CONNECTED COMMUNITIES

CONFINE

Draft Exploitation Plan (M24)

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Abstract

Community-owned Open Local IP Networks (COPLANs) are already successful and represent a promising model for edge networks in many communities around the world. However, they have a number of inherent issues.

The CONFINE consortium has developed Community-Lab, an open, distributed infrastructure intended to support experimentally-driven research on COPLANs.

This document outlines the first version of the CONFINE Project Exploitation Plan. The consortium's exploitation principles and approach are established. In addition to a number of generic exploitation opportunities that have already been identified, the initial plan outlines the initial strategies of the respective CONFINE partners to use CONFINE results in real-world environment and to spread it to others within the respective eco-systems of the partners.

At the time of delivery the project is at the mid-way point of its life. This initial plan will be revised over the course of the next two years, in order to deliver a more concrete plan in M48.

Executive Summary

Community-owned Open Local IP Networks (COPLANs) are already successful and a promising model for edge networks in many communities around the world. However, they have a number of inherent issues. The CONFINE consortium has developed Community-Lab, an open, distributed infrastructure intended to support experimentally-driven research on COPLANs.

This document (D5.8) outlines the draft CONFINE project exploitation Plan. In addition to a number of generic exploitation opportunities that have already been identified, the initial plan outlines the initial strategies of the respective CONFINE partners to use CONFINE results in real-world environment and to spread it to others within the respective eco-systems of the partners.

At the time of delivery the project is at the mid-way point of its life. This initial plan will be revised over the course of the next two years, in order to deliver a more concrete plan in M48.

Document history

Version	Date	Comments
0.1	13 August 2013	Initial draft
0.2	25 August 2013	Revised draft (OPLAN)
0.3	5 September 2013	Initial partner contributions included (UPC, Pangea, Guifi, OPLAN)
0.4	9 September 2013	Further partner contribution included (iMinds)
0.5	9 September 2013	Minor typographical amendments, further partner contribution included (Fraunhofer)
0.6	11 September 2013	UPC revisions
0.7	11 September 2013	Formatting, further OPLAN revisions
0.8	16 September 2013	Peer review (Leandro)
0.9	16 September 2013	Peer review (Davide)

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1. Introduction

1.1. Project description

The main objective of the CONFINE project is to complement the offerings of the FIRE Experimental Facility by the development of a new facility - "Community-Lab".

Community-Lab is an open, distributed infrastructure intended to support experimentally-driven research on Community-owned Open Local IP Networks (COPLANs). It is designed to allow experiments ranging from the link layer to routing, transport and application layer, or even social experiments.

The CONFINE project targets the exploration and advancement of the community networking model, towards providing the right quality of experience and sustainability of community networks by looking at the social, technical, economic and legal implications.

Figure 1 below contains a high-level, graphical representation of the testbed.

