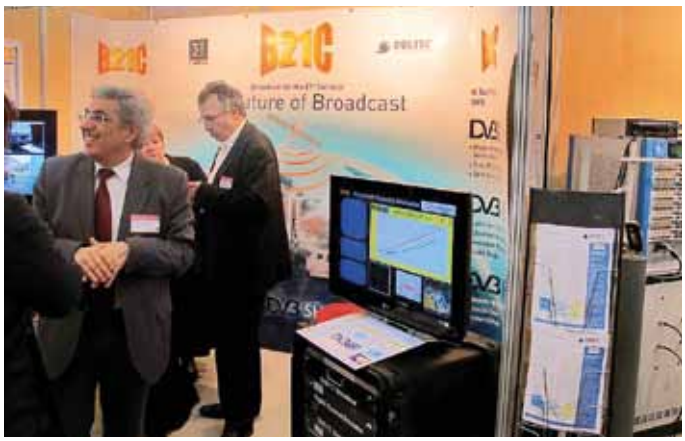

Booth of Celtic project B21C

The HDVIPER project at the exhibition

The project was led by Gérard Faria, Team-Cast, France. 34 partners from 8 European countries participated in the very large project.

Bronze Award Winner 2009: EnComPAs-2 (Enabling Community Communications – Platforms and Applications phase 2)

The project has introduced a Residential Gateway in the home network which provides an intelligent and integrated management platform allowing end-users, operators and service providers to easily and effectively manage the services and connected devices at home.

Speakers at the Celtic Event (from left): J. Jimenez, J M. Leceta, and A. Blanco

The project had impact on new products, like residential gateways for deployment in Spanish households. New products based on project results are currently under development/deployment in Israel and Netherlands.

Finally, EnComPAs-2 was also selected by EUREKA for a Success Story, which was published in their magazines. The project was led by Valentin Alonso Alvarez from Telefónica. The project consortium consisted of 5 partners from 3 countries.

WINNER+

Global Impact on LTE and IMT-Advanced

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Mobile communications is an important means to enable the information society, to increase efficiency in business processes and to ease private life. In the last 20 years since the launch of GSM and UMTS, mobile communications has been a tremendous global success story with further evolutions towards more broadband mobile systems.

Already in 2001 ITU-R started activities on the future broadband systems in order to prepare the identification of additional frequency spectrum in the World Radiocommunications Conference 2007 (WRC 2007). For that purpose ITU-R asked in 2003 in the Recommendation M.1645 "Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000" the global research community to investigate technical means in order to provide broadband access everywhere, anytime.

Project phases, consortium and objectives

The WINNER project was launched as an EU Framework Programme 6 project, which started in January 2004 and continued until December 2007 in two phases. This project was a direct response to the ITU-R recommendation to develop a radio interface concept, the necessary physical layer and lower layer technologies and algorithms for IMT-Advanced based on the ITU-R requirements (Figure 1).

In the third phase the project continued as the Eureka Celtic project WINNER+ from April 2008 to October 2010. In addition, the WINNER project contributed to the preparation of WRC 2007: more than 50% of the European contributions to this process were prepared in the WINNER context.

The WINNER consortium comprises major manufacturers, network operators, R&D centres and universities from EU Member States and during the first two phases also from Canada, China and the US.

Global impact

At the end of 2004 the basic system concept was developed as a consensus view between the major players, which was further refined and evaluated in the later phases. In November 2004 3GPP organised a "Long-Term Evolution Workshop" in Toronto to investigate further developments of UMTS towards broadband mobile communications (called LTE) as

