

# vsat

VERY SMALL APERTURE TERMINALS



INTERNET ACCESS  
BY SATELLITE



Department of Communications,  
Marine and Natural Resources

Roinn na Mara agus Acmhainní Nádúrtha





## TABLE OF CONTENTS

<b>1</b>	<b>Minister’s Foreword</b>	<b>3</b>
<b>2</b>	<b>Introduction</b>	<b>4</b>
<b>3</b>	<b>Role of VSAT</b>	<b>6</b>
<b>4</b>	<b>Why consider satellite?</b>	<b>6</b>
<b>5</b>	<b>Call for Proposals</b>	<b>6</b>
5.1	Objectives	7
5.2	Role of Department	7
5.3	Funding	7
5.4	Definition	8
<b>6</b>	<b>Selected Projects</b>	<b>8</b>
6.1	The Mayo Education Centre	8
6.2	Cedar	9
6.3	Feedback	11
6.3.1	Inver National School	12
6.3.2	Swinford National School	15
6.3.3	Mayo Education Centre	15
<b>7</b>	<b>West Offaly Task Force</b>	<b>17</b>
7.1	Library services – Banagher and Ferbane	18
7.2	Crank House Banagher/West Offaly Partnership	19
7.3	Teach Lea, Boora Parklands/Boora/Leabeg Development Association	19
7.4	Fear Ban Centre, Ferbane/Fearbane Arts & Heritage Group	21
7.5	Kilcormac Community Centre/Kilcormac Development Association	22
7.6	Cloghan Community Services Centre	22
7.7	Feedback	23
<b>8</b>	<b>Navan Education Centre</b>	<b>24</b>
8.1	Feedback	27
<b>9</b>	<b>Conclusions</b>	<b>28</b>
	Appendix 1: Special Thanks	29
	Appendix 2: Useful Links	30
	Appendix 3: Glossary	31



## 1 MINISTER'S FOREWORD



The ubiquitous transfer of high-speed data between fixed locations has become one of the great challenges of modern society. This challenge is one key issue that has to be resolved as part of the development of the knowledge society.

As part of a number of Government initiatives to promote the development of the knowledge society using a variety of technologies and platforms, my Department sponsored the trial of satellite technology for the delivery of high speed internet throughout Ireland.

This document contains the report on the success of the trials. Following a call for proposals, in July 2000 for the trial of satellite technology, three projects were selected for the purposes of demonstrating the advantages of using satellite technology. Projects were initiated in Mayo, Meath and Offaly. The choice of these locations allowed schools, teacher training organisations and public bodies such as libraries the opportunity to introduce the advantages and opportunities of reaching out to the greatest communications tool ever created, the internet, using high speed connectivity.

This report describes the experiences of the participating groups. It is clear from reading the reports that high-speed access to the Internet can change the way children learn and that the teaching of primary school children can benefit from the availability of high-speed Internet access. Some of the participating schools have produced CD format documents giving the local history of the area and reports on the local environment. Other schools have developed video conferencing programs using the satellite connectivity where school children exchange information on local events and school projects. I am very pleased to see that one of the national schools involved in the trial have been selected for an International Award, the eSchola Award.

The flexibility of the high-speed satellite technology can also be demonstrated in the number of music courses that are now being conducted using high-speed Internet connectivity. Music files can be created, modified and distributed by using high speed internet giving the possibility for musicians to access music libraries, technical expertise and distribution channels that would not have been possible in the past from a remote location.

The extension of distance learning projects in conjunction with Limerick University is another example of the application of this technology. I would like to wish the best of success to the teachers who have participated in these trials and used the technology to complete their Post Graduate study programme.

I hope that this trial has provided an opportunity for all of the participating groups to learn and experience a new technology and that it has been a positive experience for all of you.

A handwritten signature in black ink, which appears to read 'Dermot Ahern'. The signature is written in a cursive style with a large initial 'D'.

Dermot Ahern T.D.  
Minister for Communications, Marine and Natural Resources  
September 2003

## 2 INTRODUCTION - WHAT IS VSAT?

VSAT stands for Very Small Aperture Terminals. It allows for the provision of Broadband services using Satellite technology. This technology has been deployed for many years and was traditionally reserved for large telecommunication operators. Modern VSAT technology now allows small businesses and residential users to avail of the opportunity to receive Broadband services via satellite.

VSAT is a platform, which uses satellite terminals upon which broadband application services and electronic commerce activity have the potential to advance and develop. VSAT offers satellite based, 'always-on' Internet access.

A VSAT network consists of three components:

- A central hub
- A satellite
- A virtually unlimited number of VSAT user terminals.

The user's computer is connected to the satellite dish generally located at the users premises. This transmitter mounted on the satellite dish sends and receives digital signals to a satellite at the same time. When a client requests data from the Internet, the client's VSAT dish transmits a signal to the satellite, which in turn retransmits the signal to a central hub earth station, which in turn is connected, to the Internet. Data from the Internet to the VSAT dish follows the reverse path. The hub or earth station manages, controls and monitors the network.

VSAT is capable of providing Broadband services. The diagram below explains how this is done.