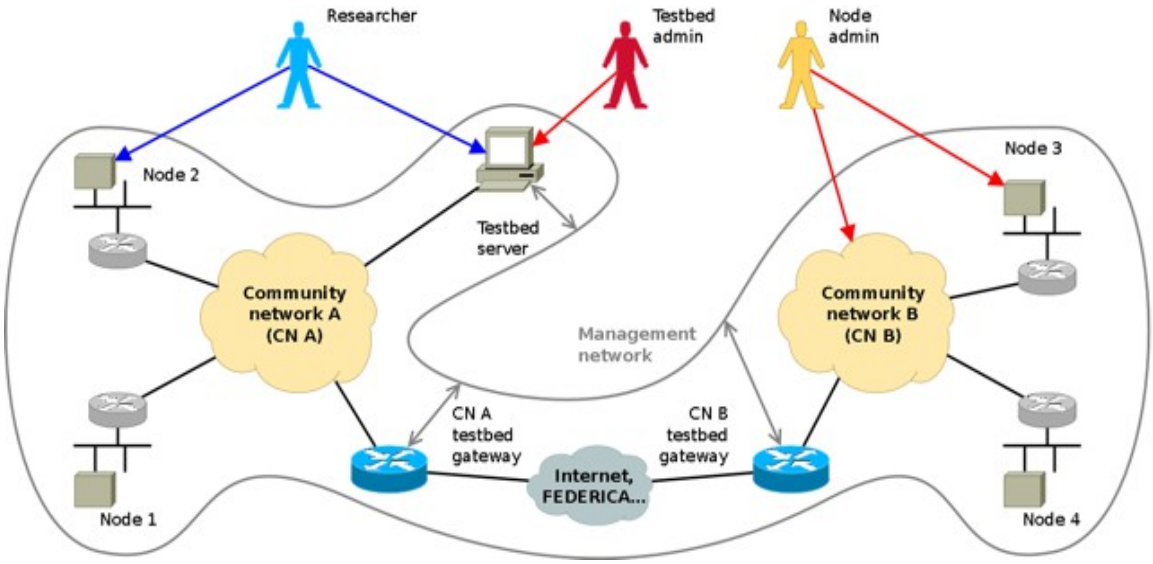

Figure 1: The CONFINE testbed

1.2. Community-owned Open Local IP Networks (COPLANs)

COPLANs are already a successful and promising model for edge networks in many communities around the world. Although there is a distinct lack of reliable statistics as to the number of operators, there are a number of COPLANs in the range of 500 to 20,000 nodes and links such as FunkFeuer, AWMN, Guifi.net among many others. Most of them are based on Wi-Fi technology (adhoc networks or sector IEEE 802.11a/b/g/n access points for the first hop, long-distance point-to-point Wi-Fi links for the trunk network) but also optical fiber links (still more costly but with more capacity). The Wikipedia article on wireless community networks[1] (August 2013) reports 145 networks across Europe.

[1] http://en.wikipedia.org/wiki/List_of_wireless_community_networks_by_region

1.2.1. Inherent characteristics of COPLANs

COPLANs share a number of inherent characteristics, notably they:

- are networks of truly “broadband” capacity i.e. where the bandwidth capacity is determined by nothing other than the physical characteristics of the deployed technologies (network neutrality),
- are dedicated to serving a local geographic community or location, ranging from a street or business park through to a rural community or an entire city,
- provide abundant low cost "open access" to connectivity on an end-to-end and symmetrical basis throughout that community,
- are public utilities in that it is available for use (on equal terms) by any party connected to it within the community it serves: public and private; business and residential; service provider and service consumer,
- afford global connectivity (to the global Internet) through offering open access to compete with third party carriers/service providers,
- do not differentiate between “content creators” and “content consumers” and their bits,
- provide infrastructure which is open to all and it is owned and controlled independently of any service or content which uses it,
- are structured (financially and legally) and configured with management and governance measures and locks which serve the “common good” and assure that the main value and benefit rests locally with users connected to it,
- are funded largely by the private sector and market driven.

1.2.2. Issues with COPLANs

However, their inherent characteristics create a number of issues with COPLANs:

- There is usually no central authority that is responsible for a precise network planning, although often the community provides scripts for configuration of new nodes, coordination of IP address assignment, etc. There are no formal service level agreements and services are offered without guaranteed on a best effort basis. There is no centralized customer service (but decentralized and open: provided by the community or by diverse companies).
- The network nodes are often inexpensive off the shelf equipment and the network elements exhibit a high degree of heterogeneity in the hardware, software, and capacity. The network infrastructure belongs to the user and is shared to build the network.
- There may be a huge number of (low capacity) nodes actively participating in routing the traffic (large scale) in contrast with few high capacity nodes of commercial backbones.
- Very dynamic: the number of nodes may rapidly grow and change as new members join the network, or when nodes overload or fail.
- As a result, the frequently changing topology of the network, combined with its large size and coupled with its heterogeneity and decentralized structure, break the assumptions of many Internet protocols designed for a more stable and controlled network.

1.3. Purpose of the report

This document (D5.8) outlines the first version of the CONFINE Project Exploitation Plan, and is scheduled for delivery in M24. At the time of delivery the project is therefore at the mid-way point of its life, and still has the results of experiments from two open calls to digest. The final version (D5.9) will be due at the end of the project (M48), consistent with Article II.4.2.b of the standard EC Grant Agreement for FP7 projects.

The exploitation strategy outlined in this report will therefore be revised and updated during the remainder of the project lifetime based on the use cases, market needs, medium-and-long term trends, and the partners' interests.

1.4. Dissemination

Exploitation and Dissemination are inexorably linked. S2.5 contains a brief discussion of CONFINE's dissemination activities. However, for the purpose of brevity and to avoid duplication, this report (deliverable) deliberately excludes detailed analysis of the CONFINE project's dissemination activities and strategy. These have been covered in detail in Deliverables D5.2 and D5.3, (delivered in months M6 and M12 respectively) and more recently in Deliverable D5.4, presented simultaneously with this report. Readers are therefore requested to read D5.8 in conjunction with the aforementioned reports.