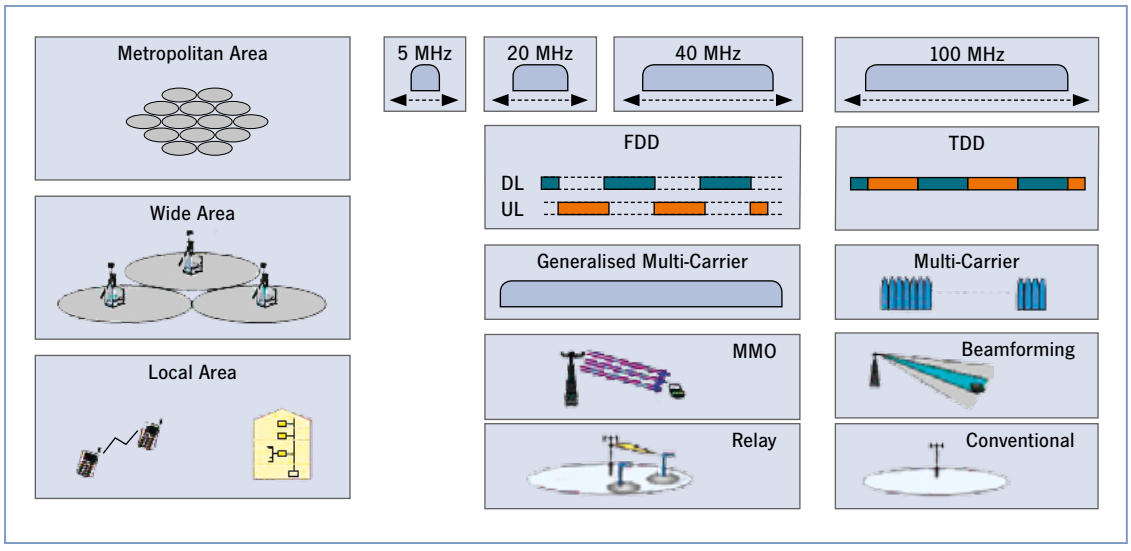

Figure 1: IMT-2000/IMT-Advanced framework

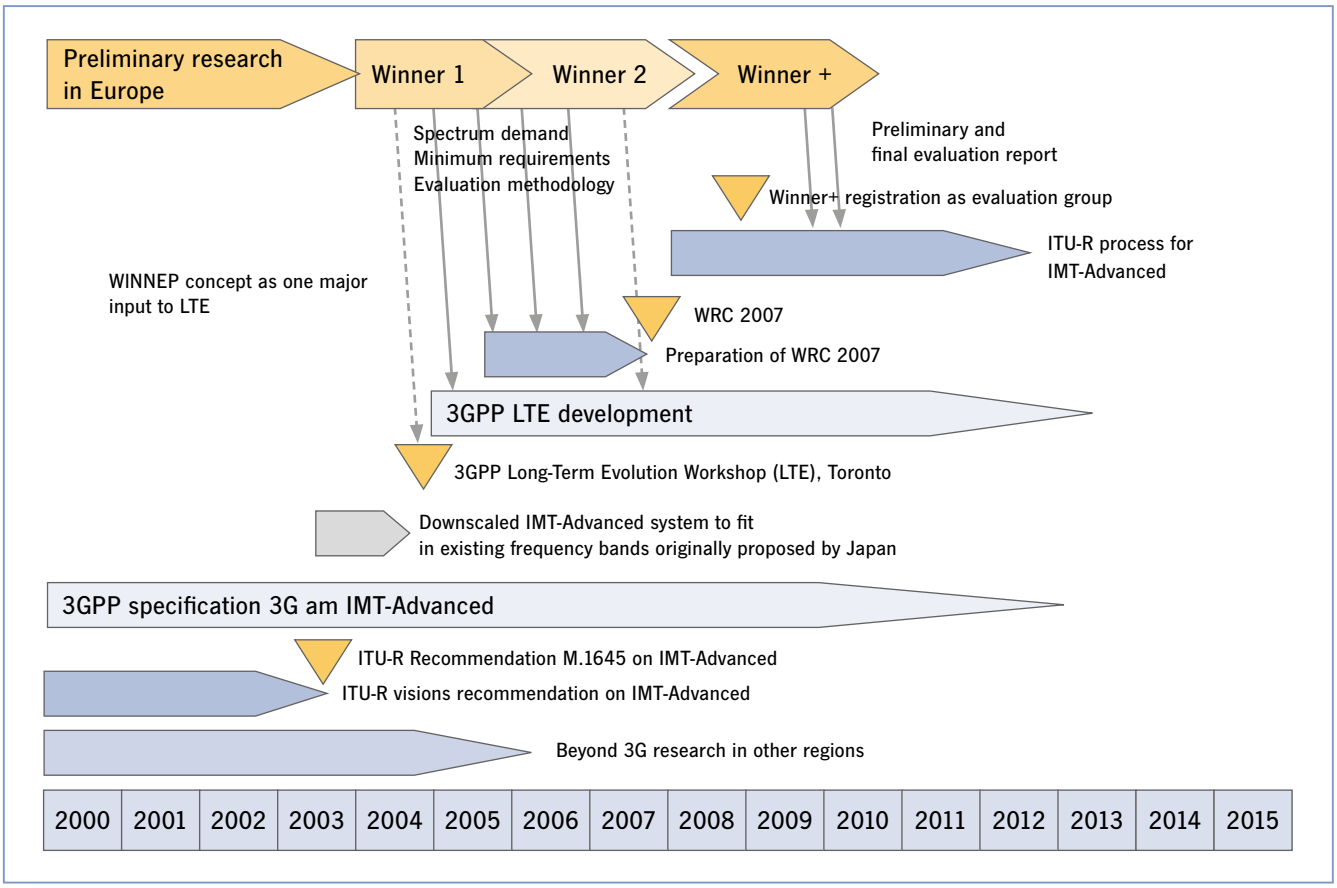

Figure 2: WINNER contributions to 3GPP LTE and IMT-Advanced

the first step towards IMT-Advanced. Based on requirements like peak throughput, flexibility and scarce availability of frequency spectrum, the OFDM-type of radio access concepts were a natural choice. Therefore, the WINNER partners used the developed concept as a starting point for the LTE specification. The WINNER+ project is now continuing its research work on further optimisation and investigation of new concepts for future LTE releases and adapting the concept to the outcome of WRC 2007. It is a registered ITU-R Evaluation Group for IMT-Advanced candidate technology proposals. WINNER+ and ETSI are the only evaluation groups from Europe within 14 globally registered groups (Figure 2).

Conclusion

From a strategic perspective the international cooperation between major international players in the WINNER project for the development of a new system facilitated consensus building on the basic concepts and algorithms. The results of this work were exploited by 3GPP for a smooth and fast development of LTE for globally accepted standards. Therefore, cooperation in an early, pre-competitive phase in collaborative research projects is an important means for consensus building, which enables future economic growth and new businesses.

Further details are available at *http://projects.celtic-initiative.org/winner+.*

MyMobileWeb

Agile Mobile Web Development Framework