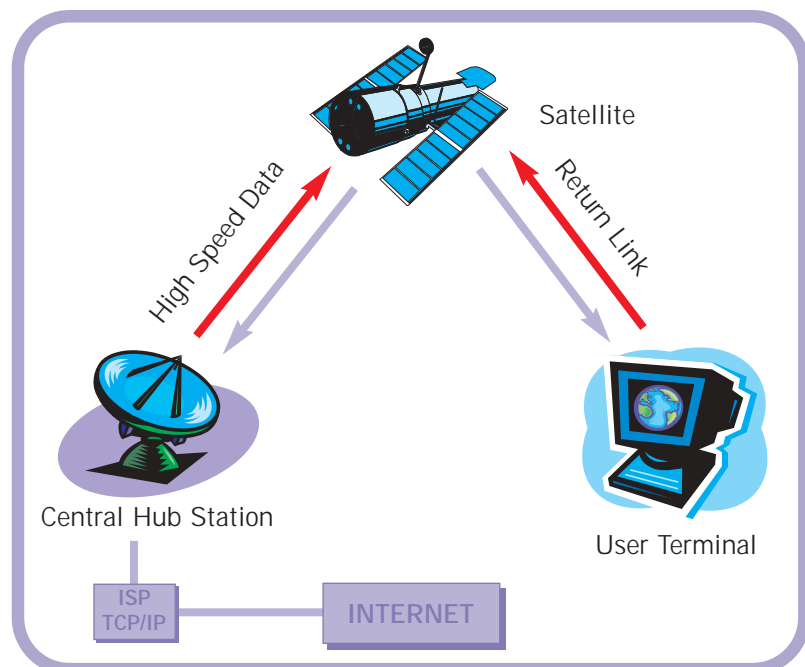


Figure 1 - Satellite connection to Internet

The satellite is located in a fixed-point 36,000kms above the surface of the earth. This position is known as the geostationary orbit. Satellites located at this height orbit the earth at the same speed as the earth rotates on its own axis. This allows the VSAT earth station equipment to be positioned at the satellite and avoids the need for the VSAT earth satellite dish to be repositioned once the initial installation has been completed.

The VSAT earth stations are usually made up of an outside mounted satellite dish (approximately 1m in diameter) and a coaxial wire connection to specially installed electronic boards mounted inside the master computer. These boards allow signals to be transmitted and received from the satellite dish. Transmissions between the earth station and the satellite station generally operate in the 12 and 14 Ghz frequency bands. Because of the high frequencies used high levels of rainfall can attenuate the signals. The design of the installation is generally engineered to allow for the reductions in the radio signal paths during periods of intense rainfall. The design of the satellite link is generally to guarantee communications for 99.999% time, which is equivalent to a loss of signal for about 4 minutes per year. During this trial no outages were recorded as a result of rainfall.

The central satellite hub station allows communications to and from the satellite to connect to the Internet. The central hub station can be located anywhere within the satellite footprint area. For some of the larger satellite operators a number of central hub stations are operated at different locations to ensure alternative telecommunications paths in the event of a failure of one of the hubs.

One of the main advantages of VSAT is that it allows Broadband service availability in remote locations on a twenty four-by seven basis. Once the receiving terrestrial equipment is located within the footprint area of the satellite, two-way telecommunications services via satellite is generally possible. A typical footprint from a satellite offering services in Europe extends from Iceland to Russia in the northern part of the beam and from North Africa to the Middle East in the southern part of the beam. With the use of the Satellite any area in Ireland can be supplied with Broadband and instant bandwidth once the appropriate terminal equipment is installed and there is clear line of sight from the terrestrial equipment to the satellite.



Figure 2 – VSAT satellite dish on Department building servicing terminal at Reception

## 3 ROLE OF VSAT

The Government has identified the need for rollout of broadband infrastructure throughout Ireland. As part of the policy, a pilot trial of VSAT technology was conducted in a number of diverse communities. These trials evaluated VSAT technology as a complimentary technology to the existing access platforms such as DSL, G802.11 technology, radio technology etc.

The role of the project was:

- To test the deployment of VSAT technology as a means for providing Broadband access.
- To assess the feasibility of providing Broadband infrastructure to remote communities using VSAT technology.
- To facilitate the regional development of the Information Society.

## 4 WHY CONSIDER SATELLITE?

Using a VSAT system to provide Broadband access can provide many advantages. It can, for example, offer ubiquitous coverage to all its users. A VSAT is especially useful to Ireland, as many users live and carry out their business in non-urban locations where wired broadband infrastructure is not easily or economically provided.

A VSAT system also allows the provision of an always-on Internet service. This allows users to use the Internet whenever they want and avoids the needs to establish dial up connections where users are charged on a time basis. Satellite circuits are also capable of providing bandwidth on demand services, which increases the flexibility for business.

VSAT can be used for a wide variety of telecommunications applications, including corporate networks, rural telecommunications and distance learning. A major advantage of VSAT systems is that they provide connectivity without having to build expensive terrestrial networks. VSAT networks can be installed quickly, and configured easily. VSAT is also particularly suitable for multicasting, in which a single signal stream is routed to a number of recipients, for example distance-learning.

One limitation associated with satellite broadband is the availability of a line of sight path to the satellite and for the earth station to be located in the service area.

