

PAWS: Public Access WiFi Service

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ABSTRACT

PAWS (Public Access WiFi Service) is a RCUK funded project that seeks to develop technology that will enable a service provider to offer free Internet connectivity to access essential services to all. This will provide greater opportunities of access, enabling digital inclusion and, in turn supporting the UK Government's 'digital by default' programme with associated cost savings. This short paper outlines a paradigm based on a set of techniques that make unused capacity in home broadband networks available to other users, and describes how the methods will be realised and assessed by experimental deployments to urban and rural communities.

1. INTRODUCTION

Digital inclusion is important for social equality to ensure access to the many benefits that the Internet offers. The digitally excluded are often elderly, socially excluded, and/or economically deprived. Many individuals have low levels of physical mobility (e.g. lack a car) and high levels of reliance on support services (which are themselves becoming increasingly digital), and so have a great deal to gain from Internet access. At the societal level, aside from the issues of social justice and equality, the consequences of digital exclusion are economically inefficient offline access to services and a reduction in participation in the new opportunities offered by the Digital Economy (DE).

Whilst amongst the elderly the primary exclusionary factor is cultural (who commonly do not perceive value in digital technology [1]), amongst younger demographics who *want* to be online, affordability is cited as the primary barrier, (e.g. over 40% of digitally excluded 16-44 year olds [2]). The UK Government's current efforts to address digital inclusion have focused primarily on £530m to subsidise industry deployment of both 'superfast' broadband (predominantly to urban areas), and 'standard' broadband (mainly to rural locations) [3]. This approach is predicated on a desire to support new DE services through improvements in access speed, while simultaneously ensuring basic levels of access for all (e.g. access to critical services such as jobseekers, NHSonline websites etc that do not require high capacity broadband).

Crucially, this approach addresses infrastructural barriers without addressing economic ones. Pricing is left to the market. Many individuals find themselves unable to afford broadband access, unable to pass a necessary credit check, or living in circumstances that are too unstable to commit to lengthy broadband contracts. However, we believe that

leaving connectivity for all to be governed by market economics is a major impediment to achieving the full benefits of the DE, and that *basic* Internet access should be made freely available to all due to its societal benefits. Indeed, Internet services are increasingly accessed on the move and so current models of "roaming" access provision drive this economic exclusion to a new level, not currently addressed by the push to deploy broadband.

We assert that to enable digital inclusion, everybody should be guaranteed a *minimum* level of Internet access. A significant group of people find themselves at the lower end of the social or economic scale, and unable to afford this essential service. These groups exist in both urban and rural areas, but can become critical where they characterise entire urban communities. The challenges of access for many rural users are the same, but the under-lying causes are different, the cost of providing Internet infrastructure is usually higher because the points of access, i.e. consumer houses/offices are more dispersed in rural areas – leading to patchy network coverage, especially when multiple providers compete for customer share. These issues are compounded by the greater distances over which people operate and the need for access across a range of locations.

2. The Public Access WiFi Service

Our research is informing and developing technology to enable free Internet connectivity to access essential services, paving the way to new access models. PAWS (Public Access WiFi Service), is a new Internet access paradigm based on a set of techniques that make use of the available unused capacity in home broadband networks and allowing Less-than-Best Effort (LBE) access to these resources [4]. Case study deployment of this technology will be underpinned by a programme of social research which will establish a socio-economic profile of the area, recruit potential participants and, most importantly, conduct a longitudinal multi-method assessment of participants' current practices and subsequent experiences of this technology.

PAWS adopts an approach of community-wide participation, where broadband customers are enabled to donate controlled but free use of their high-speed broadband Internet by fellow citizens. Other initiatives have already explored sharing a user's broadband Internet connection via wireless (e.g. [5]). Although these methods are gaining worldwide acceptance, they are usually viewed as an extension of a user's paid service – accessible only to

other customers of the same service. In contrast, PAWS will extend support *free access to essential services to all*.

To protect the consumer's paid service and the service provider revenue, it is essential to ensure that the free user traffic does not impact perceived performance of the bandwidth donor (customer). The PAWS service is therefore constrained to offer a LBE access to network resources (lower quality compared to the standard Internet service offered to paying users). Various methods are being considered, including enabling LBE in the network.

The project is designed to consider the recent growth of smartphones, as the user interface to many digital applications, and to a lesser degree other common WiFi-enabled devices like tablets, laptops and TVs, that the digitally excluded are beginning to access the Internet. Data is limited on this recent phenomenon but it is known that 52% of 16-24 year olds and 23% of Socio-Economic Group C2DE now have smartphones. This proportion is growing rapidly: in both groups, 65% obtained their phone in the last 12 months [6]. This growth is likely driven at least in part by the willingness of parents in low income families to make considerable sacrifices to meet their children's informational needs [7]. WiFi-enabled Pay-As-You-Go smartphones are now available for £50 and as prices continue to fall it is likely that an increasing proportion of the 86% of C2DE individuals who already own a mobile will switch to a smartphone [8]. PAWS would further accelerate uptake by providing a free, network-independent means of Internet communication.

3. User Engagement in PAWS

The project seeks to increase user access opportunities, enabling digital inclusion and in turn supporting the UK Government's 'digital by default' programme with its associated cost savings and service improvements [9]. We will explore the benefits offered by our proposed method to both users and network operators. This will consider other important deployment challenges concerning how to manage a "free user base", e.g. establishing a fair use policy, access control, etc.

Case study deployment of the technology to both urban and rural deployment areas will underpin the programme of research. The project will recruit 50 'donors' (existing broadband users whose routers will provide access points) and 50 'users' (currently digitally excluded) in each deployment area.

The research programme has two strands: socio-economic and technological:

(a) **Socio-Economic:** The socio-economic strand will establish a picture of relevant urban-rural economic demographics i.e. people who cannot afford to pay for a basic/high speed Internet service; to understand ownership of devices that have the capability to access services, and the user requirements; to evaluate perceptions of the opportunities offered, and ultimately the impact of the project itself. We expect the majority of users will already own a device to access the Internet, but we will also provide 10 users with smartphones during the trial, which will provide additional usage information.

(b) **Technology:** The technology strand focuses on analysing the technologies required for deployment. We seek to understand the potential networking techniques in the context of how broadband customers use their Internet service and how much unused capacity is actually available within the network. We seek to answer the following high-level questions: How easy is it for an operator (e.g. BT, a project partner) to deploy a LBE service and make it known to potential users? What facilities must we provide regarding registration of users to such a service for regulatory, legal and other reasons (e.g. lawful interception)?

Coordination as the deployment proceeds between the two strands is expected to allow for the rapid identification of social and technical issues, which will then be addressed through responsive implementation. We expect the longer-term goals of the work to influence standardization, define best current practice for operators, and influence government policy. There could also be opportunities to pilot new applications and uses of digital technology.

4. CONCLUSIONS

Although there is no single 'magic bullet' to remove socio-economic barriers, there are infrastructural solutions that we suggest could drastically reduce the barriers. The PAWS (Public Access WiFi Service) project provides an important first step in this direction by establishing technical requirements and identifying the current practices and needs of the digitally excluded. The case studies will demonstrate PAWS and establish a socio-economic profile of the case study areas, recruit potential participants, and most importantly conduct a longitudinal multi-method assessment of participants' current practices and subsequent experiences of the technology. Following successful demonstration, we plan to encourage government policy to support industry uptake, leading to national deployment.

5. REFERENCES

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