A Broadband Blueprint - Supply Side Initiatives

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1 Executive Summary

Over the last few years, we have witnessed a new paradigm in digital communications. There has been a profound change in the way people live their lives and conduct business.

Broadband technologies are becoming the base upon which people and IT systems are enabled to communicate electronically ubiquitously, rapidly and cheaply, resulting in a high level of innovation and a wide range of economic and social benefits.

Internet access rates in most European countries have now reached significant levels. Dial-up access, while still the most popular means of connecting to the Internet has limited throughput (56 ~ 64kbps) and cannot support converged services. Broadband is obviously the next step.

In their quest to be at the forefront of the knowledge-based economy most European countries have now signed up to the eEurope action plan that aims to deliver faster, cheaper and more secure access to the Internet. Broadband underpins the development of new innovative services, and is a relatively cheap and simple way of ensuring ubiquitous interconnection for residential, government and business communities to be able to interact efficiently, to the mutual benefit of all parties.

Achieving a high degree of broadband rollout is now clearly central to a country's economic development. This document seeks to map out the supply side strategies for achieving a significant degree of broadband availability and utilisation throughout the Maltese territory in line with the eEurope 2005 Action Plan parameters.

This document must be seen in the light of the publication of a National Broadband Strategy[1] in April 2004. The MCA is a co-author of that document. This supply-side blueprint in no way replaces that document but serves to augment and complement it.

This document is without prejudice to the legal position or the rights and duties of the MCA to regulate the market generally. This is not a legal document; the MCA is not bound by this document and may amend it from time to time.

[1] http://www.miti.gov.mt/html/Broadband%20V1.pdf

2 Broadband – An Overview

2.1 What is "broadband"?

Broadband is a technical term that describes a data communications technology, which provides a permanent, high throughput connection. In marketing-speak it is "fast" and "always on" and bridges the gap between dial-up modems and leased line circuits. Typical speeds can vary between 128 kilobits per second (kbps) and several Megabits per second (Mbps). Broadband technologies are able to provide a mix of data, voice, and video services over one "pipe".

Several varying descriptions and definitions of "broadband" exist and there is no universally accepted definition.

In the *Explanatory Memorandum* to the European Commission's Recommendation on Relevant Product and Service Markets[2] within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services, footnote 33 explains that "Higher bandwidth or broadband Internet services may be characterised as allowing downstream capacity to end-users in excess of 128 kbits/sec."

In footnote 5 to the eEurope 2005 Action Plan[3], the following is stated "There is no universally accepted definition of broadband, but its key characteristics are high speed and always-on functionality."

The *Encyclopaedia Britannica*[4] defines broadband as

1 : operating at, responsive to, or comprising a wide band of frequencies

2 : of, relating to, or being a communications network in which a frequency range is divided into multiple independent channels for simultaneous transmission of signals (as voice, data, or video)

In the context of this document, *broadband* is taken to mean any technology that has the capability of providing data transmission rates higher than achievable using a *narrowband* (e.g. dial up modem) technology without resorting to the use of a dedicated end-to-end network resource.

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[2] http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/documents/explanmemoen.pdf
[3] http://europa.eu.int/information_society/eeurope/2002/news_library/documents/eeurope2005/eeurope2005_en.pdf
[4] http://www.britannica.com/

2.2 Broadband Technologies

A number of technologies are available, with others in development, which allow the delivery of broadband. The following describes the most prevalent of these technologies in summary.

2.2.1 Digital Subscriber Line (DSL)

DSL is the predominant type of broadband access in use today in Europe and is continually growing as DSL operators expand their networks. DSL works by transmitting a digital signal over a traditional phone line, thereby avoiding the expense of installing a separate phone line.

DSL provides high speed data access, typically to the Internet, in a variety of speeds ranging from 64K to 2Mbps, via the existing copper twisted wire pair system that the standard telephony system uses. A DSL modem is connected to subscriber's existing telephone socket via a splitter device that "separates" the voice and data components on the line. With DSL, consumers are provided with a comparatively higher speed broadband link to the Internet, while still being able to receive telephone calls simultaneously.

DSL has the ability to leverage the existing copper wire network infrastructure. This makes DSL technology a relatively quick and cost effective medium for broadband delivery to a large percentage of the population. In essence, DSL removes the requirement and associated cost of establishing an alternative-terminating path to the end customer, as most consumers with existing telephony access can take advantage of this technology. Capital investment is however required at the incumbent exchanges to install DSLAMs (Digital Subscriber Line Access Multiplexer) equipment to utilise this new technology.

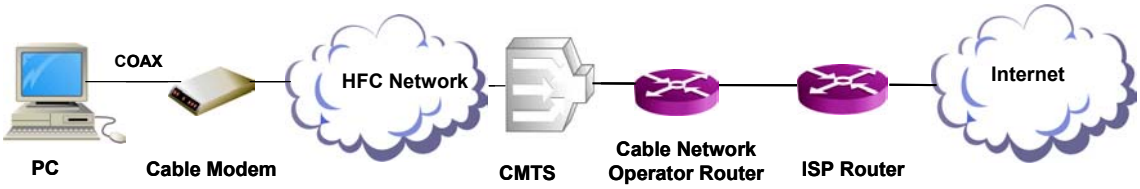
The quality of DSL access is highly dependant on the condition and quality of the copper local loop and the distance between the exchange and the final termination point. DSL is therefore seen as a "first step" technology to broadband access, and despite its limitations still serves as the foundation for many countries' adoption of widespread broadband technology. Furthermore, research into future variants of DSL, (ADSL2), shows promising results of extending data

throughput to a theoretical 20Mbps and higher, while reducing the size of the DSLAMs, making it easier and less costly to re-fit telephony exchanges.

One important future DSL enhancement is the migration of the underlying technology from ATM (asynchronous transfer mode) cells to IP packets (Internet Protocol). This will means that DSL will operate using the same system as the Internet allowing the seamless delivery of IP packets from end-to-end without the need for re-packaging, providing better efficiency and decreasing costs. This is seen as vital when considering the possibility of delivering "triple play" – voice, video and data – services over DSL.

2.2.2 Cable Modems

Cable Internet is the most widespread form of broadband in service today. Cable Internet is delivered over the same physical infrastructure that delivers cable TV. Cable operators have spent vast sums of money upgrading their hybrid fiber-coaxial (HFC) networks to enable two-way communications. This was because traditionally, the delivery of cable TV signals only needed a unidirectional system. Such an investment is both time and capital intensive. However this infrastructure has the ability to deliver a whole range of services ranging from high speed Internet access, digital television, video on demand and telephony services.



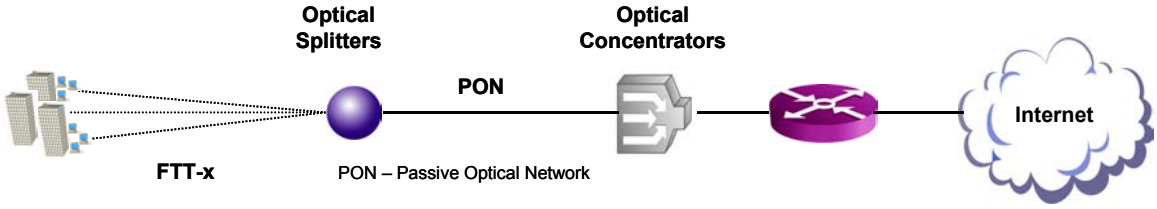
CMTS – Cable Modem Termination System

Once the cable infrastructure has been made bi-directional, the setting up of a data-over-cable connection requires the installation of a cable modem and some wiring to the computer.

Cable broadband access provides speeds of up to 10Mbps. The limitation of cable is that it is typically a shared connection, in the sense that all of the data traffic in a given area has to pass through a common network node. This means that the more people in a given neighbourhood that have and use data over cable, the slower the connection will typically be. New cable modem protocols however enable operators to provide security and quality of service enhancements to overcome the inherent limitations imposed by the architecture.

2.2.3 Optic Fibre Loops

Optic fibre is an evolutionary leap from the current use of copper wire, to the use of light, as the basic material to enact transmission of data. It is characterised by an increasing ability to transmit more information (rates in excess of 100Mbps), more quickly and over longer distances (up to 20km or more), which has had the profound impact or further breaking down geographical boundaries in terms of technological development in all areas.

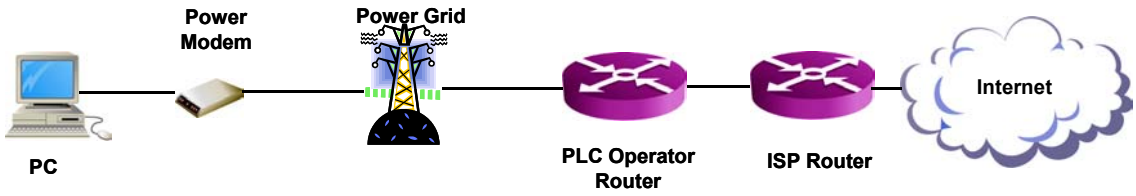


Today's glass (or even plastic) fibre optic cable offers almost unlimited bandwidth and unique advantages over all previously developed transmission media. The main advantage of this technology is its ability to transmit infinitely more data, over greater distances with greater quality than existing transmission mediums based on copper or coaxial cable. The transmission is immune to all kinds of interference, and since the transmission medium is light itself, it will not conduct electricity, nor potentially create sparks it severed. Moreover it does not radiate any interference.

Its main weakness is its cost and related specialised technical expertise required to install and maintain it. However, more and more countries are now extending the benefits this medium offers by using optic fibre cabling to the main distribution centres in new high density high rise buildings. This is often termed fibre to the curb (FTTC), fibre to the building (FTTB) or even fibre to the home (FTTH).

2.2.4 Power Line Communication (PLC)

Power Line Communications (PLC) provide delivery of broadband access across the electricity grid infrastructure. This unique technology transforms the common electrical wiring into a data transmission medium, allowing high-speed data to be transmitted at the same time as the delivery of the normal electricity supply. A modem is "plugged" into the normal electrical sockets and data is transmitted from the direction of the Utility's power or sub-station to the user at one end and interconnecting to a telecommunication service provider at the other.

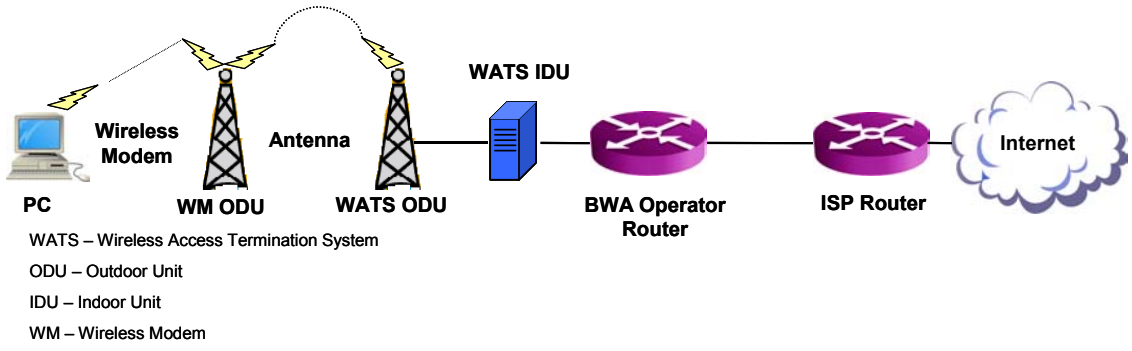


By using the existing electrical supply infrastructure, this technology provides another unique terminating path to users, with the additional advantage of having coverage to multiple points within the same site by virtue of electricity sockets being present in most rooms in a dwelling. In essence this provides an instant LAN in every dwelling, without the need for any additional cabling. In comparison, DSL and Cable are normally delivered to a single point within a dwelling.

