Commission for Communications Regulation

Speech

Address to the Institute of Electrical Engineers of Ireland by Etain Doyle, Chairperson of the Commission for Communications Regulation

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Issues in the Irish Telecommunications Industry

Good evening Mr Chairman, ladies and gentlemen, distinguished members of the IEE. I am very honoured to be invited to give this address to the IEE.

I have been asked to address issues in the Irish telecommunications industry and there are a number of key aspects which I will focus on this evening. They are:
  i. Liberalisation & alternative markets: an overview of how the telecom markets have developed in Ireland since liberalisation;
  ii. The challenges and opportunities which lie ahead in further developing those markets to world standards in terms of availability and access;
  iii. the innovative possibilities with new mobile wireless applications and technologies, particularly 3G, and the need for ease of access;
and finally
  iv. A challenge to the engineering profession.

1.   Liberalisation & alternative markets
The telecommunications sector has been revolutionised since the full liberalisation of the market in 1998 following the establishment of the independent telecommunications regulator which we know today as ComReg.

I would like to start by providing an overview of the scale and changes which have taken place in the industry over this period. In 1999, the total market value for the telecommunications sector – telecoms – fixed and mobile - and broadcasting distribution amounted to €2.2bn, of which the fixed market accounted for about three quarters of the total. In 2002, total market had grown to €3.2bn, with mobile accounting for some 40% of the total, and the fixed sector for 54%. While the overall total has grown significantly, the development of mobile is particularly striking, with massive growth in subscribers from just under 9% penetration in 1997 to 80% today. Development of broadband is limited to date, but the recent decline in prices appears to be producing increased demand.

The markets that the communications sector is supplying can be divided into 3 main categories – 250 or so major corporates, 50 of whom account for a highly disproportionate amount of the overall spend: the 100,000 strong SME sector, in which however over 90% have less than 10 employees, and the residential sector where there are some 1.4 million households.

In 1997, Ireland was still quoting the 1980's digital upgrade of the telecoms network as proof of its advanced state in communications, but in fact, Irish infrastructure and services were generally far behind in terms of price and quality compared to those supplied in other developed countries. Where Telecom Eireann proved slow in

delivering, the Government and its agencies secured somewhat more rapid delivery of services to key economic players, in particular multinational companies. The total number of companies was small and hence manageable. However, the opening of the market and the need to provide mass services on a widescale basis changed this. We are now seeking to ensure that all of the market has advanced services and good service levels. We have still a broadband gap in terms of take-up, but Ireland is catching up on the over 70% average DSL roll-out in Western Europe with approximately 50% of lines DSL enabled here, but has not until recently had the price structure and still does not have sufficient competitive spur to deliver broadband. I am pleased to note that DSL orders have increased since the introduction of lower prices in April last.

We need to continue to close the gap, and our focus is on that, but it should be noted that widescale roll-out of ISDN started in Ireland only at the end of the 1990's, while in the leading countries it had taken place about a decade earlier. We have closed the gap on mobile, indeed with the level of data and SMS usage here, and the recent launch of 3G we are now in the leading group. We have also taken innovative steps to increase wireless broadband, to which I will return, again in the leading group in Europe. Likewise in television, the growth in digital subscribers has been very high over recent years: while BSkyB has the largest share in this market, ntl and Chorus are increasing their shares. It is notable that progress has been fastest in the newer sectors, with newer companies, but some catching up has and is taking place with the incumbent type players also.

All of this is about providing for users generally rather than concentrating on the position of the incumbent and a small number of key users.

There are important implications in this. Ireland has a very successful policy of picking a small number of sectors and businesses where we have comparative advantage and exploiting them on a massive scale. We have done this in respect of IT for example, and more recently in respect of pharmaceuticals and these sectors together now make up more than half our exports. The number of companies and even employment involved is relatively small, but picking winners has worked well for the economy, supporting development in other areas.

The same approach is to be found in a recent Forfás report which identified digital content as a new economic sector with tremendous enterprise and creative potential for Ireland. Within this broad area, five market sectors for Ireland have been identified as high potential growth sectors to be jointly targeted by the indigenous and overseas development agencies: digital games, e-Learning, non-media applications, business and consumer telematics/wireless services, and non-media applications. This programme will leverage our particular advantages and help replace older export lines that are declining with new ones, but it is not designed to involve all companies or citizens in Ireland. It could be achieved by upgrading communications services to a relatively small number of firms and ensuring that the education sector develops awareness and programmes to ensure we have the graduates we need.