## 5 CALL FOR PROPOSALS

A call for proposals was advertised on the 1st July 2000, with the submission date being 31st July 2000. The call was open to all telecommunications operators in the Information Technology and Communications (ICT) Sector who are capable of providing suitable VSAT infrastructure and application services.

The purpose of the trial was to increase awareness of satellite technology and to enable local industries, public services, education institutions and the broader communities to transact business electronically, independent of geographical location.

The programme was intended to support and accelerate the implementation of the Information Society in Ireland in accordance with the Action Plan, "Implementing the Information Society in Ireland", published by the Irish Government in January, 1999.

The initiative involved the deployment of VSAT technology in a number of diverse user communities.

## 5.1 Objectives

The objectives of the pilot trial were:

- The deployment of VSAT technology as a means for providing Broadband access to serve diverse types of users (e.g. Educational Establishments, Agricultural/Agri-tourism sector, SME's and Gaeltacht regions, etc).
- To promote the deployment of Broadband access technology in remote areas including offshore islands.
- To demonstrate the feasibility of transacting business electronically and independent of geographical location.
- To demonstrate the use of Broadband access capable of providing capacity of 2 Mbits/sec or higher in enhancing the access of diverse communities to the information society.

## 5.2 Role of Department

The role of the Department of Public Enterprise (now Department of Communications, Marine and Natural Resources) was to support the objectives and activities of the pilot trials. It was decided that a report on the trials would be published to provide information on the experience of the applicants in relation to the deployment of this technology.

For this reason grant support consistent with the Regional Aid Guidelines was made available to the projects. The Department's role included evaluating and selecting the projects, monitoring the progress of the project, auditing project development and costs, collecting and collating the project findings and learning experiences of each participating company on completion of the trial and disseminate information on completion.

## 5.3 Funding

Funding was made available by the Department in compliance with the regional aid guidelines and these were made payable to the successful applicants. The rules required that grant payments were only made on the basis of vouched expenditure. All expenditure was independently certified and grantees were required to enter into contracts that contained specific milestones.

## 5.4 Definition

As part of their call participants in the VSAT Broadband access scheme were required to fulfil the following objectives:

- Use VSAT technology that was capable of delivering 2Mbits or higher broadband access:
- Deliver this access and applications to selected user communities.

A full copy of the proposal is available on the Department of Communications, Marine and Natural Resources website at [www.dcmnr.ie](http://www.dcmnr.ie).

## 6 SELECTED PROJECTS

Three projects were selected to participate in the pilot trial.

These included:

- Cedar Satellite Systems Ltd. In association with the Mayo Education Centre.
- Navan Education Centre, Co. Meath.
- West Offaly Task Force, Co. Offaly.

Organisations, which participated in the Pilot Trial, are all community related organisations either of charitable status, voluntary organisations or partially funded by the Department of Education.

### 6.1 The Mayo Education Centre

This project was initiated in November 2001. Fifteen schools in the Mayo/Galway region were linked to the Hughes Broadband Satellite network. The Mayo Education Centre also linked part of its existing ICT training facility to this satellite network.



Figure 3 - Mayo Education Centre-VSAT satellite

## 6.2 Cedar

The Cedar Satellite Systems Ltd. Project was deployed using 26 terminals; 1 at the Mayo Education Centre, which linked into 7 Primary Schools and 8 Post Primary Schools. The remaining 10 terminals were managed by Lake District Enterprise Ltd. (10 Community Initiative sites such as libraries, tourist offices and community access points under the aegis of Lake District Enterprise Ltd).

The following fifteen primary and post primary schools were involved in the VSAT Project. They are divided into three separate clusters- Cluster A, Cluster B and Cluster C. The clusters represent the schools that the island children attend, the schools in the Gaeltacht regions and the schools in the West, Centre and South of Mayo, respectively.

### Schools involved in the VSAT Cedar Project:

The following is a list of the school clusters that participated in the project.

#### Cluster A

This cluster of six schools represents the island and the post primary schools that island children most commonly attend.

1. Inis Turk NS, Westport, Co Mayo
2. Louisburg Community School, Louisburgh Co Mayo
3. Inishboffin NS, Inishboffin, Cleggan, Co Galway
4. Cliften Community School, Cliften, Co Mayo
5. Clare Island NS, Clare Island, Westport, Co Mayo
6. Sacred Heart Secondary School, Westport, Co Mayo

#### Cluster B

This cluster represents primary and post primary schools in Gaeltacht regions of County Mayo and Galway. These areas are remote and are not currently served by Broadband infrastructure.

7. Cloch Breac NS, Cloch Breac, An Fháirche, Co na Gaillimhe
8. SN Tour Mhic Éide, Tuar Mhic Éide, Co Mhaigh Eo
9. Gairm Scoil Chorr Na Móna, Corr Na Móna, Co. na Gaillimhe
10. Coláiste Mhuire, Tour Mhic Éide, Co Mhaigh Eo

#### Cluster C

These clusters represents a broad spread of schools in the west, centre and south of the county that would be well positioned to test the viability of the satellite network.

