OUTCOME DOCUMENT ON COMMUNITY CONNECTIVITY

The elaboration of this Outcome Document been facilitated by the IGF Dynamic Coalition on Community Connectivity (DC3). The Outcome document include a **Declaration on Community Connectivity** and a Report titled **Community Connectivity: Building the Internet from Scratch.**[1]

Inputs, comments and feedback to the Declaration have been provided by both DC3 members and non-members via the open mailing-list of the DC3 between July and November 2016. The Report includes a selection of analyses of different community connectivity issues. Any interested individual could submit papers to be included in the report. Submissions have been evaluated for their novelty and undertook a blind peer-review process.

DECLARATION ON COMMUNITY CONNECTIVITY

Preamble

Over four billion people may remain unconnected to the Internet, including around a billion who do not have access to basic telephony services. Most people in rural and economically disadvantaged areas are unlikely to realise the benefits of connectivity in the near term. Rural communities and slums dwellers represent almost 60% of the worldwide population and, to date, traditional Internet access models have failed to provide coverage to such populations.
While Internet access has improved in several countries, concerns about vertical integration, breach of privacy and net neutrality have become increasingly concrete. Policy and regulation have been adopted to avoid abuses but regulatory environments may be cumbersome and ineffective in fostering connectivity.
To reverse these trends and reclaim the role of the commons in networks, it is necessary to create appropriate frameworks that empower communities and local entrepreneurs to solve their own connectivity challenges, thus creating new opportunities in a sustainable fashion. Bottom-up strategies that embrace non-discriminatory treatment of Internet traffic and diversity in the first square mile can truly empower individuals and communities, allowing everyone to play an active role in making connectivity affordable and easily accessible.

1. Connectivity

Connectivity is the ability to reach all endpoints connected to the Internet without any form of restriction on the data-packets exchanged, enabling end-users to run any application and use any type of service via any device. Connectivity is the goal of the Internet.

2. Community Networks

[1] The Report can be downloaded at http://www.slideshare.net/FGV-Brazil/community-connectivity-building-the-internet-from-scratch

Community networks are a subset of crowdsourced networks, structured to be open, free, and neutral. Such networks rely on the active participation of local communities in the design, development, deployment and management of the shared infrastructure as a common resource, owned by the community and operated in a democratic fashion. Community networks can be operationalised, wholly or partly, through local stakeholders, NGO's, private sector entities and/or public administrations and are characterised by the following points:

a) collective ownership: the network infrastructure is owned by the community where it is deployed;
b) social management: the network infrastructure is governed and operated by the community;
c) open design: the network implementation details are public and accessible to everyone;
d) open participation: anyone is allowed to extend the network, as long as they abide the network principles and design.
e) free peering and transit: community networks offer free peering agreements to every network offering reciprocity and allow their free peering partners free transit to destination networks with which they also have free peering agreements.
f) the consideration of security and privacy concerns while designing and operating the network

3. Community Network Participants

Community networks members have to be considered active participants and, as all Internet users, have to be considered both producers and consumers of content, applications and services. Notably community network participants:

a) have the freedom to use the network for any purpose as long as they do not harm the operation of the network itself, the rights of other participants, or the principles of neutrality that allow contents and services to flow without deliberate interference;
b) have the right to understand the network and its components, and to share knowledge of its mechanisms and principles;
c) have the right to offer services and content to the network, while establishing their own terms;
d) have the right to join the network, and the obligation to extend this set of rights to anyone according to these same terms.

4. Policy Affecting Connectivity and Community Networks

National as well as international policy should facilitate the development of connectivity and the deployment of community networks. Notably, national as well as international policy should:

a) be designed considering the impact on connectivity, with particular regard to individuals' human rights to freedom of expression and privacy;
b) lower barriers that may hinder individuals' and communities capability to create connectivity;
c) allow the exploitation of existing unlicensed spectrum bands or dynamically asigned secondary use of spectrum for public-interest purposes and consider the growth of unlicensed spectrum bands and special licenses for the needs of community connectivity.

d) incentivize the development and adoption of technologies based on open standards, free software and open hardware, which improve the replicability and resilience of community networks.