However, what we now want in terms of communications development is not merely to develop other niche markets which will contribute disproportionately to economic growth, but to involve everyone in the process. Our major companies are already very much involved, although many need to do more in terms of e-services. Our SMEs generally have connections to the internet, used for e-mail and information, but the transformation from this to full e-business which is our national objective, needs more attention. We need to do a lot more than engage the leading companies and help them expand, we need programmes which will involve all companies. Necessarily this takes time and is a larger project than developing a niche sector which we do so well. As recognised by Enterprise Ireland, we need to work on the basis that Irish SMEs are very small and most do not have an IT or communications specialist to help re-think and re-engineer business processes or products in a way that will make sense of a broadband connection in terms of cost and enhanced services.

For farmers, Ireland has a major service in Teagasc, with 1,500 people doing research and providing advice for individuals and groups. We may not be in a position to duplicate this level of service in respect of e-business, but we should recognise that the vital issue of developing advanced e-business among the vast bulk of our SMEs may be more like development in the farming sector and techniques in this area may need to be employed as well as those used in dealing with – or creating – a couple of leading firms in a promising sector.

The end user has also benefited from the competitive liberalised market through price and diversity of service. For example, since the advent of competition, prices of national phone calls in Ireland have fallen by 50% since 1998. While we have not yet had the opportunity to analyse the detail of the O_2 figures on Irish mobile use just issued, I should note that the cost of Irish fixed to mobile charges are among the lowest in Western Europe and I am pleased to note that recently Vodafone announced further cuts of some 13% in the rate it charges other operators to finish a call on their network. To the extent that this is passed on it will be of considerable benefit to businesses.

In terms of benefits of liberalization to consumers our surveys show an increasing awareness by consumers of choices available over telecommunications operators and surveys also show that a very high percentage of those who switch operators achieve reductions in their telecommunications costs.

1.1   Competition
Our job is to facilitate the competitive market. Competition should force higher quality standards, but in a market with a tradition of 'sure it will do' and limited competition, intervention is needed to raise the level of everyone's game. This is why ComReg has required operators to set service quality standards, and codes of practice for resolution of user complaints which focus their attention on dealing with service quality issues in a

systematic way, solving underlying problems rather than giving ad hoc responses – or lack of response – to individuals' issues.

We can require performance in some key respects in particular in respect of the incumbent. We do not have a magic wand which we can wave to solve all problems so in many cases, to achieve a result in a reasonable time, we rely on persuasion and prodding, seeking to line up competitive forces which are so much more powerful than any regulation in achieving the results we all want.

However, creating an open competitive market is not just a matter of abolishing the legal monopolies. Without a framework of regulation, dominant players will tend to prevent the establishment of, and squeeze out, any competition before it has time to find its feet. Our job is to enable new entrants to enter the market and to facilitate competition.

This involves a wide range of activities - from devising wireless licence competitions for new 3G licences to exemptions for short range devices such as wireless LANs, from developing, in close co-operation with the operators, the rules for local loop unbundling and other types of access to the *eircom* network, and pricing these in accordance with regulatory and competition law rules, to enforcing compliance with the directions made by ComReg and set out in law.

ComReg deals with telecoms networks of all kinds and key access services on these such as local loop unbundling, also telephone numbering and other access codes; we deal with licensing of broadcast distribution networks and we are responsible for management of the radio spectrum.

2.   Challenges and opportunities
The Government is keen to encourage widespread availability and take-up of broadband.

In this context the National Spatial Strategy is particularly relevant as it identifies the need to achieve:
- continuing national economic and employment growth;
- consolidation and improvement of Ireland's international competitiveness;
- balanced regional development;
- social inclusion.

In its report, "A Strategy for the Digital Content Industry in Ireland", Forfas stated that, "*Broadband telecommunications infrastructure is critical for the production and distribution of digital content. Currently, Ireland lags behind its international counterparts in terms of broadband services and infrastructure rollout. This needs to be addressed to ensure Ireland maintains its image as a leading 'wired' ICT economy and to act as a catalyst for the development of the digital content industry.*"

A coherent, competitive state-of-the-art telecommunications infrastructure is key to gaining and maintaining these achievements. Key aspects of that infrastructure include

broadband, DSL and wireless connectivity, i.e. access to fixed and mobile wireless services.