11. Inver National School, Inver, Barnatra, Ballina, Co. Mayo
12. Scoil Náisiúnta Na h-Eachléime, Eachléim, Béal an Mhuirthid, Co Mhaigh Eo
13. Swinford Primary School, Swinford, Co Mayo
14. Foxford Community School, Foxford Co Mayo
15. Swinford Secondary School, Swinford Co Mayo

The network was configured in such a way that it facilitated the availability of high-speed always-on Internet access. Each of the schools were linked to each other and the Mayo Education Centre via satellite. This provided the schools with cheaper, faster, always-on Internet access than was available at the time of the trial. An ISDN connection was provided as a back up in case of satellite failure. The VSAT technology deployed provided for a 2 Mbit/s downstream and a 128 bit/s upstream connection.

Some of the benefits accrued from the satellite network included:

- High speed internet access
- Always on service 24 x 7
- Ability to operate up to 20 terminals simultaneously
- Reduced Operating Costs
- Ability to offer multimedia teacher training

The presence of VSAT technology has facilitated numerous schools in establishing a network, which allows Internet access to reach all classrooms inside the school.

It also encouraged the development of a fully equipped training room within the schools. An example of such is Swinford National School who have presently 50 computers accessing the World Wide Web through this system.

This type of system would be impossible without such a broadband system.

In another participating school, a portal was developed. (<http://www.inver.org/>) The pupils of Inver National School created the portal to allow them to collate and store local historical and geographic information.

The network also facilitated video streaming where the children could exchange video images with other schools. This facilitated the development of new teaching methods and provided new experiences for both the teachers and pupils. This site has recently been selected for an International Award (eSchola Award see [www.eun.org](http://www.eun.org) and see also the [www.inver.org](http://www.inver.org)).

Due to geographic isolation, the island schools in particular have little possibility of getting traditional Broadband Internet services. The access to Broadband has opened up many new opportunities. The fast download time for large files has created new possibilities for them in terms of keeping up with the technology – downloading media files or technical files (i.e. – antivirus software of 20Mb only takes minutes as does music film, access to internet radio etc).

The system was also capable of delivering real time online learning. This service offered additional teaching experiences, which would not be possible without the availability of broadband.

### 6.3 Feedback

From a technical perspective, the system worked very well in all the locations where it was installed.

The participating educational establishments have discovered that the Broadband services have facilitated the exploitation of distance learning. The technology has enabled effective on-line collaboration between remote locations and has allowed more productive and Internet focused training courses and curriculum among the educational sites to be developed.

In regards to the community initiatives, ICT awareness has increased among the public in the regions. Public web access points in tourist offices and libraries have grown, and community-training centres have been established using the Broadband technology.

While the Satellite communications can be affected by terrestrial weather conditions, this project demonstrated that services continued uninterrupted over the period of the trial. (1 year)

The Satellite network was also used to offer outreach programmes from Trinity College Dublin, University of Limerick & Mater Dei Institute Dublin. This postgraduate work involves research online as well as web development. The ease and speed of access facilitated by the VSAT service have made these courses possible for a large number of students in the region. The Centre has also hosted a large number of ICT training courses for teachers using the facility.



Figure 4 - Students at work in Convent of Mercy Westport using the Satellite system



Figure 5 - Art Ó Súilleabháin, Denis O'Boyle, Kevin Mc Mahon and Anne King in the ICT room at the Mayo Education Centre.



Figure 6 - Location of satellite in Inver NS with teacher Máirin Glenn

### 6.3.1 Inver National School

This school became involved in a number of Internet Projects once the Broadband connection was installed. This had not previously been possible on the ISDN system. Inver is a small two-teacher school north of Belmullet on the very edge of the Atlantic. The VSAT system opened a gateway to the world for them. They have investigated their own area culturally and physically and used the broadband connectivity to reach out to the world. Further information can be seen on [www.inver.org/ceantar/](http://www.inver.org/ceantar/).

The work carried out in this school has been rewarded by way of an International E-Schola Award in Sweden. The schools have confirmed that this project would have not been possible without the availability of the VSAT Initiative.

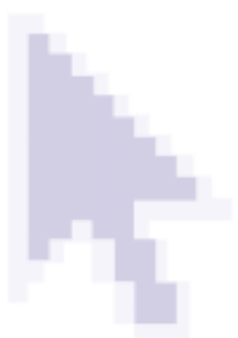
### Activities undertaken in Inver National School

The pupils of Inver National School have used the satellite network to conduct Videoconferences with a class of pupils from St. Cloud, Florida.



Figure 7 – Inver NS Children using videoconferencing technology to communicate with pupils in other countries

Fig 8 – Inver NS pupils creating their own music on the computers



The VSAT pilot trial was a means of providing IT facilities and an Internet connection that would be faster and increasingly more reliable to organisations and all participants that lacked broadband in their area.

The introduction of faster, greater capacity broadband was useful in numerous ways to the pupils of Inver N.S.

The pupils of Inver National School created a web page inspired by the Irish Everest 2003 expedition. The following is an extract from their website:

### “Mount Everest”

“Join us on top of the world! Follow John Peters, Sarah Sharp, Patrick Larch and Lisa Bernal [that’s me] climbing Mount Everest.” I read on finding out all about me, [“whom I already know of by heart”] and all of the other climbers. There were six days left until the climb began.

That day has come I’m all packed up and ready to go, I’m wearing hiking boots, windproof pants and a thick jacket, in my bag is a tent, a gas stove, food, a sleeping bag, an oxygen tank, ice axe, a radio, thick gloves, a harness, a hat, ski goggles, glacier glasses and a face mask.