1.5. Standardization

A further means of exploiting the CONFINE project's output is via its contribution to industry standardization. This has been an ongoing area of activity since the beginning of the project. S2.6 contains a brief discussion of the CONFINE project's input into industry standardization. However, readers requiring more detailed analysis of standardization activities should refer to D5.2, D5.3 and D5.4.

1.6. Report structure

The analysis in this report is contained in four chapters.

Chapter one is this section, containing an introduction to the CONFINE project, an introduction to the research subject – COPLANs -, the statement of the purpose of the report and a brief comment on standardization and dissemination.

Chapter two contains the analysis of the exploitation strategy, with a focus on the exploitation principles, together with the exploitation approach.

Chapter three contains the exploitation strategies of the respective CONFINE partners – both for the member COPLANs themselves, and the research institutes.

Chapter four contains the report's conclusions.

2. CONFINE exploitation strategy

2.1. Exploitation principles

Exploitation is perhaps the key enabler for the project success. The primary exploitation principle will be alignment of research objectives with the goal of demonstrating the real-world value of COPLANs as a key platform within the future Internet.

As discussed in the exploitation approach (s2.2), a key aspect that is fully coherent with this mission statement is the process of identification of expected results from early on in the project's lifecycle and the translation of these results into exploitable assets. However, the consortium is also aware of the potential for the exploitation of emergent opportunities. The exact nature of this process will naturally vary as the different tasks within the project are undertaken.

2.2. Exploitation approach

The consortium proposes to follow the approach outlined below to maximize the value of CONFINE project exploitation:

When: The consortium partners considered two approaches to the timing of identifying exploitation opportunities. The first approach was to focus on exploitation from the outset of the project, and use it as a driver for research and innovation. Inputs in all phases of the project could therefor be focused on the identification and definition of the emergent exploitable assets. The alternative approach would be to postpone the identification of such assets until later in the project lifecycle.

There are flaws with both approaches. The latter approach allows insufficient time to analyse the implications (impact, dependencies, etc.) of exploiting the identified opportunity. However, at the outset of the project there were a number of unknowns. Firstly, that the testbed was designed from the ground up and in terms of deployment and operation was unlikely to meet exactly the consortium's expectations. Furthermore, it was also acknowledged that the open calls represented a further area of uncertainty. Until approved – some time into the project - the consortium could not know the exact nature and outcomes of the experiments run via the open calls.

The result was the adoption of an arguably pragmatic approach. The consortium has attempted to identify exploitation opportunities from the beginning of the project. The current standing of these are discussed in sections 2.4 and chapter 3. However, the first open call is presenting some interesting opportunities, and the significantly larger second open call will undoubtedly do likewise. The consortium will therefore examine further exploitation opportunities as they arise.

Further comment on the first open call is contained in Deliverable D4.8, delivered simultaneously with this report.

What: As outlined in s1.1, the CONFINE project's initial mission is the development of a new testbed to support experimentally-driven research on Community-owned Open Local IP Networks (COPLANs). Ultimately, the goal is to conduct research into COPLANs to support their existence as a key platform within the future internet.

From the genesis of the project, the CONFINE consortium identified two key areas of exploitation of the research. Firstly, via the application of research results on node design to build more scalable, heterogeneous, dynamic open networks, able to cope with the Internet evolution and

growth. Secondly, the project has generated knowledge and experience in modelling and analysing the performance and behaviour of the facility gained during the testbed operation, the enhancements and improvements of the software used in the testbed, the federation mechanisms to be introduced, and the Community-Lab testbed itself. This research should be directly exploitable by the community network providers in order to improve the service management provided to their users, and to facilitate the research community to continue the collaboration.

Who: The CONFINE consortium includes members from academia and research institutes, but also existing COPLANs operators. Clearly the project exists to conduct research. However, the latter group, as practitioners, are equally important since their close involvement in the project should benefit them from insights gained into network design and operation.

2.3. Scientific knowledge

The scientific outcome of the CONFINE project is summarized by the defined deliverables, and developed software.

2.3.1. Publications

Table 1 contains a list of the CONFINE project's deliverables.

