



# Celtic-Plus

## Newsletter 2/2017

Chairman's Corner: The future of Celtic-Plus

Events: SENDATE Mid-Term Event in Paris

Project Highlights: UPSC – Unleash the Power of SIM Card



# Editorial

## Table of Contents

Editorial ..... 2

**Chairman’s Corner**

The future of Celtic-Plus ..... 3

**Events**

SENDATE Mid-Term Event in Paris ..... 4

**Project Highlights**

UPSC – Unleash the Power of SIM Card ..... 6

ACEMIND – Delivering your future home network management tool ..... 7

MITSU – Seamless wireless video streaming ..... 8

## Dear readers,

Amidst the fast-changing ICT environment, also Celtic-Plus and this newsletter are constantly changing. The first modest change concerns this newsletter. From this issue on, we will have a new section called the ‘Chairman’s Corner’, which is inaugurated by, you guessed it, our chairman Jacques Magen. In future editions, this section may sometimes change its name to ‘Vice-chairman’s Corner’ or ‘Vice-chairwoman’s Corner’, as the three vice-chairpersons of Celtic-Plus – Valérie Blavette, Jari Lehmusvuori, and Riza Durucasugil – will also get the opportunity to share their views and insights in this section. The new section is opened with a bang: Jacques Magen will outline the first time in public what the plans for the future of Celtic-Plus beyond 2018 are.

From the future of Celtic-Plus back to our current activities: In the Celtic-Plus Autumn Call, which closed on 16 October, we received 9 Celtic-Plus project proposals. 8 of them were labelled at the label meeting in Paris on 20 November. The technical evaluators as well as the Celtic-Plus Core Group and the Public authorities indicated that the quality of the proposals was high, and we expect that most of these projects will start in 2018.

Enough organisational matters for now – let us have a look at the exciting Celtic-Plus projects. Shortly before the publication of this newsletter,

our flagship project SENDATE had its mid-term event in Paris, which included a high-level event on the first day. Read all about it in this issue. Smaller, but nonetheless important for the technological development of the ICT sector in Europe, are the three projects presented in our popular section ‘Project Highlights’. The selection of projects and results is evidence for the rich diversity of topics and concepts covered by Celtic-Plus. The article on UPSC explains how to unleash the power of the SIM; in the ACEMIND article, readers learn about network management tools for the future smart home; and the MITSU article explains a novel concept for seamless wireless video streaming.

As you can see in this issue of our newsletter, Celtic-Plus is a vibrant programme with a highly innovative community, which is constantly pushing the borders of ICT technology. If you are not yet part of the Celtic-Plus community and would like to join, there are ample opportunities, like, e.g., the proposers day on 13 December 2017 in Luxembourg and, of course, the next call for proposal, which ends on 23 April 2018. Feel free to talk to me or any other colleagues at the Celtic-Plus Office – I look forward to hearing from you.

**Peter Herrmann**  
Editor-in-chief

## IMPRINT

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## About Celtic-Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new “Smart Connected World” paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the inter-governmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.



# The future of Celtic-Plus

**As Chairman of the Celtic-Plus EUREKA Cluster, I have the honour and privilege to be the first to write a contribution for this new section. And appropriate to this occasion, I have great news: the Celtic Industry Core Group, supported by the public authorities constituting the "Celtac", the Celtic Authorities Committee, have decided that Celtic-Plus needs to continue beyond 2018, the current date for completing Celtic-Plus. Therefore, it is my pleasure and duty as Chairman to lead this effort towards a renewed EUREKA label.**

Before providing further details on what is to come next, a little bit of history. Celtic was formally kicked off in 2003 after two years of effort to prepare a new EUREKA Cluster that would differentiate from the existing ones, ITEA and MEDEA at the time, which were dedicated respectively to software and embedded systems and to microelectronics. The objective of Celtic was to run innovative research & innovation projects dedicated to "end-to-end communication systems", involving both telecommunications manufacturers and operators, to keep and strengthen European leadership in telecommunications.



The EUREKA High-Level Representatives agreed with that approach and decided to grant Celtic with the EUREKA label for 5 years, and then to renew it for another 3 years until 2011.

In 2010, the Celtic Industry Core Group expanded to welcome IT manufacturers and specialised industry players, e.g. in security. The focus broadened to the "Smart Connected World" to cope with the evolution of the telecommunications landscape, including not only network infrastructure but also new media, Future Internet, green Internet, and related applications and services. The label for Celtic-Plus was granted for 8 years.



