Voice over IP
Regulatory Principles for Innovative Services

Consultative Paper

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Malta Communications Authority
"Il-Pjazzetta", Suite 43/44, Tower Road, Sliema SLM 16, Malta, Europe.
Tel: (356) 21 336 840. Fax: (356) 21 336 846
website: www.mca.org.mt
e-mail: info@mca.org.mt

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1 Introduction

1.1 Executive Summary

The emerging range of Internet Protocol (IP) enabled services, including Voice over IP (VoIP), represents the most fundamental shift in telecommunications technology since the invention of the telephone 130 years ago. A revolutionary set of converged voice, data and video services can now be delivered, bringing better features at lower prices for users, better applications for businesses and new revenues for service providers and equipment vendors.

In traditional voice calls, the conversation is converted into electronic signals that follow an elaborate network of switches along a dedicated circuit – the Public Switched Telephone Network (PSTN). With VoIP telephony, speech is converted into packets of data that travel through the Internet or private networks, just like an e-mail. The packets are then reassembled as speech at the other end of the call.

Since VoIP is essentially a data service that uses the same protocol as the Internet, most regulators initially tended to view it as a service entirely distinct from conventional telephony. However, as VoIP moved away from the realm of hobbyists and fringe players into the mainstream, it became evident that there is a need to review its regulatory status in the light of concepts such as technology neutrality, fair competition and consumer protection.

In this document, the Malta Communications Authority (MCA) seeks to consult with all interested parties about a suitable regulatory treatment applicable to VoIP services. This treatment has to be viewed in terms of newly proposed Maltese legislation in parallel with harmonisation efforts within the European Union.

1.2 Overview

A longstanding “hands off” regulatory policy has probably been responsible for the enormous success of the Internet. VoIP is considered to be a significant force for

increased competition, a platform for innovation, and now, also a driver of broadband deployment.

A widely adopted public policy was to refrain from applying traditional telecommunications regulations to VoIP services. This policy worked well especially in view of the fact that VoIP services were, in the main, based on nascent technologies and provided by small operators. Furthermore, since the underlying technology for packet switched voice services did not typically permit VoIP quality to match that provided by traditional circuit switched telephony networks, it did not appear proportional to regulate VoIP services using mechanisms designed for dealing with monolithic incumbent telephony operators with significant market power.

The historic reason for telephony regulation was the existence of monopoly incumbent providers and owners of infrastructure. VoIP providers are often wrongly compared to phone companies with a degree of market power. A provider of a VoIP service has typically no need to own or build the infrastructure on which the service is delivered. However there is a shift being witnessed where even incumbent operators are moving to using IP in their core networks in order to more efficiently transport telephony services. At the same time it is crucial to ensure that infrastructure owners can justify continued and increased I nvestment in their networks by being able to recognise a fair return through access charges to third parties.

In September of 2002, the MCA published a consultation paper entitled "*VoIP: Systems, Services & Regulation*"[1]. This proposed a regulatory treatment for packet switched voice services in terms of the legislation in force at the time.

In December 2002, the MCA issued a publication titled "*Packet Switched Voice Services - Consultation Report & Authorisation Guidelines*"[2] in which it laid out the criteria that would be applied in determining whether a packet based voice service was to be considered a data/Internet application or a telephony service in terms of regulatory rights and obligations at law.

[1] http://www.mca.org.mt/news/show.asp?id=85
[2] http://www.mca.org.mt/news/show.asp?id=95

In January 2003, the Maltese telecommunications market was completely liberalised with the last barriers to competition removed. This prompted some service providers to begin to offer low cost international VoIP services using Internet infrastructures. These services, regulated as Internet applications in line with the published guidelines, proved to be extremely popular and an explosion in the number of international call minutes was witnessed.

Since then, as a consequence of Malta's accession to the European Union (EU) there was a requirement to reform legislation regarding electronic communications so as to be in line with the new EU regulatory framework that had to be adopted by Member States by July 2003. In February of this year, the then Ministry for Transport and Communications published a White Papertitled "*A New Regulatory Framework for the Telecommunications Market*"[3]. Following a consultative process, a Bill[4] amending various laws related to electronic communications was published in April. At the time of writing, the Bill was in discussion in Parliament and its coming into force is expected to take place imminently.

In July 2004, the Ministry for Competitiveness and Communications published a Consultative Document[5] outlining the proposed Electronic Communications Networks and Services (General) Regulations, 2004.

The MCA recognises that the role that VoIP will play in shaping future telecommunications markets will be fundamental as it becomes evident that there is a definite shift from legacy circuit switched networks to technologies employing the IP. With the launch of innovative voice over broadband services together with the continuing popularity of cheap international VoIP calls using pre-paid cards, there is a need to review the market and provide a clear direction as to the regulatory environment that will apply under the new legislation.

Quite apart from the definitional considerations, the VoIP community is to be consulted on such issues as providing access to those with disabilities, access to emergency

[3] http://www.mca.org.mt/news/show.asp?id=164
[4] http://www.mca.org.mt/news/show.asp?id=171
[5] http://www.mcmp.gov.mt/pdfs/ecnsregs2004.pdf

services, cooperation with law enforcement agencies, securing funding for universal service, numbering, consumer education and protection as well as a reform of inter-carrier connection regimes. It is hoped that these matters can be addressed without imposing heavy regulatory burdens.

New voice service providers can potentially develop product offerings rapidly by utilising new or existing data networks for voice transport. This technological evolution, now rapidly gaining increasing popularity, can create opportunities for new entrants to the telecommunications market while challenging established operators to respond. Issues such as quality of service, pricing, reliability, availability, numbering and billing will have to be closely examined. Service providers' responsibilities and obligations will also have to be determined.

This paper is not a legal document and is being published without prejudice to the legal position or the rights and duties of the MCA to regulate the telecommunications market generally.

2 Legislative Background

2.1 The EU Position

In July 2000 the Commission submitted a package of legislative proposals to the Council and the European Parliament aimed at a substantial reform of the regulatory framework for the telecommunications sector. After 18 months of intensive negotiations, four Directives and a Decision were adopted in two readings by co-decision procedure in March 2002. A fifth Directive, on data protection, followed suit in July 2002. Member States were required to have transposed the Directives into national law by 25 July 2003. Countries that acceded to the EU in the recent enlargement were to transpose the Directives by the 1st May 2004.

The New Regulatory Framework (NRF) consists of the following instruments :

- Framework Directive setting out the main principles, objectives and procedures for an EU regulatory policy regarding the provision of electronic communications services and networks.
- Access and Interconnection Directive stipulating procedures and principles for imposing pro-competitive obligations regarding access to and interconnection of networks on operators with significant market power.
- Authorisation Directive introducing a system of general authorisation, instead of individual or class licences, to facilitate entry in the market and reduce administrative burdens on operators.
- Universal Service Directive requiring a minimum level of availability and affordability of basic electronic communications services and guaranteeing a set of basic rights for users and consumers of electronic communications services.
- Privacy and Electronic Communications Directive setting out rules for the protection of privacy and of personal data processed in relation to communications over public communication networks.

- Radio Spectrum Decision establishes principles and procedures for the development and implementation of an internal and external EU radio spectrum policy.
- Commission Competition Directive consolidating the legal measures based on Article 86 of the Treaty that have liberalised the telecommunications sector over the years.

In addition to these basic instruments, the Commission has adopted additional measures that will play an important role in the functioning of the new framework:

- Commission guidelines on market analysis and the assessment of significant market power setting out a common methodology and principles for the national regulatory authorities charged with these tasks.
- Commission recommendation on relevant markets defining a list of 18 sub-markets to be examined by national regulatory authorities.