Table 1: CONFINE deliverables

ID	Due	Content	Status
D1.1	M12	First progress report (Year 1)	Complete
D1.2	M24	Second progress report (Year 2)	Complete
D1.3	M36	Third progress report (Year 3)	*Due M36*
D1.4	M48	Fourth progress report (Year 4)	*Due M48*
D1.5	M48	Final progress report	*Due M48*
D2.1	M12	Initial system software and services of the testbed	Complete
D2.2	M12	Initial software system for the testbed (nodes, services)	Complete
D2.3	M24	System enhancements (Year 2)	Complete
D2.4	M16	Testbed federation: scenarios, system requirements, interfaces, procedures	Complete
D2.5	M36	System enhancements (Year 3)	*Due M36*
D2.6	M24	Implementation of federation mechanisms for community networks	Complete
D2.7	M48	Software system for the testbed	*Due M48*
D2.8	M36	Federation of community networks	*Due M36*
D3.1	M12	Initial plan for operation of the community net testbedOperation and support guides of the testbed	Complete
D3.2	M24	Initial management guide of the testbed	Complete
D3.3	M36	User and deployment guides (Year 3)	*Due M36*
D3.4	M48	Manangement guide for deployed testbed (Year 4)	*Due M48*
D4.1	M24	Experimental research on testbed for community networks (year 1)	Complete
D4.2	M36	Experimental research on testbed for community networks (year 2)	*Due M36*
D4.3	M36	Experimental research on testbed for community networks (year 3)	*Due M36*
D4.4	M48	Experimental research on testbed for community networks (year 4)	*Due M48*
D4.5	M12	Open call for experiments	Complete

D4.6	M30	Results of first batch of selected experiments	*Due M30*
D4.7	M42	Results of second batch of selected experiment	*Due M42*
D4.8	M24	Tools for experimental research (Year 2)	Complete
D4.9	M36	Tools for experimental research (Year 3)	*Due M36*
D4.1	M48	Tools for experimental research (Year 4)	*Due M48*
D5.1	M3	IT and knowledge management tool	Complete
D5.2	M6	Plans for dissemination, training, contribution to standards	Complete
D5.3	M12	Dissemination, training, standardization activities in year 1	Complete
D5.4	M24	Dissemination, training, standardization activities in year 2	Complete
D5.5	M36	Dissemination, training, standardization activities in year 3	*Due M36*
D5.6	M48	Dissemination, training, standardization activities in year 4	*Due M48*
D5.7	M48	Socio-technical-economic-legal evaluation and sustainability model	*Due M48*
D5.8	M24	Draft Exploitation Plan	Complete
D5.9	M48	Exploitation plan	*Due M48*

Many of the deliverables have/will result in a dedicated publication. These and other scientific publications are available from the CONFINE project website[2]

2.3.2. Software

CONFINE-developed software is also publicly available from the CONFINE project website[3].

The CONFINE project's partners are committed to the creation of software under the Open Source/Free Software model, a proven means to continue useful software beyond project lifetimes.

2.3.3. Open data sets

The participating community networks and the research activities have created data sets of interest for the research community. Some data sets are generic, such as network graphs and other open data published by community networks. Other data sets are used in specific publications that are made available to enable others to reproduce, verify, extend the results or simply use them in other research activities. These are published in the project open data repository[4].

2.4. Generic exploitation opportunities

This section contains an overview of exploitation opportunities in three areas – academia, node systems and usage and management services.

2.4.1. Academic activities

The developed testbed and its operation are exploitable results within academia from different perspectives. From the perspective of access to community networks, the Community-Lab testbed closes the gap between community networks and academia. Usually, the movement of community

[2] http://confine-project.eu/publications/

[3] Software repository: http://redmine.confine-project.eu and documentation: http://wiki.confine-project.eu

[4] http://opendata.confine-project.eu

networks is bottom-up and not originated academically. Academia is therefore not well represented there. This new “bridge” to community networks build by the project results opens the opportunity for academia to bring community networks close to researchers and students. In addition to the obvious value of the Community-Lab testbed for research, students can be involved at different levels in research and development issues, and might find this applied field of ICT motivating for their career. The usage and the opportunities of community networks might grow due to the fact that academia will incorporate through technical subjects community network knowledge into engineering studies and doctoral programmes, which will finally make many more young engineers and researchers aware of these ICT infrastructures. Finally it should be stated that community networks could offer a currently mostly unexplored potential for new business opportunities, particularly for SMEs, and opportunities to work in high-qualified jobs. Summarizing we can say that the exploitation opportunity for academia is including community networks into the education of their students in the engineering and research training levels.

