



Networked Society

(NetSoc)

Deliverable D1.1

Joint technical position papers and technology roadmap towards and beyond Horizon 2020 - Version 1

Editor:	Halid Hrasnica, Eurescom
Deliverable nature:	Report (R)
Dissemination level:	Public (PU)
Contractual delivery date:	31 December 2012 (first version 1.0), 15 November 2013 (updated version 2.0)
Actual delivery date:	15 November 2013
Suggested readers:	Wide ICT research community
Version:	2.0
Total number of pages:	12
Keywords:	ICT initiative, Networked society infrastructures

Abstract

Within this deliverable, the following three position papers created by European ICT stakeholder industry group are provided, where the NetSoc project facilitated process for creation of the document and served as the document editor:

- European industry call for a focused ICT Initiative on “Network and Information Systems in Horizon 2020”: A Bright Future for Europe,
- Infrastructures PPP for a Smart Connected Future, and
- Infrastructures PPP for a Smart Connected Future – Technical Background

Disclaimer

This document contains material, which is the copyright of certain NetSoc consortium parties, and may not be reproduced or copied without permission.

All NetSoc consortium parties have agreed to full publication of this document.

The commercial use of any information contained in this document may require a license from the proprietor of that information.

Neither the NetSoc consortium as a whole nor a certain party of the NetSoc consortium warrant that the information contained in this document is capable of use, nor that use of the information is free from risk, and accepts no liability for loss or damage suffered by any person using this information.

Impressum

Full project title: Networked Society

Short project title: NetSoc

Number and title of work-package: Identifying Requirements and Challenges

Document title: Joint technical position papers and technology roadmap towards and beyond Horizon 2020 - Version 1

Editor:

Work-package leader: Rahim Tafazolli, University of Surrey

Estimation of PM spent on the Deliverable: 5

Copyright notice

© 2012/2013/2014 NetSoc project participants

List of Authors

Organisation	Authors	
Alcatel-Lucent	Klaus Wuenstel, Karl Schattaer	
Astrium	Philippe Boutry	
Ericsson	Magnus Madfors	
Eurescom	David Kennedy, Halid Hrasnica	
InterInnov	Jacques Magen	
NSN	Werner Mohr	
Technicolor	Jean-Dominique Meunier	
Thales	Nicolas Chuberre	
University of Bologna	Alessandro Vanelli	
University of Surrey	Rahim Tafazolli	

Table of Contents

Contents

List of Authors	3
Table of Contents	4
1 INTRODUCTION.....	5
2 SUMMARY OF THE POSITION PAPERS	6
2.1 European industry call for a focused ICT Initiative on “Network and Information Systems in Horizon 2020”: A Bright Future for Europe.....	6
2.2 Infrastructures PPP for a Smart Connected Future	7
2.3 Technical Background and Roadmap.....	8
3 CONCLUSIONS AND FURTHER STEPS.....	11

1 INTRODUCTION

Following a meeting between a number of European ICT companies and DG Connect Deputy Director Zoran Stančič in mid-2012, one specific action emerged to consider what specific actions the ICT industry felt were important, particularly if the European ICT industry is seeking to maintain current leaderships and develop new leaderships in their industrial sectors.

A working group emerged and a call for a focused ICT Initiative on “Network and Information Systems in Horizon 2020” was prepared. This call outlines the challenges facing the ICT sector, and all the application sectors whose future competitiveness will be based on the exploitation of advanced ICT services, needs to have a significant step function in the evolution of the infrastructures that will underlie the European societal and economic development in the next 10 years.

For a society that is moving more towards intellectual based economic development, it is critical that the infrastructure in Europe facilitates innovative and creative working and social environments way beyond the limitations of today’s networks and services.

The call further elaborates the challenges of achieving this explosion of network power and capacity while achieving equally dramatic progress in reducing the energy demands and environmental impact of future networks.

After some further discussion with the European commission, the idea to consider using the PPP structure to implement such an initiative was proposed.

Following this, the industrial players produced a paper on “Network and Information Systems in Horizon 2020: A Bright Future for Europe” getting more specific about what, from their perspective, an Infrastructures PPP could address.