ComReg is very aware that its role as regulator is to facilitate development of electronic communications networks and that there are many players involved in reaching these goals. We will continue to work towards these goals and hope that they can be achieved with the full co-operation and commitment of the Government, the industry and end-users.

I will now address these key infrastructure components.

2.1 Broadband

The broadband communications environment is a challenging sector. Where many other countries have healthy competition between cable and DSL operators, the Irish broadband landscape lacks a strong cable sector (despite the relatively large number of cable TV subscribers and homes passed) that is capable of competing with DSL operators, leaving us with a more difficult job to do in promoting competition in broadband access markets.

Currently the broadband landscape is made up of a mixture of:
- Fixed operators using broadband technologies such as DSL and fixed wireless access (FWA). There are approximately 3,300 DSL lines and 5000 FWA users;
- Mobile operators offering advanced services with GPRS and O$_2$'s WLAN hot spot network. As 3G networks are rolled out we should see the range of mobile broadband services increase significantly during the next few years.

As highlighted in the Forfas report mentioned above, broadband is crucial to our economy and the attraction of Ireland for inward investment. Shortly after taking office, Minister Dermot Ahern rightly identified this as a major issue facing Ireland that he wanted to have solved. It is absolutely clear that if Ireland is to prosper, we must have a communications infrastructure which is well ahead of the average amongst our competitors. We are geographically peripheral in Europe, but we have developed expertise in information technology, we have the benefit of speaking English, increasingly the international language for the sector and we have relatively low-cost international bandwidth.

There was a "chicken and egg" problem inhibiting the development of broadband. Operators will only invest if it is likely to be profitable. It will only be profitable if there are customers. There will only be customers if it is not too expensive and they can see what it can deliver. I am pleased to say that we have broken into this vicious circle and that things are now moving quickly. I will concentrate my remarks on the initiatives which involve the regulator to some degree - you will be familiar with other initiatives such as the fibre-optic rings currently being developed.

2.2 Digital Subscriber Line (DSL)

Following the launch of DSL in May 2002 Ireland had a clear demonstration of the fact that DSL broadband is not attractive at high prices. Firstly Esat BT and eventually *eircom* recognised that the prices set last year were too high and have reduced them substantially. ComReg secured agreement on the wholesale price now being offered by *eircom* and the retail products were launched. For €45-€50 a month, consumers can now have always-on high speed access to the internet and first indications are that this is having a positive impact.

An interesting example of an early adopter of DSL highlighted in a recent edition of Smart Company was Michael's Jewellers in Thurles. In many ways this is a traditional jewellery business, family owned and run. It does not have a web presence but uses DSL services to contact wholesalers, order stock, locate rare parts and to keep an eye on their competitors. Having a high-speed internet connection has encouraged them to go online more often and saved then money compared to dialling up each time as they did in the past.

This is an interesting example of how we can use a regulatory framework as an enabler to get an effective launch of DSL and then allowing competition and market forces to act as drivers towards price reduction and service enhancements.

However, DSL services are distance dependant and typically even the longer reach DSL products now being made available will not work if you are more than 4km from an exchange. In lower density population areas beyond this range wireless based systems currently provide the best alternative.

2.3 Wireless LANs

Ireland was one of the first EU countries to set up a regulatory framework facilitating the use of Wireless LANs. These are ideal solutions for schools and other educational institutions which can use the cheapest versions in the €150-€250 range without any security features, and also for some SMEs – with security features.

We have also taken a lead in Europe in another area where we have made spectrum available in the 5.8 GHz licence-exempt band for wireless applications such as metropolitan area networks. One of my engineers has recently taken on chairmanship of a new European project team to undertake compatibility studies with other services in the band with the aim of developing a harmonized European solution in this band.

Service providers such as Leap, Irish Broadband and Digiweb, among others, have taken advantage of these initiatives and are using license-exempt radio spectrum as part of their infrastructure to provide competitive broadband access to Irish consumers.

An example of an innovative WLAN application is the Rococo/Trinity College project being funded under the DCMNR's (Department of Communications, Marine and Natural Resources) trial programme to assess the feasibility of WLAN broadband technology. This project will provide 50 students at Trinity College with PDAs (Personal Digital Assistants) that can connect to a campus WLAN, demonstrating and comparing the

applicability of WLAN and Bluetooth technology in a campus environment. Students will be able to access emails and the Internet from their PDAs on the college campus, without needing to find a computer.