Throughout those 15 years, Celtic and Celtic-Plus projects have been widely successful and have brought many innovations to the marketplace. I would not dare to cite here only a few examples, as they are so numerous. Suffice it to say that in addition to being recognized in the Celtic awards, some of those projects also received awards from EUREKA and other organisations, recognizing their added value for economy and society.



So here we are, almost at the end of Celtic-Plus. I am really proud to look at all the achievements that are behind us – "us" representing the Celtic community as a whole. This community by the way is one of the things I am most proud of. So now, should we consider that our work is done, and that there is nothing more to do? This is certainly not the feedback we get from the Core Group, from the Public Authorities, and moreover from all of you. Therefore, it is now the right time to roll up the sleeves and prepare for a new Celtic.

We have started to think about what kind of programme would be required to cope on the one hand with the continuous development of the telecoms-related landscape, and on the other hand with the changing context of ICT research & innovation in Europe and beyond. A first presentation, highlighting some preliminary ideas, was given at the EUREKA High-Level Group meeting that was held mid-October in Tampere, Finland, thanks to the support of the Finnish EUREKA Chair and of the Inter-Cluster Committee, which includes all EUREKA Clusters in a dedicated group.



We see this new Celtic based on the core values that have been supporting our R&D community for 15 years now, i.e. the bottom-up industry-driven approach, combined with large strategic flagship projects. There are critical issues that need to be addressed in the coming years, which are not addressed by other EUREKA instruments, and only partially by other instruments in Europe. From a technological standpoint, Networking and Cloud Enablers addressing and using technology from such areas as cyber

security, artificial intelligence, 5G and beyond, FinTech, big data, business analytics, IoT and cloud, are considered as important orientations to develop. Applications and services, more and more serving vertical sectors such as content (video, gaming), e-Health, smart cities, agriculture, mobility, energy, automotive, and manufacturing, are equally important to advance, while end-to-end connectivity and security will still be significant domains to address.

We believe that strengthening ties with the national public authorities, improving again and again our processes and tools, and refining periodically the scope and implementation of the renewed Celtic-Plus, will strengthen the programme. Furthermore, we will increase the impact of the projects and of the programme on economy and society by increasing the involvement of SMEs, strengthening support to newly created start-ups and to growing SMEs, improving our partnering tool, shall help broaden our community. Finally, increasing the flexibility of the programme to reflect more quickly technological and market trends, and allow projects that are closer to the market, up to high technology readiness levels.

These are only preliminary ideas. We have just started to prepare for this renewed programme, and the formal application for the EUREKA label is scheduled for June 2018. Until then, we welcome your support towards this important milestone in the life of the European telecommunications industry – and beyond.



Jacques Magen  
Chairman of Celtic-Plus

*P.S.: I am looking forward to meeting you at the next Celtic-Plus Proposers' Days and Event. The next Celtic-Plus Event Annual Event will be located with the EUREKA Innovation Week in Helsinki, Finland, on 22-25 May 2018. I hope to see you there!*



# SENDATE Mid-Term Event in Paris



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On 21 – 23 November 2017, SENDATE, the Celtic-Plus flagship project for secure networking of data centers in Europe, held its mid-term event in Paris. More than 170 high-level representatives from industry and public funding organisations participated in the main event on 21 November, which was held at Orange Gardens, the research and innovation campus of French network operator and service provider Orange.

The participants discussed SENDATE's progress in creating a secure, distributed data center environment, which meets the requirements of industrial communication, autonomous driving, and more.

The event started with presentations by representatives of ministries and funding agencies from the countries financing SENDATE. After that industry leaders from the consortium presented the achievements of the five SENDATE subprojects. These presentations were complemented by demonstrations of technical results. The event concluded with a panel discussion on "Changes in Cybersecurity in Europe until 2020".

## Opening session

The event was opened by Nicolas Demassieux, Senior Vice President at Orange Labs Research. In his opening remarks he welcomed the researchers from industry and from academia working in the SENDATE project. Explaining Orange's engagement in SENDATE, he pointed out that Orange is one of the telcos most committed to pushing the boundaries of technology.