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MyMobileWeb is a CELTIC call 4 project intended to make the Mobile Web 2.0 a reality by providing the technology which enables the creation of compelling mobile, web-based applications that offer a harmonized user experience in disparate delivery contexts.

MyMobileWeb makes the Mobile Web 2.0 a reality by enabling the rapid development of rich applications (AJAX-based) adapted and optimized for every device. On the other hand it provides a powerful, standards-based and open source technology that make it possible the creation of adaptive mobile web applications in time to market without investing a lot of money or hiring specialized (and expensive) developers.

The latest version of MyMobileWeb, version 4, has been developed in a CELTIC project of the same name, which was finished in December 2009. MyMobileWeb v4 is composed by a set of novel technologies:

- the **IDEAL2** language for the declarative description of device-independent user interfaces and adaptation policies.
- The **SCXML** language for describing application flows modeled as state machines.
- the **"Device Description Framework"** concerned with obtaining information about the characteristics of devices and web browsers by interfacing with different Device Description Repositories (DDRs).
- the **"Adaptation and Rendering Engine"**, in charge of selecting and generating the final markup, script, style sheets and other resources (images, audio, video) to be delivered to the mobile device.
- the **"Client-side Framework"** (a.k.a. "Mobile AJAX Framework") which enables rich interactions in different Javascript-enabled browsers.