PLC is a relatively new technology although tests have been ongoing since the late 90s and a number of commercial rollouts have now taken place. There are considerable concerns that PLC may cause interference with other communications networks although this is being addressed through standards and auditing.

2.2.5 Broadband Wireless Access

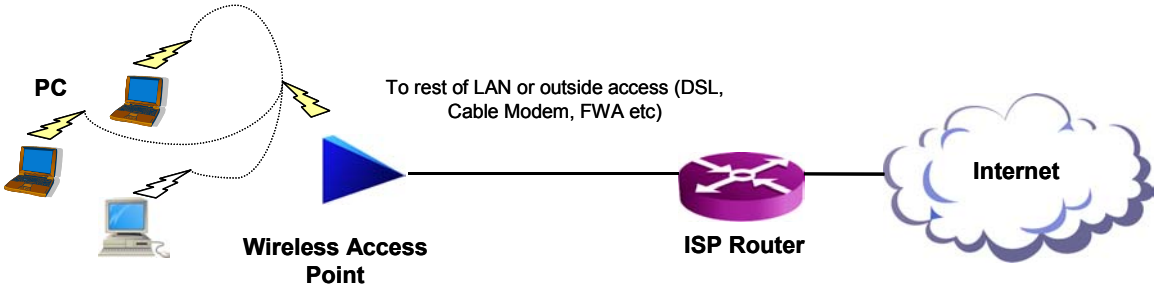
Broadband Wireless Access essentially provides Internet connectivity via a radio frequency transmission medium, thus replacing the fixed access portion of the telecommunications network. The most attractive aspect of this technology is its ubiquity of reach, eliminating the requirement for physical cable transmission, reducing the "last mile" barrier for customer access. It therefore offers a low cost and efficient distribution medium for broadband access.



Current broadband wireless access technologies allow connection speeds that are equivalent to DSL or cable modem and support the same voice, data and video services.

2.2.6 Wireless LAN or Wi-Fi

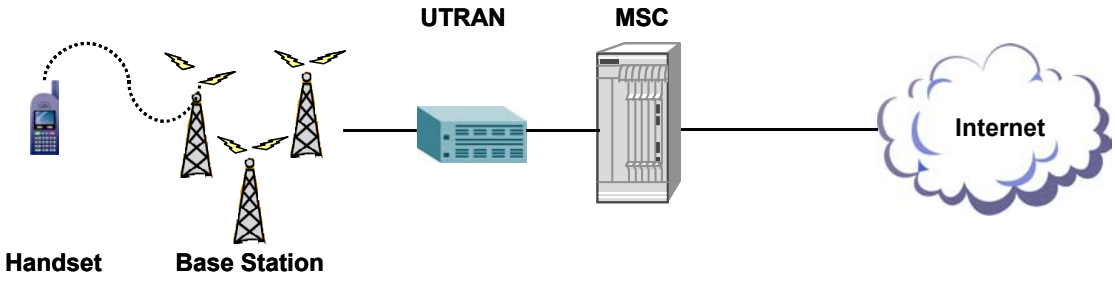
Wi-Fi (wireless fidelity) networks operate in unregulated radio spectrum and have throughput capacities ranging from 11 Mbps to 54 Mbps depending on the standard employed. In essence they provide performance on par to current fixed 10/100 BaseT Ethernet networks, without the hindrance of a physical connecting point. Wireless Access Points (or Hot-Spots) are being deployed in increasing quantities, providing users with Wi-Fi enabled computers and PDAs to have broadband access to the Internet from airports, hotels, cafes and almost any other location. Known also as Wireless or Radio LANs (WLAN or RLAN), this technology normally relies on a terrestrial connection (e.g. DSL or cable) for backhaul and connectivity to the Internet.



In essence, Wi-Fi can be considered more as an extension to other broadband technologies that a broadband medium in itself.

2.2.7 UMTS / 3G

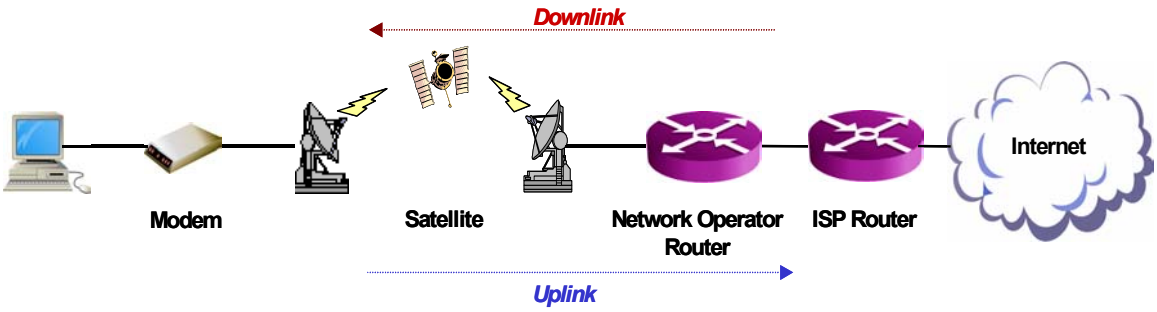
Universal Mobile Telecommunications System (UMTS) is the next generation mobile phone network technology that is capable of transmitting both voice and data at higher transmission rates, allowing the use of new and innovative services like video messaging and internet browsing all from a mobile handset. 3G mobile systems are initially expected to be able to transmit data up to 384Kbps, followed by up to 2Mbps in later versions. The higher data rates will typically only be available to users who are stationary in certain well-served areas.



UMTS is the natural evolutionary choice for operators of GSM networks, currently representing a customer base of almost 1 billion end users in 195 countries and representing over 70% of today's digital wireless market. To date several countries, including the UK, Sweden, Italy, Australia and Japan have rolled out UMTS and have approximately 2 million paying subscribers using their services.. Although in its infancy, and in line with revised expectations of consumer take-up and revenue per subscriber, it appears that there has been tacit adoption of the technology. Many other countries are currently in an advanced stage of UMTS trials, and most are all expected to launch commercial 3G services in 2004.

2.2.8 Two-Way Satellite

Satellite is a growing type of broadband access, although still primarily limited to those areas and users who cannot access other forms of broadband. Satellite broadband began by using the satellite to broadcast the downlink channel, and to have a dial-up connection to provide the uplink. With improved technology, satellite broadband now offers bi-directional communications via satellite dishes. Satellite broadband typically is both more expensive to install and subscribe to on

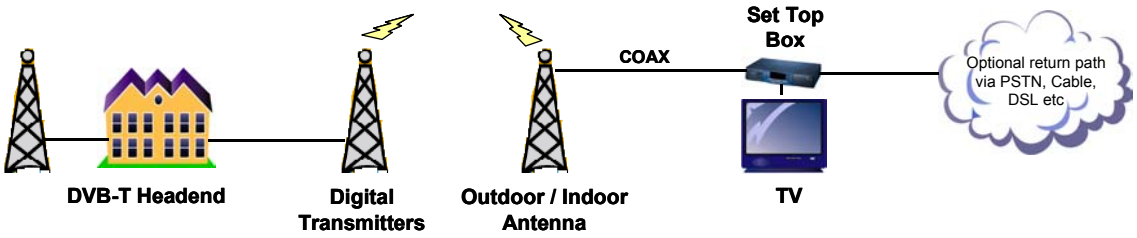


a monthly basis as compared to most other forms of broadband.

Satellite communication limitations are the long delays involved in sending a signal all the way from an orbiting satellite to earth and vice-versa. Nevertheless it has excelled in its ability to provide Internet access to inaccessible, mobile and remote locations, where traditional broadband deployment is either impossible or uneconomical to roll out.

2.2.9 Interactive Digital TV (DVB-T)

The acronym stands for Digital Video Broadcasting – Terrestrial. This involves terrestrially transmitting a television signal that is digitally encoded. The signal is picked up a by a standard antenna and is decoded either by a digital TV or by an appropriate set-top box. DVB-T has the advantage of superior sound and picture quality as well as being immensely more spectrally efficient. DVB-T deployments have started to take place throughout Europe and have been pioneered in the UK in the late 90s.



Digital TV provides better quality, an explosion in the number of channels available, impetus for original niche programming together with the possibility of interactive digital TV through a backhaul channel using POTS or GSM dial-up, GPRS or UMTS mobile or DSL/cable broadband connections. Data-casting will allow the provision of "packetised" data to a set top box or suitably equipped television set, allowing the delivery of Internet access and other services.

2.3 Summary

There are now several technologies that permit the delivery of broadband connectivity to end-users. In fact, the myriad choices may actually cause confusion as to which is the ideal selection, given a set of requirements. The availability of multiple broadband infrastructures is highly desirable since there is clear evidence that competing network operators do stimulate innovation and cause mutual price pressure, benefiting consumers.

3 Strategy Objectives

The compilation and adoption of a national broadband strategy is seen as a key milestone in the achievement of a world-class information society in Malta. The availability of ubiquitous, high-speed, always-on connectivity to the Internet will mean that the population has access to the power of global information.

3.1 Vision Statement

The successful attainment of the objectives laid out within this broadband strategy will see Malta building ubiquitous, highly-available and cost-effective broadband infrastructures that will be used to deliver reliable, affordable, secure, enhanced and value-added services in the fields of education, health, business and government and to amplify the economic, cultural and social benefits of broadband connectivity to consumers.

3.2 Strategic Objectives

The combination of a critical mass of permanently connected citizens, together with the development of new and exciting value-added services that may be accessed and used, will provide benefit to all.

The development of information and communication technologies is seen as one of the most important elements for growth in the Maltese economy, providing a vital catalyst for attaining higher productivity growth and therefore economic and social wealth. This benefit however can only be realised if there is a successful and sustainable underlying broadband infrastructure to support it.

The main strategic supply-side objectives in terms of broadband that need to be attained within the next 36 months are :

a. Malta will have multiple broadband infrastructures in place

b. Coverage via these infrastructures will extend to 99% of the population

c. Each infrastructure will be capable of delivering a minimum of 512kbps in the downstream direction to the end-user

d. 66% of all Internet users in Malta will be accessing the Internet via a broadband connection

In order to evaluate the achievability of these objectives, a detailed understanding of current market, social and political conditions have to be achieved so as to establish the context under which the prevailing strategy is being formulated.

3.3 Tactical Areas

In the context of attaining the vision and objectives outlined above, there are a number of key tactical areas that require action to be taken while developing and maintaining a national broadband strategy containing both supply and demand-side policies.

