Automated network control tools cut information system costs

ENERGy
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Most businesses today are completely dependent on their information systems. Achieving optimal solutions has resulted in a patchwork of multi-vendor and multi-technology environments, where end-to-end services are provided by distributed subsystems and limited by complicated intersystem exchanges. The ENERGy project set out to develop the tools for autonomous control of such heterogeneous networks to cut management complexity and reduce operational costs. User case studies are in progress to validate its approach in a range of application areas. Commercial products are envisaged within a couple of years, making it possible to slash network operation costs while meeting tough service level agreements.

The explosive growth of intranets in companies and the Internet in general means the number of mobile technologies, fixed-mobile convergence, network infrastructure and related services has become ever more complex. Network administrators need much more sophisticated tools to manage complex heterogeneous environments that provide an ever increasing range of dynamic services.

Moreover, many more computer-system customers are demanding complete network services rather than just equipment alone. Such customers do not want to know how their services are provided but simply that they conform to tough service level agreements (SLAs). System providers now have to take responsibility for managing the networks themselves. If a problem occurs, the costs come back to the provider.

Consequently, there is an urgent need to reduce the cost and the complexity of network management. And, as a result, the market for effective network management tools is continually increasing.

Enormous pressure to cut costs

Network operators have invested billions of euro in infrastructure in recent years – not only in hardware but also in the management tools required to optimise network use. Hence, there is enormous pressure to achieve a return on this investment. In 2002, €32 billion – about 3% of total revenue – was spent on operations support systems and the integration of dissimilar systems.

However, most of the management tools available commercially today only provide solutions to monitor the network layer itself – hubs, routers, switches and so forth. Very few also provide capabilities to measure real business impact in terms of quality of service

(QoS), security threats and downtime. This is a particular challenge for some large companies where annual costs of problems with their information systems can reach millions of euro, depending on the number of users affected and the recovery time.

How to increase service uptime in this ever more complex environment without radically changing the perception of the information system is a real issue in maintaining a good quality of service for end users and saving money for companies. ENERGy therefore set out to develop a unified generic platform for the delivery of global network management services. The key to its success has been a capacity to interpret information – for the first time, software has been developed to analyse the events coming from the system and compute the reaction.

End-to-end management of complex information systems requires the co-ordination of a wide range of heterogeneous network services and resources to ensure reliable services with a high QoS and minimum downtime. With information retrieved from the network, network-management systems (NMS) must implement network policies to ensure the best service for end-users. In addition, the NMS must detect and repair faults and errors while protecting the network from security threats. At the same time, the NMS needs to track and report on network resources and service use to control costs.

All this involves the deployment and configuration of network equipment such as servers, hubs and switches and the operation of diverse applications and services, as well as the control, monitoring, updating and reporting on network status – particularly QoS, fault levels and security threats. There are few systems that can do this automatically.

Meeting high level objectives

The results of ENERGy make it possible to improve this situation through the exploitation of relevant enabling technologies enabling autoconfiguration and self-management of complex systems. Operation is simplified by transcribing network information into a form manageable by humans with improved interpretation of high level objectives such as SLAs and correlation of networks alarms, enhanced and supported by computer-based analysis.

Before ENERGy, system behaviour was tracked by monitoring 'raw' events – such as more and more traffic, a security attack or low system performance; the interpretation had to be done by a human. Now this can be done by semantic interpretation, meaning the system software is able to analyse raw events and compute the reconfiguration to cope with the problem – offering its recommendations to the human operator or enforcing the new configuration directly.

Such automatic interpretation has been achieved by establishing a link between the raw events and knowledge supplied by network experts. The experts define the ontology of the network – effectively a specific systematically ordered model of the data structure that represents the complex relationships between the different elements and provides the rules governing interchanges.

Such a model enhances the exchange of information and supports reasoning by software agents. The definition is established in ENERGy using the OWL web ontology language. This model is then used with semantic annotation to understand and interpret events, compose new configurations and enforce them.

ENERGy provides

- *Network and service management* using a business-oriented services-based approach to assess the quality and efficiency of the end-user experience;
- *Policy–based management* to deal with high level objectives;
- *Automation* (or computer-assisted operations) in service and policy management;
- *Web–based network management* using Web Services, etc.;
- *Security management* with implementation of security safeguards providing reasonable assurance that all components related to security, transaction processing and network availability are well protected, preventing unauthorised access while assisting with verification and recording of the current network configuration;
- *Telemanagement and teledistribution* to provide monitoring information and manage the system – software updating, dispatch of security log, etc. – dynamically; and
- *Quality of experience* improvement by maximising service reusability to facilitate automation of service creation and to energise developments and improve distributed execution and monitoring to perform, manage and feedback applications ubiquitously.

Cutting network management costs

Simplifying network management by automating and distributing the decision-making process helps optimise the use of network resources, improve the reliability of services while decreasing downtime, and thus cut network management costs. With ENERGy, human network operators can focus more on the business logic and less on low level device configuration.

More reliable networks lead to greater customer satisfaction and business efficiency. The major targets for ENERGy were telecommunication companies and services providers.

Information system departments and infrastructure providers are the most interested in such tools.

Moreover, the ubiquitousness of information systems and telecommunications networks means that ENERGy provides answers to a worldwide need. Europe already has large market shares in both telecommunications and industrial network technologies, with around a third of the global automation market, worth about €75 billion. There are considerable financial implications related to network management, and the ENERGy project places Europe in the vanguard to supply the next generation of tools providing self-management and self-healing features.

ENERGy partners are continuing to develop and improve the system. This includes demonstrating the possibilities offered by the new tools in real use cases this year. The first commercial implementations are expected within one or two years.

Thales intends to use these tools to manage SLAs for the growing number of its customers requiring complete network services within contracts with strong incentives. So the need to enhance the efficiency and responsiveness of network management will undoubtedly speed the introduction of ENERGy tools.