“On my way to the Himalayan range I began to think about George Mallory his body was found on Mount Everest in 1999, he was climbing Mount Everest in 1924, if he died on the way down from the mountain he would have been the first person to reach the top of the world, unfortunately the truth is we will never know.”

For the remainder of the journey I thought about other people who reached the top of Mount Everest. Once I arrived at the Himalayas and had sorted everything out I looked up and up and up until I couldn’t see any farther up and said I am going to reach the top of the world!!!

By Rebecca



Fig 9a & 9b – The web page developed by the Inver NS children about Mount Everest

### 6.3.2 Swinford School and learning Irish through the Internet

Swinford is a 12-teacher school located in Co. Mayo. The school used the VSAT initiative to initiate a complete integration of their ICT networks. They have established a network of 50 computers within the school and have established an internal training scheme for ICT with a large focus on the World Wide Web. They have pushed the limits of the VSAT delivery in terms of content provision and have produced their own compact disks containing local history information and projects on the environment, which were distributed in the areas.

The school have confirmed that they have been very satisfied with the results.

The pupils of Swinford have also developed multi media content to facilitate the learning of the Irish language on the Internet and on compact disks.

Teachers of the School have developed a CD that allows the pupils to learn their Irish verbs etc. via the computer.



Figure 10 - CDs the pupils of Swinford Community School produced

### 6.3.3 Mayo Education Centre's Feedback

1. The availability of Broadband in the Education Centre has allowed the Mayo Education Centre to develop a new course for teachers at the Centre - 'ICT and Music'. This course is heavily dependant on the availability of Broadband because of the heavy downloading and transfer of WAV, Midi and various other sound files. They have designed and run a number of courses in Mayo and the feedback from teachers has been hugely enthusiastic. All the courses were over subscribed and a key part of the course has been the ease of access to

the Internet provided by the satellite system. Compaq computers and Yamaha Ireland have further backed the development by providing additional equipment to develop the project and the Irish National Teachers Organisation (INTO) are now including this course as part of a national course for their teachers in association with the National Centre for Technology in Education (NCTE).

2. ICT Advisor & Tutors at the Mayo Education Centre are currently developing materials for tutoring in Education on Digital Video editing and production. This type of work is also heavily dependant on large files being downloaded from Internet for various clips, sounds, animations, transitions - without access to the satellite broadband set up at present in the Centre this type of work is impossible.
3. The centre is currently working with Foras na Gaeilge to develop a huge range of resources using Powerpoint, for teachers at all levels. This material is content heavy with sound and graphics & animations files included. The material will be available from the Education Centre Website but will depend on teachers in the region having proper broadband to be able to access and download resources for themselves.
4. A Number of teachers are currently completing courses in the centre:
  - In 2001 375 teacher courses were provided.
  - In 2002 385 teachers courses were provided.

This figure is well above the national average and is partially because of the commitment of MEC and the ICT Advisor to developing the integration of ICT. The facility at Mayo Education Centre with the broadband access has been instrumental in the success of this training schedule.

5. A number of people are currently preparing Masters Theses on ICT and examining the effect of broadband or the lack of it in influencing the adoption of ICT in Second Level and Primary Schools in the Mayo area.



Figure 11 - Art Ó Súilleabháin, In Swinford examining the satellite link with Datanet Ltd.

There are currently a number of projects being undertaken by local people in the Community that have been influenced by the VSAT initiative. They include the following:

**Titles of ongoing works currently being carried out in the Centre:**

- A thesis on “What are the factors that support or prevent the full exploitation of ICT in the Leaving Cert Applied” by Kevin Mc Mahon.
- A thesis on “An evaluation of the integration of ICT at senior cycle in second-level schools in Mayo in 2003, Current and future needs” by Anne King.
- A Doctoral Thesis on “The effects of Broadband access in smaller schools”, by Máirin Glenn of Inver.

The broadband facility has introduced huge changes in the area of training. Educational institutions that once focused training curricula on software package training are now able to conduct courses on the Internet and e-mail. This in turn has increased both the ICT awareness and the level of ICT skills of the people in the related vicinity. Comparing the broadband access to ISDN and PSTN connections, VSAT enables tutors to cover more material utilizing the Internet effectively. Faster access to the Internet has also helped to enhance existing projects – the reach of these projects can be extended.

The VSAT access has also developed the potential of distance learning. In rural areas where schools were isolated geographically they can now interconnect via a satellite link. Additionally because of the broadband access a form of videoconferencing is possible. This system has the ability to reach increased numbers at decreased costs. Many of the community projects utilised the fast connection to the Internet for research purposes and to establish global links with similar community initiatives and related organisations

## **7 WEST OFFALY TASK FORCE**

In an attempt to test new technologies and the demonstration of the advantages of Broadband to the public, the vehicles chosen in Offaly included Community Centres and Libraries.

The West Offaly Task Force are particularly conscious of the importance of the availability of Broadband and the need to minimise the risk of creating the digital divide. West Offaly Task Force were particularly interested in demonstrating the satellite technology among the community and increasing the awareness of the technology and the opportunities that derive from access to high speed internet.