2.4 Fixed Wireless Access

FWA has an important role to play in the rapid provision of broadband access with a guaranteed quality. In 2000 we issued national licences for broadband and narrowband Fixed Wireless Access (FWA) services. To further stimulate the market, ComReg recently launched an initiative to permit Local Area FWA services on a first-come first-served basis. The objective is to support local provision of FWA where there is a need for such services without the financial constraints of a national roll-out schedule. It is clear that there is considerable interest in this scheme.

2.5 Power Line Communications

Another interesting area of telecommunications innovation is the development of power line communications to carry telecommunications traffic. At one level this has the potential to provide easy access for users. Virtually all homes and businesses are wired to the electric power grid so the basic infrastructure exists. At another level however, there is also a potential risk of interference to radiocommunications. After all, power line distribution networks were designed to deliver power, not telecoms, and power lines feeding street lamps or overhead cables make very nice antenna radiators as any engineer will appreciate. There is significant potential here but as usual it will be necessary to find a suitable compromise between the telecom need and the requirement to protect users of radio. Work on developing appropriate technical standards is continuing at the international level with ComReg participation.

With these initiatives together with reductions in cost of DSL we expect that broadband take-up should begin to accelerate and we are aware of major contracts for such lines in the pipeline.

2.6 Mobile Developments

Mobile phones have become so much a part of everyday life in Ireland, that they have transformed the way we conduct our business and personal lives. The Irish mobile penetration rate currently stands at 79% – a far cry from the less than 9% penetration we had six years ago. Nationwide networks have been built in a few short years and consumers have services readily available to them. Users in Ireland have particularly taken up the prepaid services and SMS texting has taken off in this country at a phenomenal rate – we are only second to Japan in our usage of SMS.

You may have seen the film "Phone Booth". During the opening titles we are told that there were 3million mobile phones in New York in 2001, when the film was made – Ireland had reached about the same number by then, a far higher % of the population.

Always-on mobile access, via GPRS (2.5G) and 3G allow users to interact with the Internet, send and receive e-mails and access other mobile services without having to dial-up every time. This is a service being used by some companies' sales

representatives who have instant access via laptops and a mobile wireless connection to their HQ. It is a service that may appeal to engineers and other professionals as it could make site visits more effective with interaction and indeed reduce the number visits needed.

The combination of 3G and wireless LANs, or 802.11 as the generic WLAN standard is known, will increase the levels of mobile access to broadband in Ireland. The provision of public access wireless LANs in hotspots that are already appearing in public spaces such as hotel lobbies (O2, *eircom*) will give users nomadic access to the Internet, allowing them to access many of the same applications they would in their offices or homes.

The introduction of location based technology is likely to develop a whole new host of applications.

3G mobile services are on the way. In Ireland three operators will provide 3G services: Vodafone, O2 and a new entrant to the market called '3', a subsidiary of Hutchinson Whampoa. '3' may also host other operators (MVNOs) on its network, adding to the range of choice and services here. This will be healthy for competition and we anticipate a robust challenge to the incumbents. Having extra competition in the market will also be useful in putting additional competitive pressure on mobile prices – Irish average revenues per users are among the highest in Western Europe – as well as extending the range of services.

3G services will extend the current services based on GSM technology such as GPRS and will provide 'always on' fast access on the move to the internet, emails and a host of other applications. The key is the greater bandwidths and consequent higher data speeds available with 3G technology. We can expect to see applications of m-commerce, location based services, e-business. The main advantage of 3G is that it is broadband on the move, an upgrade of the services we get on mobile phones already and which are used by 4 out of 5 Irish people. Increasing familiarity with and widespread use of mobile applications can play a key role in expanding broadband and internet use in Ireland.

3.   Innovation & Opportunity
Whilst we now have extensive coverage with mobile networks, and can look forward to greater bandwidths facilitating higher data speeds and bandwidth-hungry applications such as video, the next challenge for the ICT industry is to develop attractive, useful, innovative applications.

3.1   Emerging Mobile Applications
With the advent of GPRS (2.5G) and the greater bandwidths and higher speeds expected from 3G, wireless applications have the potential to provide users with a rich experience in a mobile or nomadic environment. The following are some examples of emerging applications and areas to which Ireland can surely contribute and even provide a lead.

