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Roger Baig, Felix Freitag, Leandro Navarro

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Cloudy in guifi.net: Establishing and sustaining a community cloud as open commons

Roger Baig[a], Felix Freitag, Leandro Navarro[b]

[a] *Foundation for the Neutral, Free and Open Network - guifi.net. Gurb, Catalonia*
http://fundacio.guifi.net
[b] *Distributed Systems Group, Departament d'Arquitectura de Computadors, Universitat Politècnica de Catalunya, Barcelona, Spain,*
http://dsg.ac.upc.edu

Abstract

Commons are natural or human-made resources that are managed cooperatively. The guifi.net community network is a successful example of a digital infrastructure, a computer network, managed as an open commons. Inspired by the guifi.net case and its commons governance model, we claim that a computing cloud, another digital infrastructure, can also be managed as an open commons if the appropriate tools are put in place. In this paper, we explore the feasibility and sustainability of community clouds as open commons: open user-driven clouds formed by community-managed computing resources. We propose organising the infrastructure as a service (IaaS) and platform as a service (PaaS) cloud service layers as common-pool resources (CPR) for enabling a sustainable cloud service provision. On this basis, we have outlined a governance framework for community clouds, and we have developed Cloudy, a cloud software stack that comprises a set of tools and components to build and operate community cloud services. Cloudy is tailored to the needs of the guifi.net community network, but it can be adopted by other communities. We have validated the feasibility of community clouds in a deployment in guifi.net of some 60 devices running Cloudy for over two years. To gain insight into the capacity of end-user services to generate enough value and utility to sustain the whole cloud ecosystem, we have developed a file storage application and tested it with a group of 10 guifi.net users. The experimental results and the experience from the action research confirm the feasibility and potential sustainability of the community cloud as an open commons.

Key words: Community networks; community clouds; Cloudy software stack; self-organised governance systems; self-provisioning; common-pool resources; commons.

1. Introduction

Commons are natural or human-made resources that are managed cooperatively [1, 2]. Based on that, we define open commons as commons with no restriction regarding the number of participants. Community networks (CNs), IP-based networks that are built, owned, and operated by citizens in a participatory and open manner, are a successful example of digital infrastructure managed as open commons. Hundreds of CNs operate across the globe in rural and urban as well as rich and poor areas. In these communities, the participants, including volunteers, enterprises, and public or private organisations share not only networking hardware but also time, effort, and knowledge. In Europe, several CNs have been operating for more than a decade and have several thousand nodes.[1] In India, community-owned and operated wireless networks

Email addresses: roger.baig@guifi.net (Roger Baig), {leandro, felix}@ac.upc.edu (Felix Freitag, Leandro Navarro)

[1] For example, Freifunk (http://freifunk.net) in Germany and guifi.net (http://guifi.net) in Spain both have over 30,000 nodes (2017).