Conclusions

In this chapter, several kinds of contributions are presented for the policy-based management systems. Conclusions are summarized from the contributions specified in every chapter of the Thesis.

- The proposed Thesis allows the integration of several Internet environments in networks based on ITU and TMN. A clear example of this integration among platforms is observed in the use of integrated LDAP directories into TMN environments, OSA PARLAY, domotic environments, ITU networks, etc.

- The policy distribution among the different network elements was studied from different points of view. CORBA protocols were chosen to carry out this distribution. The work proposed allows both a synergy between CORBA and the distributed management and between the AI and the cooperative management.

- A methodology was established to assign a specific class of service to an application requested by the user. This mentioned class of service guarantees a specific quality level based on the Service Levels Agreements agreed between the user and the network. This is the reason why several SLS profiles were created.

- This Thesis promotes an IETF scenarios integration based on classes of service ATM and policies. In the same way, it promotes an integration between the policy-based management of ATM with Policy IETF scenarios

- PBMS are efficient in high-scale networks and mobile communication networks. They allow the integration of mobile networks and fix ones. In order to achieve the maximum efficiency in these systems, a three-level policy structure was defined to control and manage all functional areas in the system. These three levels are: service-level policies (high-level policies), network-level policies and configuration

policies (low-level policies). A mapping among the high-level policies or service-level policies and network-level policies was defined. Another mapping among the network-level policies in the specific configurations of every network element was also defined.

- A PBMS stores all network topologic configurations together with the system status information in its database. This database allows to predict the traffic and to plan active and dynamic algorithms.

- Device configuration can be carried out by means of MIBS defined with SMI (SMNP) and XML (management based on webs). Those MIBS can be integrated in the management based on policies as it has been proposed in this Thesis.

- The policy selection process and the conflict-among-policies resolution process that were proposed in this work have an application in all the functional areas of a management system (in the traffic management, the capability management, the failure management, etc.).

- A mapping between the policy structure and the structure policies will follow once they are stored in a LDAP directory was established from the PCIM.

- The network and element management is proposed here considering a compatible policy system with the MPLS environment and differentiated services networks. In the same way, an integration of the BGP4 routing protocols and MPLS labels with the management based on policies is proposed here as well.

- Routing mechanisms as the OSPF protocol or the traffic engineering provide partial solutions for the routing. However, those technologies can be integrated in a PBMS. The proposed PBMS carries out the routing functions from service policies, taking into account the QoS, the global database information and the previously-defined service information.

- Several schemes were defined to avoid inconsistencies in the network. They must operate together in the policy system. A first method is applied in the moment of the policy edition to avoid creating non-sense policies, that is to say, policies that manage parameters out of those ones allowed in the network or policies that cannot accomplish the business aims. Later, a process is activated to avoid storing conflicts that can emerge at the execution time. Those policy graphic representations belong to the same role. As a result the number of dimensions of the graphic will correspond to the number of metrics that define the role. This representation makes the selection of the policy or whole of policies that must be applied in the network easier. The scheme allows solving conflicts, choosing the optimum policy, evaluating policies, etc. in a friendly, intuitive and flexible way. It is also scalable in any functional area of the management system.

- Integration of conventional routing algorithms with routing systems based on policies that consider several restrictions, both from the network and business aims, to establish a routing with different QoS levels.

Future lines

The following work issues are proposed here as future interesting research items:

- Application of intelligent management algorithms from the knowledge rules defined in the LDAP directories and the management databases.
- Automatic creation of high-and-low-level dynamic policies by means of, for example, genetic algorithms.
- Use of active nodes instead of the DiffServ and the MPLS architectures.
- Use of predictive methods for the PBMS monitoring.