In June 2004, the Director General (DG) Information Society of the European Commission published a Consultative Document regarding its proposed position on VoIP. Under the EU regulatory framework, players are free to enter the market for electronic communications services without prior authorisation, provided they abide by the conditions set out in the general authorisation applicable in each Member State.

The general authorisation sets out rights and obligations for the providers of publicly available electronic communications networks and services. There are additional rights and obligations for providers of publicly available telephone services and for those providers that have Universal Service Obligations (USOs).

This document explains the conditions that apply to these different types of services. The degree to which a provider of VoIP based services will face obligations under the EU framework depends on the type of service offered. One of the aspects where VoIP differs from a traditional telephone service is the fact that users can be nomadic and use their terminal device at different locations. This gives rise to a number of new issues in relation to the provision of emergency services, and the document calls on

market players to work together to find solutions. Issues of service availability also need to be addressed.

The continued uptake of VoIP services may have a substantial impact on the interconnect models of the traditional PSTN environment. The availability of geographic and non-geographic numbers will also be important to the success of VoIP services.

This document seeks comments on these and related issues and, in order to focus the debate, sets out proposed positions in a number of areas. The document may be downloaded from the EU DG-INFSO website[6].

2.2 Maltese Legislation

The proposed legislation – the Communications Laws (Amendment) Act of 2004, in the amendments to the Telecommunications (Regulation) Act[7] proposes the following definitions:

> *"'electronic communications service' means a service normally provided for remuneration which consists wholly or mainly in the conveyance of signals on electronic communications networks, including telecommunications services and transmission services in networks used for broadcasting, but exclude services providing, or exercising editorial control over, content transmitted using electronic communications networks and services. It does not include information society services, as defined in the Electronic Commerce Act, which do not consist wholly or mainly in the conveyance of signals on electronic communications networks."*
>
> *"'publicly available telephone service' means a service available to the public for originating and receiving national and international calls and access to emergency services through a number or numbers in a national or international telephone numbering plan, and in addition may, where relevant, include one or more of the following services:*
> *(i) the provision of operator assistance,*
> *(ii) directory enquiry services,*
> *(iii) directories,*
> *(iv) provision of public pay phones,*
> *(v) provision of service under special terms, and*

[6] http://europa.eu.int/information_society/topics/ecomm/index_en.htm
[7] The Bill proposed the renaming of the "Telecommunications (Regulation) Act" to the "Electronic Communications (Regulation) Act".

(vi) provision of special facilities for persons with disabilities or with special social needs and, or the provision of non-geographic services."

These definitions, which mirror closely those laid out in the EU Directives, are key to identifying services to be within, or out of, the realm of "Publicly Available Telephony Services" (PATS).

In terms of the proposed legislation, an undertaking wishing to provide any form of VoIP services will require authorisation as "other publicly available electronic communications services" (ECS) or "publicly available telephone service" (PATS). Classification within one category or the other will mean that different rights and obligations will apply. Of course, undertakings wishing to deploy VoIP over a private network may also require authorisation but this document focuses on services available to the general public.

In July 2004, the Ministry for Competitiveness and Communications also published a document proposing applicable subsidiary legislation - *The Electronic Communications Networks and Services (General) Regulations, 2004*[8] - dealing with the regulation of electronic communications. These also have a significant bearing on the topic under discussion since the regulations specify the treatment of various publicly available networks and services.

[8] http://www.mcmp.gov.mt/newsdetail.asp?i=68

3 VoIP Technology & Business Models

A detailed outline explaining the technical background behind VoIP was provided in the consultation document issued in 2002. Reference to that document should be made if necessary. Since then, while the underlying technologies have not really changed, technological development has permitted the emergence of a number of business and service models.

VoIP is essentially an "application" which can operate over a technologically neutral transmission infrastructure. In one of its current guises, VoIP operates over the public Internet infrastructure which is accessed via Cable, Asynchronous Digital Subscriber Line (ADSL) or the PSTN (see Glossary for explanations) or any private data network connection utilising Integrated Services Digital Network (ISDN), Leased Lines or Optic Fibre links. Over these varied transmission media, ranges of differing services are offered to consumers. At one end there are the basic "peer-to-peer" type models while at the other, there are new sophisticated hybrid models that even offer closed-user group, local or international VoIP calls across existing infrastructures and equipment.

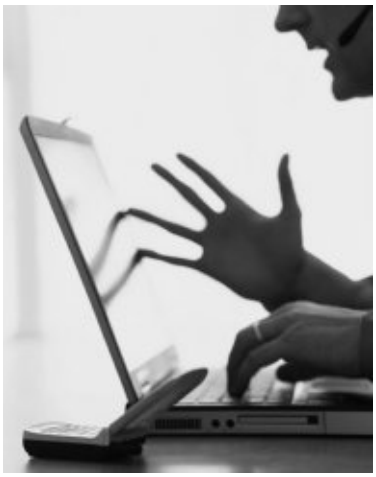

Fig. 1. VoIP enables converged services and unified messaging

VoIP can also be used as a technology at the core of operator networks. Replacing traditional circuit switched equipment with IP switches or routers to handle IP telephony traffic is something that all major carriers are implementing or intend to implement. This is expected to bring about benefits in terms of efficiency and expense.

3.1 VoIP Service Types

As VoIP matured as a technology, service providers have found different ways to deploy it in order to realise revenues or save costs. The commonest forms of VoIP services are presented below

3.1.1 Peer-to-Peer

Peer-to-peer VoIP models are typically based on Personal Computers (PCs) having an Internet connection. Both calling parties are generally required to be connected to the Internet and sometimes to the same VoIP platform provider. Conversations are normally carried out using a soft phone (i.e. PC based software) and a headset or via an IP Phone (a Session Initiation Protocol (SIP) based phone which connects to your internet connection instead of your phone socket). There is normally no or little cost to subscribe to these services other than the cost of accessing the internet. Consequently the quality of voice transmission is based on best effort instead of any guaranteed quality.

Peer-to-peer VoIP can be accessed via publicly available services such as MSN or Yahoo. These applications mainly focus on Instant Messaging (IM) however they also do offer some limited VoIP functionality. In reality their use for VoIP other than for recreational or personal use is very limited, due to quality issues and network connectivity related problems created by firewalls which can block required IP ports. The emergence of a non-port specific peer-to-peer, with significantly better voice quality, may help promote usage under this delivery model. Recently the massive success of Skype[9], a peer-to-peer VoIP service that doubles as an IM application with all the presence functions associated with such, seems to indicate that this model will prove to be extremely attractive especially when coupled with mobile networking from notebook PCs and Personal Digital Assistants (PDAs) from within Wireless Fidelity (Wi-Fi) hotspots.

[9] http://www.skype.com

3.1.2 Voice over Broadband

The Voice over Broadband (VoBB) model (also known as the "Vonage" [10] model after the US-based provider that is believed to have used it first) relies on the commercial provision of a VoIP service that runs over a permanent broadband connection, by an independent operator to a consumer. In most cases, the service primarily allows subscribers to make VoIP calls to any destination. While the main focus would be cheap international or long-distance calls, free or very cheap local calls are also typically offered. The attraction of the service is the significant reduced rates offered by VoIP on internationally terminated calls as compared to those offered by the telephony incumbent. The subscriber uses either a soft-phone, SIP Phone or an adapter that converts their normal PSTN phone to a SIP phone, to initiate calls. Vonage-type functionality includes personalised numbers, unified messaging and a large variety of tariff plans.