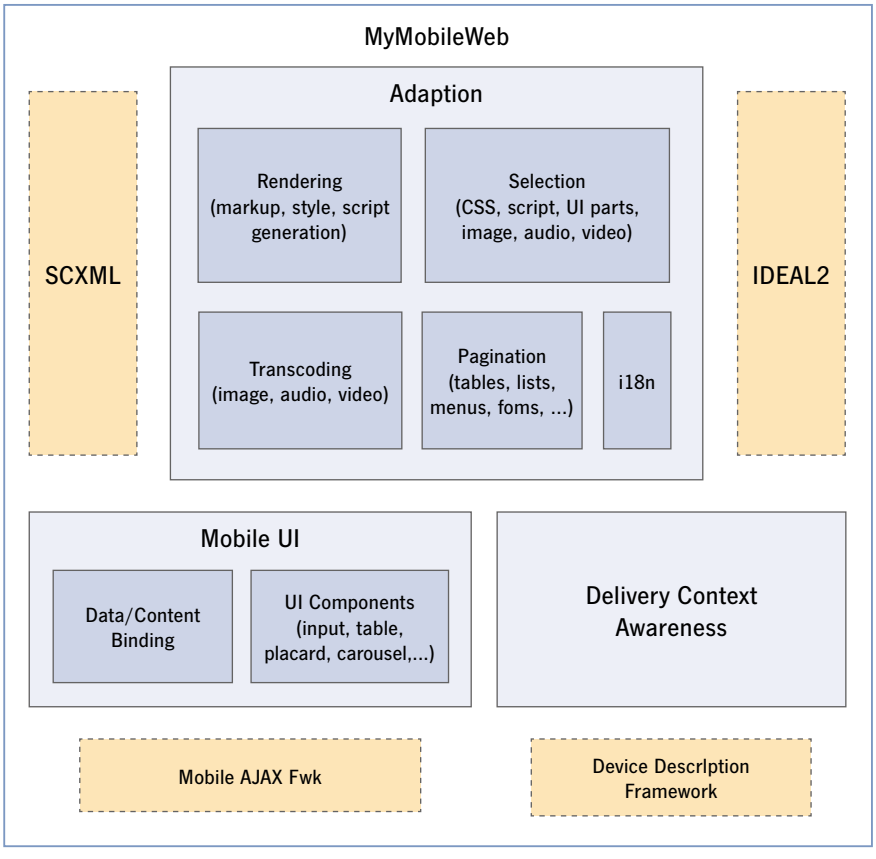

Figure: MyMobileWeb framework

The product is currently used within more than 20 different applications already deployed. The number of downloads increases every day – at the time of writing more than 240 downloads a month on the average. In addition, there are more than 40 developers certified to use the technology. These figures have stimulated the consortium to continue with the development of MyMobileWeb through its open source community. For the next years, we plan to improve the technology to satisfy new market demands, as we believe that the web browser will be the platform for application front-ends in the Future Mobile Internet.

More info is available at *http://mymobileweb.morfeo-project.org*.

MANGO

Management Platform for Next Generation Optical Networks

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The advances in optical technology enable an evolution towards all-optical networks capable of providing light-paths as optical circuits. However, the functionality of all-optical networks remains highly limited, largely due to the lack of an appropriate management platform.

Management software platforms are developed mainly by the companies producing optical network equipment, and are only capable of managing their specific products. Our approach is to consider network management from the service management perspective, which is not limited to the particular manufacturer. The main issues considered within the MANGO project are: inventory, cross-layer fault, performance, service, optical layer monitoring and connection management.

Platform architecture

To provide complete system functionality, certain modules have to be developed or extended. The cooperation of Comarch with the Proximion Company and Acreo Laboratory enabled the development of optical physical performance data measurement and storage. A WISTOM optical performance monitoring platform provided by Proximion supplies the Comarch OSS Suite with the necessary physical signal quality measures that can be used for service monitoring and path computation (a module using RWA algorithms developed by both the KTH and WUT universities).

