

Autonomic Internet

The network of the future will require greater degree of service-awareness, and an optimal use of network resources. As a consequence the complexity of networks will grow. As a solution, Autol suggests a transition from a service agnostic Internet by virtualising network resources and Policy-Based Management techniques

Main Objectives

At A Glance: Autol

Autonomic Internet



Project Coordinator

Alessandro Bassi

Hitachi Europe SAS

Tel: +33 4 8987 4100

Fax: +33 4 8987 4199

Email: alessandro.bassi@hitachi-eu.com

Project website: www.ist-autoi.eu

Partners: Hitachi Europe SAS (FR), Waterford Institute of Technology (IE), University College of London (UK), Universitat Politecnica de Catalunya (ES), Institut National de Recherche en Informatique et en Automatique (FR), University of Passau (DE), Universite Pierre et Marie Curie – Lip6 (FR), Motorola (US), Ucopia Communications (FR), University of Patras (GR), Gingko networks SA (FR)

Duration: Jan 2008 – Dec 2009

Total Cost: € 3.639 K

EC Contribution: € 2.695 K

Contract Number: INFSo-ICT 216404

The current Internet has been founded on a basic architectural premise: a simple network service is used as a universal means to interconnect intelligent end systems. The end-to-end argument has served to maintain this simplicity by pushing complexity into the endpoints. The very success of the Internet is now creating obstacles to future innovation.

Autonomic Internet (Autol) aspires to be a sustainable solution. It will design and develop a self-managing virtual resource overlay that can span across heterogeneous networks, support service mobility, quality of service and reliability. The overlay will self-manage based on the business-driven service goals changes (service context) and resource environment changes (resource context). *Ontology-based information and data models* are used to facilitate the Internet service deployment in terms of programmable networks facilities supporting NGN.

In other words, *Autol* will design and develop, based on well-defined methodologies, an open software infrastructure and tools that enables the composition of better (fast and guaranteed) services in an efficient manner and the execution of these services in an adaptive (Autonomic form) way

The envisioned strategic impact of the Autol project is to usher in an era where the European economy becomes a service-based economy, in which organisations deliver rich suites of services as utilities to their customers – other businesses and individuals – while assuring quality of service. Thus, with the Autol virtual service infrastructure, consumers will benefit from higher service availability, quality and dependability across all areas of life – including business, science, leisure activities and government operations.

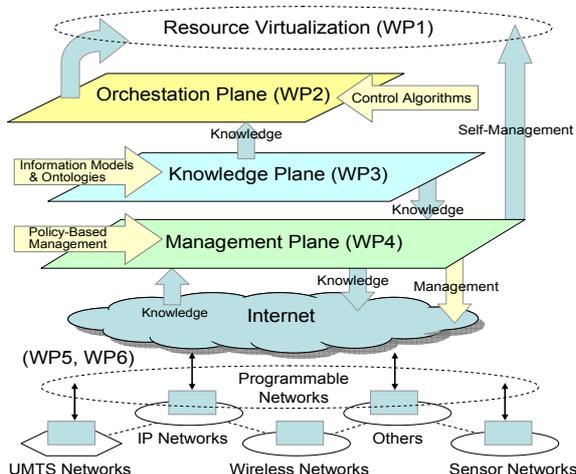
The Autol consortium contains competent partners from all the specific areas needed to achieve the project objectives, and includes large industries, SMEs and key academic partners. In particular, the support of networking equipment and services industry and the direct SME involvement will

Autol will implement the creation of a communication resource overlay with autonomic characteristics for the purposes of fast and guaranteed service delivery

reduce barriers for SMEs by establishing new channels to join the service economy.

Technical Approach

The General Autol project structure is described in the figure below, where each work package (WP) activity is depicted. It is necessary to develop a knowledge plane containing a distributed knowledge base and an orchestration plane to manage knowledge generation and analysis environment. The orchestration plane is in charge of feeding the required knowledge to the management plane. The management plane is responsible for managing the data plane and more specifically, the virtual environment. The action of the knowledge plane is to feed the orchestration plane and more precisely the service and resource overlay algorithms with the best values for the different parameters. As a summary, the knowledge plane has to configure the orchestration plane which itself configures the Management plane. The Management plane has to provide the self-adaptation of the resources.



WP5 (Service Deployment) takes its lead from the Management WP and applies dynamic programming enablers to an executable service code that is injected/activated into the system's elements to create the new functionality at runtime. The basic idea is to enable trusted parties (users, operators, and service providers) to activate management-specific service and network components into a specific platform. WP6 serves to demonstrate the *Autol* solution via the implementation of appropriate case studies. The case studies have been chosen directly from the requirements of our industrial partners as a tentative and realistic approximation to real necessities

Key Issues

The following key research challenges are identified as the basis of the *Autol* design:

- Virtualisation of Network and Service Resources: Design & new Models
- Autonomically Enabled Service Delivery
- Assurable Resources
- Self-Management
- Context Awareness
- Orchestration
- Network & Service enablers for programmability

Expected Impact

In the future service-oriented economy, every transaction or transmission of information will be based on a service that is available on demand, regardless of geographical or ICT boundaries. The Autol project therefore will have a strong economical and societal impact and will reinforce the European competitiveness, by implementing a virtual service infrastructure that will allow consumers to benefit from higher service availability.

On a high level, Autol aims to bring innovative service-oriented network infrastructure and solutions for deployment of complex services across different administrative domains, while assuring QoS and security guarantees closer to possible product development, push contributions to standardization bodies that serve the overall vision of Autol, and share the pioneering findings with the global research community.

The results of the project will be targeted primarily towards the newly created international standard group "Autonomic Communications Forum" which has the aim of:

1. Unify current thinking in autonomics by creating a new set of Autonomic Standards, focusing on the management of systems and on computing and communications.
2. Define an autonomic reference framework as well as a set of baseline compliance statements to guarantee interoperability.
3. Create an organisational structure that will empower academia and industry to work together in developing and maintaining the above goal