Site Survey for Power Line Communication

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Power Line Carrier System for Medium and Low Voltage Grids

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Objective:

Objective of the site survey in the medium and low voltage network is meant to evaluate the intrinsic communication parameters of the grid.
More than two decades of the accumulated experience in performing such surveys worldwide has provided sufficient evidence that not every line nor network is fit for either narrowband or broadband PLC applications. It is well known that it is possible to calculate communication parameters of the line or the grid. However, lack of the data about the current state and condition of the line or network makes the calculation-based decision about the potential of the network unreliable and risky.
On the contrary, once undertaken, the data evaluated of the current network grants sufficient and reliable evidence to support the findings of whether the line or the grid is fit to be used for the intended communication purposes.

The survey:

- indicates the condition of the line or grid in order to improve its communication performance.
- and its results and recommendation are unbiased and therefore independent from the technology provider. However, where the technology provider is selected in advance the survey is conducted to identify the optimal use of the line, grid and associated devices and systems taking into account the specifics of the technology intended to use.
- with its findings, analysis and recommendation provides to the Company Management an invaluable insight into the feasibility of the line or grid usage as a communication medium.
- eliminates the need for expensive open-ended experiments resulting from the lack of the evidence to make a qualified decision to enter into the full-scale system installation. There are several identified cases where survey has not been done prior to the system installation, and where suitability of the network or some of its components have been identified during the contract execution.
- eliminates the necessity to create several small-scale installations to gain the experience and evidence selecting the communication technology provider.
- provides hard evidence to the utility to make the right decision selecting the communication technology, appropriate to satisfy its needs communicating for an effective and cost efficient network management.
- establishes the potential of a line or a network to be offered to a third party for using in applications requiring broadband communication.

- generates an opportunity for the Network Operator to set up the business case and accurate investment planning based on hard evidence.
- enables an unbiased selection of the most appropriate communication technology provider.

What is required for a survey?

To execute the line or the network survey one should differentiate the specifics of the line and the network. For low voltage mains, only basic preparation work is required.

1. Proper actual network documentation
2. Guarantied undisturbed access to the selected measurement points.

Surveys in the medium voltage grid are more challenging. It is required that the Network Operator prepares the network for the survey and provides full support to the survey team such as:

1. Providing an up to date single line diagram for the network under consideration, including
    a. Identified overhead line segments and cable segments
    b. Length of each line segments
    c. Identified cable joints if known
    d. Cable type used with the cross section details
    e. Location of normally open points in the distribution network
    f. Voltage level
    g. Type of the network neutral point earthing
        i. Solid
        ii. Over earthing resistor and the value of the resistor
        iii. Compensated
        iv. Combined form the above with the details of the control scheme and its time settings
    h. Substation and switchgear layout and the details of the switchgear earthing and cable sheet earthing.
2. Installation of the coupling devices at the measurement points in the network that will be selected and supplied by the surveillance company.
3. Unrestricted and undisturbed access to the measurement points during the measurement period.
4. Person trained and authorized to perform device switching operations and network reconfiguration.
5. Transport to site and to the agreed place of accommodation.
6. Fault isolation switching strategy for the network under consideration.

Deliverables

Following the survey completion, the surveillance company will make and supply to the Utility an extensive report, which will include:

- Signal transfer functions for the cable / overhead segments under consideration.
- Noise measurements at the dedicated measurement points.
- Impulse response and group delay measurements for the segments under consideration.
- Impedance measurements for narrow band systems as defined in standard(s) (CENELEC A-D and FCC Band) where required to be executed as a part of the survey.

Based on the results of the tested segments, an analysis of the expected communication performance of the system will be under consideration.

Where appropriate, recommendations to improve network communication performance will be given.

Where to be used for either dedicated or specific task, potential risk of using power line based communication system will be discussed.

Unless specifically requested and defined prior to the survey, report will be unbiased and will not champion a specific technology provider