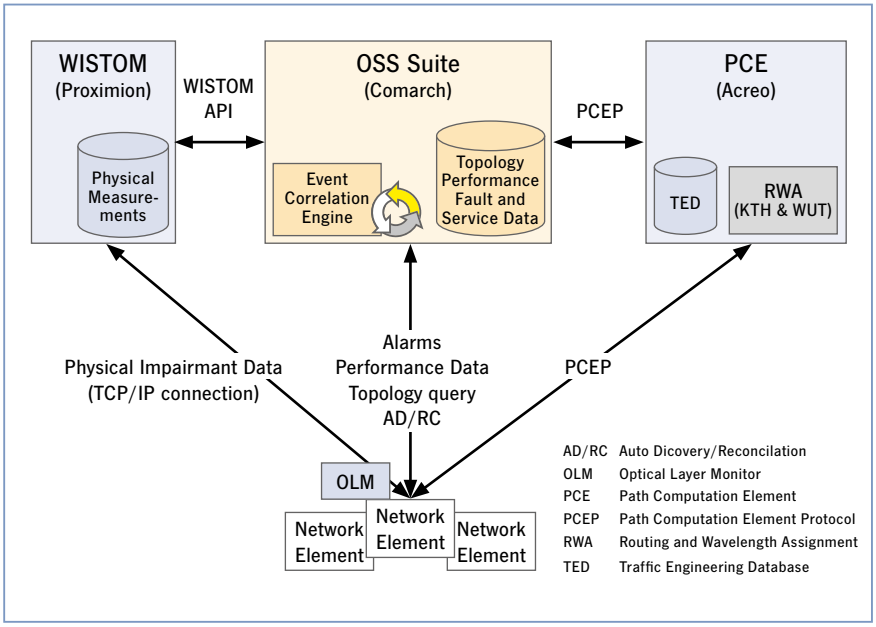

Figure 1: MANGO platform architecture

Optical layer monitoring

In all-optical networks, fiber failure may cause interruption to an extensive number of connections and the loss of a tremendous amount of data. Therefore, rapid fault detection and diagnosis followed by recovery mechanisms is crucial. For this purpose, the Comarch Correlation Engine, successfully verified in the traditional operator environment, is extended.

Services provided by the optical layer require the monitoring of optical signal quality indicators. For this reason, integration with the Optical Layer Monitor (the WISTOM solution) is provided.

Impairments-Aware Optical Path Computation

The transparency of all-optical networks with the absence of electronic signal regenerators imposes the need for taking into account physical (optical) impairment constraints during the Routing and Wavelength Assignment (RWA) phase.