## Selected Projects

The locations that received VSAT were as follows:

1. Banagher Library
2. Ferbane Library
3. Teach Lea, Boora Parklands
4. Fear Ban Centre, Ferbane
5. Kilcormac Community Centre, Kilcormac
6. Cloghan Community Services Centre, Cloghan
7. Crank House, Banagher

Apart from the library services, the users were community based development groups, the focus of which included social inclusion, education and environmental issues.

The equipment installed at each location included a satellite earth station and a Dell PC. CD writers were added to the equipment in each location during the course of the pilot.

Training was undertaken on the use of the system in each location, including account monitoring, operation of system and Internet access etc.

Community & Enterprise Section, Offaly County Council with training and support being provided by West Offaly Partnership on an agency basis, administered the project.

## PROJECTS UNDERTAKEN BY THE USER GROUPS

### 7.1 Library services - Banagher and Ferbane

The library services used the VSAT system to provide Internet access to individuals or members of the public. It was considered to be a cost effective means of providing Internet access and the library services are interested in entering discussions regarding the provision of services for a further year.

Following the trial the following points were concluded:

- It was considered that additional promotion could have been undertaken to advertise the VSAT project and services provided in West Offaly.
- It was considered essential that technical support is provided within the library services, as well as from suppliers if the system is to continue in use.
- There needed to be adequate networking within library system to maximise benefits.

## 7.2 Crank House Banagher/West Offaly Partnership

There were a number of research projects conducted in this facility.

The following points arose from conducting the project:

- An interactive project on childcare involving US and UK contacts.
- Limited usage in mainstream operation of partnership projects in West Offaly Partnership.
- Cost saving envisaged for year 2 over use of landline facility.
- Raised awareness of availability of such technologies and suitability of satellite systems are being progressed as part of West Offaly Training Social Economy Enterprise programme.
- Research undertaken via VSAT into distance learning and interactive training modules, again within the remit of the West Offaly Training initiative.
- Linking with agencies/websites as part of ongoing operations of company.
- Demonstrated use of VSAT system to a number of local businesses and other interested parties, at initial stages and throughout the pilot period.
- Use of system by out of school hours project Co-ordinator for research into arts/crafts based material/activities for children.

## 7.3 Teach Lea, Boora Parklands, Boora/Leabeg Development Association

A number of projects were undertaken in Boora including:

- Use of system for uploading to websites in preparation for and during international sculpture symposium.
- Compilation and installation of a directory of websites for use by all community groups in West Offaly.
- It was concluded that the system offers advantages in downloading large files.
- A longer trial period was required to test the technology and to see its benefits.
- Broadband system facilitated community development projects.



Figure 12a & 12b – A sign For the Teach Lea Community Building & the VSAT satellite.



Figure 13 – The Teach Lea Community Building- VSAT satellite



#### 7.4 Fear Ban Centre, Ferbane/Ferbane Arts & Heritage Group

The following points arose from the projects:

- The system was used for research into enterprise elements within the centre, including handmade paper and art/craft media, part of an award winning FÁS project.
- The system was used for tourist information, based at the centre.
- A number of other projects have developed around the VSAT initiative and awareness of various IT elements has been heightened significantly.
- Training of employees in Heritage Centre was also undertaken using the VSAT initiative.



Figure 14 – The Ferbane Arts & Heritage Centre- VSAT satellite

## 7.5 Kilcormac Community Centre / Kilcormac Development Association

Various projects commenced in Kilcormac included:

- Parish project involving a number of school groups in compilation of local history, to feature on the [www.offaly.ie](http://www.offaly.ie) website.
- Training of elderly groups in use of Internet, provided by schoolchildren.
- Recording of customs and cultural activities from past by schoolchildren in conjunction with elderly.
- Research by school children, including 'read a book'



Figure 15 – The Kilcormac Community Centre – VSAT satellite

These projects did not continue as planned due to the relocation of the school children from the community centre to the newly refurbished school at Broughall.

## 7.6 Cloghan Community Services Centre

The system was used to a limited extent in the centre to provide a service to local individuals or groups to use the Internet to make bookings, purchases, and source information, research and maintain contact via Internet.

In addition a number of discussions took place regarding use of VSAT facility for activities such as contact with groups in Chernobyl. However, the lack of IT facilities available in the contact areas didn't allow for meaningful projects to be initiated.

## 7.7 West Offaly's Feedback

The original trial intended addressed a number of issues:

This Included:

- Increasing public awareness
- Addressing the digital divide
- Trial of new technology
- Facilitating the cost benefit analysis

For the purposes of the trial it was intended to employ this network in

- Public service organisations e.g. Libraries
- Private Sector organisations e.g. Banagher Concrete Firm

In Public services the following conclusions were reached:

- Technology works.
- Statistics show a lot of use E.g. Tourists and local people particularly in the summer months. Further service concerns existed over costs.
- Many community projects utilised the fast connection to the Internet for research purposes.
- Rural libraries & other public access points now offer commercial Internet access service to the public, which is fast, more reliable and less expensive than the modem connection.
- Additional phone lines are no longer tied up on data calls.

Unfortunately a number of proposals to trial the technology in the private sector did not occur. The private firms expressed their reluctance to participate in the trials until the reliability of the technology was demonstrated further.

