NETWORK MANAGER VERSUS NETWORK OPERATOR

AMALIO RODRIGUEZ
UFACEX
TRANSMISSION AND DISTRIBUTION SYSTEM MANAGER
LERIDA 44, 2 – 280020 MADRID
TEL.: 34-915676000 FAX.: 34-915714593
E-mail: arodriguez@ufacex.com

A major change to the concept of traditional network operation has arisen during last few years as consequence of having to provide a high quality product to a more demanding customer in an ever more competitive world
State of the art technology allows for the implementation of management tools and mechanisms that help to efficiently manage the operation of the network at a reasonable cost.
In deregulated electrical markets, a new concept has been introduced, which is the economic management of the operation activity. Any term (non-supplied energy, dependability, losses, quality) can be translated into an economic value and assigned a level of priority within each company's scale of values.
It is necessary to consider three main elements involved in operating a network and analyse the requirements that they will have to meet in the new environment. They are Organisation, the electrical network and Management systems.

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Before, the principle objective was to achieve the best possible rates of availability based on highly dependable networks. The main concern was to ensure the supply of electricity.

Let us consider all the elements involved in operating a network and then analyse the requirements that they will have to meet in the new environment.

1. Organisation: composed of network operators in dispatching centres, of local operation crews and of a group of operational technical supervisors.

2. The electrical network: Elements that make up the electrical network, including the different types of installations and the different operation configurations. Also included in this element, is the telecontrol network, composed of relays, RTU's, fault detectors, sectionalisers and measuring equipment.

3. Management systems for the operation of the network: such as the system for data collection in real time, the GIS and the management tools.

1. ORGANISATION:

The organisational structure of the future should be flexible, permitting it to adapt to the different workloads and situations that can arise at any given moment. There is a point on the work curve that must always be covered, and for this reason it should be carried out by fixed shift personnel. To meet the demands of the peak load periods it will be necessary to reinforce the operation stations with open shifts and reserves.

The organisation will depend on three different groups of people. The first group is composed of highly qualified technicians to carry out supervisory tasks and follow-up, define operation norms, conduct operation analysis, analyse the impact of operations on the network, define the steps to be taken in the case of emergency, established stored operation procedures, optimise operations in economic terms, study customer complaints and train the network operators.

The second group is made up of network operators. These persons should have the appropriate technical profile, and they should have a training and simulation environment (complete distribution network) which enables them to optimise their response times in any given situation.

The third group consists of the local operation crews. The number, type and location of the local operators should take account of the quality ratios established by each company, using the legal requirements in effect as a reference. It is essential to look for a compromise solution between quality service and the associated cost.

The design of the local operators is a function of the network structure, geographic distances, response and access times, the average number of incidents, the average time for resolution and the extent to which telecontrols have been implemented. These crews will

tend to be subcontracted in order to achieve the flexibility necessary to reduce costs.

2. NETWORK

Within the NETWORK group, we should take into account the following categories:

- Support network (Fault detectors, Relays, RTU's, Sectionalisers, Communications)
- Network architecture for operation

The network architecture for operation should consider those criteria that allow for the optimum operation of the network in economic terms. It should consider the localisation of telecontrol points, fault detectors and sectionalisers, in other words, the support network). Since it is an architecture designed for the company's entire network, it allows the company to:

- Use a homogeneous network
- Establish simple operation norms
- Facilitate the training of the operators, since it is not necessary to have a specific knowledge of the network
- Compare the functioning of different offices

The signals from the support network communicate to the different data collection systems.

3. MANAGEMENT SYSTEMS:

At present, management tools have been developed to the point where they allow companies to achieve a management of the network that is reliable, controlled and cost effective.

The operation of the network has evolved from small control centres at the electrical substation level, where information was transmitted by telephone and the network was represented by a schematic diagram on the wall. Knowledge of the network and its operation was based to a large extent on the experience of the operators. The number of installations under their control could be quite high, but this was unusual. The relationship between a customer and an installation was determined by rudimentary methods, using small local data bases that the operators were in charge of updating. The part of the network controlled by SCADA systems was operated separately from the rest of the distribution network.

Current technology allows companies to use operation centres that are able to control tens of thousands of installations by simply augmenting the capacity of the machines. To be able to manage a distribution network it is essential that the operators have an operation system that gives them the information that they need, when they need it and in a sufficiently intuitive and clear form, guiding the operator through the steps that he must follow.

The work environment uses a single user graphic interface, which we can call OPERATION INTERFACE, and which interacts with the following sources of information:

1. SCADA: Data collection system in real time.
2. GIS: Graphic and alphanumeric data base for the Distribution installations.
3. Commercial Data Base: Customer/Installation relationship.