The actions that will be undertaken are to :

a. Examine different broadband technologies, and identify their respective strengths and weaknesses in respect of applicability within the local environment, delivery and ubiquity of access with the scope of increasing the penetration of broadband in households and SMEs.

b. Identify the regulatory measures to be employed so as to ensure fair and competitive access to broadband networks while ensuring long-term market sustainability.

c. Make certain that consumers benefit from the adoption of these new technologies through increased access speeds and enhanced services at affordable prices.

d. Ensure that Malta is supplied with the necessary international connectivity to global Internet backbones (including redundancy connectivity), at an equitable price.

e. Promote the strengthening of competition in the local telecommunications market, while striving to attain synergies and optimise connectivity among major information networks to reduce interconnection costs and broaden network access.

f. Enact effective electronic communications, e-commerce, data protection and computer misuse legislation that is in line with the prevailing EU directives and international conventions and best practice.

g. Promote the concept of fair competition and foster a culture of self-regulation amongst all major operators in the electronic communications industry.

h. Partner with the key players in the telecommunications industry to produce a regular inventory of the best telecommunications technologies in order to optimise ICT-access costs.

i. Engage on a series of awareness and education campaigns aimed at increasing the knowledge of electronic legislation both for the general public and special-interest groups.

j. Develop a Quality of Internet Service (QoIS) framework, which ensures that measurable definable characteristics of quality relating to the provision of Internet services are adhered to.

4 The Current Scenario

The two forms of broadband delivery technologies available in the local market today are DSL (Digital Subscriber Line) and Cable Modem Access. Both of these have been available for a number of years.

By the year 2000, both Datastream Ltd (a Maltacom subsidiary) and Melita Cable plc had commenced provision of broadband access through DSL and cable modems respectively. Commercial and residential users, who previously had to select either slow and unreliable dial-up connections or very expensive leased lines, could now avail themselves of the latest technology in order to access the Internet or connect to the corporate network. In just over 3 years, approximately 21,000 broadband connections were deployed. Statistically, Malta certainly compares well in relation to other European countries in terms of penetration. Detailed statistics are provided in Appendix 1 to this document.

An analysis of this performance is surely warranted. User frustration with their previous dialup Internet experience (slow speeds, engaged signals in the evenings, expensive daytime usage, recurring disconnections) meant a significant migration to DSL and cable once these became available. Using a broadband connection was a revelation – instant and rapid access to the web and e-mail at reasonable prices - and an Internet mini-boom ensued.

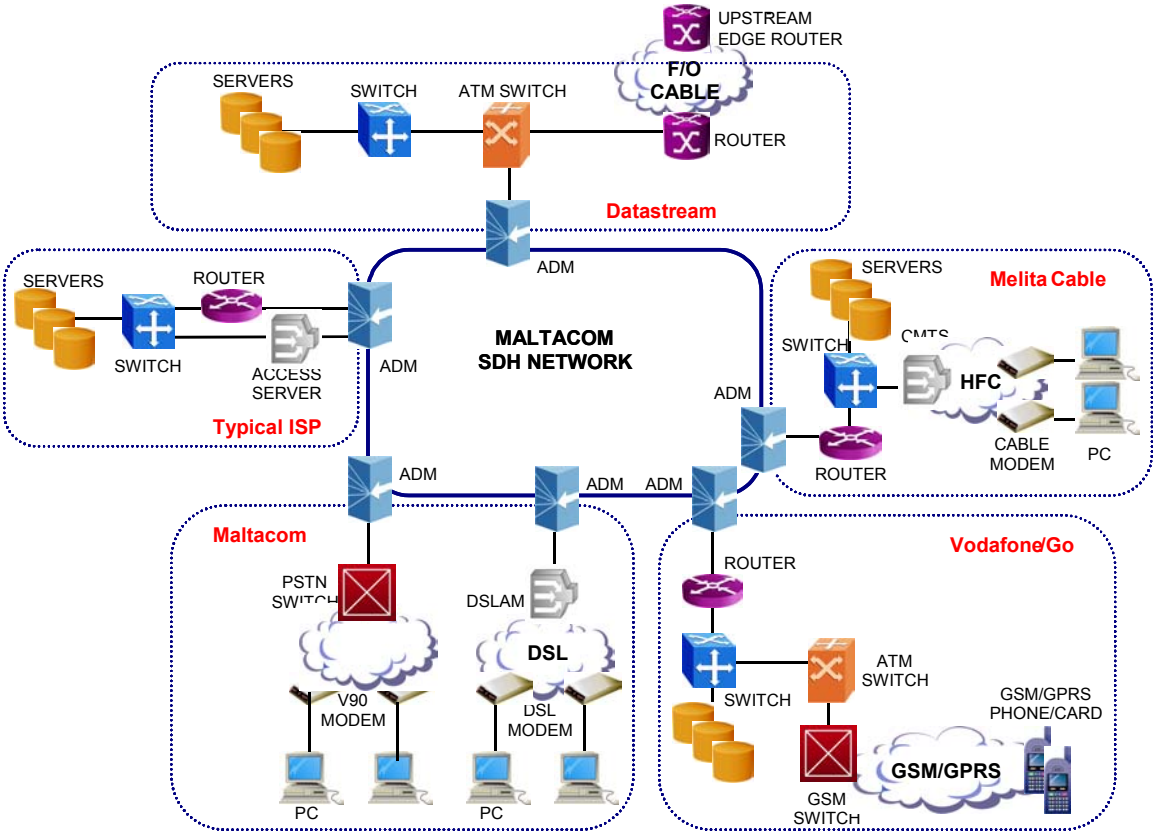
4.1 Broadband Networks & Operators

Currently there are four licensed network operators.

Maltacom plc is the fixed line operator and has constructed an optic fibre transmission network based primarily on an SDH (synchronous digital hierarchy) core, with an ATM (asynchronous transfer mode) data network layered over this. This network supports the transmission of fixed line voice as well as other services including Internet dial access, DSL, Leased Lines and ISDN. International connectivity is via a submarine fibre optic link to Sicily. This provides critical connectivity for the passage of international call traffic as well as serving to provide connectivity and IP transit to and from global Internet backbones. A subsidiary of Maltacom, DataStream, resells IP transit to all local ISPs. DSL services are available at speeds from 128kbps to 1 Mbps. In certain instances, higher speed connections can also be provided. Metropolitan ATM or Ethernet connections via fibre can also be provided.

Melita Cable plc operates the other terrestrial network. This is a typical hybrid fibre coaxial cable network, the primary use of which is the delivery and provision of cable TV. Melita undertook a massive network upgrade in the late 1990s in order to render their network bi-directional and thus be in a position to provide two-way communications. This allowed it to offer high speed Internet access across its HFC network via cable modem. Differing plans offer "always-on" connectivity of speeds of up to 512Kbps for home customers and 1Mbps for business customers.

From a wireless network perspective, 2 operators - **Vodafone Malta Ltd** and **Mobisle Communications Ltd** - own and operate two independent local mobile cellular telephony networks based on GSM 900 and PCS 1800 technologies respectively. Vodafone is an independent operator with an overseas parent company, while Mobisle is part of the Maltacom group. Mobile penetration is high, with close to 300,000 subscribers. Both networks offer a standard suite of mobile services to the end-consumer. Data access is provided via GSM or GPRS connectivity, which currently allows for data transfer rates of around 40Kb, too slow to be considered as a form of broadband access. Higher data transfer rates akin to that supplied by other broadband technologies, will potentially be possible once the adoption and deployment of new 2.5G or eventually, 3G technologies occurs. In an example of convergence and the use of complementary technologies, both mobile operators have recently begun offering Wi-Fi access, across a number of locations, as part of their service offering to customers, complementing the standard GPRS data services.



The diagram illustrates the current broadband and data network architectures.

It is in this local market context that the advent and deployment of new, alternative broadband technologies comes to bear. Emerging technologies bring with them the opportunity to diversify the number of paths to end-customers thus reducing the reliance on incumbents' infrastructure. The proliferation of differing service offerings however, should be approached with the overriding view of overall market sustainability, not necessarily lowest possible cost of service.

4.2 Internet Service Providers

There are currently 18 ISPs that provide various services to market. MITTS Ltd is the service provider for the public sector and does not provide commercial services to the consumer or business sectors. All these ISPs utilise the Datastream transport network. Video on Line currently have exclusive access to the cable network and can provide Internet access via cable modem.

	ISP	SERVICES									
		Dial		DSL				Cable			
		Mthly	P-Paid Hrs	128	256	512	1024	128	256	512	1024
	Camline Internet Services	✔	✔	✔	✔	✔	✔	-	-	-	-
	Euroweb Ltd	✔	✔	✔	-	✔	-	-	-	-	-
	IT& T Ltd	-	-	✔	-	✔	✔	-	-	-	-
	Kemmunet Ltd	✔	✔	✔	-	✔	-	-	-	-	-
	Keyworld Ltd	✔	✔	✔	-	✔	✔	-	-	-	-
	Maltanet Ltd	✔	✔	✔	-	✔	✔	-	-	-	-
	Melitanet Ltd	✔	✔	✔	-	✔	-	-	-	-	-
	NextGen.net Ltd	✔	✔	✔	-	✔	✔	-	-	-	-
	Video-On-Line Ltd	✔	✔	-	-	-	-	✔	-	✔	✔
	Waldonet Ltd	✔	✔	✔	-	✔	-	-	-	-	-
	Webwaves Ltd	✔	✔	✔	-	✔	✔	-	-	-	-
[1]	MITTS	-	-	-	-	-	-	-	-	-	-
[2]	OnDnet Ltd.	x	x	x	x	x	x	x	x	x	x
	Telemail Ltd	x	x	x	x	x	x	x	x	x	x
	Bellnet Ltd	x	x	x	x	x	x	x	x	x	x
[3]	Callzone Services Ltd	-	-	-	-	-	-	-	-	-	-
	Primatele Ltd	-	-	-	-	-	-	-	-	-	-
	International Call Mgt Ltd	-	-	-	-	-	-	-	-	-	-
	M.B.I.S Ltd.	-	-	-	-	-	-	-	-	-	-

Notes

[1] MITTS provides Internet connectivity to all Government departments. It does not sell connectivity to the retail market

[2] On-line presence established, however no rates published for any Dial/ADSL/Cable services.

[3] Licenses granted however no on-line presence detected.

4.3 Environmental Analysis

The local market is well positioned to both facilitate and adopt broadband-based technologies. The island's size reduces a significant barrier in ensuring adequate network coverage for broadband deployment. Malta, unlike other countries, does not have large areas of sparse population scattered across large distances, making deployment of infrastructure a far easier proposition, though not without other challenges. Consequently typically over 95% of the island enjoys DSL or cable modem coverage. From a backbone infrastructure perspective, the existing Maltacom SDH backbone is well suited to cater for the deployment and subsequent increase in traffic volumes associated with broadband technologies. Melita Cable also has an extensive fibre network that could potentially be exploited to provide metro optical connectivity.

Consumers have a significant degree of technological sophistication and awareness, adopting new technologies and services, at the right price point, with relative voracity. The rapid adoption and take-up of mobile phones technology over the last four years is a testament to high adoption ability.