## 8 NAVAN EDUCATION CENTRE

The Navan Education Centre in Athlumney was set up to offer in service training facilities for primary and post primary teachers in the Meath and West Meath areas. The centre employs an ICT advisor who coordinates the ICT needs of the schools in the catchment areas. Before the trial the centre was served with ISDN telephone lines. The centre is also set up with a computer room where the ISDN line provides Internet access for the networked computers. One of the main difficulties experienced by the education centre was the need to dial up, every time access to the Internet was required and the charge on a per minute basis. In addition to this the speed of Internet access was very slow especially when up to twelve trainees were simultaneously trying to access the Internet.

As part of the education's centre submission they agreed to pilot the technology as part of their main internet technology platform at their offices in Navan and to trial the technology at a remote location in a small primary school, which would not under normal circumstances be able to avail of competing high speed internet access technologies by virtue of their geographic distance from the nearest telephone exchange.

In Autumn 2001 a satellite terminal was set up in the education centre and in Kilmainhamwood National School.



Figure 16 – Navan Education Centre – VSAT Satellite

The main advantages experienced by the users of the satellite technology were:

- The always-on feature removing the need for dial up operations.
- The speed of downloads where large files such as freeware, images and Microsoft PowerPoint presentations were downloaded without any difficulty.
- The ability to use the Internet for different aspects of the curriculum such as maths, history and religion.
- The ability for many users to simultaneously use the Internet without slowing the response times to unusable levels.

During the trial the Navan Education Centre conducted 19 different courses using the satellite technology.

These included courses on:

- School website design
- Special needs and ICT
- ICT and guidance – internet
- ICT and guidance – software
- Computer Network Presentation
- Microsoft office support group

In total around 151 teachers received training using the satellite network.

As part of the education centre's outreach program education courses were given to members of the local agricultural community. The object of these courses was to introduce people who have been out of full time education for some time, to the Internet and to demonstrate applications of the Internet that could affect the way they do business.

A particular emphasis was given to the new government web sites such as [www.oasis.ie](http://www.oasis.ie) and [www.basis.ie](http://www.basis.ie).



Fig 17a & 17b – Inside views of the training rooms in the Navan Education Centre

The courses provided demonstrations of:

- Video streaming
- Access to chemical analysis of milk samples, water samples etc
- Booking flights
- Completing on line applications for grant aid from the Dept of Agriculture and Rural Affairs
- Use of the site [www.revenue.ie](http://www.revenue.ie) for completing tax returns
- Use of local government web sites to look at planning applications etc
- Use of search engines to retrieve information

The high-speed facility allowed all of the trainees to use the Internet effectively thereby maximising the benefit of the training time available to the students.



Figure 18 – Navan Education Centre

## 8.1 Feedback

While there were some initial technical problems with the setting up of the network and integrating the satellite network with the ISDN backup, the systems performed in a satisfactory manner.

The always-on facility removed the risk of dialling up problems that often needed to be addressed during course time. The high performance and high-speed component of the network allowed students the flexibility to fully use the network during the entire training courses. This feature also allowed additional students to be trained in any class.

While Navan is an urban location currently served by ISDN, the performance of the satellite network was superior to the ISDN.

The experience of the principal of Kilmainhamwood National School, Mr. Michael Hayes was equally positive. Mr Hayes regarded the always-on Internet access as a classroom resource and that it had the effect of integrating ICT into the classroom. The advantages of the Internet quickly became apparent to the children and often when a question arose about something in class the children would suggest using Google to find the answer.

Mr. Hayes expressed his delight at the opportunity to participate in the project. The possibility of downloading large files in a short period of time opened up new opportunities, which had not been possible using normal phone connections. Mr. Hayes further indicated that his image of the Internet as a reference and communications tool was strongly reinforced.

## 9 CONCLUSIONS

The VSAT technology was capable of providing uninterrupted continuous broadband coverage to the remote locations in which it was placed. From this project, satellite connectivity to provide broadband can be a working solution to various user needs.

The application of VSAT is particularly well suited to Ireland, as broadband rollout is specifically catered for undeveloped areas near core cities/towns in Ireland. Ireland is composed of many rural locations and there are users in these areas that can greatly benefit from continuous broadband access. The VSAT technology can complement the existing innovative solutions that Irish businesses are prepared to adopt in order to have a broadband connection. Many businesses and educational centres that are located in remote areas now have the possibility of using a technology like VSAT to provide a service such as this from which they can benefit hugely.

Both organisations and regions have benefited from the Government sponsored VSAT Pilot Trial. These benefits include increased public access points, which are now faster and more reliable, training facilities have been improved, educational institutions are now making increased use of the potential of distance learning and the ability to use interactive audio, video and multimedia materials. The spin off effects have included increased ICT awareness in the more remote regions, more productive training courses, more educated people and children, social benefits for the users and with the possibility of providing broadband access via a satellite link the regions are now more attractive as a location for companies.

Depending on the different uses made of VSAT different benefits have been identified. There are also spin-off implications that the technology has influenced. The increased awareness of the role ICT can play in educational facilities and community developments has resulted in even larger developments. Some of the projects have made further investments in bigger systems and networked their whole system with the VSAT technology as a result of the Pilot Trial.

## APPENDIX 1: SPECIAL THANKS

A special thanks is extended to all the participants who made this technology trial a success.

