

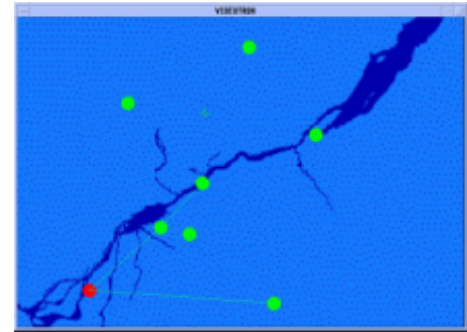
# CABLE NETWORK APPLICATIONS

## ON-LINE MONITORING MODULES

### Real-time detection of network anomalies

#### The objectives:

The primary objective of the monitoring application is to probe the network to seek-out anomalies in real-time. The purpose is to display the network equipment that is faulty or damaged on a map, as well as all the sub-elements and/or clients that are affected. The monitoring application uses state of the art Geographical Information Systems (GIS) technology to link off-line engineering design/balance databases to the real-time world of on-line monitoring. The solution allows for the direct feed of the on-line database from the engineering department, thus navigating in a real geo-referenced database for alarm management.



#### How does it work?

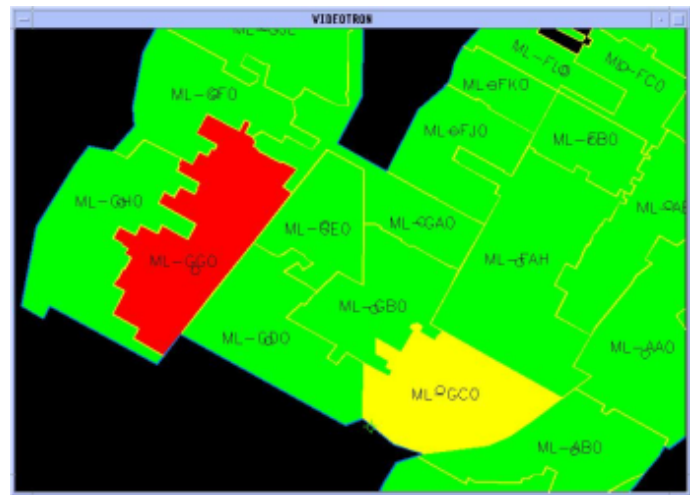
It's by using electronic sensors, installed on the equipment, that faults in the operations of the network are detected. Consequently, the equipment displayed by the system is shown using scales and colors representative of the severity of the alarm. The application also allows to perform alarm analysis related to the network connectivity, showing the affected domains.

Real-time analysis are performed on the alarms in order to filter them and represent the significant ones according to the network configuration. The information on the system comes directly from the production servers of the engineering department. This information includes topologic, graphic and textual data.

#### The modules: The alarm reception module

This module carries out the reading and processing of the alarm signals received by the available communication channels. The system stores the alarms into a database in order to identify and process those that show the equipment affected by the breakdown. The result of this analysis allow the user to visualize the equipment, represented in a georeferenced database, using different scales and colors depending on the severity of the alarm.

Because the system data "knows" the network connectivity status, the major alarms (those that stop the network of operating) are then propagated toward the equipment descending on the network. It is then possible to find out which customers have been affected by the alarm. The system will automatically filter the alarms based on their severity (it will bring to the upper levels the alarm of the highest severity for a given view and/or region) and on the network topology. This principle can reduce the amount of reported alarms that are "downstream" in the network. If there's an important alarm in a given region, the system will filter out the lower priority ones, thus making the user analysis easier and faster.



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## The display module

The display module uses a dynamic display functionality. This function allows a symbol that represent an equipment to be displayed under different shapes or colors depending on the severity of the alarm pertaining to the symbol (equipment) or a polygon (a region or network sector). In the case of a symbol or a polygon, the display (made dynamically) of an element is directly related to the highest priority represented by the "offspring" view (see the construction module on this page).