Locally, two service providers have already launched such a service and it is expected that others will follow suit in the near future. Termination of calls from a PSTN network are technologically feasible, however the presence of an as yet somewhat exorbitant interconnect rate makes the placing of such calls more expensive when compared to that offered by traditional services at this point. Originating calls from a traditional PSTN subscriber to a VoIP customer is also possible, since the supplier of the VoIP service assigns the subscriber a unique phone number from a range of Direct Dialing In (DDI) numbers on a Private Autmated Branch Exchange (PABX). Users on a traditional PSTN network can dial this number, which is received by the VoIP supplier's network, converted to IP and routed to the VoIP end user. This model is nevertheless a significant and important first step in promoting VoIP as a potential substitute for traditional fixed line telephony services.

3.1.3 PSTN Dial VoIP

In this model, originating calls are primarily made to a local number utilising the standard PSTN service. Users are not required to use either a SIP or soft phone. However a pre- or post-paid subscription to the VoIP service provider is required to

[10] http://www.vonage.com

access the service. A standard local call is made from a PSTN or mobile phone to a VoIP gateway. This will authenticate the user via an allocated PIN or password found on pre-paid stored-value cards that allow access to the service. Once connected, calls to international destinations typically terminating on a PSTN network can be undertaken.

This type of VoIP service proved extremely popular due to the combined factors of ease of use and cheap pricing. The massive take up rate was responsible for severely impacting the incumbent operator's revenue from international calls although this was mitigated to some degree as some revenue was recouped from charging subscribers for local calls when using the PSTN to dial the VoIP gateway.

Due to the regulatory regime in force so far, VoIP service providers have not been able to provide and allocate standard E.164 telephone numbers to customers. This is due to the fact that the authorisation guidelines led to the classification of such VoIP services as a data or Internet service that required Internet Service Provider (ISP) authorisation. Under the previous legal framework, ISPs did not have access to numbering resources, as this was only a right of telephony operators. In this regard, users could not rely exclusively on a VoIP service provider to fully replace the telephony operator for all their voice telephony services.

In some respects, the current local model represents a hybrid "Carrier Selection" (CS) model, which allows international calls to be made, utilizing the VoIP gateway as the mechanism to provide the toll-bypass service. Unlike pure CS however, the local call origination and termination portion is paid by the originating user to the telephony operator, and is separate to the cost paid to the VoIP operator.

In its last proposal for carrying out a tariff rebalancing exercise, the telephony incumbent, Maltacom plc, took a position whereby it insisted upon some form of surcharge for dial VoIP traffic to compensate for the use of its infrastructure. This was not considered to be tenable by the Authority. Subscribers making a VoIP call currently pay Maltacom plc for the local portion of the call (to the VoIP service provider) in exactly the same way as for any other local call, whether this is made in order to

access the Internet or for a standard local call. Unfortunately the fact that tariff rebalancing was a long drawn out process only served to compound the situation by providing ample arbitrage opportunities on international calls.

3.1.4 Corporate Local Area Network (LAN) & Wide Area Network (WAN) VoIP Systems

The cost benefits provided by VoIP have not been lost on the business community. Many organisations within the local market have begun to express substantial interest in VoIP technology as a means to reduce operating costs. This is primarily achieved by merging both communication and Information Technology (IT) infrastructures and subsequently having the ability to utilize their existing high speed data infrastructures for both services, resulting in an efficient use of existing infrastructure. Consequently, most organizations are at the least exploring the opportunity to implement VoIP as an alternative voice service between geographically separately located offices. This is seen as an interim step in evaluating the technology in a closed environment, without risking possible quality issues with external customers.

Locally, encrypted VoIP is now even being utilised by government to link all international embassies, and new projects are currently underway to eventually migrate all inter-department government voice traffic to a VoIP solution over an integrated Optic Fibre network.

From a business perspective, VoIP offers more features and customisation than circuit switched technology applications. Applications like virtual PABX systems for business customers built on VoIP solutions provide extended capabilities at a fraction of the cost of traditional products. Although interest from the general business community exists, the uptake has been to date small. This however has possibly more to do with cautious replacement cycles than a lack of desire to move to VoIP based solutions. Given that some firms have made a substantial investment in their existing PABX solution, they are reluctant to replace this technology without some payback realization on their current investment. Once the time comes to replace their PABX solution then the decision to move to a VoIP model becomes more tenable.

It is anticipated that as VoIP quality continues to improve, and there is greater acceptance of this technology, new innovative solutions may find their way replacing traditional telephony services further in the field.

3.1.5 Next Generation Networks

It is now clear that circuit switched telephony is a technology that is heading towards obsolescence. In its place will come converged next-generation networks based on tightly integrated IP and optical technologies. These infrastructures will no longer be dedicated to supplying a single service – telephony or video or data – but will be capable of delivering all of these irrespective of the terminal devices. Packet switched cores will be able to efficiently route voice traffic in the same way that core routers today direct data traffic all over the Internet. In this way, the same devices can be used to convey voice and data, resulting in significant capital and operational expenditure savings.

IP-converged voice-data communications will soon become the *de facto* standard for residential and business customers. Present day telephony operators understand that migration to next generation infrastructures is their only chance of survival in the face of competition from other operators of broadband-capable infrastructures. This bodes well for consumers who will be faced with a choice of service, platforms, access devices freeing them from the need to deal solely with a single telephony service supplier.

3.2 VoIP as an Enabler of Change

The velocity at which both technological advances and consumer adoption of this technology has occurred, has taken many by surprise. New service offerings appear with constant regularity and have the potential to disrupt existing established business models. Changes at both the network and application levels, through either new alternative transmission mediums or better applications, have the potential to re-define VoIP services as they stand today.

Constant technical improvements are allowing VoIP to be delivered with quality close to voice telephony transmission under adverse network conditions. This is a clear indication that carrier grade voice quality will be achieved in the near future. Further enhancements to allow transparency of VoIP access with firewalls and Network Address Translation (NAT) servers, which traditionally hamper VoIP connectivity by blocking ports used by VoIP services, are also being developed. Voice quality guarantees across VoIP services have to date been viewed as a "value-added" feature, which warranted premium charges where possible. The development of better compression algorithms and improved packet delivery methods somewhat devalues this proposition, essentially declaring quality as an inherent baseline in the future provision of VoIP. This will obviously have some impact on the overall current retail market offerings.

At the physical transmission layer, there are a number of emerging access technologies, which could have a significant impact on existing VoIP, PSTN and mobile telephony services. The most exciting of these result from the recent emergence of wireless based technologies ranging from WiFi and WiMax to Ultra Wideband (UWB) technologies. These technologies can bypass both the physical cable infrastructure and technology specific wireless technologies such as Global System for Mobile communications (GSM), Fixed Wireless Access (FWA) and Universal Mobile Telecommunications Services (UMTS) and use unregulated radio spectrum to transmit data between network users. The implications for using VoIP across this medium are quite significant. Used across a wireless medium, VoIP has the potential to disrupt current second generation (2G) and emerging third generation (3G) mobile markets. It is feasible for, say, any Wi-Fi enabled device, (like a Laptop or PDA), to be able to initiate a voice conversation without the requirement for either a mobile phone connection or a landline. This also provides complete "nomadicity" meaning that a user is no longer tied to a specific location or network when accessing voice services.

The increase in wireless hotspots in locations around the country, and the ability to utilise VoIP over a wireless enabled device like a laptop or PDA could have a significant impact on the current market environment. With this service VoIP has the

distinct ability of being able to erode mobile market revenues in the same way it has done with traditional fixed line services. The conditions are similar. Mobile voice rates are significantly high, inducing many mobile users to using text based messaging as an alternative to making a call. Data connectivity is even more expensive and limited by the size of existing screens on phones. New 3G networks promise to offer increase in speed and therefore application diversity, however the costly investments in deployment of this new technology have to be kept in mind. VoIP across Wi-Fi or WiMax solutions, could potentially in the future offer an equivalent service at a fraction of the cost. Indeed, some mobile phone manufactures are seeking to begin production of both traditional 2G and 3G phones with wireless LAN connectivity as well, thus allowing users to select the cheapest possible option for mobile voice termination.