Carrying out both a SWOT and PEST analysis, the following is revealed with respect to the local market:

Strengths:	**Weaknesses:**
Limited geographical size Early adopters of new technology Good backbone infrastructure.	Very limited market size Limited availability of free capital for investment Vulnerability to external pressures
Opportunities:	**Threats:**
Revenue generation Economic productivity Mistakes made elsewhere avoided	Delayed roll-outs Lost time/opportunities Bureaucracy

The potential for economic development, supported by the adoption of broadband technologies, is significant. Faster dissemination and sharing of information, together with better communications, will enable businesses to

streamline and re-engineer their overall processes with the ultimate scope of reducing costs and improving services.

While the geographical size of the island allows the opportunity for blanket coverage, conversely the size of the local market is the Achilles heel in the successful adoption of broadband in Malta. The relatively small, price-sensitive market establishes a revenue cap, which limits the amount of free capital employed to develop new broadband infrastructures. However, unchecked deployment of differing broadband infrastructures will trigger market sustainability concerns as differing supplies fight for the same consumers' revenue. It is important therefore, that a balanced view of introducing new technologies without creating price wars that could significantly harm the local market be a critical aspect of this overall policy.

The emergence of new technologies, like wireless technologies which require the sale of broadband spectrum, have the potential to provide both new operators and governments with an incremental alternative source of revenue.

Political:	**Economic:**
EU Accession & Compliance Strategic importance of Go / Maltacom Government revenues	Financial cost for "Malta Inc" Market sustainability Operators' financial resources Increasing cost of telecoms Pull for new services
Social:	**Technological:**
Tourism & Business aspects Status symbol Competition & consumer benefits Environmental concerns	High technological desirability Interoperability issues Unclear which dominant technology to back

Adoption of new technologies ensures that the country benefits from the latest technology developments, however it is critical that in conjunction with work being undertaken from a supply aspect to ensure a solid broadband infrastructure, the social and demand aspect of deploying this technology must not be forgotten. As in most cases, the use and uptake of any technology has been a polarised one. Early adopters are characterised as being affluent, educated, above average earners who have the means to take advantage of this digital medium.

This social and economic divide has a significant bearing on mainstream adoption, and it has been the duty of governments to ensure that access is available to all. Understanding this has been seen as one of the most resilient aspects of broadband take-up. Providing education to using the technology is an important but not absolute step to guaranteeing adoption. Unless people can see tangible benefits and advantages of utilising this technology, together with the improvement it could have in everyday use, ubiquitous adoption will never occur and, result in high-cost unused broadband infrastructure.

4.4 Legal Framework

The current framework is based on and is compliant with the 1998 EU regulatory framework for telecommunications. It was enacted with the objective of paving the way for the liberalisation of the telecommunications market and created structural separation between service provision and regulation of the sector – a distinction previously not deemed essential. Such services were until then the exclusive domain of a state-owned monopoly.

The present framework has been instrumental in getting competition underway in the mobile telephony market. In the fixed telephony and cable services markets where competition has yet to materialise, the framework is vital for paving the way for competition as well as ensuring, through price controls on dominant players, that consumers receive value for money.

The provision of data services was completely liberalised in 2001 while Internet service provision had been liberalised in 1995.

4.4.1 The New Electronic Communications Regulatory Framework

The 2003 EU Electronic Communications regulatory framework is being introduced via an Act that will bring about the necessary changes to the existing Telecommunications (Regulation) Act, (Cap 399 of 1997) and to the Malta Communications Authority Act (Cap 418 of 2000).

The amendments being proposed are driven by three overriding policy objectives for the sector:

- The continued introduction of competition in the market;
- The continued improvement in quality of service and affordability for consumers; and
- The continued sustainability of a robust, healthy and innovative sector capable of meeting the social and business needs of the Maltese community while competing in European markets.

A white paper on the primary legislation has been published by the Government on the 5th of February 2004[5]. Consultation ended on the 27th of February. The intention is to have the primary legislation as close to accession as possible.

A first version of subsidiary legislation is in the final stages of drafting and will replace most of the existing regulations and provide a more detailed framework around the principles articulated in the parent Act. It will provide for, among others, a general authorisations framework, the designation of dominance, universal service obligations, provisions for the migration of regulatory processes from the current to the new Framework, as well as other general provisions.

4.5 The eEurope 2005 Action Plan

The Barcelona European Council called on the Commission to draw up an eEurope action plan focusing on "the widespread availability and use of broadband networks throughout the Union by 2005 and the development of Internet protocol IPv6 and the security of networks and information, eGovernment, eLearning, eHealth and eBusiness".

eEurope is part of the Lisbon strategy to make the European Union the most competitive and dynamic knowledge-based economy with improved employment and social cohesion by 2010.

The eEurope 2005 Action Plan[6] was launched at the Seville European Council in June 2002 and endorsed by the Council of Ministers in the eEurope Resolution of January 2003. It aims to develop modern public services and a dynamic environment for e-business through widespread availability of broadband access at competitive prices and a secure information infrastructure.

[5] http://www.mtc.gov.mt/pics/white_paper_for_press_release.pdf
[6] http://europa.eu.int/information_society/eeurope/2005/index_en.htm

The objective of this Action Plan is to provide a favourable environment for private investment and for the creation of new jobs, to boost productivity, to modernise public services, and to give everyone the opportunity to participate in the global information society.

eEurope 2005 therefore aims to stimulate secure services, applications and content based on a widely available broadband infrastructure.

The new regulatory framework, which came into force in EU Member States in July 2003, takes full account of the convergent nature of broadband. Encouraging efficient investment in infrastructure (by new entrants and incumbent operators) and promoting innovation are explicit objectives for regulators. This means taking account of the need for investors to obtain an adequate return on their investment, in the light of the risks taken. This also means that regulatory uncertainty for investors must be reduced as much as possible.

The Action Plan also proposes the following measures:

- Spectrum policy: The Commission will use the new regulatory framework for radio spectrum policy to ensure spectrum availability for, and efficient spectrum use by, wireless broadband services (e.g. W-LANs).

- Broadband access in less favoured regions: Member States, in co-operation with the Commission should support, where necessary, deployment in less favoured areas, and where possible may use structural funds and/or financial incentives (without prejudice to competition rules). Particular attention should be paid to outermost regions.

- Reduce barriers to broadband deployment: Member States should ease access to rights-of-way, poles and conduits to facilitate investment, for instance through the removal of legislative barriers. The Commission will support this by encouraging and organising exchange of local and regional experience and private/public partnerships.

- Multi-platform content: Public authorities in Member States and the private sector should aim to offer their content on different technological platforms, such as interactive digital TV, 3G etc.

- Digital switchover: In order to speed up the transition to digital television, Member States should create transparency as far as the conditions for the envisaged switchover are concerned.

5 Supply-Side Initiatives

The requirement to establish an appropriate regulatory framework that is compatible with the objectives of the national broadband strategy has to be viewed in the context of

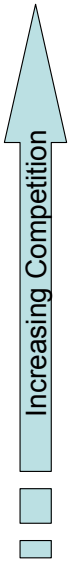
a. The domestic broadband market and its nuances both in its current guise and possible future developments.

b. Ensuring that access and development of the supply aspect of the infrastructure supporting widespread broadband adoption, is provided as ubiquitously and competitively as possible.

c. The overall principles of the new EU regulatory framework.

5.1 Regulatory Intervention

It is the national regulatory authority's desire to intervene and regulate in those matters only where necessary in order to ensure that the underlying infrastructure supports the equitable and competitive uptake of broadband.



Network Layers	Typical Providers	Regulatory Mechanisms
Applications, Services & Content: Websites, Audio/Video, Software	SMEs, Portals, Broadcasters, Government, Banks, Software Developers	E-Commerce, Data protection, Intellectual Property Rights, Interoperability
Services: Data, Voice, Video	Internet Service Providers	Co- and Self Regulation, Quality of Internet Services, Consumer Protection & Fair Competition
Networks: DSL, Cable, FWA, 2.5/3G	Datastream, Melita Cable, Go Mobile, Vodafone	Bitstream Access, Resale, Wholesale Offers, QoS Standards, Non-discrimination
Transport: Fibre, Copper, Coaxial, RF/Wireless	Maltacom, Melita Cable, Vodafone	Interconnection, Local Loop Unbundling, Cost-orientation
Physical: Ducts, Trenches, Pylons, Masts, RF Spectrum	Government	Rights of Way

The myriad of technologies and access methodologies available to support a broadband infrastructure will require differing regulatory approaches in each case. In this respect, each technology is examined and evaluated in terms of its suitability and fit within the localised market, and any regulatory aspect highlighted.

5.1.1 Local Loop Unbundling (LLU)

The importance of access to the Local Loop to provide access cannot be underestimated. The Local Loop is the physical copper-wire infrastructure found in every dwelling currently having phone connectivity. It is the physical link over which the bulk of communication services are offered and delivered and its ownership and control therefore immediately gives unfettered access to the end consumer. Given the capital-intensive nature and expense of providing this infrastructure, in nearly all cases, installation, operation and funding for this infrastructure has been the domain of incumbent government-owned telecommunication companies.

It is this access, which without equitable access, would lead to curtailed and uncompetitive service offerings, which LLU seeks to redress. LLU unbundling, in all its differing forms, seeks to re-address market dominance by opening up access to customers to new operators. This approach has been predicated by the situation in most countries, where the main communication infrastructure is owned and operated by a single operator, making it a significant barrier to entry for new operators due to the cost of replicating these facilities. By granting access to this infrastructure, it was envisaged that competition would flourish and quicken the provision of broadband services.

LLU therefore seeks to offer, by reasonable subscription, the current available copper wire infrastructure to new entrants, enabling them to offer services and products without the requirement for them to build a new, competing, duplicate infrastructure. The reference to “reasonable subscription” underlies by far the most contentious issue behind the implementation of LLU. It is essential that the incumbents providing LLU are not placed at a commercial disadvantage in providing the service and that all appropriate costs are adequately reflected in the published tariffs for the service, however, this must be tempered with economic prudence ensuring that the rates reflected by the tariffs are that of an efficient and effective operator. Inefficiencies in operation should not be borne by new market entrants.

From a regulatory standpoint, the role to ensure this balance is achieved is critical. If tariffs are set too high, LLU will still be a barrier to entry, and may simply lead new operators to opt to invest in alternative infrastructure roll-outs that may not be conducive towards long term competitive sustainability. If tariffs are set too low, the incumbent is placed at an unfair competitive disadvantage,

having to endure both revenue cannibalisations from new entrants as well as increased cost pressures from compliance, and therefore having a cumulative impact on gross profitability.

From a technical viewpoint, LLU requires the incumbent operator to allow new entrants to connect to the network connection point at the customer's premises to their own network infrastructure. Typical LLU products would primarily be the provision of POTS, ISDN and xDSL services to end consumers.

Local Loop Unbundling is seen as a primary objective by the EU as a mechanism to ensure that local incumbent operators did not hamper the provision of services to facilitate the uptake of broadband access as part of its eEurope 2005 strategy. The intent behind this directive was to ensure that new entrants were not penalised due to their inability to have access to adequate coverage as the local incumbent. In practice however LLU has not returned the success that had been envisaged.