OVERVIEW OF

COMMUNITY CONNECTIVITY: BUILDING THE INTERNET FROM SCRATCH

The Report is structured in two sections analysing (i) the architecture, governance and policy features of Community Networks (CNs) and (ii) subsequently exploring a variety of CN experiences, fostering connectivity around the world.

1.1. Community Networks: Governance, Policy and Regulation

The first part encompasses four analyses defining CNs' underlying structure and conceptual theory, explaining regulatory barriers and bringing possible solutions for the main policy, regulatory and governance challenges.

In their paper on "Fostering Connectivity and Empowering People via Community Networks: the Case of AlterMundi," Luca Belli, Nicolás Echániz and Guido Iribarren stress that, given that 4 billion people still lack access to the Internet, the traditional model of Internet access provision should not be necessarily considered as the most efficient one. Therefore, alternative models such as CNs should be experimented and analysed, in order to test their feasibility and should be encouraged, in case they prove viable and scalable. CNs foster a particularly interesting approach to connectivity, due to their peculiar features as alternative bottom-up initiatives, based on community-driven infrastructure development, which may prove efficient to bridge existing digital divides. The authors stress that, differently from traditional networks, CNs directly engage users that may be active participants in the network design, deployment, operation, and maintenance. Analysing the core elements of CN, the authors suggest that although in the past the establishement of CNs has been challenging, at present, CNs may be relatively easy to develop, exploiting the exisiting knowledge. However, the success of such bottom-up and community-driven efforts depends on a variety of factors, exceeding the mere technical sphere. Belli, Echániz e Iribarren consider some essential policy and governance challenges and, subsequently, analyse an example of successful community-networking experience, the AlterMundi network model. Providing insight on the inception, evolution and fundamental features of the AlterMundi Network, the authors stress that alternative models may not only be successful in connecting unconnected communities but they can also empower local stakeholders, creating a new local digital ecosystem and allowing local communities to become the true protagonists of the connectivity growth.

In "A commons-oriented framework for Community Networks" Leandro Navarro, Felix Freitag, Roger Baig and Ramon Roca introduce a unique framework for the comparative analyses of community networks instances, mostly driven by Elinor Ostrom's commons theoretical principles. First, the authors review and partially re-define the concept of commons in the

context of digital networks infrastructures. Subsequently, the article provides a general framework for the comparative analysis of different CN instances in an attempt to set a “reference conceptual architecture" that can help understanding different organisational models and their implementation. Particularly, the authors analyse the resilience and sustainability in a common property regime (CPR), its incentives and compensation mechanisms and provided a list of CNs around the world, followed by a detailed analysis of commonalities and differences. As the authors highlight, diversity makes a difference, and local CNs are able to created local institutions or organisational structures adapted to local conditions and needs, with different levels of sophistication and varying from starting points, goals, strengths and weaknesses, as well as levels of development and structuring. However, form the analysis it emerges that the power of CNs is not limited to the local realm. The complexity and challenges around the CN environment suggest that as the networks grow, they tend to form federated structures. Importantly, such “second-layer organisations” allow to aggregate smaller and local initiatives and enjoy the benefits of scale in sharing knowledge, sometimes also governance, services, infrastructure, and become a visible actor to have a dialogue with governments, regulators or other agents as a sector or collective.