The paper on an “Infrastructures PPP for a Smart Connected Future” has only to date been released in draft form as it is subject to a continuous refinement process and will evolve further in the way as industry and the commission can foresee its implementation as a PPP in Horizon2020.

The third paper in this deliverable is more detailed information about the technical challenges that could be within the scope of such a PPP. Clearly this information is a little incoherent as yet and needs to be discussed and refined by the NETSOC project, the NETSOC experts group and liaised with the industry group to produce a potential roadmap of how we can attain European leadership by addressing key technical challenges in a coherent and logical fashion.

The following papers, showing the status of the work to date are provided as attachments to this deliverable:

- European industry call for a focused ICT Initiative on “Network and Information Systems in Horizon 2020”: A Bright Future for Europe,
- Infrastructures PPP for a Smart Connected Future, and
- Infrastructures PPP for a Smart Connected Future – Technical Background

Respective summaries of the position papers are provided in Chapter 2.

The first paper will not be further updated. The ideas, focus and technical challenges for a PPP initiative in Horizon2020 will be developed further.

2 SUMMARY OF THE POSITION PAPERS

2.1 European industry call for a focused ICT Initiative on “Network and Information Systems in Horizon 2020”: A Bright Future for Europe

In the provided position paper, the European Telecom, IT, Media and vertical industries welcome the Horizon2020 framework programme and its approach to combine basic, technology-driven and applications-driven research in one coherent programme to maximise the achievements and impact as to facilitate the exploitation of results on a greater scale than previous programmes. The clear statements of H2020 looking for European leadership as a direct result of this programme is very much appreciated by the ICT industry in this context which proposes to assemble competences at a European level into a focused ICT initiative within Horizon2020 **to develop the next generation of Network and Information Systems** that will lead European business, government and society in to a bright future by 2020.

To get the maximum benefits for Europe, it is proposed that the ICT research should be focused on a limited number of “**ICT Grand Challenges**” where Europe has both strength and opportunities and to which the EU ICT industry is committed, such as:

- To provide capabilities for Big Data and Innovative Services
- To provide Fast, Reliable and Green Networks and Infrastructures
- To provide an Inclusive, Trustworthy and Secure Digital World

Addressing these challenges as part of a coherent research and investment strategy, that also promotes the usage and uptake of the results, is a recipe for success. The ICT industry shares the vision with the EC and is willing to be a proactive partner in developing and performing this programme and achieving the goals for Europe. European leadership in Network and Information Systems will not only enhance the ICT industry but will also allow productivity gains in all other sectors, and thereby multiplying the GDP improvements from this investment.

ICT is pervasive throughout all sectors of the economy, and is itself now one of the largest and fastest growing sectors of the European economy. The ICT sector represents 12 million jobs in Europe and generates between 5 and 6% of the EU GDP⁵. Even more important is that applied ICT is estimated to be providing 50% of all European productivity growth. In particular many new jobs can be created in secondary sectors of the service industry through the deployment and use of advanced ICT services and networks. Therefore, the general availability of connectivity is not only an essential requirement for further economic growth, but it is probably the unique investment that can be made today that has the potential to improve the productivity of all other sectors and restore growth to the European economy.

The pace of development in the ICT sector is very fast and still accelerating. The race for the next generation of networks and information systems has started worldwide and Europe should act now to maintain its pole position and for both economic and security reason to stay in control of such a strategic sector. The impact must be maximised through strategic

focusing of the ambitions, in order to achieve the progress in the facilities and capabilities necessary for the future generations of Europeans to be connected, digital and successful.

European Industry calls for: a specific initiative on Network and Information Systems within Horizon2020. This call from the Telecom, IT, Media and vertical industry in Europe is to establish a pan-European partnership between the public and the private sector to align the research activities on Network and Information Systems within Horizon2020 with a clear strategy, based on measurable goals. The recommended approach is to combine the interests of the European Public authorities with the Industry objectives in a coherent use of available resources. The ambition is to guide research and innovation energies to achieve the maximum impact and the highest possible return in terms of the competitiveness of European industry and the benefits to European society.

