Unifying Cloud and Carrier Networks (UNIFY)

Today, rigid network control limits the flexibility of service creation. We envision full network and service virtualization to enable rich and flexible services and operational efficiency. Therefore, the UNIFY consortium will research, develop and evaluate means to orchestrate, validate and verify end-to-end service delivery from home and enterprise through aggregation and core networks to data centres.

Main Objectives

Telecom providers struggle with low service flexibility, increasing complexity and related costs. Although cloud computing and networking have been two active fields of research, there is currently little integration between the vast networking assets and data centres of telecom providers.

In UNIFY we will open up the potential of virtualization and automation across the whole networking and cloud infrastructure. We will focus on enablers of a unified production environment and will develop an automated, dynamic service creation platform, leveraging a fine-granular service chaining architecture. We will propose a service abstraction model and a service creation language to enable dynamic and automatic placement of networking, computing and storage components across the infrastructure. We will develop an orchestrator with optimization algorithms to ensure optimal placement of elementary service components across the infrastructure.

We will research new management technologies and develop a Service Provider DevOps concept to address the dynamicity and agility of new services. We will investigate the applicability of a universal network node based on commodity hardware to support both network functions and traditional data centre workloads.

We expect that such a unified production environment will deliver unprecedented level of agility for service innovation; simplicity and scalability in operation; improved quality of experience in rich and flexible user services; economic advantages and technological leadership of Europe.
Technical Approach

In UNIFY we implement a work plan, which starts with the exploration of use cases and the definition of the requirements followed by the design of a reference architecture (WP2).

The identified research and design issues are then addressed in three technically focused work packages:

Service Programming, Orchestration and Optimization (WP3) will work on network function virtualization (abstraction); application programming interfaces (API); description languages, optimization and orchestrator algorithms for automated creation of service chains.

Service Provider DevOps (WP4) will work on agile operations and development aids for dynamic service chains. This includes scalable service monitoring approaches; design of flexible observation points; algorithms for runtime verification of service chains and workflow automation.

Unified Node Architecture and Evaluation (WP5) will work on a programmable data plane component based on commodity of the shelf hardware platforms, particularly on x86 hardware; on the benchmarking of the unified node and on node optimizations in alignment with WP2, 3 and 4.

Technical coordination, refinement of the architecture, integrated prototyping and the techno-economic evaluation of the UNIFY concept is carried out by WP2 in alignment with the use-cases and requirements in the second part of the project execution.

Key Issues

1) Service abstraction model and an associated domain-specific service creation language and programming interfaces to automate and optimize the deployment of service chains.

2) Advanced management and operation schemes to cope with increased network/service agility and to handle network services end-to-end.

3) Design and performance of a universal node architecture based on standard x86 components and accelerators for network functions virtualization.

Expected Impact

The UNIFY project is expected to significantly contribute to strengthen the position of the European industry in leading the evolution of network architecture to reach unprecedented capabilities in flexible service creation and simplified operation, by unifying the view of the network infrastructure and the cloud data-centre resources, leveraging the software defined networking (SDN) approach and network virtualization technologies.

Through the design of universal hardware architectures UNIFY aims at improving the intelligence and flexibility of the network and so open up opportunities for new converged fixed and mobile end-user service offerings, while also enabling advanced programmability and efficient virtualization, providing means to reduce the cost of new service creation and operation.

By the optimized and programmatic placement of virtualized services and the scalability of the universal node architecture in the access and transport infrastructure UNIFY will improve resource flexibility and economic efficiency.

Industrial partners of the consortium (Deutsche Telekom AG, Telecom Italia, Ericsson and Intel) are established players in the relevant international standardization bodies, such as Open Networking Foundation (ONF), Network Functions Virtualization (NFV) group at ETSI and at several working groups of the IETF. Furthermore, Deutsche Telekom AG, Ericsson and Intel are all members of the OpenStack Foundation. The UNIFY project aims at influencing standardization work globally, ensuring that European positions are well represented in the resulting recommendations and standards.

The contributions to workshops, books, magazines, conferences, etc. will be made available frequently on the project website.