60193

INVENTION DISCLOSURE

1. **Invention Title.**

A Simple algorithm for fault localization using naming convention and micro-reflection signature.

2. **Invention Summary.**

This invention proposes a simple algorithm to determine the location of the fault after calculating the micro-reflection signature and applying the naming convention described in the previous disclosures (Proactive CATV Network Maintenance Method by Alberto Campos and Pre-equalization based Pro-active maintenance model by A. Campos, E. Cardona and L. Raman). A manifestation to implement this algorithm is described by defining an XML schema and XPath queries. This algorithm enables efficient processing of large numbers of CMs thus facilitating scalability and automation.

3. **Invention Description**.

a. **Describe the invention in detail and/or attach a description, drawing(s) and/or diagram(s), if available. Please include flow charts for descriptions of software processes, and block diagrams for descriptions of hardware systems. Include the description/attachments in electronic form if possible.**

The algorithm determines the start and end of the common path where the micro-reflection results in affecting CMs on that path. The affected CMs on that path exhibit the same signature (micro-reflection level and delay). Analysis of the signatures and the naming convention required to apply this algorithm in this disclosure are described in other disclosures.

Query Expressions

Q1: Determine the number of CMs on the candidate path exhibiting the same signature

Q2: Determine the number of CMs on the candidate path that does not exhibit that same signature

Q3: Determine the names of the elements directly connected to a given node

Q4: Determine the number of CMs present on all paths originating from a given node

Algorithm

The start of the common path segment (P1) is determined as the farthest point from the Fiber Node where Q1 () = n & Q2 () = 0, n being the number of CMs with the same signature

The end of the common path segment is determined as the farthest point from P1 where Q4 () < n (the number of CMs with the same signature has reduced)

The XML schema for any HFC plant topology is attached (.xsd file that can be opened with any text editor). The attached presentation shows an example of how the algorithm is applied for a specific topology (a jpeg file of the tree is also attached for better readability).

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?

In developing the presentation to MSOs to explain the model, we wanted to show how to use the naming convention in localizing fault quickly. During these discussions, the algorithm was developed to demonstrate how MSOs can benefit from the pro-active maintenance process model.

c. Briefly outline the potential commercial value and customers of the invention.

Operators can leverage the algorithm to build their own pro-active maintenance application inexpensively. The algorithm is highly scalable when multiple fault localizations are required across the plant because these queries are atomic and distributed processing can be applied.

4. HOW is your invention different from existing products, processes, systems? Please list the closest publication(s), product(s), method(s), patent(s), etc. to your invention. For each item, how is your invention different?

This disclosure builds upon the pro-active maintenance process model and naming convention for plant topology. This disclosure is different because the algorithm provides an easy method to find the start and end of the path within which the source of the problem lies. We are not aware of the use of such an algorithm for fault localization.