Actual usage of this medium for VoIP is still in its infancy and there are still significant hurdles yet to be overcome in terms of quality, roaming, billing and performance before it is even considered as a mainstream technology. However its impact cannot at this stage be discounted.

3.3 VoIP Technology Convergence

The degree of convergence of technologies and services has consequently a significant impact on any existing regulatory framework. Legislation, which is service or technology specific, runs the risk of being outdated in a relatively short space of time. Consequently, legislation which takes into account the market irrespective of the type of differing services being offered and the technology being used to deliver them, is by far superior and future proof. The new EU legislative framework, which is founded on competition principles, adopts this concept. Nevertheless, it is clear that differences in outlooks exist and there are consensus gaps in regulatory approaches to the treatment of next generation services.

3.4 Future Scenarios

There is no doubt that VoIP will play an increasing and important role in the transmission of voice. The extent and rapidity to which it will replace traditional

switched voice is yet to be seen, however with the rapid advances in complimentary technology, carrier grade VoIP is not an unrealistic expectation in a relatively short timeframe.

Initially, VoIP services may be relegated to being provisioned as second lines in homes, and used predominantly for cheap international calls. Broadband providers may begin to use VoIP as an incentive to customers to sell their broadband packages. Free VoIP minutes may be offered to subscribers, although it is more than likely that these may be limited to peer-to-peer VoIP solutions to avoid incurring termination costs on PSTN. Peer-to-Peer models will appear, however their prevalence may be limited to early adopters. Current VoIP operators will initially dominate the market, with various products, services and charging models, however this will change over time as telephone companies are forced to enter the market once traditional revenue streams decline. By this stage the concept of local telephony may have changed completely through the convergence of a myriad of technologies.

3.5 In Summary

- VoIP is a platform independent application, which is able to transmit voice using IP across multiple transmission media.
- Consumer acceptance of quality and convenience was initially highly price dependent but this will probably change over time as users expectations mature.
- Constant developments in both technology and delivery models ensure that “status quo” timeframes are short-lived.
- Emerging technology within VoIP arena blurs even further the distinction between otherwise traditional segmented communication platforms of Fixed and Mobile.

This highlights the volatility of the communications market as a whole, and re-affirms the requirement for suppliers to be open to adopting emerging new technologies as a

means to ensure their future sustainability. It is unlikely that this pace and magnitude of technological change will abate in the near future.

Consultative Question 1:

Do you agree that these are the technologies and business models (as listed in 3.1.1. to 3.1.5.) that are most likely to emerge and dominate?

Consultative Question 2:

Does your organisation provide/intend to provide/use services as described? If so, please give details of how this service operates/will operate?

Consultative Question 3:

Do you envisage other potential VoIP business models and/or disruptive technologies impacting the current and foreseen electronic communications services environment? Give the necessary explanations.

4 Regulating Undertakings providing VoIP Services

It is expected that within a relatively short timeframe Government will, following the industry consultation currently underway, bring into force subsidiary legislation that deals with the appropriate authorisation regime that applies to ECS and PATS.

VoIP service providers will need early visibility of what their rights and obligations will be under the future regulatory regime. It is important to note that PATS is a subset of the full set of ECS, as shownin Figure 2. USP signifies the *Universal Service(s) Provider(s)*, which can be designated by an National Regulatory Authority (NRA) to ensure the nation-wide provision of essential communication services to consumers. An NRA may choose not to select a USP, but only if it is certain that other undertakings, in combination, provide the same degree of universal service. At all times, all consumers must have the comfort of knowing that telephony services are available to them at affordable prices. Consumers must also be able to make an informed choice when deciding which communications service to use.

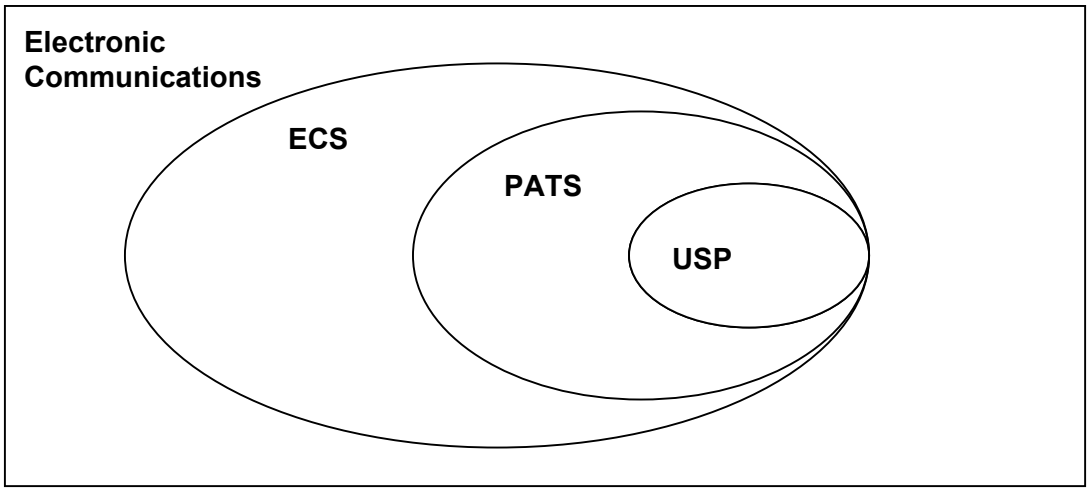

Fig. 2 – Comparison of regulatory classifications for voice services

4.1 Regulatory Classifications

The foremost issue when taking into consideration the way VoIP services will be treated under the NRF is the mechanisms that are to be used to make any distinction, if at all, between an ECS and PATS.

Earlier in 2004, the European Commission asked Analysys[11] to compile a report examining the various VoIP business models and recommending the appropriate regulatory approach for each of these. The report[12], which was published for consultation, is available online.

In the report, Analysys basically outlined five potential or existing business models. Some of these fell outside the scope of the NRF as they were not publicly available or were typically information society services. For those that *did* fall within the scope of the NRF, they also came out with two "views" with respect to how a VoIP service could be categorised as an ECS or as PATS. These views were based on the ***four*** criteria listed in the Directives' definition of PATS, namely:

1. Public availability of the service,
2. Ability to make and receive both national and international calls,
3. Use of a national or international numbering plan,
4. Ability to access emergency services.

It is understood that these criteria are cumulative and additive. The classification of a VoIP service as ECS or PATS is critical because PATS providers have more obligations as well as greater rights.

PATS providers have, under the terms of the Universal Service Directive, more onerous obligations that could prove costly to provide.

[11] Analysys is a leading strategy and management consultancy specialising in the telecommunications, IT and media sectors.
[12] http://www.analysys.com/goto.asp?strwhere=/pdfs/EC_VoIP_Report.pdf

Furthermore, a key consideration is that a "public telephone network" is defined in this directive as a network that provides access to PATS. We have seen in the previous sections that a VoIP service can run over various networks and technologies. A VoIP service provider does not necessarily have to own a network infrastructure. The indication therefore is, that if a VoIP service is considered to be PATS even though there is no ownership of the underlying network, then the supporting infrastructure *also* has to be classified as a public telephone network! Public telephone networks have specific obligations. This could potentially lead to distorted regulatory situations unless clarified at an early stage.