The customer/installation relationship plays an especially important role since it gives the CALL CENTRE information regarding the status of the network, and consequently, enables it to inform the customers affected by problems in the electrical supply. In addition, it helps the CALL CENTRE provide information to the dispatching centre regarding customer calls. Although this relationship will suffer changes in a competitive environment, the concept will continue to be valid.

The network operators should control two main processes: the resolution of Incidents and the Management of Releases.

The process for the resolution of incidents consists of the following steps:

1. Detection
2. Analysis – Identification
3. Resolution

The objective should be to reduce as much as possible the total time from the Detection phase to the reestablishment of service.

The detection phase is usually triggered by two different channels:

1. The first is through changes produced in the SCADA system. These changes are sent and registered in the OPERATION INTERFACE environment and automatically generate an incident, to which all the installations affected by this change are associated.

This analysis is accomplished through the process of electrical connectivity whereby the implications caused by the change in operation are analysed, using the GIS environment (the complete distribution network). Once the affected installations are identified, the list of customers affected is obtained through an interface with the corresponding call centre. At this point the call centre is able to anticipate information to the customers regarding the type and characteristics of the incident, as well as the approximate time of resolution. The

communication with the customer should be made through the company's CALL CENTRE, which has the personnel qualified for these types of functions, thereby relieving the dispatching centres of these tasks.

In the new competitive environment, there will be more than one automatic interface with a Call Centre, since there will be many different marketing agents within the distributor' territory.

2. The other primary source of input to the Incident Management process comes from the calls that customers make to the different associated Call Centres. In the OPERATION INTERFACE environment, the calls received are analysed based on the configuration of the network in operation. Depending on the installations affected, the operator defines the sequence of actions to be taken.

Once the problem has been identified, the next step will be to execute the resolution tasks. At this stage, the company can use the operation logic proposed by the help systems and execute it either through the interface with the SCADA system or with local operation personnel. Specifically, when an undesired change in a telecontrolled element occurs, it is possible to define the rules to follow in order to accomplish a partial or total reestablishment of service. This process can be triggered either automatically manually.

The assignment of jobs to the local operation crews will be accomplished through an automatic interface with the maintenance management system. This automatic interface will reside in a standard Work Orders module. It is essential to carry out a detailed control of the jobs done by subcontracted maintenance personnel since the objective is to improve the ratios defined in the maintenance contracts and optimise the resources employed.

The crews are controlled from screens at the operation stations through signals received from GPS equipment. It is possible to send orders automatically to the crews by mobile phone, truncking, and other means, as long as it is permitted by the coverage.

During the incident management process, the operator should be aware at all times of the cumulative evolution of the corresponding quality ratios, and the system should advise him whether the established limits are being met or not. The system will prioritise the incidents to be resolved according to the information provided. The management environment is in charge of generating the values for the quality ratios of each company.

The restored service can be either temporary or definitive. In the first case, the incident has not been closed and it is automatically sent to the maintenance system for later resolution.

When many incidents are produced, the application should pass the control of the low voltage incidents directly to predetermined subcontractors, thereby permitting the operators to focus on more important problems.

With regard to the management of releases (scheduled cuts), they will receive special consideration, and it will be necessary to correctly evaluate the affects that a release can have on the individual and zonal quality ratios. The application should let the people requesting works know beforehand the evolution of the quality ratios for the requested installations. The network operators will analyse the implications of the release and will update the quality ratios according to the increased value caused by the work. Based on these results, Operation can order a work to be done on live installations and even backed up by alternate means (mobile generators). All the options will have and economic value and will be governed by principle of the lowest cost operation. This will bring about an increase in works done on live installations and will lead to the specialisation of the people executing them.

Within the cost concept should be included the direct cost defined for an increase in the quality ratios, the cost differential for doing the work on live installations, the cost of alternate methods, and the commercial cost to the company's image. The person in charge of the release request should accept the solution adopted by Operation. In order to define the option, Operation will keep in mind the criteria defined by the company's management. The company should define internal valuation criteria to decide how to account for the theoretical cost either from the outset or from the time that the legally established quality limits have been exceeded.

In the specific case of connecting new installations, the operator should verify beforehand and with the information stored in the construction layer of the GIS data base, that the requested work corresponds to the diagrammed information. At the moment when the connection is completed, the operator approves it and triggers the updating process of the new network structure automatically and in real time, in other words, updating the graphic and connectivity information. In this way, the company can ensure that the data base is updated by the people with knowledge of the network and its operation.

