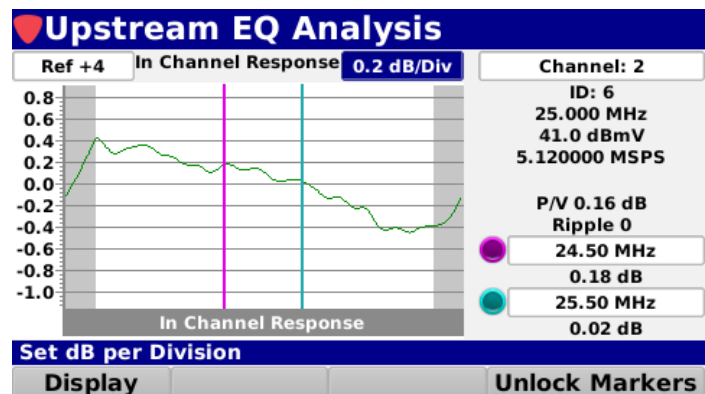


Figure 4

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These tests and their associated metrics make it much easier to find linear impairments or micro-reflections that may have been causing problems for multiple modems.

This comprehensive Trilithic testing suite gives the operator an unprecedented ability to track issues that may have been hiding in post equalization, for long periods of time.

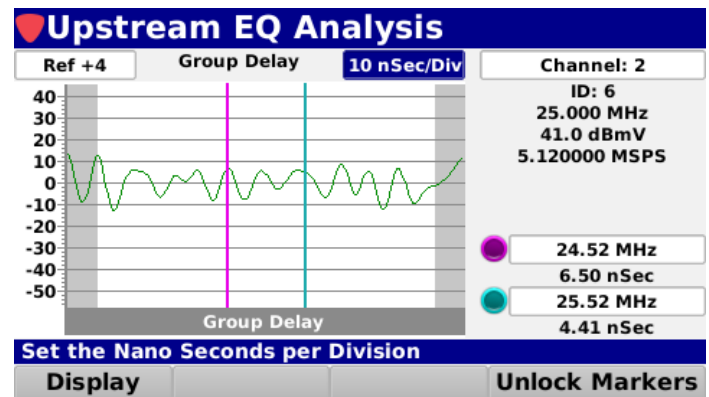


Figure 5



NOTE

For Additional Help, Contact Trilithic Applications Engineering
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