To sum up, *any* VoIP service is considered to be an ECS. However to be classified as PATS, further examination is necessary. Note that throughout this text when reference is made to ECS, this applies to *publicly available* services. Private ECS may of course be provided and may also require authorisation, be subject to obligations and pay administrative charges.

4.2 PATS – Broad versus Narrow Views

The "narrow" view adheres strictly to the criteria as listed above. Any VoIP service that also provides access to emergency services must be classified as PATS. The corollary – that any VoIP service that does not provide access to emergency services *cannot* be classified as PATS – also applies. Hence the imposition of any extra obligations resultant from classification as PATS can only follow if ALL four criteria are met.

The "broad" view, as put forward by Analysys, is that classification as PATS should depend on the degree of substitutability (as perceived by the market and consumers) of the VoIP service with the traditional PSTN. This would mean that a value judgement would have to be made, and obligations emanating from regulatory classification as PATS could be imposed on any ECS voice service that is considered to be functionally equivalent to, and competitive, with the PSTN's fixed line telephony.

Both approaches have their advantages and drawbacks.

The broad view is open to contention since changes in technology and services make a clean classification very difficult. There is also the possibility that by classifying VoIP services as PATS and imposing extra obligations this would hamper innovation, competition and consumer choice.

On the other hand, applying the narrow view could mean that service providers hold back from voluntarily offering access to emergency services so as not to be classified as PATS and hence be given the additional responsibilities associated with a PATS provider.

In the consultation document issued by the European Commission and which is referenced earlier, the direction taken is that it is up to the undertaking providing (or intending to provide) the voice service to select which general authorisation to seek. This is taken to mean that it will be the choice of the undertaking as to whether it classifies itself as PATS or ECS and then abide with the requisite obligations and enjoy the associated rights as per the classification sought. The NRA's role does not appear to be that of classifier but one of oversight in ensuring that the undertaking meets its obligations as necessary.

At this point, it should be clarified that the key extra rights pertaining to undertakings that are classified as PATS are:

- The right to number portability and,
- The right to CS.

In communications markets that are more developed or more mature, the right to CS and number portability provides a highly valuable competitive ability. In this way, a new entrant can quickly move to compete on a similar footing to an incumbent or undertaking with market power.

However, in the local situation, these rights may not yet be of the same perceived value. This is due to the fact that the way that the market developed tended to dampen the need for both CS and number portability. In the case of the former, call origination and interconnection rates may still be considered too high in relation to local calls

prices to justify a business case, a situation that is receiving regulatory scrutiny. For number portability, the size of the market means that the investment needed by undertakings in order to provide this capability is somewhat out of proportion to the expected number of ports. Again, there is a great deal of regulatory activity to address this. Clever use of number ranges has also lessened the impact on the consumer in the event of an operator switch.

In the proposed new subsidiary legislation being released for consultation contemporaneously, the general authorisation regime for both ECS and PATS is being specified. It would be best to make reference to this to clarify all the rights and obligations for both classifications. There are different administrative fee structures for each service classification and the administrative fee burden for a PATS provider is expected to be more onerous than that applicable for an ECS provider.

VoIP Service or Business Model	Description	Regulatory Implications
Peer-to-peer	Widely used and first to become available. Personal computer based, makes use of VoIP software clients. Can be integrated with Instant Messaging (IM). No telephone handset used. Free or very cheap. Any form of Internet access may be used.	Generally considered to be an information society type service. Not typically regulated as a publicly available ECS.
Voice over broadband	Rapidly becoming the predominant model for VoIP service delivery. Typically use a SIP phone (or standard phone + adapter) connected to a broadband modem (e.g. cable or DSL) to place calls. Differentiated rates for on-net, local and international calls.	Certainly falls within the realm of ECS. Depending on service features can be used to provide PATS if all criteria are met.
PSTN Dial VoIP	Normally accessed via a local call to a VoIP gateway. Call time usually purchased via pre-paid cards. Generally used for placing overseas calls at cheap rates.	This is certainly an ECS. Depending on service features can be used to provide PATS if all criteria are met.
Corporate LAN & WAN VoIP Systems	Enterprise "PABX" type solution spanning single or multiple premises over own or leased infrastructures.	Since services are not typically commercially available to the public, while authorisation is required, these systems are not regulated as other publicly available ECS.
Next generation networks	Service provider networks with converged infrastructures and IP-based or packet-switched cores.	New regulatory regime will consider services on a technology neutral basis.

Table 1. Comparison of VoIP Services & Regulatory Implications

Consultative Question 4:

Do you endorse the "broad" or "narrow" view in classifying VoIP services as ECS or PATS?

Consultative Question 5:

Do you consider PATS classification for a VoIP service to be a burden or an opportunity?

Consultative Question 6:

In terms of the proposed subsidiary legislation, would your organisation opt for classification as ECS or PATS if it is providing/were to provide VoIP services? Please explain your reasoning.

5 Key Issues in relation to VoIP Services

Now that it is amply clear that there is a significant shift away from further investment in circuit switched voice systems while constructing next generation converged networks that support VoIP, in the main through the use of a broadband network, many of the regulatory mechanisms that traditionally were conceived to apply to PSTN networks now need to be completely reviewed and re-thought.

The following areas have been identified and each aspect is described. **Feedback is requested on each of these areas.**

5.1 Interconnection

Traditional interconnection referred to fixed line or public mobile telephony operators agreeing to set up circuits connecting them together so that voice traffic can be passed between their networks. In this way it was possible for a caller linked to one network to be able to call a subscriber connected to another operator's network.

Interconnection arrangements were vital for such operators because significant revenues could be generated, or costs paid, depending on the volumes of incoming and outgoing call traffic. From a regulatory point of view, in order to ensure transparency and fairness, telephony operators who were deemed to posses dominant or significant market power (DMP/SMP) were usually required to publish a Reference Interconnection Offer (RIO). This described in detail the commercial and technical arrangements necessary for effecting interconnection to the operator.

Because of the new VoIP technologies and services, traditional RIOs may no longer suffice. Operators with SMP who are required to publish a RIO have basically two options in terms of dealing with VoIP. They can either opt to maintain their current RIO format and or they can chose to modify it to take into consideration the technological developments.

If the former is the case, this would mean that a VoIP operator or service provider wishing to achieve interconnection would have to be responsible for taking all steps to establish an appropriate gateway functionality that is compatible with that of the circuit switched operator in order to establish the IP ←→ PSTN links. This will introduce additional costs for the VoIP service provider.

As the telephony incumbents also migrate their core networks to IP, then it will become increasingly the case that technical specifications within the RIO would include interfaces for direct IP ←→ IP connections. Yet, and perhaps more importantly, there may be new interconnect billing models required for such a connection scenario. Traditional PSTN ←→ PSTN interconnects had billing schemes based on voice traffic minutes in a certain direction. Due to the packetised nature of VoIP, there are no "dedicated" voice traffic minutes. In fact, the VoIP traffic may be mixed in with data packets and be indistinguishable from these. So accurate metering could prove to be difficult. This has been shown in the public Internet model, where the interconnect model relies on "peering" and "sender keeps all".

However, the underlying expectation of service providers is that the IP←→IP gateway interconnection functionality will perform in the same manner as a traditional Time Division Multiplexing (TDM) handoff, with the exception of realizing greater efficiency and significant cost savings. This is a critical difference between traditional IP←→IP peering of pure data, and IP←→IP peering for VoIP. In the IP telephony scenario, the behaviour is expected to more closely emulate a TDM handoff than a more conventional IP←→IP handoff.

