Satellite Technology in Schools

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INTRODUCTION

SchoolSat[1] was an initiative to utilise advances in satellite technology to improve access to the Internet for Irish schools. It was partially funded by the European Space Agency under the ARTES 3 Multimedia Programme and ran from December 2001 until January 2003. The purpose of *SchoolSat* was to set up, manage and evaluate a pre-operational, satellite-based service for compulsory schools in Ireland. It had as a clear objective and expected outcome: the establishment of a business and deployment plan for a fully operational and sustainable service for the Irish compulsory school sector based on a strategic mix of uni-cast and multi-cast services.

BACKGROUND

In most countries, the Internet is seen as a central component of an educational ICT strategy. It is seen as important for a variety of reasons. In part, the Web can be seen as a vast library of resources, some of which can be used by both teachers and students to enrich teaching and learning. There is also an equality dimension to the resource view of the Web, as the smallest and most isolated schools with no library can access exactly the same online material as the biggest urban schools.

The Internet may also be a conduit for a new generation of educational software. For decades specialist software aimed at schools has been produced however, despite the success of the educational software sector in the home and training markets, little of it is in use in schools. The use of software in schools may have been constrained by logistical difficulties including licensing, installing the software, etc. Many of these difficulties can be avoided if educational material is available online, providing an easier solution in school, one that students can continue at home, and teachers can explore in advance with ease.[2]

The need for Internet access in school also goes beyond the content of the World Wide Web. In part, "the medium is the message," as it becomes important for learners to develop information literacy. Negroponte, in his seminal book *Being Digital*, describes a "post information age," where individuals have much greater control of the information they receive and send, where they can communicate with agencies in a "place without space," and where they can control more of the information they receive.[3] This vision of a society with empowered individuals finding information as they need it and managing their own learning and information needs is an attractive one, but it is dependent on learners having the skills to deal with the vast amounts of material available to them.

THE SchoolSat PROJECT

The *SchoolSat* Pre-operational Pilot project used Internet via DVB (Digital Video Broadcasting) satellite technology with the KU band return channel for the establishment of the interactive channel. The aim of the trial was to investigate how far this technology could offer a solution to connect schools to the Internet, to build school networks and to transmit large files of information, be it data, video, audio, or graphics.

The planned service was based on the Digital Video Broadcasting (DVB) standard which is deployed Europe-wide (and is becoming accepted as a worldwide standard) for digital television. It allows the user to receive Internet services with a relatively small antenna (less than 1 metre diameter) and a PC (personal computer) equipped with a satellite modem anywhere within the footprint of the Eutelsat W3 satellite (used by the technology provider, Web-Sat[4]). This PC can be used as a gateway to connect multiple PCs to the Internet.

The 14-month project included the following phases:

- **Phase 1:** Set-up and orientation of end-users: December 2001-February 2002
- **Phase 2:** Pre-operational pilot phase: March 2002-December 2002
- **Phase 3:** Evaluation: March 2002-January 2003
- **Phase 4:** Business planning and deployment: September 2002-January 2003

The following schools took part:

- Gairmscoil Mhic Diarmada, a vocational school on the Irish speaking Arrain Mor island
- Gairm Scoil Chu Uladh, Bellanamore Secondary School
- Carrick Vocational School

- Loreto Community School, Milford
- Scoil Mhuire, Buncrana
- Abbey Vocational School, Donegal Town
- Loreto Secondary School, Letterkenny
- Carndonagh Community School
- Donegal Education Centre

SchoolSat was a direct response to the relatively poor level of connectivity to the Internet experienced by primary and secondary schools, despite the Irish Government's stated intention to provide every Irish classroom with a broadband connection to the Internet. Although it is true that throughout the developed world most schools have Internet access—(recent EU figures suggest that 90% of EU schools have Internet access, and this figure is growing all the time[5]), increasingly narrowband access is seen as insufficient for real educational use, and provision of broadband access is seen as a major objective for educational ICT policy. That is why in Northern Ireland, the current ICT strategy provided broadband access for all second-level schools. But although city schools are offered more and more choice according as ADSL services roll-out and competition drives costs down, the rural schools and schools in towns have too small populations to attract a competitive broadband offer. Despite the best efforts of all concerned, broadband access to the Internet in Irish schools remains considerably below European norms and there is a danger that Irish pupils will find themselves on the wrong side of a digital divide in terms of their access to and use of resources and opportunities afforded by fast access to the World Wide Web. Nolan Bowie notes, for example, that in the US there is a geographical dimension to the digital divide, with rural families less likely to have access to the Internet than urban families.[6]

From the service provider point of view, *SchoolSat* proved that putting a service like Web-Sat in a school environment was viable and provided a great deal of evidence as to the service requirements of a schools community. On average, each school transferred about 1GB maximum of data each month with a usage ratio of approximately 1:20, where each school downloaded about 20 times more content than they transmitted. Technical problems were minimal and to a large extent such a service can be expected to run trouble-free with the minimum of maintenance. Problems, where they occurred, had far more to do with connectivity into the schools LAN and local maintenance issues that they had to do with any difficulty to do with the satellite service.

Having said that, it is clear that in order for a satellite supported service to be viable, it has to be to a community of school users and is not a service that can be offered on an individual basis. In rather simple economical terms, it is just not viable to offer a service such as *SchoolSat* to individual schools as installation, maintenance, and service provision all require specific levels of buy-in to make such a service sustainable. Significant economies of scale can be called upon in order to build a reasonable business case, but without these, satellite service providers will struggle to offer a reasonable and long-term solution for Irish schools regardless of brash marketing campaigns.

This requirement for some form of centralised service provision is not all bad news, however, and another significant outcome from *SchoolSat* was that given schools' tendency towards predictable and pre-defined content, they are in a good position to benefit from the added value of satellite multicasting services. During the 12-month pilot in Donegal, it was evident that a great deal of Internet traffic was to a small number of Web sites. School communities tend to be conservative and inclined to visit the same sites, where quality, suitability of content and safety can be guaranteed. This means that a satellite-supported service that delivers a set of pre-described content to the local server is eminently suitable and one which can deliver significant economies of scale. To this end, Web-Sat and ATiT are now building a school multicasting offer within another ESA project which can offer end-to-end multicasting and caching services to schools aimed at maximising their use of the Internet and delivering safe and reliable content to the classroom using state-of-the-art technology. The objective behind the project, called *SchoolCast*[7], is to plan, design, implement and bring to pilot utilisation a content delivery system, whereby a variety of multimedia files (Internet, video, audio, image) can be multicast to 10 or more Irish schools using a two-way satellite infrastructure, and cache the files at the school server for fast local access. The pilot will also validate the service on high bandwidth terrestrial multicast networks through the collaboration of HEAnet.

The intention is to pilot test *SchoolCast* in schools in Ireland with a view to its take-up as a sustainable commercial service. Through the pilot the business case for such a service will be refined and elaborated. Key target clients include satellite service providers, educational stakeholder communities including national and regional school portals, ministries of education and government agencies, schools and educational content providers.

FUTURE OF THE PROJECT

In June 2003 the final report[8] was submitted to ESA, which includes the report on the pedagogical value of such a service as carried out by Dr. Aidan Mulkeen from the National University of Ireland, Maynooth. This report

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