The scale of the challenge requires an advanced model of a **Public Private Partnership**. The industrial commitment and investment will be such that it must be allowed to share the responsibility for the continuous assessment and refocusing of the programme between the public and the private sector that will be necessary in any programme that takes a short to medium term perspective in such a fast moving industrial sector.

This position has been adopted by the major European ICT industry stakeholders, creating an **Industry ICT Initiative Core Group**:

- Alcatel-Lucent
- ATOS
- BT
- Deutsche Telekom
- Engineering
- Ericsson
- Nokia Siemens Networks
- Orange
- SAP
- Siemens
- Technicolor
- Telecom Italia
- Thales
- Telefonica

2.2 Infrastructures PPP for a Smart Connected Future

As is mentioned above, it is critical that Europe takes a specific initiative now to stimulate the development of the ICT infrastructure 2020 and, in this way, to ensure the competitiveness of both the European ICT industry and all the industrial sectors requiring advanced ICT services as part of their competitive profile. The additional benefit is that preparing and providing the new infrastructure will also empower European citizens by giving them access to the most advanced capabilities for the benefit of their social wellbeing and to enable their inclusion into all aspects of European Life in accordance with the Digital Agenda for Europe. Thus, **the strategic objectives** of the initiative are:

- To reinforce the European industrial leadership in Network and Information Systems

- To accelerate the adoption and use of advanced ICT services in Europe
- To attain European leadership in uptake and use of ICT technologies
- To advance the critical communications infrastructure in Europe and its implementation
- To drive the integration of the services and the intelligent infrastructures for highly optimised service provision across heterogeneous networks
- To be the global leader in the “Big Data” economy and services

To achieve these objectives the European ICT industry is proposing to have a focused initiative, in partnership with the European commission, to harmonise and align the strategic investments necessary over the next 7 years to achieve the maximum impact in terms of success for European industry and benefits for European society and citizens.

The mentioned objectives of the initiative are defined along industry vision and major trends in and around ICT area towards 2020; **the hyper connected world defining the new infrastructure technological challenges:**

- Big Data and Innovative Services
- Fast, Reliable and Green Networks and Infrastructures
- Inclusive, Trustworthy and Secure Digital World

A critical aspect of achieving a **focussed approach** in targeting the challenges is the need to understand and assess the proposals for project under this initiative in terms of how they contribute to achieving the overall vision. Involvement of different industrial sectors in the work – particularly as concepts need to be validated - should be inherent in the programme addressing the main **drivers of change**, such as access speeds, advanced applications, big data, as well as new usage models and market parameters.

2.3 Technical Background and Roadmap

The position paper “Infrastructures PPP for a Smart Connected Future – Technical Background” provides detailed technical background related to the three main technological challenges, identified in the ICT positions summarised in sections 2.1 and 2.2. Furthermore, this document elaborates needed technological steps to achieve visions presented for each of the challenges, including identification of future research and innovation topics.

The provided document on the technical background will serve for establishment of a related research and innovation roadmap, which will be provided in the second version of the deliverable (D1.4), planned for beginning of 2014.

The table below depicts the expected evolution of each segment and their convergence into a unified system in a hyper connected world – rough roadmap on expected and needed research achievements.

Timeline	In 5 Years	In 10 Years	Beyond 10 Years
Terrestrial Mobile	<ul style="list-style-type: none"> • LTE-A, B and C • data rate: several 100 Mbps • small cells • cloud RAN • fast inter-RAT load balancing • opening TV white spaces • Optimised infrastructure sharing. • Virtualisation of network functionality as well as of computational, communication, and storage resources in order to deliver cost-efficient operation especially in multi-administrative domain environments 	<ul style="list-style-type: none"> • New air-interface data rate: up to 1 Gbps • bandwidth: at least 100 MHz • antennas: tens of cooperative antenna elements • user context aided <i>RRM</i> • Uniformity between licensed and licensed exempt bands • Software designed networking • Device to device communications • Millimetre-band communications • Information Centric networking 	<ul style="list-style-type: none"> • Data rate: multi-Gbps • bandwidth: GHz range • Hundreds of cooperative antenna elements • ultra small cells • Context-based networking • dynamic spectrum management (sensing, sharing, and trading) among operators • Dynamic service aggregation from different providers to create new complex services • visible light communication • Service and coverage integration with Satellite