Any regulations imposed for LLU would closely follow those set out in the "Regulation of the European Parliament and of the Council on unbundled access to the local loop 2000/0185 (COD)". The basic core requirements for LLU access would include:

a. Access to the local loop being defined as physical twisted metallic pair circuit in the fixed public telephone network connecting the network termination point at the subscriber's premises to the main distribution frame or equivalent facility.

b. Access to incumbent co-location facilities for new operators.

c. Access to incumbent Operational Support Systems (ie Provisioning, Fault resolution, Billing etc)

d. Provision of Network information. (ie Technical, Outages, proposed future technology upgrades etc).

e. Costing and pricing rules for local loops and related facilities should be transparent, non-discriminatory and objective to ensure fairness.

Locally, enforcing LLU will cause Maltacom, as the incumbent operator, to open up their infrastructure to new operators upon request. It is unclear at this stage if the current market is large enough to sustain multiple diverse operators. The associated cost and effort to unbundle the local loop is significant, however the implied benefit at this stage is seen as to be small. It is also feared that in such a small market, opening up the local loop will be seen as a disincentive for investment. Nevertheless, suitable legislation has been enacted via Legal Notice

45 of 2003[7]. Maltacom have been requested by the Malta Communications Authority to submit a cost-oriented reference unbundling offer (RUO) by May 2004.

5.1.2 Bitstream Access

Another alternative to LLU offerings is bitstream access. Like LLU it enables new operators to reach customers across an incumbent copper wire network and enable them to offer a range of broadband services. The primary difference to LLU is that new operators here have no ability to manipulate the physical network connections into the customers' premises, only the services transiting across it. Unlike LLU, bitstream does not involve the transfer of ownership rights for network infrastructure from the incumbent provider to the new operator.

In essence, incumbent providers sell the "use" of their network between the customer and the new operator's network. Despite the inability of the new operator to physically access the "final" connection into the customers' premises, they do however have full control over the quality and type of service, which can be offered over this link. More importantly, they have the ability to alter the technical characteristics of the service provided over this link. In contrast, the incumbent supplier can only affect the physical connectivity of the link provided and not the services operating over it.

From a supply aspect, bitstream offers an alternative medium to enable the uptake of broadband access, however some initial element of regulatory control may be required. This will protect both the interests of both incumbent and new operator as well as establishing a framework, which encourages the use of this medium to promote broadband take-up.

In the European Commission's Recommendation on Relevant Markets[8], Market 12 is described as:

Wholesale Broadband Access: This market covers "bitstream" access that permits the transmission of broadband data in both directions and other wholesale access provided over other infrastructures, if and when they offer facilities equivalent to bitstream access.

Bitstream access is defined as follows[9]: 'High speed bitstream access (e.g. provision of DSL services by the incumbent operator) refers to the situation where the incumbent installs a high speed access link to the customer premises

[7] http://www.mca.org.mt/images/library/LN%2043.2003.pdf
[8] Official Journal of the European Union, L 114/48, 8.5.2003
[9] ONPCOM01-18Rev1 and ONPCOM02-03, quoted in ERG Consultation Document on Bitstream Access, publ. 14 July '03

(e.g. by installing its preferred ADSL equipment and configuration in its local access network) and then makes this access link available to third parties, to enable them to provide high speed services to customers. The incumbent may also provide transmission services to its competitors, to carry traffic to a 'higher' level in the network hierarchy where new entrants may already have a point of presence (e.g., transit switch location). The bitstream service may be defined as the provision of transmission capacity (upward/downward channels may be asymmetric) between an end-user connected to a telephone connection and the point of interconnection available to the new entrant. Resale offers are not a substitute for bitstream access because they do not allow new entrants to differentiate their services from those of the incumbent.'

Bitstream access allows the competitor to technically differentiate similar service offerings to consumers, by adding specific features such as a better concentration rate or a lower overbooking factors. In providing this differentiation, the competitor climbs up the value chain or the 'ladder of investment'. In other words by both utilising and investing in more of their own infrastructure, it increases the ability to add gradually more value to the product offered to the end user. At the same time, this strategy reduces the reliance on the wholesale products of the dominant operator.

Bitstream access is currently not available or deployed locally. Any deployment would require Maltacom, the incumbent, to open their infrastructure to enable bitstream access to other providers. The Malta Communications Authority will initiate a consultative process leading to an eventual bitstream implementation in Malta, within the parameters of the new EU regulatory framework, later this year.

5.1.3 Third Party Infrastructure Access for Data over Cable

Third Party Infrastructure Access for cable networks (Open Access) refers to the sharing of one physical cable access network by multiple Internet service providers. As incumbent telecommunications companies have been obliged to share their copper wire infrastructure, cable companies in some jurisdictions are now being requested to open up their HCF (Hybrid Coaxial Fibre) networks to Internet companies, enabling them to offer Internet access via cable modems akin to that being done with DSL access on traditional copper.

In a utopian environment, open cable access would allocate a specific channel for each ISP offering the service, however, given both finite transmission capacity this is both impractical and an inefficient use of a scarce resource. To enable the transfer of data across a cable network, routers must be integrated in the cable network system to enable the correct delivery of data from third party ISPs to the interconnection point of the cable operators network and then finally to the end consumer. Depending on the network topography, the use of either source routing or tunnelling methodologies is employed to transfer data simultaneously

across set channels on the cable network and correctly track the originating ISP providing the service. Cable network operators will typically also require investing in additional equipment to provide this service.

Melita Cable is the sole cable network operator in the local market. Its HFC cable network allows it to offer cable Internet access via its subsidiary Video on Line. On-Vol. In its August 2003 review of dominant market position in telecommunications markets[10] for the year 2002, the Malta Communications Authority determined that Melita Cable held a dominant position in the telecommunications transport provider market. This led to Melita Cable having to initiate a process that would lead to third party infrastructure access by June 2004.

This would mean that all ISPs would be able to resell services based upon, and/or have access to, both broadband infrastructures, thus enhancing consumer choice and increasing competition.

5.1.4 Leased Lines

Leased lines are a fundamental building block underpinning the development of a competitive communications market. Leased lines are used by service providers as the basic transport infrastructure upon which their wholesale and retail services are delivered, including large business users as the means of linking their locations world-wide for the transport of internal voice and data communications traffic. Internet service providers may also rely on the availability of leased lines to connect to the worldwide Internet backbone.

Leased lines regulation is of critical importance to telecommunications, as it creates the “level playing field” for competition between telecommunications operators in the provision of services. Open and efficient access to, and use of, leased lines at fair prices is essential for competitive telecommunication services to develop in a sustainable fashion.

While leased lines are not a broadband technology *per se* in terms of the definition given earlier, they are complementary and indeed may serve as a vital building block for new entrants or alternate operators when constructing an alternative infrastructure.

The issue of high prices for leased lines in foreign jurisdictions as well as in Malta has been a major cause of concern by users for a considerable period of time. High leased line prices, and more specifically high prices for cross-border leased lines, may be detrimental to the competitiveness of industry and services, and

[10] http://www.mca.org.mt/images/library/DMPtelecoms03.pdf

may restrain the development of Internet services and the growth of electronic commerce. On the other hand it is equally important that an authorised provider of leased lines is entitled to recover operational and capital-related costs in order to ensure that the service is provided on an efficient and sustainable basis.

Local legislation (Legal Notice 61 of 2003)[11] has taken both local and international leased circuits into account.

As a notified DMP leased lines provider, Maltacom plc will have the obligation to publish information in respect of technical characteristics, tariffs, and usage conditions for leased lines. Maltacom will also be required to set tariffs for local and international leased lines that follow the basic principles of cost-orientation and transparency.

5.1.5 Rights of Way

"Right of Way" refers to the right granted to operators to allow access across public or private roads, land or property for the purpose of either building, maintaining or improving their transmission infrastructures. It is an essential element in the successful deployment of both terrestrial and wireless networks as it relates directly to the physical deployment of cable or base stations required to provide any type of broadband service. The importance, complexity and impact that right of way has in relation to overall deployments cannot be underestimated. Delay or denial of access can have significant impact on deployment timeframes for new operators.

The complexity principally arises from the number of organisations and government authorities that have to be consulted in order to grant permission for work to be undertaken. Given that infrastructure deployment traverses a large geographical region, it would impinge on a multitude of localities and associated authorities. It is the lack of a co-ordinated, consistent and transparent approach that is the ultimate cause for angst, with operators often being faced with differing decisions from differing bodies.

Given this, the EU have set out a framework under how right of way applications should be evaluated transparently and without discrimination or conflict of interests

Article 4d of the 1990 'Services' Directive, as amended by the March 1996 'Full competition' directive (96/19/EC) establishes that Member States shall not discriminate between providers of public telecommunications networks with regards to the granting of rights of way for the provision of such networks.

[11] http://www.mca.org.mt/images/library/LN%2061.2003.pdf

The Directive concedes, however, that some circumstances may be allowed to impede rights of way. They are called 'applicable essential requirements', which includes a number of reasons related to security, to safety, to networks integrity, as well as to environment or planning constraints. In such cases, the Member State must ensure that a substitute solution is in place, such as access to existing infrastructures.

Article 11 – 12 of the Framework Directive specifies in more detail the rights of authorities to restrict rights to install facilities, based on either environmental, health or town planning issues. It also discusses the ability to issue directives to allow the sharing of space at existing facilities with other operators. Article 11(2) requires that, there should be a separate and independent authority to deal with requests for "rights to install facilities" in situations where local authorities have control or ownership of the main infrastructure. This is required to ensure independence of the regulatory authority.

Locally[12], the issues pertaining to Rights of Way are loosely regulated under the Utilities and Services (Regulation of Certain Works) Act . The legislation gives the right to the Malta Transport Authority to carry 4(1) out works on private land to pass infrastructure as required, as well as the ability 4(2) to order co-location for their services in facilities owned by other providers. Section 13 allows the Malta Transport Authority to levy fees for the laying of any cable or infrastructure on public roads. In practice, infrastructure rollout requires the consultation of a number of governing bodies. It is therefore critical that the adoption of a co-ordinated, consistent and streamlined approach to evaluating "right of way" requests amongst all relevant councils and departments be adopted.

5.2 Policies for Alternative Broadband Infrastructures

5.2.1 Access to Scarce Spectrum

The liberalisation of the telecommunications sector has generated significant interest and investment and it is highly opportune to consider the opportunity to introduce new services such as UMTS, DTTV and FWA in Malta. These services operate via radio waves, providing wireless connectivity. The emergence and viability of these new technologies has now made an otherwise previous intangible asset, Radio Spectrum, valuable.

Consequently, Radio Spectrum is now recognised as a scarce resource to which rights of use may be granted against payment. EU law requires that spectrum is priced according to its market value. The more difficult that spectrum is to attain

[12] Utilities and Services (Regulation of Certain Works) Act

and the more revenue that an operator can expect to make from having access to that spectrum, the higher the market value.

It is difficult to make an exact economic assessment of the value of spectrum. Differing countries have placed differing values on its worth, and in most cases have left it to market forces to dictate the final price paid. This has caused issues in certain countries and care has to be taken to ensure that the pricing applied to a spectrum band is not set too high such as to act as a barrier to entry that stops new entrants from being able to participate in the electronic communications sector. The use of benchmarking, which is less complex and more defensible, is therefore being proposed as a mechanism to establish the fees to be charged for rights of use of spectrum.

Given that spectrum could be available for multiple operators, some thought must also be given to the number of bands that will be offered, the spectrum allocation methodology to be used and the duration for which such rights will be granted.