In June 2016, the netCommons.eu project organised a workshop in Barcelona (Spain) to share views and discuss how public administrations, citizens and enterprises can strengthen ties amongst them to contribute to the growth of CNs. In the third contribution of this report, Leandro Navarro, Roger Baig, Ramon Roca Renato Lo Cigno, Leonardo Maccari, Panayotis Antoniadis, Maria Michalis, Melanie Dulong de Rosnay and Félix Tréguer reflect on the advancement and main lessons learned during the netCommons.eu workshop. Notably, based on the experience and the work done so far by various CNs in Europe, the paper on “Efficient collaboration between government, citizens and enterprises in commons telecommunication infrastructures” attmpts to expand knowledge about multistakeholder collaboration with regard to CNs, while identifying specific lines of action to make them more efficient in the future. These challenges are analysed and discussed successively from the point of view of governance, presenting the theoretical framework and a variety of organizational arrangements beyond the traditional commercial model; regulation, in order to provide a better understanding of the legal issues surrounding CNs; and CN implementation. Although further work is required to develop universal ideas and generic mechanisms in the light of the local specifics, the authors believe that coordination mechanisms among private and public organisations and citizens can help to accelerate the development of sustainable networking infrastructures, for the benefit of all parts and society in general. Different organisational models, cooperative and competitive schemes, coordinated and regulated by public entities, can flourish and allow commercial and community operators to develop and ensure they can best participate in the digital society.

The first part of this report is closed by Federica Giovanella’s paper on “Community Networks: Legal Issues, Possible Solutions and a Way Forward in the European Context.” *Particualrly, Giovanella* focuses on the issue of tort liability , with regard to three different actors: CNs users; Internet Service Providers, for the case of shared Internet connection; and CNs themselves, describing different situations to which civil liability could or should be applied. As the analysis demonstrates, the inherent structure of CNs seems irreconcilable with the aims of current legal framework for tort law in Europe. Its distributed character often implies the

fragmentation of conducts: a single conduct can be ascribed to a high number of different users' machines, and most communities have neither written norms regulating relations amongst users, nor central authority. If, on the one hand, the possibilities of identifying wrongdoers are diminished, on the other hand, offering no legal protection for victims, implementing an identifying system could have a chilling effect on freedom of expression. The author therefore seeks to indicate possible steps to be taken to allow a reconciliation between CNs' prosperity and the needs of law-enforcement. For instance, she suggests that lawmakers should consider existing CNs' tools, or "soft regulatory tools", as a starting point and encourage the adoption of more detailed codes of conducts that could turn into an informal monitoring system implemented by users. This would depend on a careful study of the functioning of the communities and of their social norms and the effectiveness of such system would have to be tested. In any case, as Givanella argues, a part from the questions related to liability, policymakers should start considering the adoption of regulations that could foster CNs. In light of the fact that CNs are spreading all over the world, there is no doubt that specific policy actions should be considered in order to allow and
promote the experimentation and eventual prosperity of such networks, including in developing countries.

1.2. Do It Yourself: Creating Connectivity around the World

The second part of this report explores a wide range of CN examples, stressing the existence of an ongoing CN movement, which is successfully spreading on a global scale.

In her paper on "A network by the community and for the community" Ritu Srivastava argues that CNs play a pivotal role in bridging existing digital divides in India, fostering connectivity and empowering individuals and communities, particularly creating new opportunities for individuals living in remote areas. Notably, the paper focus on Wireless Community Networks (WCN) or Community based Internet Service Provider (C-ISP), which are such networks whose infrastructure is developed and built by small organisations and community members by pooling their resources. These networks are managed, operated and owned by community members. Srivastava highlights that CNs offer affordable access to the internet while strengthening the local community. These networks are meant to provide last mile access from the village council level to the household level. Srivastava highlights that, to provide last mile access, the government of India has proposed various action plans including the National Optic Fibre Network (NOFN) under its umbrella vision, Digital India. As the author argues, the challenge is not only limited to laying wired infrastructure but also demands to consider how to connect a country where limited bandwidth is available. This implies a need for a decentralised model, highlighting the existence of various patterns of using ICTs and alternative solutions to foster sustainable connectivity and create sustainable smart villages. In this perspective, the author explores the "wireless for community programme," promoted by the India based Digital Empowerment Foundation, whose purpose is to provide affordable, ubiquitous and democratically controlled Internet access in rural regions of the country. Conspicuously, Srivastava notes that the wireless for communities programme is enabling communities' economic development, reducing poverty and encouraging civic participation, while creating smart villages around the country. The author investigates the efficacy of creating

WCN, C-ISP and Rural Internet Service Provider (RISP) and explores the possibility of policies, which could help in creating widespread information infrastructure for the lstill-unconnected populatins of the country.