## The navigation / research module

This module has been made to allow a user to find a specific equipment through a vast database made of a wide range of local drawings and continuous maps. To speed up graphic access in a large data volume configuration, the navigation module allow the information to be segmented according to the hierarchic detail levels and regions. Navigation between levels allow the user to see more and more complex views of the same object, from a global size view of a territory (showing the major network "heads") down to a customer level map (showing streets in real dimensions, customer houses, feeder cables, taps, etc.)

## The construction module

The primary objective of the construction module is to carry out the organization of the views on different hierarchic levels. The constuction of levels is completely dynamic and dependent on the needs of the user. In general, a generic view of the region with symbols representing different sub-regions, as well as the network equipment is found on the first level.

The system treats the display of polygons and symbols to establish a representation of the regions or the sub-regions on the screen. Their color is sorted according to the highest priority of the alarms included in the "offsprings" views.

## The update module

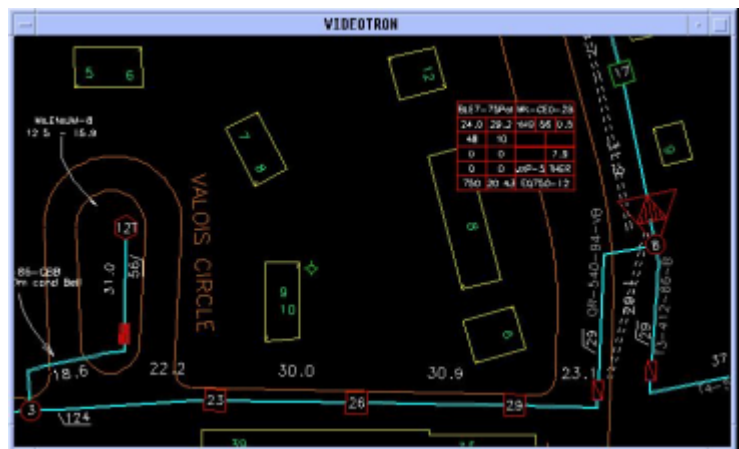
This module ensures that the data is not outdated and that it reflects reality as much as possible. Feeders can be added, deleted and updated by the engineering department. The on-line database can be adjusted without having to "redo" what the engineering department has done. The module will identify and extract the updated data and merge it with the real-time database. A data transfer module can be installed in the event that the production and monitoring servers are of a different nature.

Updates are performed only on the modified data, not on all of it. The volume of the data found on the production servers is often very large and in order to decrease the time a server take to carry out updates (that may be ordered by the recurring task panel to be carried out by the system), the module identifies the parts of the network that have been modified.

This last module is already included in the "RF/FIBER" design module.

### Characteristics of the modules:

- Alarm reception with an API module (Alarm processing in real-time)
- Important volume of data (Data hierarchy for quick response time)
- GUI navigation module (Dynamic and simple construction of views)
- Data updates (Data automatically generated from production servers)
- Real-time alarm visualization (Immediate user visualization)



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## *Advantages*

- Completely parametrizable module
- Real-time use of the module
- Transparent integration to the RF production application
- Simple analysis of breakdowns
- Dynamic alarm visualization
- Transparent processing of the users's alarms
- Choice of three operation methods:
  1. Completely asynchronous: the screen automatically redisplayes on the reception of alarms.
  2. Asynchronous and idle: the screen automatically redisplayes if the user is not working.
  3. Idle: the screen redisplayes only at the request of the user.
- Automatic and transparent updates of user data
- Multi-user access
- Support for raster, topologic and vectorial data
- Easy dynamic hierarchy construction with the help of tools defined by the user
- Overlapping hierarchies between regions
- Alarm propagation between hierarchies and regions
- Operational on installation

## *Print-outs*

- Subscribers in distress lists for the customer services department
- Geographic sites and equipment related to alarms
- Connectivity routes of the land base between customers, from the distribution head down to the client
- General thematic mapping based on selection criterias