2.4.2. Node systems

If the node system is considered from a broader perspective, it can be observed that while the node system has been developed following the requirements of Community-Lab nodes, it has obtained properties that are interesting also for other applications.

1) Self-management capabilities were developed to address the need for un-attended updates. Among these self-management capacities we mention being able to safe update and carry out data preserving updates. Self-management is important for many other applications and the approach used in the node system could open new opportunities.

2) Functionalities that were up to now mainly done by high-end machines have been brought into low-end devices. The proof-of-concept of the node system for the particular application of a testbed node can easily inspire seeing such nodes being used for other purposes. While not as tiny as devices of the IoT, the devices used for the node system have shown that it is possible to downsize the requirements on hardware for certain applications. The concept of experiments associated to slices, a set of virtualized computers and networks, can be applied to build community clouds and provide scalable and adaptive services, equivalent to long-running experiments. The opportunity for exploitation is therefore in the potential for achieving energy-savings for certain applications for which up to now high-end machines were used. The node system, with the given evidence of an existing prototype, will allow to raise interest in considering the node system framework for other applications: both existing ones that could run now on smaller hardware and new ones that up to now could not been enabled due to energy consumption constraints.

2.4.3. Usage and management services

The Community-Lab testbed management is a unique experience world-wide. While there are many other testbeds which have management services, the conditions of how Community-Lab integrates into community networks are different to the other testbeds. There is therefore a clear opportunity to share the developed Community-Lab management services and the gained management experience with the community networks to evaluate the applicability of these Community-Lab's services for community networks, as well or considering the merging of components. The federation of Community-Lab testbed nodes among different community networks has implied the technical evaluation of a number of networking technologies. The experience gained with Community-Lab's usage and management services could allow community networks to build upon it and achieve different levels of federation among them. Federation will increase the community networks' reach in terms of people and services, which as a consequence

will increase their usefulness. In fact, these services can be the basis to support community clouds, where experiments are replaced by services, and resources can be contributed by a myriad of tiny resource providers. The usefulness of community networks for a significant number of people is crucial for the long-term sustainability of community networks. We see therefore as one of the important potential exploitation possibility of Community-Lab's usage and management services helping to unify community network infrastructures, bringing thus more people, a critical mass of people, together.

2.5. Dissemination

The CONFINE consortium has undertaken a number of dissemination activities to date, and will continue to do so over the next two years of the project. The key ones have been:

- Development of website and public wiki
- Establishment of Social media presence (Linkedin)
- Production of Leaflet and Poster
- Production of Press release
- Numerous general journal and magazine articles and scientific papers
- TV & Print media coverage
- Public demonstrations on academic conferences and community events
- Event organization promoting CONFINE (mainly the CNBuB scientific workshop, the IW4CWN community conference, and the Battlemesh workshop, and other specific socio-economic events)

The key point is that numerous activities have been, and will continue to be undertaken, with different stakeholder groups being targeted.

A more detailed analysis of the dissemination activities conducted to date is contained in D5.3 delivered at M12 and D5.4 delivered simultaneously with this report. To avoid repetition, this analysis is not reproduced here. Readers are directed to these documents.

2.6. Standardization

A further means of exploiting the CONFINE project's output is via it's contribution to industry standardization – these activities are contained in T5.4 of WP5 and reported at M24 in D5.4.

Further detail on this topic is contained in S3.7.

3. CONFINE partners individual exploitation strategies

This section contains the exploitation strategies of the individual CONFINE partners, together with a brief introduction to the respective organisations.

3.1. AWMN

AWMN operates a COPLAN in Greece. In Athens it comprises 1213 backbone nodes (Sept, 2013) and more than 2900 client nodes. It also expands outside the Attica region covering a geographical area of 110 km from North to South and 85 km from West to East. Furthermore, the islands of Aegina, Salamina and the regions surrounding Athens are connected to the network. AWMN is an active member of the Community-Lab testbed and several of its members participate in related activities.

3.2. Funkfeuer

Funkfeuer Vienna, Austria is a registered non profit association, focusing on the research and the advancement of community wireless networks. Funkfeuer started in 2003 as a Wi-Fi mesh community network. The model of Funkfeuer is an open community network, where participants are invited to join the network (and create a network node which can serve as intermediary hop for further nodes) thereby also expanding the network. Since 2003 Funkfeuer managed to create a wireless mesh network covering the whole city of Vienna and reaching far beyond until the edge of Bratislava. The network currently contains roughly 500 nodes on 240 roofs. FunkFeuer is an active member of the Community-Lab testbed and several of its members participate in related activities.