His presentation was followed by representatives of the public authorities funding SENDATE, starting with Mathieu Weill, Director of the Digital Economy Department at the French Directorate-General for Enterprise (DGE). He reaffirmed the



Nicolas Demassieux, Senior Vice President, Orange Labs Research

strong support of France for this project, where colleagues from Finland, Germany, and Sweden work together to address key technology challenges in the ICT domain. He particularly highlighted SENDATE's contribution to making broadband networks across Europe more secure, which he considers critical for our economy.

Heikki Uusi-Honko, Finnish EUREKA chair at Tekes, said that SENDATE is a very important project and that in the future it would be good to see more effective market driven innovation. He outlined the vision for EUREKA Clusters according to which interaction between industry leads to agile and fast innovation. He argued to go beyond adapting to global disruptions and trends and instead be active contributors to these developments. In this respect, he considers SENDATE a good example of countries coming together to

initiate something that can lead global changes.

Heike Prasse, Head of Unit for Communication Systems at the German Federal Ministry of Education and Research (BMBF) said that Europe must be at the forefront and set its own priorities. She pointed out that two thirds of the growth in Europe is due to investment in R&D. In this context she considers it important to link industry production with modern information and communication technology.

Andreas Aurelius, Head of the ICT department at Sweden's innovation agency VINNOVA, said that Cybersecurity is one of the main priorities of the Swedish government. He pointed out that Cybersecurity is a very big challenge that is not easy to address. Thus, he considers initiatives like SENDATE to be very important, in order to go beyond just talking about cybersecurity, but take real action with real impact. Underlining this statement, he announced that Sweden will increase its financial support to EUREKA clusters even more.

After the opening presentations, the high level representatives of funding agencies and companies got a first-hand impression of the SENDATE results at a demo tour.

## Presentations of SENDATE project partners

The event continued with presentations by high level representatives of the SENDATE project partners, including Nokia, Ericsson, Coriant, and



Mathieu Weill, Director of the Digital Economy Department at the French Directorate-General for Enterprise (DGE)

ADVA. Jean-Luc Beylat, President of Nokia Bell Labs France, highlighted the strategic relevance of the SENDATE project for Nokia. Jörg-Peter Elbers, Senior Vice President at ADVA, Advanced Technology, pointed out that SENDATE will be solving enterprise challenges related to the increase of costs due to increased data traffic.

Harald Bock, Vice President Network & Technology Strategy at Coriant, said that his company particularly sees the value of the project in autonomous intelligent transponder networks. And Elena Fersman, Global Research Area Director for Machine Intelligence at Ericsson Research, said that data centre security is key for 5G.

### Panel discussion

At the end of the event, five high-level industry representatives explored in a panel discussion, which was moderated by David Kennedy from Eurescom, the changes in cybersecurity in Europe until 2020.

Marcus Braendle, Senior Vice President and CEO of Airbus Cyber Security, said that cybersecurity is a must as an enabler for industry in view of future and current markets. He reminded the audience that mobile banking only became a reality when the security issue was solved". Detlef Houdeau, Senior Director Business Development at Infineon, highlighted the growing importance of consumer guidance, as consumers also have some level of responsibility. He added that providers need to train consumers so that they can select devices with the proper security level. The panel discussion highlighted that there are still tremendous challenges ahead on the way to creating a secure cyber world.



Demonstration of SENDATE results for high-level representatives of funding agencies and companies



Panelists at the SENDATE event (from left): Eric Dubois, Sales & Marketing Manager for Industrial Automation division, ABB France; Markus Braendle, Senior Vice President and CEO of Airbus Cyber Security; Tauno Vähä-Heikkilä, VP Connectivity, VTT Technical Research Centre of Finland; Emmanuel Dotaro, Director, ICT & Cybersecurity Labs, Thales Secure Communications and Information Systems; Detlef Houdeau, Senior Director Business Development, Infineon AG, Germany

### Conclusion

The high-level event on day one was followed by two days of mid-term reviews of the five sub-projects. At the end of the three-day event, the main insight was that the SENDATE flagship project is on track and that its solutions are more urgently needed in Europe than ever.

### About SENDATE

SENDATE, Secure Networking for a Data Centre Cloud in Europe, is a 70 million euro public-private partnership project comprising 83 companies, research organizations, and universities from Germany, France, Finland, and Sweden.

