OpenHub

The need for an open standard for digital home gateways

Introduction

It is the modern fashion to set up a “market” for all utilities delivered to customers. Bill payers are encouraged to use U-Switch and similar resources to seek out the best deals; the theory is that this will lead to steady downward pressure on prices. Flipping domestic contracts for utility supply from one company to another is almost trivial. The hardware underpinning that switch is taken for granted.

What is often forgotten is that all the traditional utilities (electricity, gas, telephony, water and sewerage) went through a phase in which public ownership was a major factor, if not the monopoly supplier. This was usually the period during which national standards were created for the infrastructure components, and when that standard infrastructure was rolled out universally. The standardized hardware was put in place long before competition was seriously contemplated.

In the case of electricity, for example, in 1925, the British government asked Lord Weir, a Glaswegian industrialist, to solve the problem of Britain's inefficient and fragmented electricity supply industry. Weir consulted an expert called Charles Merz, and the result was the Electricity (Supply) Act 1926, which recommended that a "national gridiron" supply system be created.[3] The 1926 Act created the Central Electricity Board, which set up the UK's first synchronised, nationwide AC grid.

With broadband, we have not had such a period of nationalized ownership, nor are we likely to in the future. In order to create a homogenized infrastructure – and thus a “level playing field” for competing suppliers – we are going to need a slightly different approach.

Broadband is also a much more complicated utility than anything else which is delivered to residential customers. To specify a connection to electricity, gas, or water or sewerage takes only a few parameters, and to test an implementation is also easy. By contrast, the full collection of standards applicable to data infrastructure runs to tens of thousands of pages for the connection alone. And there are still areas which need more standards work. Even a simple move from one DSL supplier to another inevitably involves receiving and installing a new router; if you want to contemplate a switch to cable or WiMAX you’re into installation engineers crawling over your house. And that’s just for the connection to the outside world.

The word “Broadband” is of course a convenient shorthand for the entire data infrastructure and its ecosystem. At the moment there is a clear case of market failure in this ecosystem. The variation in the configurations and the options available make development a nightmare, marketing confused, and customers underwhelmed. As the “internet of things” grows, the situation is in danger of getting so completely muddled that market growth will stall completely.

What is most needed is an approach to residential data infrastructures which simplifies the problem to the point that it becomes tractable. We believe that the “Open Digital Consumer Unit” (the Open DCU) provides exactly that simplification, and creates a resource into which all the other parts of the ecosystem can plug, in a standard way.

The objectives

The top level objectives are threefold:

- Create a connection device that can be transferred between broadband suppliers, to create an open market for Broadband ISP services.
  A customer should be able to choose between services in just the same way as they choose other utility offerings. Services could include broadband to the PC, but could also include the management of the core home device itself.
- Create an environment where standard off-the-shelf devices can be added to the home infrastructure without requiring specialized skills.
  The standard for the 240V/13A socket allows consumers to buy white goods from any supplier, knowing they will work when plugged in; the same should apply to data devices.
- Provide a standard processing resource to allow software services to be added to the home at minimal cost.
  The capability of modern browsers has allowed many advanced functions to be delivered through the web at low cost, and independent of the platform on which the browser is run. A similar environment for home control add-ins would allow a whole new industry to emerge.

More detail

The key to making this happen is to define a standard “black box” to deliver the functionality required. The long term aim is to ensure that this functionality is available in every home in the country (and if possible across Europe and even the world). The exact implementation is not important. It could (and probably will, in the long term) be a single small box, or the functionality could be delivered by a collection of devices from different manufacturers or suppliers. The standard should be open, so that like the PC market, manufacturers can compete to provide the best package.

The environment in which the Open DCU operates is shown in figure 1. As can be seen, the box provides a link between wired and wireless conventional home networking, home control equipment and the connection to the outside world.

Inside the Open DCU is a processing resource that can be used to run software providing services to the house. Typical application modules might include heating control, lighting control, security systems, Telecare, voice interface, assistive adaptation interfaces, and many more functions.

The system may also include a generic “smart display” that can be used as another general resource by applications that need to interact with users.