3.1.1 Location Based Applications

The introduction of location based technology is likely to develop a whole new host of applications such as:

- City guides offering maps, tourist information, shopping and dining guides, all based on where the customer is;
- Location and time-sensitive advertising and promotions;
- Traffic reports and videos of traffic conditions where the customer is driving (e.g., wireless operators can "push" information to warn the subscribers they are approaching a traffic jam and then propose an alternate route and forward a detailed map). A current example is the AA Roadwatch SMS traffic alert service;
- Emergency service location of the accident victim via his mobile phone.

Examples of location-based applications already available include:

- Dublin City Council's MPark application. MPark is a facility to pay for parking via your mobile phone. Users must first register for the service, then they park their car, go to the nearest parking meter, and send a text message (using a short code) that contains the ID number of the parking meter.

- O2 Locator: a location based service which lets users locate nearby ATMs or identify the location of their friends/colleagues – to the nearest base-station, and can provide directions.
- Some of London's black taxis now offer a service that locates and calls the nearest taxi to a mobile caller.

Market research suggests that timeliness is the key to success in location-based services, in other words services which locate and communicate with the nearest restaurant, cinema, taxi or other facility are most likely to be successful.

3.1.2 M-Commerce Applications

- M-ticketing for flights and other travel, as well as tickets to movies, concerts and other performances;

- M-banking: allowing customers to check bank balances and transfer funds from anywhere and on any device;

- M-trading: buying and selling stocks, bonds and currencies while on the go and from the most convenient wireless device;

- M-wallet: offering pre-registered credit card payment with enhanced security.

3.1.3 Portal Applications

Subscribers should be offered a simple, open, easy gateway to the wireless Internet and a rich world of personalized content and applications. Key end user attributes of the portal solution are ease of use (one touch access to content and applications offered by operator)

and ease of navigation (visual or by voice commands). Examples of portal applications include:

- Internet radio: allows subscribers to select and listen to their favourite Internet and AM/FM radio stations on their mobile phone via a stereo headset for near CD-quality sound. Features could include song title identification with song/CD purchase options, advanced station sorting capabilities, and the ability to exchange station addresses;
- Music player: allows users to listen to music files (obtained separately and stored on the phone) via a stereo headset connected to the phone for near CD-quality sound. Users can select the music they want to hear by transferring audio files to the phone, arranging and editing playlists, controlling audio playback levels, and individual track playback features.
- Music video: enables consumers to select music videos, listen to them in stereo from the phone's headset for near CD-quality sound and watch them on the phone's colour display. The videos are streamed to the phone through a wireless network connection each time a song is requested.

3.1.5   Closed User Groups and Specialized Applications
Examples of closed user groups and specialized applications include:

- Push-to-Talk: Nokia, Ericsson, Siemens recently agreed to work together on a standard for 'push to talk' applications. This application of always-on technology lets mobile users operate their mobile phones in 'walkie-talkie' mode, letting groups of people stay in voice contact with one another.

- Priority access: A priority access application is one that would allow certain public officials to have priority access to the network in times of emergency or national disasters. Emergency crews would automatically have access to the network and would not risk encountering a blocked network or a busy signal.

3.2   Successful Applications
Undoubtedly some of these new services will fail and others will succeed in tying us even more closely to our mobile devices. The ingredients to success are most likely to be timeliness, applicability, ease of access and ease of use and the bottom line – cost.

For new applications to be successful, regardless of the particular area they are being applied to, it is important that they have certain key characteristics that developers and service providers should keep in mind. They must be priced at affordable rates using suitable and attractive pricing schemes. New applications must be cost effective for service providers presenting them with compelling business cases.

They must be easy to use for widespread adoption, with simple and intuitive interfaces. This means that devices and applications must be designed so that they are user friendly for the type of consumers in the market being targeted, and not only at more technically proficient users (e.g. connecting to a WLAN hot spot can currently involve users

completing relatively complicated configuration procedures on their laptops – this needs to be completely automatic and transparent to the end user, otherwise the user gets frustrated and gives up, resulting in potential loss of revenue to the operator). Furthermore new applications must give users real identifiable benefits.

Customers also need reassurance that their communications are secure whether on mobile or fixed networks. Obviously, when carrying out financial transactions, security is essential. Similarly, users' privacy must be protected, particularly with respect to location based services where users are likely to want to restrict whom they disclose their location to. In this case users will need to be confident that their location information is kept private.