The strategic goal of the three-year project is to address the current performance and security issues of data centers and pave the way to a more effective and secure network topology for data centers based on de-localization and secure connectivity. SENDATE aims to create a secure, flexible and efficient control of data flows on the Internet in Europe. The project runs from April 2016 to May 2019 under Celtic-Plus, the EUREKA Cluster for a Smart Connected World, and is partly publicly funded by the research ministries/agencies BMBF (Germany), DGE (France), TEKES (Finland), and VINNOVA (Sweden).

- Further information:  
SENDATE website - <http://www.sendate.eu/>



# UPSC – Unleash the Power of SIM Card



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The threats of phishing, viruses and sniffer attacks are a serious barrier to the adoption of banking and transactional services on mobile devices. The SIM card within connected mobile devices has not yet unleashed its full potential. Instead, user-unfriendly security mechanisms around single-factor authentication methods, like passwords and log-ins, are used. The UPSC project facilitated and sped up the development process for mobile applications that are using SIM cards as the secure element.

In February 2017, Celtic-Plus project UPSC – Unleash The Power of SIM Card – was finalized with great success, demonstrating how SIM cards can be exploited in secure digital services.

The project started in the last quarter of 2014 with partners from the Netherlands, Korea, and Turkey, who had diversified experiences in security, SIM cards, mobile application development, and financial services.

The consortium's goal was to provide a full-fledged framework where SIM cards are used as the security service provider for mobile applications and to demonstrate the capabilities of this framework in different real-world scenarios.

## Approach

Today, the utilization of SIM cards in secure digital services is very limited. Services use the security of SIM cards through OTA (Over The Air) platforms, which cause delays and unfriendly user interfaces. There is also SIM Alliance's "Open Mobile API" standard, which describes how to reach the SIM card, however the interface is hard to use and provides a more generic approach rather than being practical.

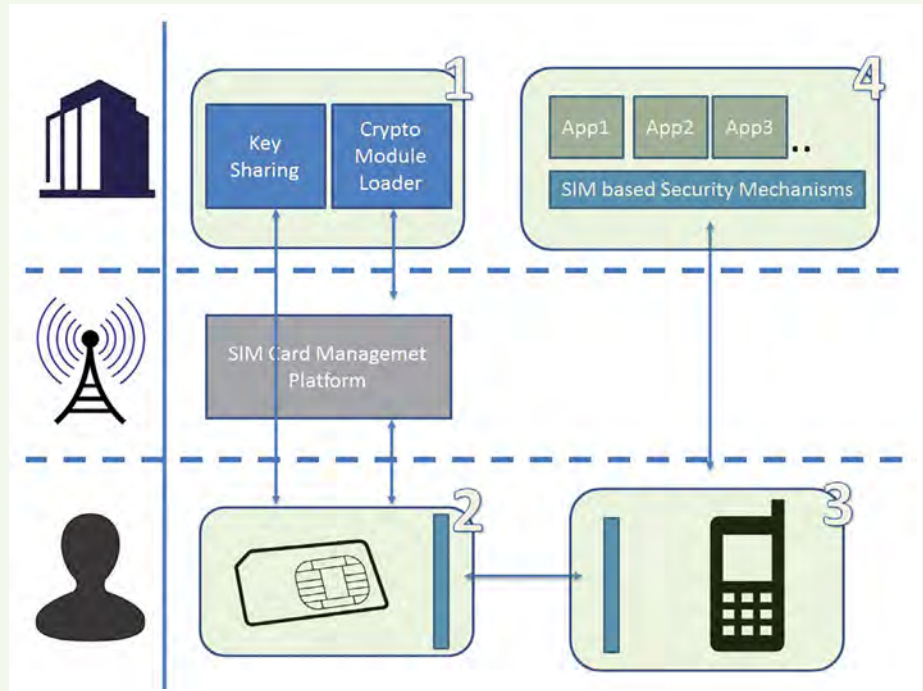


Figure: Components delivered by the UPSC project

The UPSC project has provided easy-to-use frameworks to application and service providers by isolating the complexities of SIM card usage. Developers who use the UPSC framework need to call the high-level APIs of the framework to seamlessly initiate a connection to the SIM card, prepare APDU (Application Protocol Data Unit) commands and utilize security functions of the SIM card, like encryption and signing.