The most important capabilities required by carriers for VoIP interconnection are:

- Clearly defining the demarcation point by managing all the traffic on a call-by-call basis, where a call is defined as a combination of signalling and media streams;
- Be able to grow the number of interconnections as well as the traffic load without increasing the network's overall complexity.;
- Provide carrier-class reliability;

- Maintain privacy of all parties involved in the interconnection ;
- Allow only authorized traffic;
- Extract billable records at the entry or egress point of the network ;
- Maintain and enforce Quality of Service (QoS);
- Secure the network from any malicious attack such as TCP SYN Floods, SIP INVITE Floods, or Malicious RTP Streams;
- Accurately monitor the performance and health of the IP-IP Interconnection, as well as troubleshoot the network on a call by call basis.

Consultation Question 7

Do you agree that an IP ←→ IP interconnection model should be introduced by SMP operators publishing a RIO? If so, should this be based on "peering" and "sender keep all" or should this retain traditional billing schemes, despite the potential difficulties.

5.2 Access to Emergency Services

This appears to be the most critical aspect of VoIP service provision. Access to emergency services is defined as the ability of a caller to input a short code, such as the local "112", and be immediately connected to an emergency response centre for providing assistance in the eventuality of a fire, medical emergency, accident or a crime being committed.

Fig. 3. Emergency services call centres may experience issues with VoIP services

Associated with emergency services is the ability to identify the location of the caller. Since all fixed lines are associated with an address, it is possible for operators of the emergency number call centre to be able to identify the location of the telephone from

where the emergency call is originating. In some jurisdictions, steps have also been taken to extend location identification to mobile phones – at least within the radius of a certain base station or "cell".

In terms of the definitions contained in Maltese legislation that echo the EU Directives, a publicly available telephony service provides access to emergency services. In fact, this aspect has become a key factor in deciding whether to classify a voice service as ECS or PATS. Nevertheless, there still appears to be room for discussion on how this will apply.

Within an interconnection profile there should be no technical impediment to permit a VoIP service provider to grant access to emergency services to subscribers. In doing this, the VoIP service provider will be compensating the carrier to which it is connecting for using its infrastructure to reach the emergency services number. So the issue of emergency services access is not technical but commercial.

One suggested metric for determining if a service ought to be classified as PATS is the "baby sitter test". This involves analysing the scenario where a baby sitter is left at home without being given any specific instructions as to how to make use of the phone service. In case of an emergency, if the baby sitter is able to use a terminal device and voice service to place a call to the emergency services in the traditional manner – by dialling an established short code – then, as long as the other criteria at law are met, this is to be classified as PATS. This is in conformity with the Analysys' "narrow" view explained earlier.

It is vital that a user of a voice service knows whether that service provides access to emergency services. It is thought that most households will wish to have at the very least one device in the home from where the emergency services can be called. Again, according to the narrow view, if a service does NOT provide access to the emergency services it cannot be classified (and marketed) as PATS.

If the broader view is taken, it should be potentially possible for a VoIP provider who seeks classification as ECS to voluntarily provide access to emergency services. In

other words, the provision of emergency services access functionality is an *obligation* upon PATS providers. To clarify, undertakings authorised as PATS providers *must* provide access to emergency services. Undertakings authorised as ECS providers *may opt* to provide access to emergency services. Such provision however does not entitle them to enjoy the rights of PATS providers, nor should it result in the imposition of extra obligations.

To date, the fixed line has been regarded as the key device for making an emergency call due to both the inherent reliability of the PSTN and the fact that phones continue to function in the eventuality of a power cut. However with the increased popularity of cordless phones that are dependent on a battery for operation, there is a degree of awareness amongst consumers that these could not be functional if there is no electricity supply.

In the case of voice over broadband, the modem device is powered from the mains. For carrier class service the modems would need to have some sort of emergency powering to ensure continued service in the case of a power outage.

Another issue arises when considering *nomadicity*. Since VoIP services can typically be accessed from any point with Internet access, a user may need to place a call to the emergency services from a location that is in no way tied to a specific address. In this event, there is no way that the emergency services call centre would be able to identify the location of the caller automatically.

However there are a number of initiatives underway that could provide some form of location information. These include the need to input location information when logging into a VoIP service, the need to create a database matching installed location of access devices with device identifiers (e.g. MAC address) and also the compilation of an Internet Engineering Task Force (IETF) draft that proposes including location information in an extension to the Dynamic Host Configuration Protocol (DHCP).

Consultation Question 8:

Do you agree with the view that provision of access to emergency services is an obligation of PATS providers and so, an ECS provider NOT granting access to emergency services cannot be considered to be providing PATS? Would you consider the "baby sitter" test a fair way of establishing the distinction?

Consultation Question 9:

What mechanism should be used to "brand" (e.g. trust mark, disclaimer, logo) a PATS service as providing access to emergency services in order to distinguish it from an ECS that does not have such functionality?

5.3 Lawful Interception & Data Retention

In Malta, the Security Service (MSS) is the competent authority responsible for Legal Interception (LI) of electronic communications. Currently it is using interception equipment mainly for wiretap of voice communications using equipment provided by the licensed telecommunications operators.

The MCA is the competent authority responsible for specifying the equipment and data that operators and service providers need to provide to the MSS.

Under current legislation, every telecommunications operator and service provider needs to furnish equipment to the MSS such that this agency can execute its mandate in order to enable intercept of a vast range of means of communication. To date this has led to proprietary systems being provided by each telephony equipment vendor.

Maltese laws make specific provisions for LI. Effectively this means that any form of electronic communication MUST be lawfully interceptable. Legal obligations and licence conditions are currently specific for fixed line and mobile telephony and cable TV. There are currently no specific obligations on providers of data services and ISPs. Under the proposed legislation, the relevant clauses dealing with LI will be as follows:

34. (1) The Minister may, either on the recommendation of the Authority or on his own initiative after consultation with the Authority, make regulations to give better effect to any of the provisions of this Act and in particular to:
(r) regulate the obligations including financial obligations of undertakings with regard to legal interception.[13]

In the proposed subsidiary legislation, the legal treatment is proposed to be as follows:

Legal Interception

13. (1) The Authority shall define the technical and operational requirements necessary to enable legal interception of electronic communication by the competent authorities in accordance with any law allowing and regulating such legal interception.
(2) An undertaking shall, at its expense, comply with such requirements as may be defined by the Authority under sub-regulation (1) of this regulation:
Provided that the Authority may, introduce a mechanism for the sharing of the cost of interception obligations where the Authority considers this to be appropriate.
(3) A cost sharing mechanism and any associated fund established under sub-regulation (2) of this regulation may be administered directly by the Authority or a body independent from the contributors and beneficiaries, under the supervision of the Authority:

Provided that any cost sharing mechanism based on a fund shall respect the principles of transparency, non-discrimination and proportionality.

(4) Undertakings which are required to contribute to any fund established under sub-regulation (2) of this regulation shall do so in accordance with any cost sharing mechanism as may be established by the Authority.[14]

The MCA is considering the procurement of appropriate hardware and software platforms that would be operated by the MSS to carry out its functions at law. Under the proposed regulation, the MCA will have the ability to recoup, through an as yet undetermined cost-sharing mechanism, its outlays with respect to such equipment and systems. All ECS and PATS providers will be obliged to, if necessary, contribute to such a cost-sharing fund.

As usage shifts from traditional networks to next generation converged systems, it is vital that the MSS has the ability to execute its mandate across any electronic

[13] Amendments to Cap. 399 as proposed in Bill No. 25.
[14] Draft Electronic Communications Networks and Services (General) Regulations issued for consultation by Government in July 2004.

communications system, so it is only correct and natural that the cost of this is shared equitably by all authorised providers. The cost sharing mechanism has not yet been determined and parameters that could potentially be used to determine contributions include traffic volumes, subscribers and revenues. These options will be analysed and a decision taken in due course.