The new EU regulatory framework's Authorisation Directive establishes a very clear procedure for dealing with:

- the granting of rights of use of radio frequencies and applicable conditions; and

- limiting the rights of use to be granted for radio frequencies.

The provisions of this directive are currently being transposed into national law and consequently any policy decision and subsequent allocation has to be guided by the relevant terms of this Directive within the context of the local regulatory framework

The recommended lease duration for scarce spectrum should be sufficiently long to allow a solid business case to be constructed. A greater period, say, 20 years, may restrict Government should technologies change in the future (e.g. GSM is expected to last 15 years) while a shorter period is generally considered too short to ensure adequate returns on investment.

Allocating spectrum for UMTS, DTTV and FWA therefore, is expected to provide Government with considerable revenues, while allowing new entrants to participate in the construction of a knowledge-based society. This is highly desirable given that the EU is stressing the importance of ICTs in the European economy and is pointing to the rollout of 3G and the increase in broadband access as ways to move forward in this strategic direction.

5.2.2 Fixed Wireless Access

Fixed Wireless Access (FWA) is the use of radio to provide an alternative to the so-called 'last mile' connectivity between the subscriber and the fixed telecommunications network. Fixed Wireless Access removes the need to 'fly' wire across country or dig up roads to provide fixed telecommunication links, as is the case for DSL and Cable Modem. As a result, it can easily provide an effective platform from which to expand existing infrastructure, or serve to provide infrastructure in hitherto under-served areas.

In terrestrial network deployments, physical cabling constitutes a significant portion of the overall cost of implementation. While Fibre is expensive to deploy and copper is expensive to maintain, the main cost of wireless deployment relates to the purchase of radio equipment. Furthermore, maintenance costs are lower for radio access as unlike physical cabling, there is no associated erosion and decay with the transmission medium. The combination of all these elements translates into a product that has a ubiquitous high-speed access to consumers, and a very high speed to market deployment capability. Operators can rapidly deploy new coverage as required, providing them with the ability to cherry-pick and deploy to areas of high usage with a minimum of fuss. The nature of the technology allows a great degree of independence from incumbent operators, translating into better choices for consumers.

FWA will provide an alternate broadband infrastructure in direct competition to the existing players – Maltacom plc and Melita Cable plc. Such competition will improve customer choice and enhance broadband availability. Since it is believed that there is considerable scope for increasing the number of broadband connections in the country, it is probable that FWA will not cannibalise subscribers from existing operators but serve to grow the overall market**.**

The MCA has made recommendations to Government as to the process for authorising FWA operators as well as to the pricing and allocation of spectrum and coverage and rollout obligations. A consultative process will be initiated in the second quarter of 2004. The eventual allocation and authorisation process is expected to be completed by the end of the year.

5.2.3 UMTS (3G Mobile Telephony)

UMTS (Universal Mobile Telecommunications System) refers to the next generation mobile phone network also commonly referred to as 3G. It is capable of transmitting both voice and data at higher transmission rates, thus allowing new and innovative services like video messaging and Internet browsing, all from new enabled 3G mobile handsets.

The deployment and roll-out of UMTS is wholly dependant on the availability and use of the appropriate 3G spectrum. In most cases the spectrum is made available for commercial use to interested operators via auction, with segments being allocated to the highest bidders.

Initial auctions for spectrum in held in Europe raised significant revenues for governments, however this was in partly due to the speculative nature of the technology at an early stage of development. This, together with the telecommunications sector downturn, has seen spectrum pricing being significantly reduced and in certain cases, retrospective changes made to granted licenses to reduce the associated cost. Evidence shows that the correct treatment of spectrum licensing is a critical aspect in establishing an effective and competitive 3G framework. If set too high, operators may be unable to substantiate the investment in 3G. If set too low, it may deprive governments of appropriate funding from the sale of a scarce public resource.

UMTS promises significant improvements over current generation mobile networks, offering better reliability, speed, ease-of-use and cost effectiveness. Original launch timeframes and revenue estimates have been pushed back and revised to take into account the effect of the global economic downturn and technology jitters, which placed constraints on operators' financial plans and limited access to new capital investment.

Despite this however, most countries have now completed 3G Spectrum allocations via auctions or other instruments and are now servicing around 2 million 3G subscribers worldwide. More are expected as countries currently conducting trials launch their services. Although currently not a critical mass as compared to current 2G subscribers, the move towards 3G has begun in earnest and will continue to gain momentum as users become accustomed to the new features it offers and make it as ubiquitous in use as current mobile phones.

The MCA has made recommendations to Government as to the process for authorising UMTS operators as well as to the pricing and allocation of spectrum and coverage and rollout obligations. A consultative process will be initiated in the second quarter of 2004. The eventual allocation and authorisation is expected to be completed by the fourth quarter 2004.

5.2.4 Digital Television

Digital television is a new way of broadcasting television signals. It is different from analogue broadcasting. Digital television is better than analogue for several reasons. It provides clearer, sharper pictures. It offers a wide screen format, is more spectrally efficient and it provides the potential for value-added services.

Competition for the provision of TV distribution would be infrastructure-based, that is, it would necessitate significant investment and result in an electronic communications network. This type of investment is to be encouraged. It is nonetheless felt that there is a limit to the extent of competition a market the size of Malta's can sustain.

A digital television platform is of interest within a broadband strategy since a DTV network is capable of data-casting at high capacity, thus inherently acting as an alternative broadband technology, at least in the downstream (towards the user) direction.

Of particular interest here is DTTV (digital terrestrial television, sometimes also abbreviated DTT). This is digital television (DTV) broadcast entirely over earthbound circuits. A satellite or cable is not used for any part of the link between the broadcaster and the end-user. DTTV signals are broadcast over essentially the same media as the older analogue terrestrial TV signals.

There is a natural barrier to digital terrestrial television (DTTV) transmission, and this is posed by available spectrum. It is difficult to foresee more than two operators transmitting by terrestrial means. A DTTV operator would typically need around 7 or 8 UHF frequency bands to compete with the current analogue cable TV offering from the incumbent CATV operator, which already enjoys a large market share.

The new EU electronic communications framework advocates a liberalised environment. It does, however, make allowances, under article 7 of the Authorisation Directive (2002/20/EC), for limiting the number of rights of use to be granted for radio frequencies, subject to a consultation process, fair and transparent selection criteria and periodic review of the situation.

Judging, therefore, by the number of potentially available frequency bands and the size of the market, it is expected that the number of DTTV operators would be severely constrained by the availability of spectrum.

The MCA has made appropriate recommendations to Government about the methodology of authorising DTTV operators. A consultative document will be published shortly. It is expected that the entire process of spectrum allocation and service authorisation will be completed by the end of 2004. The announcement of the analogue switch-off date is also expected shortly.

5.2.5 Power Line Communications

Power Line Communication (PLC) access, is new technology which provides delivery of data across the existing public electricity infrastructure network. This unique technology allows high-speed data to be transmitted at the same time as the delivery of the normal electricity supply. By using the existing electrical supply infrastructure, this technology provides another unique terminating path to users,

providing them with broadband Internet access. The use of PLC is not essentially new. Current power utility operators use low transmission rates to remotely manage and read electricity meters. This concept however is extended beyond the meter, into the home with increased transmission rates. The use of this infrastructure essentially transforms every electricity socket in a room as an access point to the Internet. In essence this provides an instant LAN in every dwelling, without the need for any additional cabling. Data is received via a power modem, which is "plugged" into any of the normal electrical sockets instead of the normal telephone line. Based on current trials, megabit transfer rates have been delivered.

One of the main concerns behind the use of PLC was the assumed interference and loss of data associated with the transmitting of both voice and data across a single medium. To a large degree, powerful filtering technology has limited this to an acceptable level. Legal standards are required to enforce the prevention of radiated emission interference to radio frequencies. Authority to enable cessation of operation if interference mitigation is not met, should be given to the governing body.

As part of rollout commitment, the establishment at the operator's expense, radiation monitoring stations along transmission paths to monitor and report emissions. The data is to be made available, unaltered, to relevant government authorities for analysis and review as requested.

The concept and benefits of PLC are indeed far reaching, however the technology is currently in its infancy. Current issues relating to radiating interference and transmission security require further research and resolution before the technology is seen as being mature and stable enough for commercial deployment.

The MCA is following regulatory and standards evolutions in other jurisdictions and will be making appropriate recommendations to Government later this year. Having yet another broadband infrastructure that could potentially have instant ubiquity while increasing choice would be of enormous benefit when attempting to attain the broadband strategy objectives.

6 Action Plan and Timeframes

6.1 Timeframes

Overall Broadband Strategy Document

23rd April NISCO Meeting – Strategy Presented & Feedback requested.

10th May End of Consultation period

11th May Feedback collated and reflected appropriately in strategy

19th May Publication for Consultation of Supply Side Blueprint

Overall Broadband Strategy Objectives.

By Q2 - 2007

- Malta will have multiple broadband infrastructures in place
- Coverage via these infrastructures will extend to 99% of the population
- Each infrastructure will be capable of delivering a minimum of 512kbps in the downstream direction to the end-user
- 66% of all Internet users in Malta will be accessing the Internet via a broadband connection

This will all be achieved through the adoption and execution of all the sub-components that contribute to the whole. The critical projects together with their respective timeframes are listed below.

Desired Broadband Supply Side Strategy Components

- New Legislative Framework
- UMTS Strategy
- Digital Broadcasting
- Powerline Communication
- Rights of Way
- Fixed Wireless Access

- Bitstream Access
- Local Loop Unbundling (LLU)
- Leased Lines

Proposed Implementation Timeline

All supply side initiatives are scheduled to be started by mid-2004 and completed within 12 months, at least to their first iteration.

6.2 Key Success Factors

There are several critical elements that will ensure the success of this blueprint. These include ensuring that there is a:

- Clearly articulated and communicated supply side process for all relevant stakeholders.

- Ensure adherence to published policy scope. Any deviation or changes to policy should be kept to a minimum to reduce uncertainty for potential investors.

- Ensure that any timing requirements stipulated for the roll-out of any broadband infrastructure is adhered to. This will also assist in reducing uncertainty and risk for investors in ancillary and support services following technology roll-outs.

- The establishment of an overall broadband regulatory environment, as necessary, which encourages market forces and competition while seeking to minimise government intervention.

- Ensure that any deployment of new infrastructure or technology is undertaken in the context of a sustainable market concept. This seeks to ensure that, subject to market forces, the prescribed number of efficient and competitive operators collectively, are capable of earning appropriate returns for their shareholders, while delivering value added products to the end consumer at an appropriate price within the local market.

In order to warrant that these key success factors are being met, a number of criteria will be measured and monitored on a regular basis. This will help ascertain any problem areas and prescribe a remedial course of action. A number of these are described in the Benchmarking section below.

6.3 Benchmarking

Given the broad scope of the implementation, benchmarks are required to ascertain if the overall objectives are being met. It is envisaged that certain variables will be measured on a timely basis in order to evaluate progress and identify and address any bottlenecks, which may impede the successful implementation of the strategy.

Within the process of eEurope, the EU has established a benchmarking mechanism, which lead the participating countries to undertake a series of qualitative surveys, which measure the progress under the all the objectives of eEurope including the proliferation and usage of broadband technology.