3.3   Open platforms [or Interoperability or Connectivity]

Applications and content need to be universally accessible to users regardless of the type of device or network that they are using. The majority of users are non-technical and they will need to be able to roam between different types of networks (e.g. GPRS, 3G, WLAN) as easily as international mobile users can roam between different mobile operators. This issue will need to be solved by network operators, device manufacturers and application developers to enable ordinary users to get the most from the different types of wireless networks available to them. Interoperability itself could be a ' killer application' - some believe that when users can seamlessly roam between 3G, WLAN and other technologies, including short range technologies such as Bluetooth, on a single device, then 4G will have arrived.

Compatibility and interoperability issues are being addressed by the industry with some 3G network equipment manufacturers incorporating WLAN integration within their 3G network architectures, and some devices appearing which are capable of operating in different types of mobile and portable environments.

For example,
- in the autumn Nokia is due to launch a mobile device incorporating on-line multiplayer gaming, an MP3 player, stereo FM radio and a tri-band mobile phone;
- UPS (United Parcel Service) recently announced a device for their delivery drivers that will operate with CDMA (US mobile mode), GPRS, WLAN, Bluetooth, Infrared and GPS systems;
- A new 3G voice encoding standard has been adopted by the 3GPP (one of the key 3G standards bodies) to enable global interoperability between different 3G systems.

Applications and digital content itself will also need to be adaptable for different types of devices (e.g. with smaller screens) without changing the overall experience for the user, i.e., they should be able to intuitively navigate through the same services and content using different devices.

Mobile operators can in some cases be reluctant to open their networks to other third party service providers, fearing that they will become just a 'bit pipe' without any visible added value – the Walled Garden approach. To promote more innovate services and markets however, network operators should actively encourage commercial arrangements with application, service and content providers that are open and flexible. Revenue sharing and single billing are key aspects of such arrangements. Much of the success of *i-mode* in Japan is attributed to DoCoMo's open approach to revenue sharing.

4 A Challenge for the Engineering Profession

In conclusion I would like to leave you with a challenge.

It is the role of engineers to make things work, whether it be construction of bridges or tunnels for transportation, power stations or wind farms for production of electricity, or radio networks for wireless communications or the user devices utilizing those networks, to list just some aspects of the engineering profession. Engineers are also in the forefront of developing new technologies and systems and new uses for existing technologies.

At the beginning of the last century Marconi had the vision to take a little understood phenomenon of the existence and behaviour of radio waves and, despite many trials and tribulations, persevered to turn it into a new form of wireless communication on which we are so reliant today, for broadcasting, air and sea communications, navigation, mobile phones and so on. His mother Annie Jameson was of course a member of the Jameson Irish whiskey family so there is an important Irish connection with the birth of wireless communications. Marconi made wireless communication possible and throughout his life he worked at refining and improving the technology.

He could also be described as the father of the mobile wireless text message as one of his significant achievements was sending Morse code messages from ships to shore stations over a century ago, and which was used by the unfortunate Titanic in 1911 to alert other ships by wireless, thus saving lives which might otherwise have been lost. Today there are an expanding range of mobile wireless text messaging applications – and we don't have to learn Morse code to use them.

Ireland presents unique opportunities for the development of innovative new technologies in areas where special solutions for broadband access are required. Small-scale 'pizza box' sized DSL solutions are now available which are designed to serve as few as 8 customers. These are suitable for areas where demand for broadband services may be initially too low to justify installing a large scale DSLAM. This is likely to be a common scenario in Ireland and the need for such a product could have been anticipated and developed here.

It could have been possible to also develop here in Ireland WLAN type technology to exploit licence-exempt spectrum to provide broadband wireless access. It is good to see

such technology in use and we are pleased to see the deployment of state-of-the-art equipment and systems in this area.

R&D could be targeted at telecoms solutions for markets with characteristics similar to the Irish market (i.e. in terms of population density and distribution). There are undoubtedly opportunities for Irish companies to innovate with wireless systems designed for low price and low density.

Successful engineering is often about compromise, i.e., getting results in a framework which ensures legacy systems continue to be available. Another key area is process development and carrier-scale IT systems (e.g., billing, product lifecycle costs).

These are just some examples, which leads me to my challenge to you as engineers. My challenge is that you use the inspiration of Marconi's vision and apply yourselves to stimulating the development of telecommunications in all its forms and applications. Ireland can be at the forefront of the telecommunications industry as a centre of excellence and innovation. And remember that one of the key aspects to the success of the telecommunications industry with all of these potential new applications is ease of access and ease of use. Without these two needs being met then you will not achieve success, no matter how wonderful your application or technology. So for successful development of communications ensure that applications and devices are intuitive, easy to access and easy to use.