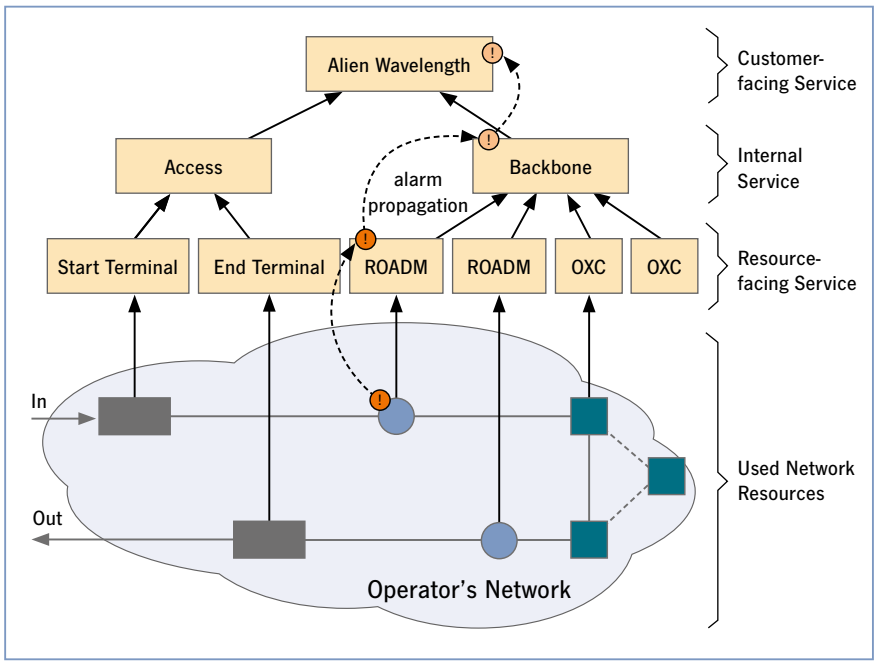

Figure 2: MANGO switching matrix and wavelength converters

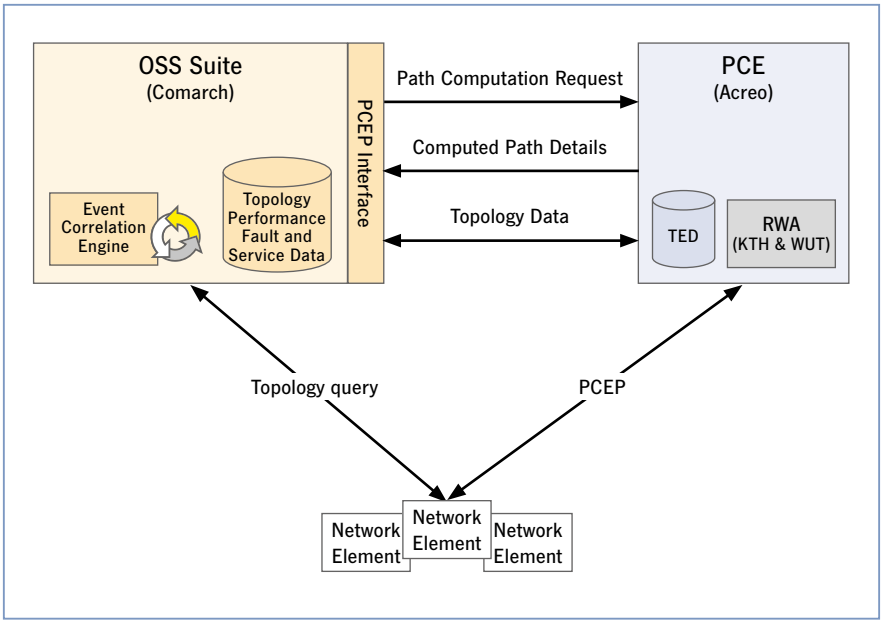

Figure 3: WDM reconfiguration scheme

Two of the most important options considered in the project for node configuration are the limited switching matrix and usage of wavelength converters. Besides physical impairments, the other path computation restrictions considered are: computation of primary and backup lightpaths and WDM reconfiguration schemes. Several types of algorithms, depending on the nature and size of the problem, are used: simulated allocation heuristics for synchronized computations, branch and bound algorithms for the WDM reconfiguration problem, and label setting algorithms for single lightpath computation subject to impairments.

Conclusion

The MANGO solution offers an ideal opportunity to respond to the real-life requirements specified by industry partners and to combine them with the latest research findings. The platform allows operators to manage components and equipment specific to all-optical networking. Furthermore, it enables cross-layer automated fault and performance management, complex service quality management and the organization of optical connections.

Further information is available at *www.celtic-initiative.org/Projects/MANGO.*

ICARUS

Experimental infrastructure for distributed wireless networking

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A diverse wireless networking world where a variety of radio technologies and mobile services coexist in a seamless manner is no longer a far away vision. Users will soon be able attain any service, at any time on any network available, and perhaps even more most importantly, to migrate between networks seamlessly, in order to reduce costs, increase quality of service, or both.

The achievement of this vision, where applications exploit in an efficient way the available wireless system resources requires a unified evaluation platform, supporting cross-layer and cross-system simulations, in which each individual simulator can be provided by a different research group and where ICARUS provides the framework for all simulators to exchange data and cooperate to a common goal. The figure shows the ICARUS architecture.