Locally, these surveys are carried out by the National Statistics Offices under the surveillance of Eurostat, which sets the methodology for the collation of these statistics in order to ensure comparability of data across the different member states.

Ongoing efforts are undertaken to re-define the benchmarking indicators, which are used for the measurement of information society statistics. The eEurope 2005 mid-term review has addressed the need to re-assess the current indicators and move from measuring the readiness of the countries to adopt technologies versus the impact and intensity of such adoption. Relating this to the broadband issue, rather than assessing the country's readiness in accessing broadband technology, the impact of the daily lives of citizens and the performance of the business sector should be measured and reported.

Locally, the National Statistics Office has already undertaken a number of surveys related to the usage of ICT in households and businesses. The frequency of such questionnaires is expected to increase with a number of surveys being carried out on a periodic basis. Moreover the Ministry for IT and Investment will also undertake a number of periodic surveys in order to gauge the effects of its policies and the deployment of its initiatives contained within the national ICT Strategic Plan.

The indicators, which will be adopted to measure the achievements of the national broadband policy, include the following:

- Take-up of broadband – the percentage of the population and households that subscribes to broadband
- Prices and speeds of un-metered offers to the residential and business market
- Percentage of business (split into micro, SMEs and large enterprises) that have access to broadband

- Broadband take-up relative to narrowband take-up
- The change in online behaviour for those who have switched from dial-up to broadband
- Availability and coverage of broadband infrastructure

Considering the importance of the adoption of broadband technology and its effect on the information society and economy, new industry developments will be monitored and evaluated to ensure the continued relevance of benchmarking parameters.

6.4 Strategy Calibration

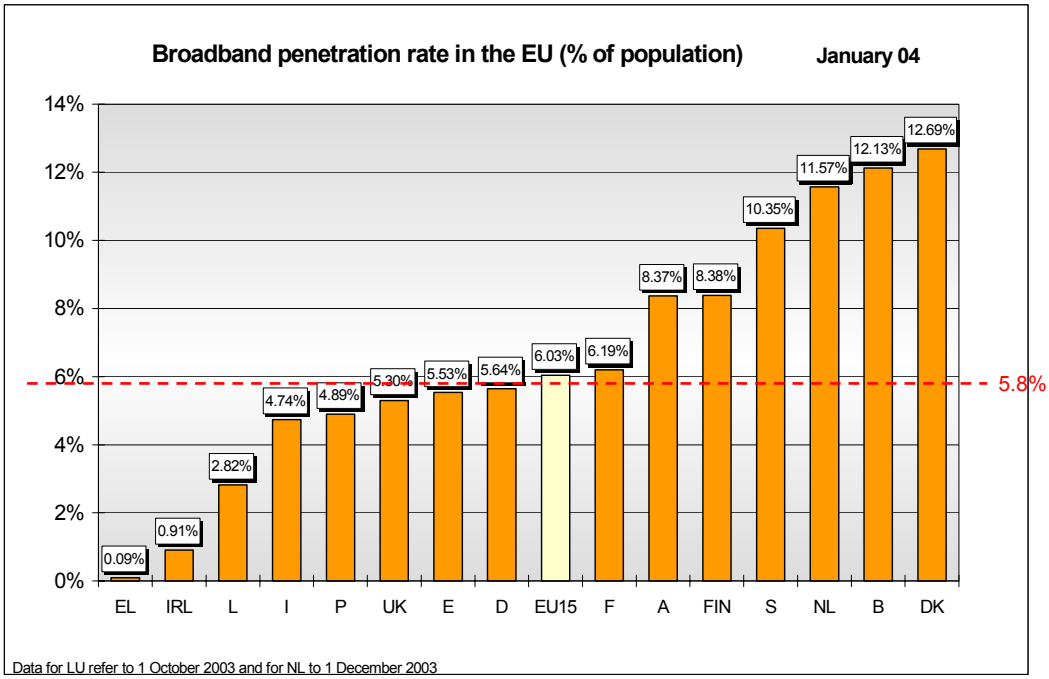
The nature of the communication industry is one which can be best characterised by rapid change. Product life cycles and technology obsolescence occurs at a far rapid pace than in other industries. The successful execution of a national broadband strategy on the other hand, relies on the interrelation of a number of complex factors, which in comparison are based on longer timeframes for successful adoption.

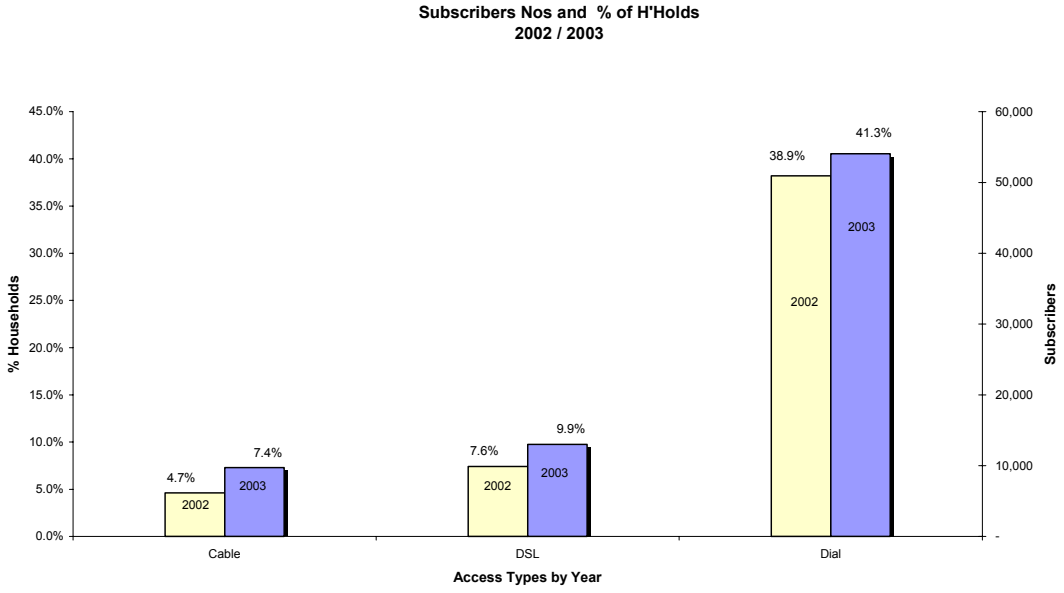
Given this dynamic nature of the industry, there is a high degree of certainty that changes in either technological, environmental or political spheres will ultimately have an impact on the originating strategy. If this occurs, it is important that any such change is dealt with in a constructive fashion to ensure protection of investor confidence and overall viability of the national broadband strategy. Any changes or re-calibration will require communication, consultation and involvement by all relevant stakeholders, so as to explain the reasoning behind the change and to allay investor and operator concerns.

7 Conclusions

Broadband adoption is seen as one of the critical elements in ensuring future sustainable social and economic development. Consequently the scenario, in which the majority of the population shares ubiquitous broadband access, is seen as a quantifiable step in achieving this goal. To achieve this, there is a requirement from both the private and public sector to develop, adopt and implement strategies that will encourage this change. The requirement for a sound, effective and sustainable broadband infrastructure together with applicable, innovative content is the foundation for these strategies.

8 Appendix 1 – Statistics as at Dec 2003





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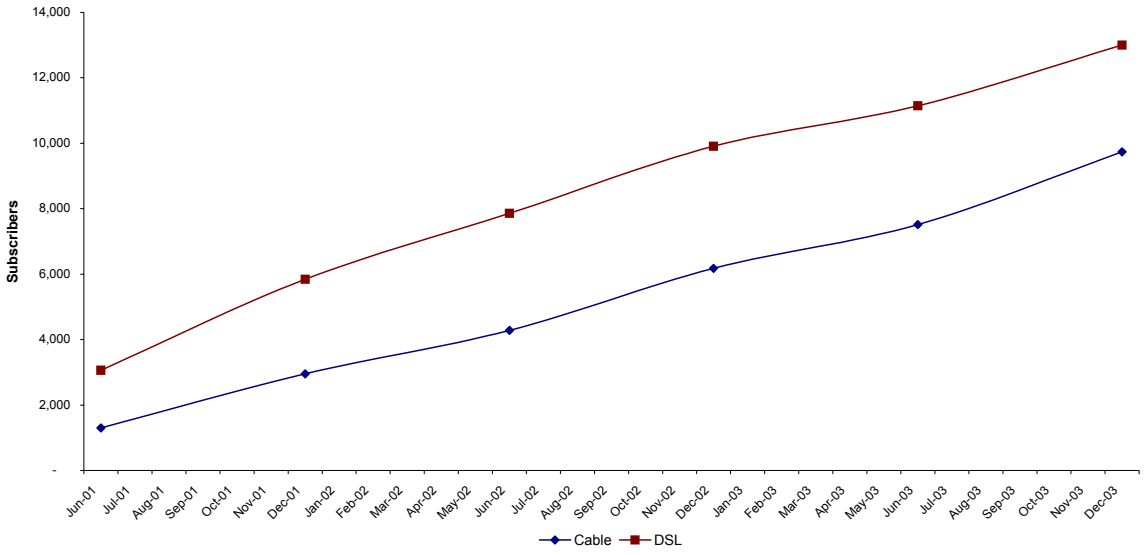
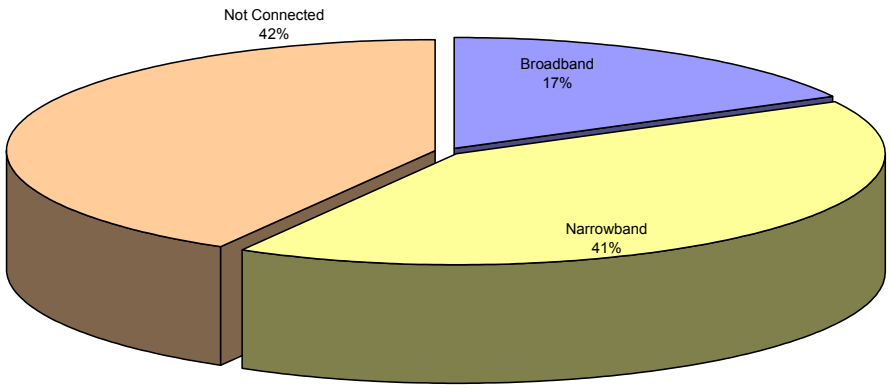
* *Source: NSO Data - Main Indicators & Labour Force Survey, Inform Soc Stats Feb 2004, Melita Cable & Datastream data*

