ITEA
INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

PROJECT RESULTS

Platform for Open, Light, Legible, Efficient Network Services

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Mobile Internet will require greater flexibility, taking the nature of transported data into account. Empowered with modern programming tools in new, more open network architectures, future telecommunication services will have to be created, re-configured and customised dynamically in response to rapid changes in network infrastructure, markets, user demand and competition.

The need for open, modular programmable routing equipment
A huge market for Internet-based services is being developed. Yet there have been, so far, few adequate transport and data delivery solutions over IP networks. Internet is expected to meet the needs of an extremely wide range of services, from premium expensive real-time services down to cheap adaptive services whose quality is adjusted to resource availability. There is therefore an urgent need for:
• connection admission control and resource reservation protocols to protect the network from congestion,
• advanced scheduling mechanisms and distributed protocols to allow effective resource sharing between diverse applications,

• intelligent, configurable, 'on the fly' routing schemes to give users access to information regardless of its location in the network, and
• customisation of interworking devices to allow IP transport technology to be seamlessly supported on evolving mobile networks.

A dynamic middleware platform for new services over IP
POLLENS has developed solutions that allow network operators to envisage, design, and programme enhanced transport and network services over IP. We've built a flexible, dynamic middleware platform for programming novel traffic control solutions and scheduling mechanisms, configuring network architectures 'on the fly', and adding intelligence to the IP routers to support future value-added services.

The use of open programmable interfaces in intelligent programmable devices such as IP routers is key. The project has therefore defined Application Programming Interfaces (APIs) for the control of such routers (in particular, support of the DiffServ and MPLS technologies proposed at the Internet Engineering Task Force (IETF)). The proposed interfaces reveal network and routing/switching hardware states, enabling flexible services to be created by providers writing to a standard API. The openness of these interfaces benefits network operators and service providers, who can provide communication services that are not currently available. Router/switch vendors will also benefit. They will be able to offer enhanced external control and management of their hardware with a minimum need for software development.

PROJECT RESULTS

Adding intelligence and flexibility to networks

The following components have been developed within POLLENS:

- Programmable routers. With different traffic and content parameters, routers must be programmable. We have developed a demonstrator of a kernel Programmable Layer for a value-added IP Router that is generic and flexible enough to run on a full range of IP-based equipment. On top of the kernel, APIs have been developed to allow the programming of sophisticated services.
- Configurable networks. Networks management policies must be based on the mobility of services and users. We have developed a flexible network platform that is compatible with current Internet standards.

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- Programmable traffic control solutions. In order to enhance the IP network with QoS-enabling solutions, POLLENS APIs have been designed to programme traffic control solutions that allow providers to offer performance and quality trade-offs (mass market vs. premium service).
- Content delivery technologies. Transport providers can enhance performance by placing intelligence in the intermediate layer between users and information. We have focused on the requirements that content delivery networks demand from the underlying middleware APIs.

A huge market

POLLENS has built up European resources to develop and deploy flexible IP-aware routers, network middleware and value-added transport services. Despite the telecom crisis, the market for IP edge routers is still huge (around 130 billion euros in 2002). POLLENS solutions offer the following benefits:

- Reduced time-to-market for advanced service features and greater competition among network operators.
- An ability to provide de facto end-to-end services (e.g. Virtual Private Networks) at every step along the communication chain (access, edge, core equipment), preferably using standard products.
- Economies in the engineering resources used for software development by spreading the huge cost of developing code.
- POLLENS solutions will also have an impact on the next generation of IP-aware products and devices (residential gateways, optical gear, ATM switches, new edge devices and servers). In particular:
  - ALCATEL is re-using and trans-ferring results related to the internal structure of the router to its main Business Divisions: some of these already being used in specific IP Router product lines.
  - THALES is developing specific security-oriented components for internal exploitation and third party equipment provisioning through licensing.
  - 6WIND is progressively integrat-ing POLLENS architecture, com-ponents and solutions into their 6WINDGate and 6WINDEdge product lines, in order to provide flexible solutions, particularly in the IPv6 domain.

Major project outcomes

Dissemination
- 3 papers in journals
- 15 papers at conferences
- 4 presentations/demos at events

Exploitation
- 6 new products (1 for internal use)
- 5 new services for internal use
- 1 new system for internal use

Standardisation
- 3 contributions to a major standardisation body (IETF)