In their paper on a "Map of the Community Network Initiatives in Africa," Carlos Rey-Moreno and Michael Graaf provide a unique perspective on CNs in the African continent. As Internet infrastructure built by citizens for the benefit of their communities, CNs have grown consistently and attracted considerable attention in recent years. In particular, the authors stress that a growing number of voices is proposing CNs as a potential solution to provide affordable access in areas where the market is failing to do so. However, none of the CNs usually considered as examples, such as guifi.net, Rhizomatica or the Digital Empowerment Foundation, to name a few, come from Africa, where access to affordable communications is lacking in most places. Rey-Moreno and Graaf attempt to identify the reasons behind this gap by providing the first map of the CNs deployed in the African continent. CNs have been identified via web search and interviewing people directly or indirectly involved with their development. Results include the identification and profiling of 37 initiatives in 12 different countries, out of which 30 are currently at least partially active. Results show that 60% of these networks are located in one single country, South Africa, while only 1 (and not active anymore) was identified in the whole of Northern Africa. Additionally, in contrast with the common definition of CNs being essentially decentralised networks, in the African continent, most networks (82%) have less than 30 nodes, and have been either funded and/or bootstrapped externally. Only Wireless User Groups in South Africa fits into the definition of a large scale and decentralised CN. Bearing in mind the many particularities of different contexts, the results put forward by Rey-Moreno and Graaf are a necessary and valuable first step to start understanding the CNs movement and allow such movement to have a greater impact in Africa.

Subsequently, in their paper on "Beyond the last mile: Fonias Juruá Project – an HF digital radio network experiment in Amazon (Acre/Brazil)," Francisco Caminati, Rafael Diniz, Anna Orlova, Diego Vicentin and Paulo Lara analyse the possibility to utilise digital radio on High Frequency (HF) to provide information and communication infrastructure. Notably, the authors present the experience of the "Fonias Juruá" project, which applies digital radio on HF to provide information and communication infrastructure to a rural Amazon community, which is underserved by regular/commercial networks. The authors analyse the historical and political background of the project and describe the novelty of the technical solution that is being developed. The beyond-the-last-mile image is evoked not only to acknowledge the material conditions of the lack of Internet connection in a particular locality but mostly to propose a critical framework to address and question the paradigm of inclusion as an imperative for the underserved global south. Notably, Caminati *et al.* highlight the centrality of the spectrum governance, in order to properly debate CNs while allowing to explore the potential of digital radio technologies as network solutions. The experience of the "Fonias Juruá" project is contextualised within relevant historical and contemporary initiatives in Latin America allowing to comprehend the different facets – local/community; popular; public; free; illegal/subversive – of radio transmissions, Internet "appropriation" and direct interventions with regard to spectrum governance.

Lastly, in her paper on "*Caracterización de los espacios en blanco del espectro radioeléctrico en la banda UHF en países emergentes: Caso de estudio del Estado Mérida*" (The Characterisation of the White Spaces Spectrum bands in emerging countries: the Case of Mérida State), Maureen Hernández explores the use of White Spaces (TVWS) as a solution to the shortage of spectrum and the expansion of connectivity in remote areas. TVWS are spectrum bands left unused by TV broadcasters, due to the transition from analogue to digital television or simply because in certain regions TV operators do not see a return on investment. Therefore, these frequencies are available for use. However, Hernández highlights that monitoring technique must be performed in order to declare that a portion of spectrum is underused. In this perspective, the author performs a census of the spectrum frequencies between 300 MHz and 900 MHz, which belong to the Ultra High Frequency band. The measurement are undertaken exploiting low-cost devices so that such exercise can be easily replicated in developing countries, where the possibility to utilise unexpensive technology is an essential requirement. The author offers a measurement framework, developed through an empirical approach, demonstrating that it is possible to make an organised and structured census of spectrum bands with the aim of providing insight into the state of spectrum. A sargued by Hernández, the possibility to undertake such measurement plays an instrumental role, in order to justify the use of TVWS for the deployment of CNs as well as for cognitive-radio use.