Another issue associated with LI is related to network ownership. A "public telephone network" is defined in the Universal Services Directive as a network that provides access to PATS. It is evident that a VoIP service can run over various networks and technologies. A VoIP service provider does not necessarily have to own a network infrastructure. The indication therefore is that if a VoIP service is PATS even though there is no ownership of the underlying network, then the supporting infrastructure has to be classified as a public telephone network. Public telephone networks have specific obligations that also include LI. While some may consider it unfair to enforce LI obligations on a network infrastructure owner even though in itself this is not providing services that require interception, since such services are in fact being provided by a third party granted access to that infrastructure, the fact remains that infrastructure owner is in fact being remunerated by the service provider for use of that network and so it is justifiable to include the network owner in the cost sharing mechanism. However care has to be taken to avoid "double counting" and ensure that two entities do not have to contribute for what is effectively one service.

Some EU member states are proposing that there should be a harmonised approach to data retention. This refers to the keeping of traffic records by a service provider for a set period of time that could vary from a minimum of 12 months to a maximum of three years. This suggestion is proving to be quite controversial since the volumes of traffic that can be generated in three years are massive and the amount of storage necessary would be considerable. The expense associated with this storage would also be of a significant nature. In Malta it appears that the law enforcement agency with responsibility for data retention will be the Police Corps. At this point in time it is not known what decision will be taken in terms of the conditions relating to data retention.

Typically, legislation relating to data protection for electronic communications services that is in force is already aligned to European norms and applies in the NRF. All ECS and PATS providers have to comply with this.

Consultation Question 10

Do you agree with the proposal to implement a unified LI system that would be jointly and proportionally funded by all authorised undertakings?

Consultation Question 11

What is your opinion on data retention, its associated costs and its relationship with data protection legislation?

5.4 Consumer Education & Protection

It is important that the consumer is informed about the possibilities offered by VoIP services and the implications that these have on the variety and quality of voice communications. The provision of VoIP services since January 2003 has already impacted consumers positively, both as far as the price and varied selection of voice services are concerned. In considering VoIP services in the light of the new EU regulatory framework and the new Maltese legislation being introduced, account also has to be taken as to how consumer interests may be affected.

Matters that need to be considered, going also by past experience, include:

- Emergency Services - depending on the option taken by the operator concerned (i.e. whether to be classified as PATS or as a provider of "other publicly available electronic communications services"), that the consumer may not necessarily always have access to certain emergency services. A potential subscriber **must be aware** of any service limitations where a lifeline is unavailable.
- Quality of service – the quality of VoIP services may not necessarily always be as good as that expected from traditional telephony services and consumers

should therefore be accordingly advised. However, undertakings offering ECS services will be obliged to provide QoS information to the public.

- Advertising – It is key that ECS services have to be clearly distinguished from PATS services particularly in any promotional material. This is especially vital where access to emergency services is concerned. Undertakings should not present themselves unfairly as providing some sort of service when this is not the case.
- Retail pricing – VoIP services are likely to take place within a competitive market where undertakings providing these services are authorised as ECS providers. Therefore prices charged are regulated by market forces and do not necessitate any intervention by the Authority to control prices unless there is evident breach of basic competition norms (e.g. collusion between the various players etc.),
- Codes of practice – the MCA wishes to encourage co- and self-regulatory models where the greatest spread possible of undertakings providing electronic communications services implement a code of practice detailing how they deal with consumers.

Consultation Question 12

Are there any other consumer education or protection issues that you feel ought to be addressed?

5.5 Numbering

As VoIP services continue their shift towards the mainstream, it is increasingly likely that use of specific numbering resources will be required. While not all VoIP services require numbering resources, there is large commercial interest in those that do. Under the NRF, all undertakings providing ECS have a right to obtain number resources from a numbering authority – the MCA.

However, since VoIP services could potentially be used in a number of different ways, traditional numbering plans and schemes may not apply equally well to these new services. The biggest difficulty is coping with “nomadicity” – the situation where a VoIP service is not fixed or mobile but rather “portable” from one location to another depending on where the point of access to the network or Internet is being made. A nomadic service is not tied to a geographic location and therefore allocating a geographic telephone number does not appear to be logical.

The other facet of this argument is that VoIP services providers may wish to compete on an equal footing with existing telephony operators and so, for competitive purposes (including the ability to port numbers) the allocation of geographic numbers would appear to be the ideal solution.

There are mainly two important requirements for a number range for VoIP services:

1. it should support the new service features of VoIP services (where “nomadicity” is the most relevant) and
2. it should enable competition with traditional voice services.

A possible compromise could consist of a modified geographic number range. It may also be possible to open an entirely new number range in such a way as to meet in a balanced way, the interests of VoIP subscribers, calling end-users, VoIP service providers, and the MCA. The geographic number range supports competition best, but the impact of modifying the allocation criteria to support nomadicity needs consideration. A new number range (or new number ranges) is able to support nomadicity best, but the ability to support competition needs consideration.

The arguments for opening a new numbering range are motivated mainly by;

1. the high tariffs typically associated by end-users with non-geographic numbers;
2. the aim to keep the existing number ranges (especially the geographical number range) intact; and by
3. giving freedom to service providers to create their service description.

However, there is no way for an NRA to influence the tariffs of non-SMP providers for the new number range. If a new number range is created for VoIP services, the NRA would have to decide whether an SMP operator should open this new number range for Carrier Pre-Selection (CPS) or not. There are therefore points of concern related to the opening of a new number range that deserve attention.

There are many arguments in favour of allocation of geographical numbers for VoIP services with a nomadic nature. There could be ways of adapting criteria for geographic numbers in order to support VoIP services. This adaptation would remove to some degree the geographic nature of the range, which could impact other regulatory issues (tariff models of SMP operators, business cases of CS/CPS providers, the way of handling location information by emergency response call centres). This impact will have to be weighted against the benefits of using the geographic number range.

Except for a VoIP service over a mobile broadband network (e.g. UMTS), the mobile number range does not seem to be appropriate for allocation to VoIP service providers. The main point of concern is that a calling end-user will associate the mobile number with a high tariff (independent of the real VoIP service tariff, which is more likely to be comparable to calling a geographical number).

The personal or corporate number ranges do not seem to be appropriate for allocation for VoIP services, although these may be used as interim solutions.

With regards to number portability, this should be implemented in such a way that when a number can be imported for a service, it also can be ported out and vice versa. If this is the case, then number portability should have no implication for the choice of number ranges for VoIP services.

The use of numbers of one national numbering plan in another country is an important consequence of the nomadic aspect of VoIP services. This facility may eventually be highly valued. However, it is outside the scope of this document at this stage.

It is vital to achieve a consistent E.164 numbering plan that supports both VoIP services and traditional voice services. Since numbering is a scarce resource and the newly proposed legislation contemplates charges for numbering resources it is in the service providers' own interest to have efficient numbering schemes that are not wasteful and complex to administer.

Consultation Question 13

Does your organisation use/intend to make use of numbering resources in relation to VoIP services and if so, what preference would you have for number allocation schemes for such services? What would you consider to be an optimal numbering solution?

5.5.1 E-Numbering or ENUM

ENUM is the IETF protocol (RFC2916) that will assist in the convergence of the PSTN and the IP network. It involves the mapping of a telephone number from the PSTN to Internet services by entering a telephone number and obtaining a URL (web address). ENUM was developed as a solution to the question of how to find services on the Internet using only a telephone number, and how telephones, which have an input mechanism limited to twelve keys on a keypad, can be used to access Internet services.