<p>Satellite</p>	<ul style="list-style-type: none"> • Mobile Broadband in higher frequency bands especially for professional and governmental services (e.g. Ku or Ka band), security systems in lower bands • Broadcasting with return link • Large spotbeam footprint • Multi-layered spotbeam architectures • Machine to machine type communications 	<ul style="list-style-type: none"> • New waveforms • Unified service platform with future terrestrial networks • Network management harmonization with terrestrial networks. • Seamless handover techniques between terrestrial and satellite networks • Distributed radio resource management algorithms • Optimised usage of spectrum allocated to Satellite services on secondary basis • Hybrid constellations • Backbone network for emergency and disaster networking • Terabit satellite • Q/V bands feederlink 	<ul style="list-style-type: none"> • Very high speed broadband internet • Space Segment High-Throughput, Flexibility and Reconfigurability • Service and coverage integration with Terrestrial • Optical feederlink
<p>Optics</p>	<ul style="list-style-type: none"> • 1 Gbps • 20 % FTTH • POF utilisation 	<ul style="list-style-type: none"> • 10 Gbps • 50% FTTH • replacing electrical switches and routers with optical • mix of wireless and optic backhaul for satellite and terrestrial mobile 	<ul style="list-style-type: none"> • 100 Gbps • 80% FTTH • fully use of POF • integration of wireless and optical wireless • Fully integrated backbone for satellite and terrestrial

3 CONCLUSIONS AND FURTHER STEPS

ICT is pervasive throughout all sectors of the economy, and is itself now one of the largest and fastest growing sectors of the European economy. To get the maximum benefits for Europe, it is proposed that the ICT research should be focused on a limited number of challenges where Europe has both strength and opportunities and to which the EU ICT industry is committed, such as:

- To provide capabilities for Big Data and Innovative Services
- To provide Fast, Reliable and Green Networks and Infrastructures
- To provide an Inclusive, Trustworthy and Secure Digital World

The pace of development in the ICT sector is very fast and still accelerating, where the race for the next generation of networks and information systems has started worldwide and Europe should act now to maintain its pole position in the area. The impact must be maximised through strategic focusing of the ambitions, in order to achieve the progress in the facilities and capabilities necessary for the future generations of Europeans to be connected, digital and successful. Therefore, the European Industry calls for a specific initiative on Network and Information Systems within Horizon2020, which scale of the challenge requires an advanced model of a Public Private Partnership programme/initiative.

As is mentioned above, it is critical that Europe takes a specific initiative now to stimulate the development of the ICT infrastructure 2020 for a Smart Connected Future and, in this way, to ensure the competitiveness of both the European ICT industry and all the industrial sectors requiring advanced ICT services as part of their competitive profile. The strategic objectives of the initiative are:

- To reinforce the European industrial leadership in Network and Information Systems
- To accelerate the adoption and use of advanced ICT services in Europe
- To attain European leadership in uptake and use of ICT technologies
- To advance the critical communications infrastructure in Europe and its implementation
- To drive the integration of the services and the intelligent infrastructures for highly optimised service provision across heterogeneous networks
- To be the global leader in the “Big Data” economy and services

In order to support creation of the mentioned initiative and the PPP programme within Horizon 2020, the involved industry stakeholders developed a roadmap (Sec. 2.3) targeting expected and needed research achievements in short-term (up to five years), mid-term (10 years), and long-term by considering specific requirements in terrestrial, mobile, satellite, and optical technological areas.

The next steps for the NETSOC work for preparing for the future are:

- to elaborate the ideas for a future “infrastructures” initiative within Horizon2020 in terms of producing a roadmap, consulting with the sector ETPs and consolidating the industrial willingness to stimulate and orchestrate such an initiative
- to assist the evolution of the ICT ETPs towards Horizon2020 by elaborating concepts for convergence of current ETPs around the networks in the wider sense
- to use the experts group to refine and improve combined SRAs and to use these results to contribute to H2020 work plans, motivation of future ETPs and any networks related initiatives within H2020.

These ambitions will be pursued through the planned NETSOC usage areas workshop, planned Expert group meetings and interactions with the ICT and non-ICT ETPs.