## Achieved results

The figure shows the main deliverables of the UPSC framework and their relations to each other:

- A server side architecture which includes downloading of crypto algorithms and secure keys to the SIM card in a secure way.
- A SIM card framework architecture where crypto algorithms can be called from terminal applications.
- An intelligent terminal framework which provides high level APIs to mobile applications.
- Demonstration of UPSC framework in mobile applications, mostly in finance and authentication services. These demo applications include: multiple document signing in a mobile signature service, authentication of mobile banking applications, NFC based mobile payment scenarios, and remote payment.

## Conclusion

The UPSC project not only achieved its goal of providing a full-fledged framework for mobile application developers, but also completed its mission of exploiting how the framework can be used in real-world scenarios.

Thanks to UPSC's high-level APIs to access the SIM card, telcos now have an alternative method of monetizing their SIM cards. On the other hand, service providers can also benefit from UPSC by enhancing the security and usability of their mobile applications.

The next step of the UPSC consortium partners will be to implement the algorithms and mechanisms developed in this project for IoT environments, where security and data integrity are also very crucial.

- Further information:  
UPSC pages on the Celtic-Plus website – <https://www.celticplus.eu/project-upsc/>  
UPSC source codes and executable files – <https://github.com/paromix/upsc>

# ACEMIND – Delivering your future home network management tool



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Finalized in November 2016, the Celtic-Plus project ACEMIND provides a set of simple solutions for enhancing home network management. The ACEMIND home network is constituted by Information and Communication Technology (ICT) devices, home appliances or white products, and home automation sensors delivering Internet of Things (IoT) services. The ACEMIND dashboard manages a large range of services such as energy, hybrid network supervision or senior care. ACEMIND also proposes a new wireless technology using optical wireless communications: Light Fidelity (LiFi).

The main achievements are a unique interface and four prototypes:

- **Dashboard:** the ACEMIND dashboard shows a complete view of customers' devices at home, like ICT devices, white products and home automation sensors. The dashboard comprises as well an interface to services, e. g. Security, Senior Care for elderly people or Green Home.
- **Wired/wireless hybrid network:** a hardware and software prototype optimizes the IEEE 1905.1 standard for hybrid networks (Ethernet, WiFi, PLC, ...) with innovative capabilities, such as automatic switching or home network anomaly detection.
- **Green prototype:** we focused as a first step on optimisation of home power consumption with a solution to flatten the energy consumption peak. Simplicity and transparency for customers were key factors for the design of the service.
- **LiFi prototype:** The optical wireless communication demonstrator proposes a bilateral communication with two devices. The first one is connected to the Orange Livebox, and the second one is plugged to a laptop.



Figure: Several devices and one dashboard

## Background

The scope of the project was very ambitious with the target to run research activities driven by the customer expectations. During the project lifetime with seven project partners (Arçelik – Turkey, Devolo and IHP – Germany, Flowmon – Czech Republic, University of Athens – Greece, Oledcomm and Orange – France), we polled users about their expectations regarding their home networks and collected more than 3,000 customer feedbacks. These results gave inputs to the specification of a Proof of Concept (PoC) in line with home users' expectations, such as simplicity, transparency, network security, a unique dashboard and a unique box, with a visualization of the room topology instead of the network topology.

## Conclusion

Key figures: one open source software user, one PhD thesis, and seven conference papers. In addition, two new products, commercially available from Oledcomm and Devolo, have been developed based on the project results. One Orange patent has also originated from ACEMIND.

Moreover, presentations of the ACEMIND results in various entities of the Orange group have either inspired or reinforced the roadmap of three internal projects devoted to new smart-home interfaces and services.

In September 2017, a huge LiFi challenge (Terabit per second – Tbps) was launched through a new European project named WORTECS.:

- Further information:  
ACEMIND pages on the Celtic-Plus website – [www.celticplus.eu/project-acemind/](http://www.celticplus.eu/project-acemind/)



# MITSU – Seamless wireless video streaming



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Seamless and continuous video delivery to users wherever they are and whatever network connection they are using is one of the major challenges for telecom operators and content providers. Market demands are pushing toward a very fast deployment of video solutions that are often not interoperable and imply an increasing processing complexity. This often causes a decreased quality of delivered video, especially over wireless networks. The MITSU project has developed a set of technologies that optimize video transmission over heterogeneous wireless networks. Thanks to MITSU end users can get better video quality.