3.3. Guifi.net

Guifi.net is a free, open and neutral, mostly wireless telecommunications community network. It started in Catalonia in 2004, with (Sep 2013) over 22,100 operational nodes, 23,300 links or 30,000 Km of links. The majority of these nodes are located in Catalonia but the network is growing in other parts of Spain and world-wide. It is probably the largest wireless community network in the world. The network is self-organized and operated by the users using unlicensed wireless links and open optical links.

The Community-Lab infrastructure allows to bring experiments into the Guifi community network. On the long-term, these experiments should be seen from a broader perspective, from experiments to the deployment of services and applications. Services and applications inside of the community network that are so attractive to members that these applications are not sought in the open Internet but in the community network, are one of the important goals still not satisfactorily achieved today, towards which Community-Lab will contribute. Community networks as a collective effort could extend the sharing of networking resources to computing and storage resources, potentially applying Community-Lab technology. The exploitation therefore consists in building upon Community-Lab to expand the collective experience of the community network to other levels of resource sharing. This will offer new application areas to community networks. Specifically, the results of the collaboration on experiments in mesh routing have an influence in the development of qMp.cat, the Guifi.net mesh node distribution.

3.4. UPC

The Technical University of Catalonia is a university focused on engineering studies, with a large campus focused on Information and Communication Technology with more than 5000 students working on ICT related topics. It is located in Barcelona, Spain. The Department of Computer Architecture (DAC) has more than 100 faculty and performs research on computer architecture, super-computing, networking and distributed systems.

The participation in the development of Community-Lab has brought UPC to be in a privileged position regarding community network research. The exploitation consists then in allowing our students to take advantage of this opportunity, by carrying out PhD thesis on community network related research topics, and by developing and evaluating solutions in Master and Bachelor thesis. The education and knowledge our students will gain in community networks should enable them to explore in their professional career additional jobs and business opportunities in community networks. The Community-Lab and the virtual (VCT) testbeds are being used in research and training activities at UPC, and these are key instruments for the Distributed Systems research group at UPC.

Small technology companies (SMEs) with links to UPC, specifically those in the area of networking and cloud computing (either focused on community networks or in general services) can benefit from the access to the testbed, the tools developed and the results of the project.

UPC is interested in creating a long-term and open consortium to keep the Community-Lab and VCT tools operational beyond the limits of the CONFINE project. Research funds can be contributed to maintain this key infrastructure, hopefully with the collaboration of other organisations.

3.5. Pangea

Pangea is a private, independent non-profit organization founded in 1993 to promote the strategic use of communications networks and Information and Communication technology (ICT) for development and social justice and become a tool to help to meet the objectives of social groups, organizations and social movements in the local context. It is focused in promoting among social movements and organizations the values of sharing information, knowledge and technical resources for an effective and strategic use of ICT, especially the Internet, in a sustainable way that respects and values diversity of culture and local and global society.

The experience of the Community-Lab testbed operation is highly useful for Pangea. Though Pangea itself as a non-profit organization is not pursuing a commercial exploitation of this experience, this experience could allow Pangea to be partner in the management of other distributed infrastructures. Such a partnership could exist for instance in the sharing of tools with other non-profit organizations and helping partners of APC to build up similar infrastructures.

3.6. iMinds

The mission of iMinds is to provide highly competent specialists in different aspects of broadband technology and to carry out multi- disciplinary research for the Flemish business community and the Flemish government. iMinds unites 20 research groups from different Flemish universities that are complementary in expertise, excellent in their field and have a tradition of co-operation with companies for result driven research.

iMinds has sent a survey to different community networks around the world to compose a list of community networks and their characteristics. As such, iMinds wants to compare community networks and wants to help share best practices. To complete this survey, iMinds will present results from this survey during the International Summit for Community Wireless Networks 2013 in Berlin. iMinds intends to increase efforts to bridge the academic and community aspects of CONFINE, to increase cooperation and improve project outcomes. As an another example of this bridging approach, iMinds also helps community networks share open data on their (technical) network characteristics. This way, outside researchers can study community networks and community networks can learn from external research to improve their network. More details on this open data approach can be found in the deliverables from WP4.

