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SOURCE[1]: VOCAL Technologies Ltd. (http://www.vocal.com)

TITLE: G.hs: Bridge taps detection and location

ABSTRACT

As cable bundles are wired together at various distribution points, not all lead to a telephone line termination. Some wires simply ‘T- off’ at points and can continue in multiple cables. For voice-band signals, such connection do not present any significant effect. However for high frequency signals such as for xDSL, the wires act as transmission lines and signals will propagate down both directions from a ‘T’. The line which is not terminated will create a reflection of the signal as the energy can not be absorbed which will in turn disrupt the signal quality. We propose an addition of an optional probing technique for the detection and location of these impairments.

[1] Contact: Victor Demjanenko, Ph. D. E: victord@vocal.com
Alberto Torres, Ph. D. E: jatorres@vocal.com
VoCAL Technologies Ltd. T: +1-716-688-4675
Buffalo, NY 14228, USA F: +1-716-639-0713

1. Introduction:

As cable bundles are wired together at various distribution points, not all lead to a telephone line termination. Some wires simply 'T- off' at points and can continue in multiple cables. For voice-band signals, such connection do not present any significant effect. However for high frequency signals such as for xDSL, the wires act as transmission lines and signals will propagate down both directions from a 'T'. The line which is not terminated will create a reflection of the signal as the energy can not be absorbed which will in turn disrupt the signal quality. We propose an addition of an optional probing techniques for the detection and location of these impairments.

2. Bridge taps detection and location:

Inclusion of remote ability for recording an alternate probing signal would permit the development of a variety of algorithms for the identification of various problems. Specifically, an alternate probing signal of the form used for time domain reflectivity (TDR) could be sent by the ATU-C in place of its normal signal used for C-ECT. This signal would be sensitive to impedance mismatches of which a loading coil would be an extreme case. However, other sources of impedance mismatch may occur which would result in corruption of the signal received by the ATU-R. These could include bridge taps either in the telephone line distribution network or within the customer premises. Each impedance mismatch would cause a reflection of the signal energy which in turn distorts the signal received by the ATU-R. The ATU-R would record those C-ECT signals using the corresponding FFT coefficients or directly in the time domain. G.hs of a subsequent start-up negotiation will then be used to retrieve either the recorded time domain or frequency domain signal representation.

Both the reflection observed by the ATU-C and the recorded signal observed by the ATU-R could be processed using TDR or other similar techniques. Telephone network bridge taps would observed by both ATU-C and ATU-R. The ATU-C may prefer to process its own signal for attempting to locate the telephone network bridge taps as its sampling and signal processing quality would be known. However, for the bridge taps caused by multiple extensions wired at the customer premises, the ATU-R may have the best recording of the subtle imperfections in the signal. As the system is causal, and each tap deflects some energy and delays the primary signal, the observed waveform will have uneven distortion on its leading and trailing edges. The amount of distortion can be quantitatively determined and classified. If this distortion is determined to be present to a significant degree, the customer can be advised of the corrective measure to be taken. This would require an additional message within G.hs to convey operator diagnostic information to the customer.

3. Summary:

1. This paper should be present in the G.hs agenda although it does minimally impact the requirements of G.dmt start-up.

2. We proposed that the G.hs include this algorithm for bridge taps' detection and location.