In particular we would like to acknowledge the valuable participation of:

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  - Mayo Education Centre, Westport Rd, Castlebar, Co. Mayo.
  - Denis O'Boyle (Director MEC)
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- Navan Education Centre, Athlumney, Navan, Co. Meath
  - Bernadette A. Mc Hugh – Director
  - Pauline Connolly – Project Coordinator
  - Dr. Michael Farry – I.C.T. Advisor
- Offaly County Council, Charleville Rd, Tullamore, Co. Offaly
  - Jack Keyes – Director of Community & Enterprise
  - Seamus Corrigan – Administrative Officer

## APPENDIX 2: USEFUL LINKS

Department of Communications,  
Marine and Natural Resources  
[www.dcmnr.ie](http://www.dcmnr.ie)

Inver National School  
[www.inver.org/ceantar/](http://www.inver.org/ceantar/)

European SchoolNet  
[www.eun.org](http://www.eun.org)

Mayo Education Centre  
[www.ecmayo.ie](http://www.ecmayo.ie)

Learning Circles  
[www.iearn.org/circles](http://www.iearn.org/circles)

Global SchoolNet Foundation  
[www.globalschoolnet.org](http://www.globalschoolnet.org)

[www.imarsat.org](http://www.imarsat.org)

Navan Education Centre  
[www.ecnavan.ie](http://www.ecnavan.ie)

[www.revenue.ie](http://www.revenue.ie)

[www.oasis.ie](http://www.oasis.ie)

[www.basis.ie](http://www.basis.ie)

International Telecommunication Union  
[www.itu.int/](http://www.itu.int/)

European Telecommunications Satellite  
Organization  
[www.eutelsat.org/](http://www.eutelsat.org/)

Scoilnet  
[www.scoilnet.ie](http://www.scoilnet.ie)

Hughes Corporate  
Orbitlink (Hughes) / Satellite Broadband  
[www.broadband.digiweb.ie](http://www.broadband.digiweb.ie)

Offaly Community website  
[www.offaly.ie](http://www.offaly.ie)

FÁS  
<http://www.fas.ie/>

## APPENDIX 3: GLOSSARY

<b>VSAT</b>	Very Small Aperture Terminals
<b>DSL</b>	Digital Subscriber Link technology, a technology that allows the delivery of broadband services using the existing twisted copper pair access network.
<b>ICT</b>	Information Technology and Communications (ICT) Sector
<b>SME</b>	Small and medium Enterprise
<b>MEC</b>	Mayo Education Centre
<b>Fás</b>	Foras Áiseanna Saothair Training & Employment Authority
<b>INTO</b>	Irish National Teachers Organisation
<b>NCTE</b>	National Centre for Technology in Education
<b>PDSN</b>	Public Switched Data Network
<b>ISDN</b>	Integrated Services Digital Network
<b>Broadband</b>	A transmission medium capable of supporting a wide range of frequencies, typically from audio up to video frequencies. It can carry multiple signals by dividing the total capacity of the medium into multiple, independent bandwidth channels, where each channel operates only on a specific range of frequencies.
<b>Digital Divide</b>	Refers to the role computers play in widening social gaps throughout our society, particularly among young people. It requires providing the youth & remote locations with equitable and meaningful access to technology.
<b>Internet</b>	An interconnected system of computer networks, not unlike the international telephone system. The World Wide Web (“Web”) is part of the Internet.
<b>Satellite</b>	A self-sustained electronic device/platform that orbits the earth at an altitude of about 22,000 miles. Communications satellites transmit and receive signals in the microwave range and are used for broadcast TV, telecommunications, global positioning, and many other applications.
<b>Telecommunications</b>	To exchange information across a distance.

<b>Frequency Band</b>	A band of adjacent frequencies (e.g., assigned for transmitting radio or television signals).
<b>Search Engine</b>	A computer program that retrieves documents or files or data from a database or from a computer network (especially from the Internet)
<b>World Wide Web (WWW)</b>	Computer network consisting of a collection of Internet sites that offer text, graphics, sound and animation resources through the hypertext transfer protocol.
<b>WAV</b>	A sound format developed by Microsoft and used extensively in Microsoft Windows. Conversion tools are available to allow most other operating systems to play .wav files.
<b>MIDI</b>	A standard protocol for communication between electronic musical instruments and computers.
<b>Antivirus software</b>	Programs to detect and remove computer viruses. The simplest kind scans executable files and boot blocks for a list of known viruses. Others are constantly active, attempting to detect the actions of general classes of viruses. Antivirus software always includes a regular update service allowing it to keep up with the latest viruses as they are released.
<b>Distance Learning</b>	Distance learning is the delivery of educational programs to off-site students through the use of technologies such as cable or satellite television, video and audiotapes, fax, computer modem, computer and video conferencing, and other means of electronic delivery.
<b>Terminal Equipment</b>	The equipment at the end of a communications circuit or the equipment that is on the "receive" end of the transmission, such as a printer or telephone.
<b>Bandwidth</b>	The difference in frequency between the top end of a channel and the bottom end. A good example of bandwidth is sound. If you are listening to a sound, such as music, you notice the different pitches. This is the range or bandwidth of human hearing.
<b>Multicasting</b>	The ability to send one message to one or more nodes in a single operation.



