Live Video-to-Video Supporting Interactive City Infrastructure

Scope and Objectives

The aim of LiveCity Project effort is to empower city inhabitants to interact with each other in a more productive, efficient and socially useful way, by using high quality Video-to-Video (v2v) over the Internet.

Video-to-video can be used to serve a large variety of activities - or related services - such as to: save patients lives; improve city administration; reduce fuel costs; reduce carbon footprint; enhance education and learning activities, and; improve city experiences for tourists and cultural consumers.

We will build a wireline and 4G wireless network of cities and include an Internet right of way platform that will remove interference from unwanted traffic, so that each user in any of the cities involved can "experience" live interactive high definition (HD) video-to-video.

LiveCity is a technology integration trial which offers advanced services to over 3,000 users in four European Cities. This unifying approach underpins a use case framework and technology platform which can be rolled out to other cities and communities as well, on a mass market basis, following the lifetime of the Project.

We propose to pilot a number of v2v services for a diverse range of applications in the areas of Emergency Services, eHealth, Education and City Experiences. The cities involved are Dublin, Athens, Luxembourg and Valladolid. LiveCity will pilot these live high quality v2v applications in order to evaluate social utility and demonstrate value to city
citizens. Stakeholder evaluation and Key Performance Indicators (KPIs) will also be measured, analysed and disseminated, appropriately. The LiveCity hypothesis is that these indicators can be further enhanced with the consideration of v2v. Other indicators will also be collected and evaluated for the different pilots. We also intend to build a business case for the rollout of the services to all the major cities in Europe.

LiveCity brings together the value chain and ecosystem necessary to support video-to-video, that is: End-users’ communities in the involved cities; public service providers; technology providers, and; network infrastructure providers. In the project-specific context, LiveCity brings these entities-organisations together, to “resolve” existing gaps that are actually identified in the European market sector, affecting further deployment and growth in a variety of domains.

Main Objectives

The main objectives that are to be fulfilled by the original LiveCity effort are identified as follows:

- Creation of a city-based Living Lab and associated ecosystem to “pilot” live interactive high definition v2v on ultrafast wireless and wireline Internet infrastructure, for the support of public service use cases among a number of city user communities in Dublin, Athens, Luxembourg and Valladolid.

- Implementation of public service use cases (with over 3,000 users) focusing on the application of video-to-video in a number of selected themes of public interest, that is: Emergency; eHealth; Municipal Services; City Experience, and; Education & Learning, in order to enhance a range of KPIs.

- Piloting innovative video-to-video services; conducting user centric evaluation experiments; collecting KPIs from embedded users; evaluating the services in conjunction with key stakeholders and public service operators; disseminating the results to a broader “area” of potential recipients, with particular focus on public service network operators and city authorities in Europe.

- Helping accelerate live interactive high definition video-to-video mass market take-up across cities in Europe, by showcasing successful use cases, producing “how-to” guides and providing a “get up and go” solution to public service operators.

A number of existing technology ingredients will be combined in an innovative manner to provide a full high quality live interactive video-to-video service. These are listed as follows:

(i) An Internet infrastructure software overlay which delivers a right of way for high quality v2v without interference from unwanted traffic;
(ii) Fourth Generation Internet access technologies (e.g., WiMAX, HSPA, LTE) as well as high-speed broadband xDSL;
(iii) Video tablet devices, and;
(iv) A variety of v2v applications.

Content is created by the user in visual actions and speech content supporting the use case will be degenerated by the application users.

The LiveCity Ecosystem

Combining the LiveCity partners capabilities technologies and processes into an “ecosystem”, delivers a quite
innovative solution for city citizens with a wide range of societal and economic benefits. Adding to the public Internet a right of way without interference from unwanted traffic for live v2v, by combing existing network infrastructure with an existing beta version of the Virtual Path Slice (VPS) Controller and with existing off the shelf v2v is truly innovative. LiveCity will be a first for the world initially in four European Cities. The Project intends to compose a common interoperable standard for “building” the right of way, in order to ensure low cost and high reachability by the involved actors. By implementing pilots with diverse user communities and by sharing common service platforms and related services-facilities in a set of key areas across the partner cities, a common result can thus be “synthesised” and be further disseminated to other European Cities as well. The benefits delivered by the Project include, inter alia: a “get up and go” solution for public service operators; lower cost service delivery; enhanced education; increased city productivity; enhanced city experience; better medicinal effects; better emergency response; fuel reduction, and; lower CO2 emissions.