MITSU focused on end-to-end video delivery, from video sources through encoders, transmission channels, wireless networks and up to end-user devices. It developed algorithms and methods to optimize encoding and transmission processes that can dynamically react to changing network parameters. The project has taken into account video delivery over WiFi, LTE and WIMAX networks. Two main video delivery scenarios were studied: the multimedia scenario, where multiple users watch the same video content, and the security monitoring scenario, where multiple video sources are delivered in the uplink direction and presented in the monitoring centre.

## Innovation for Quality of Experience

The main innovation of MITSU is the constant monitoring of Quality of Experience (QoE) at the end user's premises and the introduction of content- and QoE-awareness to the system. This steps beyond the state-of-the-art, where only QoS information is gathered and used. It enables a novel approach to various decision processes which can benefit from a more complete set of information.

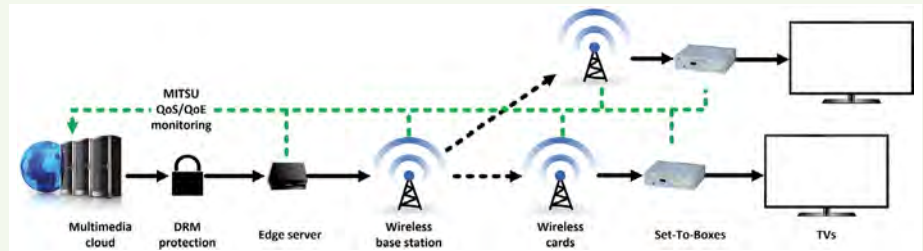


Figure 1: MITSU end-to-end video distribution cloud over wireless networks

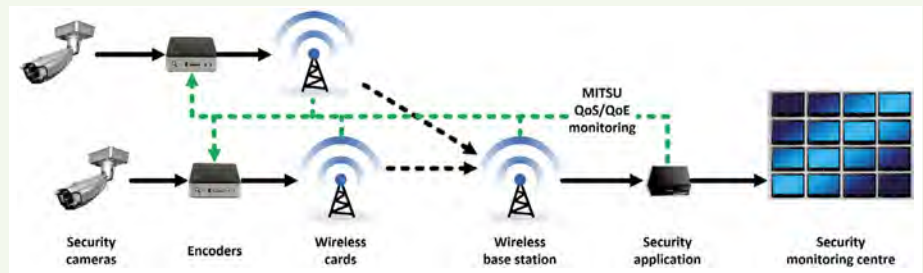


Figure 2: MITSU end-to-end security monitoring over wireless networks

Based on the project's developments, a novel solution for monitoring and scaling a video distribution cloud has been created that enables dynamic allocation of resources (Figure 1).

The solution focused on the full chain of video-content delivery to end users. It was tested with real users in Spain, where the last mile connection was done over wireless networks. The solution includes video encoders and a DRM media storage deployed in a cloud environment. The end users receive set-top-box devices allowing them to watch videos on their TVs. A monitoring system monitors the cloud, wireless links and end user devices, providing information that can be used to adapt the streaming parameters to optimize the quality.

The MITSU technology is also used for security video monitoring and was tested in a real-world environment in Poland, where security cameras have been placed in different locations in the city of Poznan. The solution enables to send a high number of video streams from the cameras to a monitoring centre (Figure 2).

The system monitors the link state as well as the quality of the streams' content and can take the viewer's preferences into account in order to assign more bandwidth to a specific stream in order to increase its quality. It is designed to provide surveillance from buses, trams, trains, robots and places where connection using a wired network is not possible.

The above-mentioned deployments are not the only possibilities of the created technology, as various MITSU components can be used separately to introduce evolutionary improvements in various video streaming systems. The outcomes have allowed the companies taking part in the project to introduce new products and improve some of their existing solutions.

## Conclusion

MITSU has introduced new technology allowing significant improvement of the Quality of Experience when transmitting video over wireless networks. The value of this technology has been proven in two test scenarios with end-users. The partners continue working on the technology to cope with the fast-changing video streaming landscape. New video coding and transmission standards will be incorporated into the MITSU solution. Attention will also be given to the creation of software modules for mobile devices, which will allow seamless high quality-streaming from smartphones over heterogeneous wireless networks. The approaching introduction of 5G technologies will give new possibilities to increase video streaming quality, but it will require new research in a follow-up project.

- Further information: MITSU project pages on the Celtic-Plus website – <https://www.celticplus.eu/project-mitsu/>