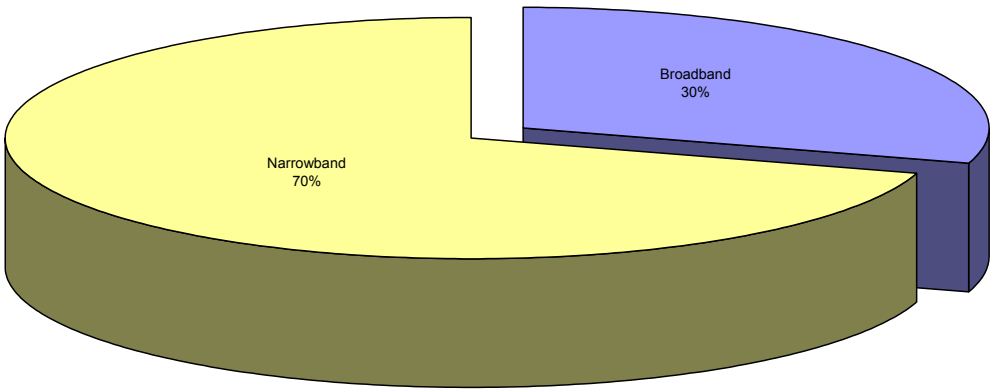
Broadband Growth 2001-03



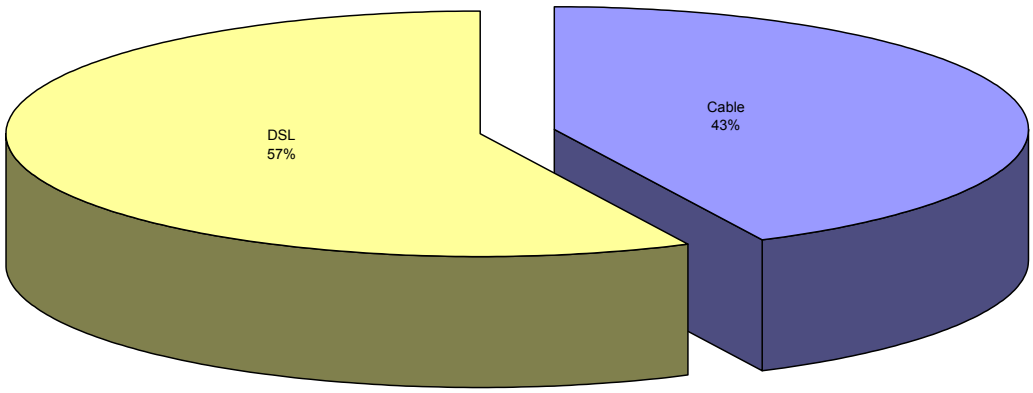
% of Households Connected 2003



Broadband - Narrowband Split 2003

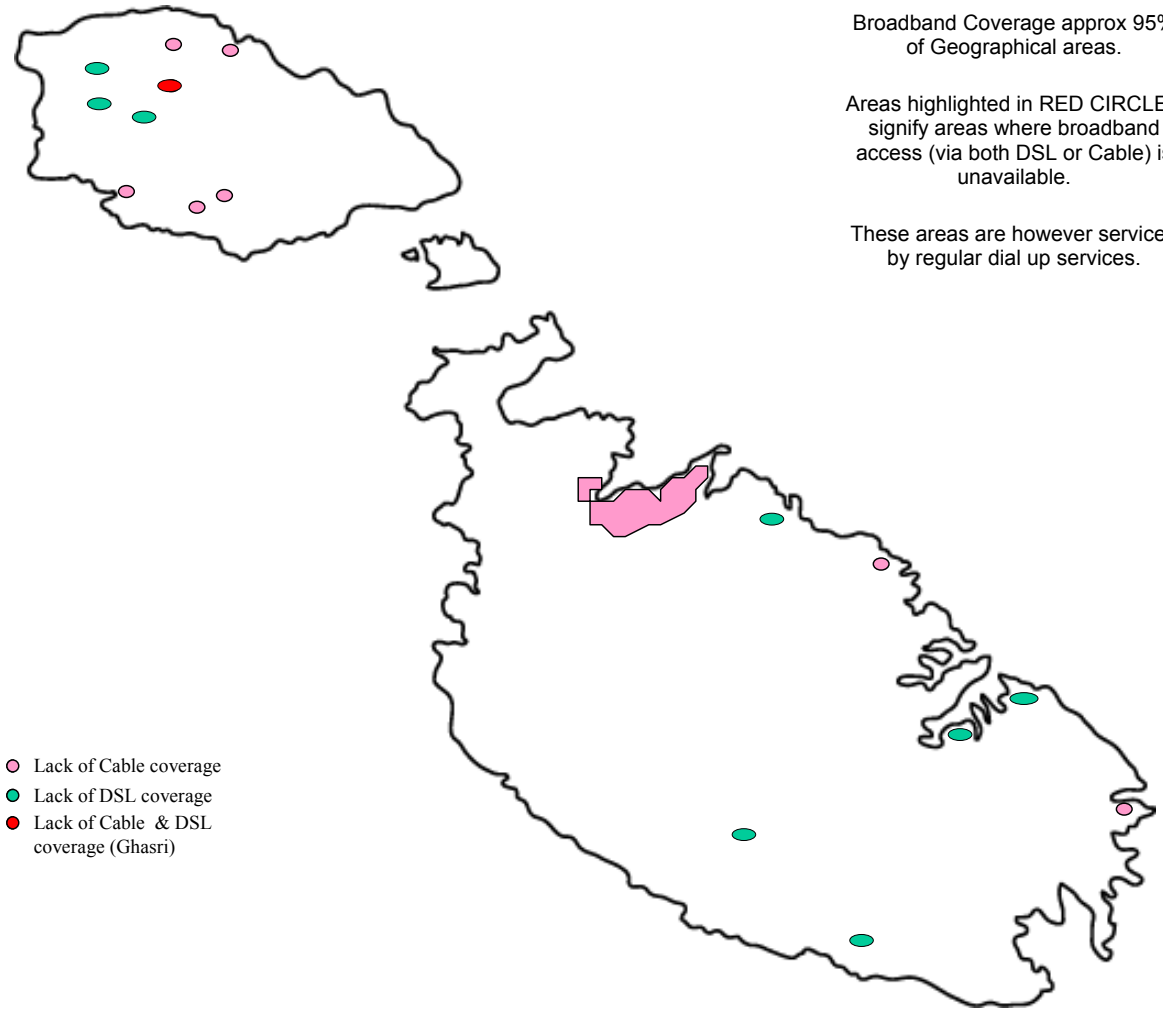


Broadband Split - 2003



Broadband- Geographical Coverage

(Areas Highlighted represent areas NOT covered by either DSL, Cable or Both)



Broadband Coverage approx 95% of Geographical areas.

Areas highlighted in RED CIRCLES signify areas where broadband access (via both DSL or Cable) is unavailable.

These areas are however serviced by regular dial up services.

9 Appendix 2 - List of References

Broadband

- Broadband Telecommunications Benchmarking Study January 2004 FORFAS
- Promoting Broadband Deployment – Richard Wilson – 21st Oct 2003 – Analysis
- Building Broadband Britain - David Edmonds - Director General of Telecommunications – OFTEL
- The Regulation of Incumbent Operators and its Impact on Competition in Broadband Networks and Services Jorge Perez Martinez and Hector Perez Saiz and Sergio Perez Saiz
- Deployment of broadband infrastructure in the EU: Is state intervention necessary ? Dr Michael S Kosmidis
- Electronic Communications: the Road to the Knowledge Economy Brussels, 11.2.2003 COM(2003) 65 final
- eEurope 2005: An information society for all. An Action Plan to be presented in view of the Sevilla European Council, 21/22 June 2002
- Connecting Europe at high speed: recent developments in the sector of electronic communications. Brussels,3.2.2004 COM(2004) 61 final
- New EU Regulatory Framework for Electronic Communications Alexandre de Streel DG Information Society European Multimedia Forum Brussels, 26 June 2002
- ITU INTERNET REPORTS: BIRTH OF BROADBAND September 2003 INTERNATIONAL TELECOMMUNICATION UNION
- PROMOTING BROADBAND: BACKGROUND PAPER April 2003 INTERNATIONAL TELECOMMUNICATION UNION
- The Economics of Broadband Access 30 June 2003 Martin Cave Warwick Business School*
- International Telecommunication Union Workshop on Promoting Broadband 9-11 April, 2003 Efficient Broadband Markets Mark Naftel
- Why some economies succeed with broadband Sam Paltridge OECD 9th April 2003
- About Broadband in Italy – Minesterio della Comunicazioni 2003

UMTS / Spectrum

- Mobile Communications & Technology Platform FINAL REPORT - Brussels, 8 January 2004
- Maximising the economic benefits from spectrum use: how to meet the needs of users, operators, vendors and regulators Analysys Research white paper for Flarion Technologies Inc October 2003
- Social Shaping of UMTS Preparing the 3G Customer Report 26 Jane Vincent – Research Fellow Professor Richard Harper University of Surrey Digital World Research Centre January 2003
- 3G vs. Wireless LANs Competition or collaboration ? Jean-Pierre Bienaimé UMTS Forum
- THE ROLE OF SPECTRUM PRICING AS A MEANS OF SUPPORTING SPECTRUM MANAGEMENT Marbella, September 1999
- 3G Where Art Thou? 1999-2002 Keren Bornshten & Amit M Schejter
- Maximising the economic benefits from spectrum use: how to meet the needs of users, operators, vendors and regulators. Analysys Research white paper for Flarion Technologies Inc October 2003

Leased Lines / LLU

- REPORT ON PERFORMANCE IN THE SUPPLY OF LEASED LINES IN 2002 pursuant to Council Directive 92/44/EEC on the application of ONP to Leased Lines Brussels, 19 December 2003
- Why Local Loop Unbundling Fails? Pablo T. Spiller and Svein Ulset Monday, March 17, 2003
- Report on the ODTR consultation on local loop unbundling Decision Notice D6/00 Document No. ODTR 00/30 April 2000
- Regulation of the European Parliament and of the Council on unbundled access to the local loop. Brussels, 5 December 2000

- Local Loop Unbundling – A Report for Clear – July 2000 – ECON
- REPORT ON PERFORMANCE IN THE SUPPLY OF LEASED LINES IN 2002 pursuant to Council Directive 92/44/EEC on the application of ONP to Leased Lines Brussels, 19 December 2003
- Recommendations from the French Telecommunications Regulatory Authority (ART) related to the Spectrum Management Plan (Plan de Gestion du Spectre - PGS) for the deployment of broadband services on the local loop 18th June 2001

Bitstream

- Bitstream Access in New Regulatory Framework Peter Scott DG Information Society Brussells Bon306-30 #1

- Bitstream Access ERG Document, November 21st 2003

Powerline

- Broadband Powerline Communications Systems A Background Brief Spectrum Planning Team Document SP 11/03 Radiofrequency Planning Group Date: September 2003 Australian Communications Authority

Wireless

- Wireless Local Area Networks Document No: Odtr02/16 Date: 31 January 2002 ODTR BRIEFING NOTE SERIES Oifig

DVTV

- COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the transition from analogue to digital broadcasting (from digital 'switchover' to analogue 'switch-off') [SEC(2003)992]

Legislation

- Communication from the Commission - Unbundled access to the local loop: enabling the competitive provision of a full range of electronic communication services, including broadband multimedia and high-speed Internet .Official Journal C 272, 23.09.2000, pages 55-66

- Unbundled Access to the Local loop - Enabling the competitive provision of a full range of electronic communication services including broadband multimedia and high-speed internet. Commission Recommendation - 26.04.2000

- Regulation (EC) No 2887/2000 of the European Parliament and of the Council of 18 December 2000 on unbundled access to the local loop (Text with EEA relevance) Official Journal L 336, 30.12.2000, pages 4-8