In addition to the processes for Incident Management and Releases, network Operation should:

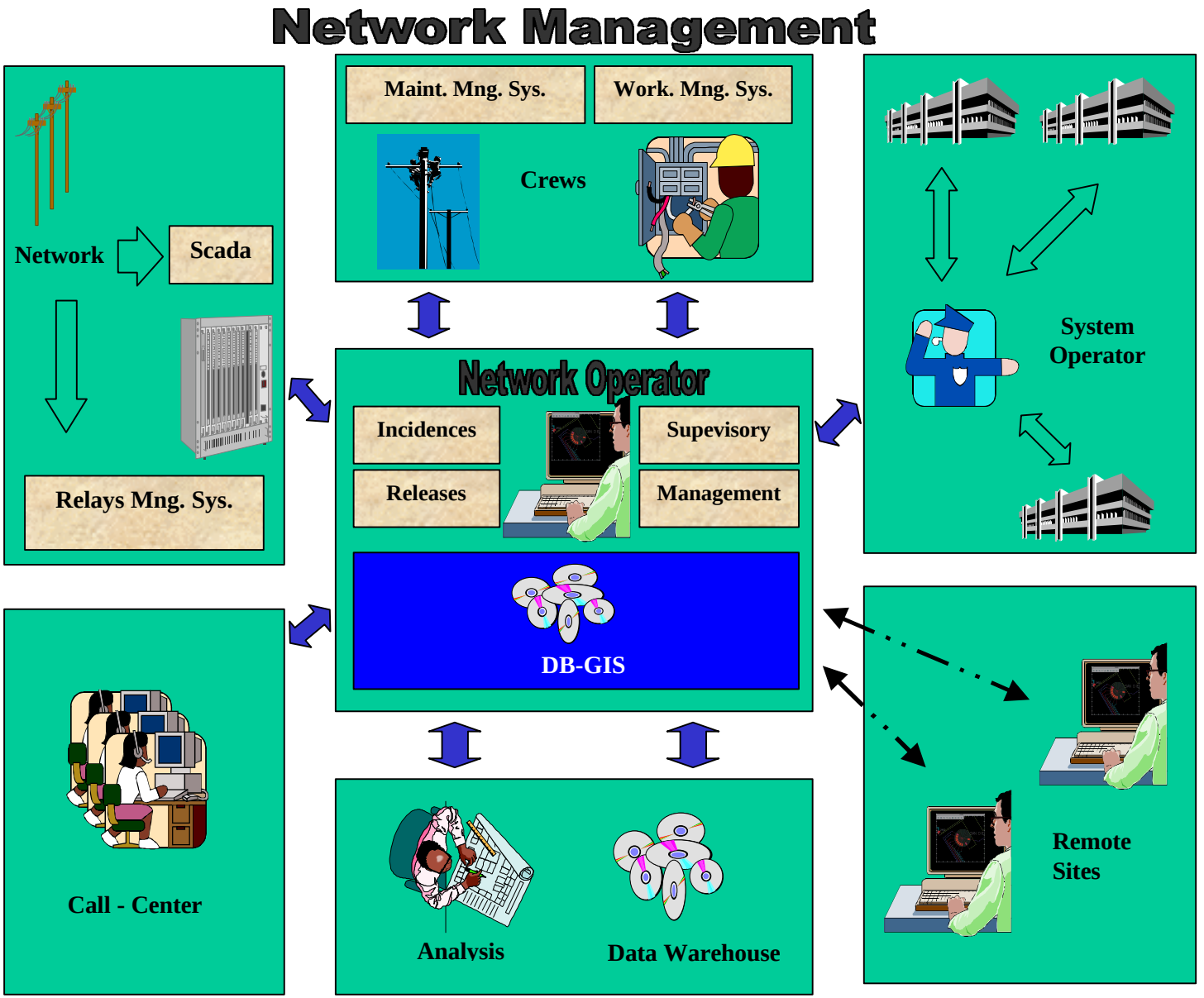
- Study the optimum reconfiguration of the network (reduction of losses, extension of the useful life of the installations)
- Analyse the operation alarms
- Study customer complaints
- Coordinate the training of the network operators
- Participate in network and support system coordination committees
- Establish automatic operation procedures
- Specifically analyse releases

With regard to information systems, the essential concept of 24 hour availability of the management applications has been introduced. Currently, SCADA continues to be the most important tool. However, it is equally important to be able to adequately inform the customer about the status of the network.

It is also desirable that they all offer some form of effective redundancy in order to avoid large numbers of interruptions.

This concept implies that there should be a crew that provides 24 hour support to the office applications in order to carry out corrective and preventative maintenance. This type of service can be subcontracted to specialised suppliers, thereby permitting a minimum structure for control the process.

The availability concept equally affects the telecontrol network, making it necessary to establish follow up procedures for incidents in the telecontrol equipment and in which are involved parts of the Systems, Communications and Telecontrol. In this way the company will be able to measure the availability the whole group of Applications and Telecontrol Network, which is what the operators view from their office. The 24 hour administration equipment can be in charge of conducting the follow up of the incidents procedures in the telecontrol equipment. In addition to aforementioned functions, outside the normal shift, the network operator must provide support to the function of buying and selling energy. The money at stake for a Distribution Company can determine the utility of creating a 24 hour energy office.



Network operation management tools.