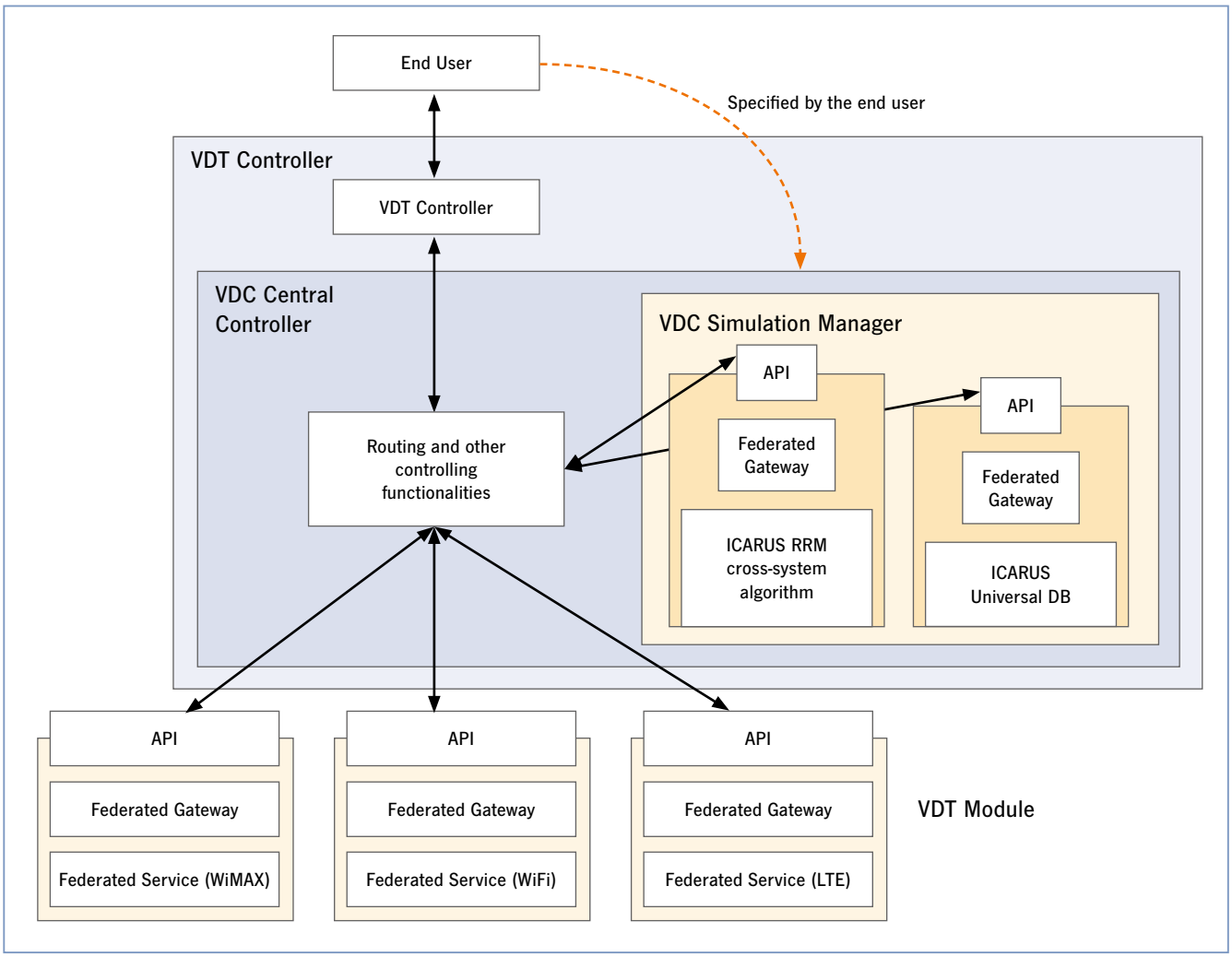

Figure: ICARUS architecture

Virtual Distributed Test-Bed Modules

ICARUS builds on the concept of a federated simulation environment, by providing the mechanisms for researchers across the world to submit their own Virtual Distributed Test-Bed Modules (VDT Modules) to the global repository, after which they are ready to be used by any other researcher (with the right access credentials) in any cooperative simulation. These modules can represent algorithms, or architectures, or visualization tools, or probability distributions representing, e.g., input data. In fact the only requirement imposed on these VDT modules is that they implement the API defined by ICARUS, which is necessary for different modules, independently developed, to communicate in a standard manner. ICARUS provides the "glue" and the mechanisms for this inter-communication between simulators to take place.

There are currently over a dozen ICARUS-compliant simulators, and we expect to reach over one hundred by the end of the year.

Platform scenarios

The ICARUS platform is currently being used by researchers to evaluate a large variety of issues, including: cooperative context-aware Radio Access Technology (RAT) selection between legacy systems (HSDPA, 802.16, 802.11e, 802.11g) and future emerging technologies (IEEE 802.11VHT, IEEE 802.16m, 802.16j and 3GPP LTE); non-cooperative RAT selection algorithms based on game theory to provide service continuity within a heterogeneous operator and access technology environment; efficient inter-system handovers protocols for heterogeneous MBMS enabled wireless networks; transparent service continuity based on methods, procedures and algorithms across MBMS enabled heterogeneous networks; routing techniques for Multi-hop Cellular Networks (MCN); multi-cell dynamic resource allocation protocols; among many others.

Conclusion

The ICARUS project not only significantly improves the current state-of-the-art in several scientific areas related to wireless networking, but also provides an experimental infrastructure that can be used by any researcher and company to easily reproduce experiments performed by others, using the exact same conditions and compare prior results against results obtained using novel algorithms or architectures.

Last but not least, ICARUS is investigating new human-machine interfaces to navigate large datasets, which will be created by the execution of millions of experiments using the ICARUS VDT.

Further information is available at *www.celtic-initiative.org/Projects/ICARUS.*

IMPRINT

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About Celtic

Celtic is a Eureka cluster, which initiates and runs privately and publicly funded R&D projects in the field of telecommunications. The cluster, which runs until 2011, is supported by most of the major European players in communication technologies. Celtic projects are focusing at telecoms networks, applications, and services looking at a complete system approach. The size of the Celtic budget is in the range of 1 billion euro. Celtic is open to any kind of project participants from all Eureka countries.