From a local perspective, iMinds wants to work on promotion of community networks. Community networks are not well known to the general public in Belgium, although networks like Wireless Antwerpen and its local partner networks are fully operational. Therefore, iMinds wants to disseminate knowledge about community networks on a local scale. This will primarily involve increasing iMinds cooperation with the local community network, by supporting interaction with other community networks to exchange knowledge and best practices.

3.7. Fraunhofer-FKIE

Fraunhofer Gesellschaft is the leading organization for institutes of applied research in Europe, undertaking contract research in behalf of industry, the service sector and the government. The Fraunhofer Institute for Communication, Information Processing and Ergonomics FKIE (former FGAN) has embodied excellence in applied research in the field of defence and security technology for more than 50 years. It employs about 300 people at its location in Wachtberg close to Bonn.

Mobile ad hoc networks and wireless mesh networks are an important operating area of the Fraunhofer FKIE. The areas of application include but are not limited to first response and disaster recovery, robust communication with autonomous systems, and sensor networks. The CONFINE project is an important opportunity to increase competence and know-how in the area of ad hoc routing protocols, wireless, and heterogeneous networks.

The OLSRv2 reference implementation will allow various applications. Due to its modern, extensible architecture, Fraunhofer will be able to use this OLSRv2 implementation to offer tailored routing solutions for the areas described above also to commercial customers, without loosing compliance to standards. The competence and experiences acquired by the research on routing metrics for wireless and heterogeneous networks will further strengthen the corporate portfolio.

Radio to router communication protocols like DLEP provide an interface between radios and routers which is open to standardization. Different types of external radios from different vendors can be coupled with a single router instance at the same time, forming a heterogeneous mesh network without loosing the ability to incorporate physical and link layer information into the routing decision. Thus, the routing solutions from Fraunhofer FKIE will not be dependent on radio devices from selected vendors. Here, the Fraunhofer FKIE can again benefit from its standardization efforts in the CONFINE project.

The CONFINE testbed offers a unique opportunity to conduct large scale experiment for applications and communication protocols in wireless and heterogeneous environment. Besides the benefits for further developments, the Fraunhofer FKIE will offer internships to conduct experiments within this testbed in cooperation with a local University in order to recruit new junior scientific staff.

3.8. OPLAN Foundation

The OPLAN Foundation was formed in November 2004 as a not for profit organization dedicated to 'opening minds to open networks'. It seeks to achieve its mission by developing and sharing educational tools, information, experience and resources about the deployment of digital technologies in Open Public Local Access Networks (OPLANs) and other community driven networks – regardless of the technology employed.

The Foundation is the leader of WP5 – Dissemination, Training, Standardisation and Concertation. It therefore has a somewhat individual role in the CONFINE consortium – it is not a network operator, research institute or academic institution. As stated above, it is an advocacy group dedicated to promoting open-access communications networks.

Therefore, dissemination of the CONFINE project's results is both a WP5 task, but also the Foundation's core function. For the OPLAN Foundation – dissemination is therefore also a means of exploiting the project's outcome. The Foundation has a wide range of governmental links at local, regional, national and supra-national levels. It will disseminate CONFINE project results to as many of these as possible in co-ordination with other members of the project team, with the expectation that these activities will lead to further dissemination opportunities with new contacts.

Furthermore, it has a direct relationship with many community networks throughout the EU. Through its own website and other means as they become available, it intends to disseminate the results of the CONFINE project to as many of them as possible. The Foundation will continue to offer itself as a point of reference for emerging community-sponsored networks, seeking to promote best practices to these new networks.

4. Conclusions

The initial CONFINE exploitation plan provides different strategies by different partners to use CONFINE results in real-world environment and to spread it to others within the respective eco-systems of the partners.

This initial plan will be revised over the course of the next two years, in order that a more concrete plan will be delivered in M48. This will be based on feedback from CONFINE project partners, the results from the open calls and information collected from third-party organisations.

Exploitation and Dissemination are inexorably inter-linked. The CONFINE exploitation plan will therefore operate in conjunction with the dissemination plan. This way information will flow to and from external parties. This will help the CONFINE partners to tailor project outcomes and results in order that they outlive the project itself. Furthermore, CONFINE partners will continue to identify new groups and organisations that could potentially be interested in CONFINE project outcomes and determine any appropriate revisions required in order that these new groups best exploit the project.

It is also necessary to keep regional, national and European agencies and policy-makers in the loop to communicate CONFINE project results which may require new policies for deployment of project results.

The Confine project

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