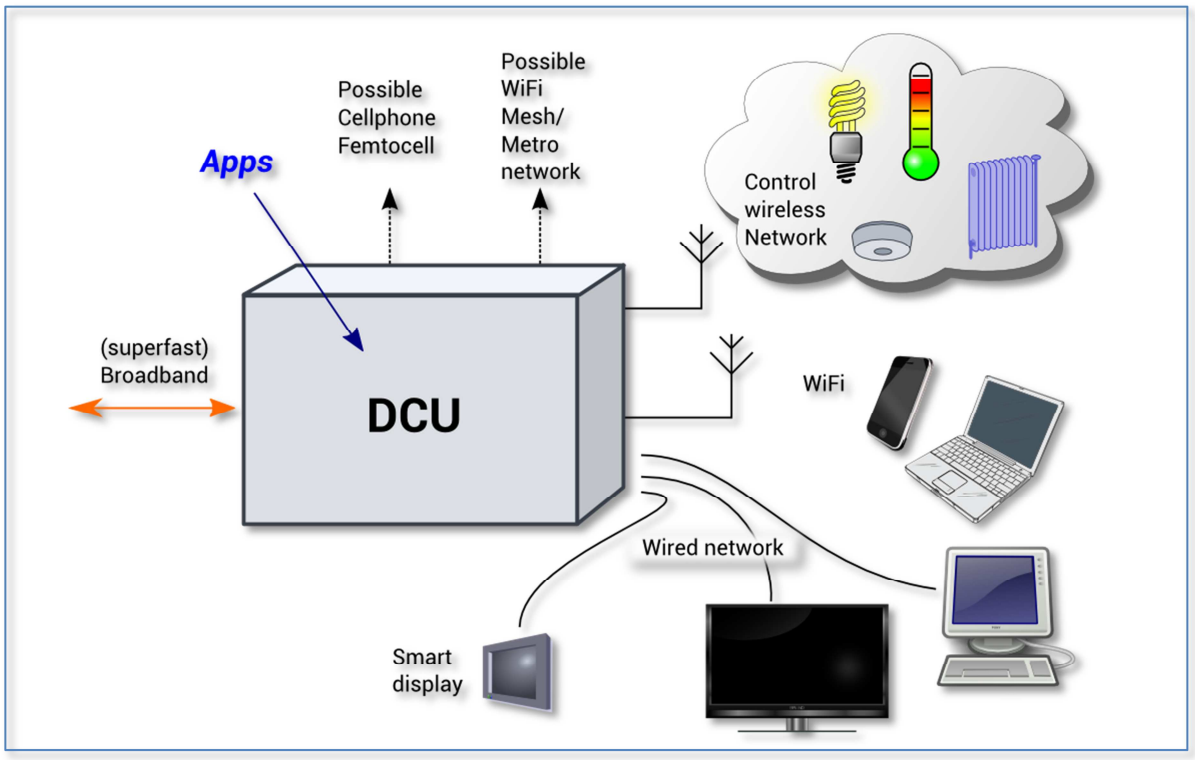

Figure 1: The home ecosystem

The politics

The main problem with trying to achieve a standard for the DCU is the huge number of powerful vested interests involved.

There are myriad private-sector initiatives and proposals for "home gateways", but none have really addressed the requirement for a standard resource that can be transferred from one management utility to another. Most such solutions address the perceived needs of the sponsoring organization(s), and are based on the assumption that the box will be provided and managed by a single company.

The open source community is primarily interested in solutions that can be configured and managed by the householder, which tends to result in powerful and flexible systems that only a geek can use. The other strand of open source work is focused on underlying building blocks. Some of the results of this work are already widely used (Apache web servers power something like 85% of the world's web servers, for example). Other open source projects are producing components that may also be useful for the Open DCU, or inform design decisions.

For these reasons, we believe that the only way to achieve a truly future-proof solution is public-sector sponsorship. After all, this is the way that most of the advances in utility provision over the last two hundred years have taken place.

The Smart Cities initiative provides the perfect opportunity to start the development process for the Open DCU. It is totally in line with the tradition of public direction for utility infrastructure, and a suitable scale to implement a working proof of concept.

Annex 1: Development process

Over the last eight years, OpenHub has been working in background mode on the requirements for an Open "Digital Consumer Unit". This provides a good starting point for moving the project forward.

The following phases have been identified to create and implement the DCU and the open market for broadband services:

Phase 1 will be a formal capture of requirements, in consultation with representative parties from all roles in the hypothesized new open market. The Smart Cities initiative will provide an excellent focus for such parties to come together.

Phase 2 will be the development of a draft Function Specification. This will be the key document in all subsequent activity, and will finally become the public standard for the Open DCU. This phase will also start to define how the open market will be created and operated.

Phase 3 will be the development of a functional prototype for the DCU. This means building a system that behaves like the final design in all external regards, although it may well be large, expensive, power hungry and overly complicated internally. This phase will proceed as a series of "sprints" to expand the functionality piece by piece. A demonstrator for the open market transfer of ownership process will also be created.

Phase 4 will be the engineering of a usable prototype which can be installed in the Smart Cities pilot locations. The open market mechanisms will be tested.

Phase 5 will be the refining of the specification and design in the light of experience in the pilot, and subsequent upgrading of the pilot installation.

Phase 6a will be publication and dissemination of the Open DCU Functional Specification as an open standard. At this point, it is expected that various parties will produce low-cost production versions of the reference design, so that it can be specified and installed in many new projects.

Phase 6b will be the implementation of the infrastructure and regulations required to create an open market for both DCU management and broadband supply.

Annex 2: Why this is different from private sector initiatives

This is not proposing a "walled garden" which will favour one industry player over another. The key difference is that this is an open-source initiative which will create a level playing field.

This Open DCU work needs consultation and external input (including funding for academic work), but it also needs a degree of autocracy (and political support) to balance the vested interests. It needs some funding to develop the standard, but that's all.

During and after the standards process, political support will be needed both to encourage the roll-out and for the creation of the open market. We see this as the lightest possible touch which achieves the desired outcomes.

The overall result will be to place UK in a world-leading position in the provision of open-market digital services to homes and small businesses.