**Essential Technical Approach**

LiveCity directly focuses to a modern environment world where live high-definition interactive v2v can be as easily available on any device on any city street as any other actual communication facility. The effective inclusion of (interactive) video communication can thus enhance the way of citizens’ every-day communications and of their vivid inclusion in the modern digital-based societies.

The LiveCity experimental network will be a federation of existing test-beds and networks to create a Living Lab Internet Federation which supports a Right of Way. Infrastructure is built by using the networks of the service providers in Europe which we “federate” by creating a dedicated, for the LiveCity’s purposes, modern infrastructure, supported by the network operators involved in the LiveCity Project. The backbone connectivity will be by using a mixture of interconnection methods and the city of Frankfurt is to be considered as a “hub”. The proposed LiveCity infrastructure is to be considered as a “real market”-oriented one with the aim of providing appropriate facilities for the completion of the purposes of the Project during its life-time, while simultaneously identifying issues for a direct deployment and offering of the intended LiveCity’s facilities in the market sector, especially to the end users and/or the citizens of the cities involved. To this, we integrate the existing VPS controller and a number of ingredients build the infrastructure to support the innovative LiveCity Living Lab. Four network types are planned to be used to access network users – xDSL, WiMAX, HSPA and LTE. Thus, LiveCity builds a network using ultrafast wireless and wireline technologies.

Then, LiveCity overlays a VPS controller so that any user can select a right of way for their video-to-video application.

Three classes of service will be defined in the data layer, that is: best effort, control plane and real time.

The VPS Controller enables a virtualised path slice to be invoked across multiple heterogeneous autonomous systems for
each QoS event using the loose-hard model. The virtualised path slice is the foundation for the Future Internet right of way. Following the learning experience of the EuQoS FP6 Project, a VPS controller will be available for deployment on the network infrastructure made available to the LiveCity Project by the network service providers involved.

**Work Package Structure and Project Participants**

The LiveCity Project is actually composed of seven distinct but quite interactive Work Packages, as shown in the related figure. In order to realise the Project’s objectives, LiveCity brings together a number of organisations across Europe to create a balanced ecosystem of entities and organisations to “drive” the Project and achieve outstanding results. The LiveCity consortium actually includes the following partners classified per category.

**Public service providers:** Municipality of Vrilissia-Athens (GR), Ayuntamiento de Valladolid (ES), Scóil Naisiunta Cholmáille- Skryne School (IE), Health Service Executive (IE), National and Kapodistrian University of Athens, Attikon Hospital, The 2nd Academic Ophthalmology Clinic (GR).

**Network operators and service providers** (*i.e.*: public Internet service providers): Hellenic Telecommunications Organization S.A.-OTE (GR), Deutsche Telekom AG (DE), Magnet Networks Ltd. (IE), Telefónica Ireland Ltd. (IE).

**Technology providers** (*mainly SMEs*): RedZinc Services Ltd. (IE), QuartzSpark Ltd. (IE), OneSource Consultoria Informatic LDA (PT).

**Subject matter experts** (*i.e.*: research and academic partners): National and Kapodistrian University of Athens, Dept. of Electronics and Telecommunications (GR), Université Du Luxembourg-SntT (LU), Brunel University (UK), Fundación Cartif in Valladolid (ES).

The Project comprises 15 experienced partners from 7 European countries (*i.e.*: Germany, Greece, Ireland, Luxembourg, Portugal, Spain and United Kingdom).

Among the core priorities of the LiveCity Project effort is to create a wider community of interest, not only within the Consortium itself, but also by involving a large number of supporting partners. LiveCity has embedded city-based user communities which are in symbiotic relationship with the foundation technology.

**Actual State and Progress**

Since its initiation (*April 2012*), LiveCity is in good progress and conformant to the original schedule. Actual progress and achievements mainly include:

- Completion of a first set of Deliverables, covering various thematic contents, *fully conformant to the DoW scope*.
- Good Progress in the network deployment effort within the involved cities to “serve” the “Living Lab”-like infrastructure, in parallel with the international interconnection.
- Gradual development of the identified use cases. *Work is in progress*.
- Start of effort to identify, depict and evaluate KPIs, being in good progress.
- Efficient start of dissemination effort (AIAI-2012 International Conference, IIVC-2012 Workshop with two LiveCity-based dedicated Sessions).
- Establishment & operational functioning of a LiveCity Website.