The word "ENUM" refers to the IETF protocol that takes a complete, international telephone number and resolves it to a series of URLs using a Domain Name System (DNS)-based architecture.

Because ENUM puts telephone numbers into the DNS, it allows for a wide range of applications based solely on a phone number. Probably the most exciting application is an improvement in VoIP, in which telephone calls can be made over the Internet. Other applications include addressing for fax machines, e-mail, IM, and web sites.

The MCA intends to consult on the introduction and implementation of ENUM shortly.

Consultation Question 14

Is your organisation aware of the possibilities offered by ENUM and do you foresee ENUM playing an important future role in service convergence?

5.6 Universal Service Provision & Funding

The Universal Service Directive[15] protects users' rights when accessing electronic communications networks and services. Universal Service is defined as the provision of a minimum set of services to all end-users at an affordable price.

In order to ensure that all consumers have access to this minimum set of services, a NRA may designate one or more operators to provide different elements of universal service and/or to cover different parts of the national territory at an affordable price.

This minimum set includes connection to the public telephone network and access to PATS at a fixed location. It also includes directory enquiry services and directories, public pay phones, and special measures for disabled users.

It is possible for the NRA to decide to set up a fund that is used to compensate undertakings that are designated as providers of universal services for any unfair burden that these providers may incur when providing such services. For such a fund to be justified, where contributions would potentially be collected from other authorised undertakings, it has to be demonstrated that the universal services are actually provided at a loss or at a net cost that is outside the bounds of normal commercial practise. Funding mechanisms may be various.

Consultative Question 15

Does your organisation agree that a universal service fund as described is a just measure to compensate universal service providers?

[15] Universal Service Directive - Directive 2002/22/EC of the European Parliament and of the Council, 7 March 2002

6 Rights & Obligations of Undertakings providing VoIP Services

It is vital that undertakings currently providing, or that intend to provide, some form of VoIP services are clearly aware of the rights they will enjoy and the key obligations they must comply with. These rights and obligations would be listed on the conditions attached to the general authorisations as proposed in the subsidiary legislation. These are listed below.

6.1 Obligations of Publicly Available ECS Providers

All obligations listed hereunder are equally applicable to PATS providers, since PATS are a subset of publicly available ECS.

6.1.1 Notification

All undertakings are required to notify the MCA under the general authorisation procedures laid out in the recently proposed *Electronic Communications Networks and Services (General) Regulations, 2004.*

6.1.2 Universal Service Obligations (USOs)

It will be possible for the MCA to oblige all undertakings providing ECS to contribute to funding USOs, if this is deemed necessary. The funding mechanism, if any, would be implemented following consultation and would take place in a manner that is proportional, transparent and non-discriminatory.

6.1.3 User right to a written contract

Consumers have a right to a contract when subscribing to services **providing connection and/or access to a public telephone network**. It is important to note that by having access to a public telephone network does not necessarily mean that the service contracted for is PATS.

6.1.4 Quality of Service Information

All undertakings providing publicly available ECS may be required to regularly publish adequate, up-to-date information regarding their performance on various QoS parameters.

6.1.5 Directory Information

Undertakings that opt to assign telephone numbers to subscribers are to meet all reasonable requests to make that numbering information available for the purposes of publicly available directory enquiries and/or directories. This is without prejudice to any privacy rights.

6.1.6 Access to directory enquiry and operator assistance

If the undertaking provides a connection to a public telephone network, then all end-users must be able to access directory enquiry and operator services.

6.1.7 Numbering

Since numbers are considered a finite resource, conditions may be attached to their use and allocation. Such conditions include service designation, efficiency in utilisation, number portability, fees and international agreements.

As a result of joining the EU, Malta will be compelled to ensure that end-users from other member states will be able to access non-geographic numbers allocated locally unless for commercial reasons the called subscriber has decided to limit access to certain geographic areas.

6.1.8 Network Security

Undertakings providing publicly available ECS are already under an obligation to take all reasonable technical and procedural measures so that security of the services provided is maintained. This may have to be carried out in agreement with the owner of any underlying network infrastructure that is used to convey the ECS.

6.1.9 Privacy

The Privacy Directive and Maltese data protection legislation specify that the confidentiality of all ECS and associated traffic records must be maintained. To achieve this all stored or processed traffic data should either be erased or rendered anonymous once it is no longer required for the means of effecting the communications. An exception to this is traffic data required for billing or interconnection payment purposes, as long as consent has been granted by the interested parties and only within the duration of the billing or payment cycle.

With regard to bill itemisation, a subscriber is entitled to an itemised bill but can opt to receive non-itemised bills.

An additional privacy consideration for mobile or nomadic services is location information. Users must be informed of the type of location sensitive data that could be processed. Consent must be given with regards to such processing, the purposes and duration for which it will be used and whether this will be shared with third parties.

The above may not apply when there are issues of national security that have to be safeguarded.

6.2 Rights of Publicly Available ECS Providers

All listed rights are equally applicable to PATS providers, since PATS are a subset of publicly available ECS.

6.2.1 Provision of a service or operation of a network

It will be a right of any undertaking to be authorised to provide electronic communications services or networks.

6.2.2 Access to rights of way

Undertakings may apply to use public rights of way. This will imply that they require the ability to install facilities in, on or over public property such as roads or buildings.

The grant of any such rights will take place through a process that follows the principles of transparency and non-discrimination.

6.2.3 Interconnection

Operators of a public electronic communications network have the right to request interconnection with other such authorised undertakings. They also have an obligation to negotiate interconnection agreements when requested by a duly authorised undertaking.

6.2.4 Numbering

Any undertaking using an electronic communications network or providing electronic communication services has the right to request, be allocated and use numbers from a numbering plan as administered by the appropriate regulatory authority.

6.2.5 Universal Service Provision

Any undertaking using an electronic communications network or providing electronic communication services has the right to apply to offer Universal Service. The regulatory authority has to consider requests from undertakings that wish to provide Universal Services.

6.3 Obligations of PATS Providers

The conditions listed hereunder apply to undertakings authorised to provide publicly available telephony services.

6.3.1 Access to Emergency Services

All subscribers to PATS services must be able to, at all times and without charge, be able to reach the emergency services via the “112” number.

6.3.2 Number Portability

A subscriber to a PATS service can opt to retain the same telephone number irrespective of the undertaking offering the service.

6.3.3 Network Integrity and Resiliency

The availability and integrity of publicly available telephone services at **fixed locations** needs to be ensured at ALL times. Providers of PATS at **fixed locations** are to take all reasonable steps to provide uninterrupted access to emergency services.

6.3.4 Provision of Information

The PATS provider is obliged to make available to end-users and other consumers all relevant terms and conditions of service and applicable prices and tariffs. This information must be readily available and kept updated.

6.3.5 Directory Information

All subscribers to a PATS provider have the right to an entry in a publicly available telephone directory, except where for privacy reasons, they expressly wish not to be included.

6.4 Rights of PATS Providers

The rights of undertakings authorised to provide publicly available telephone services are as follows.

6.4.1 Carrier Selection & Pre-Selection

Only undertakings authorised to provide PATS can apply for access to the network of a PATS operator with SMP for reasons of CS and/or CPS.

6.4.2 Number Portability

The right to request the porting of a telephone number is only available to subscribers of a PATS service. Subscribers to an ECS voice service cannot request number portability.

6.4.3 Directory Listing

The right to appear in a public telephone directory is only available to subscribers of a PATS service. Naturally, an ECS provider can voluntarily decide to provide a telephone directory service.

6.5 Administrative Charges

The new subsidiary legislation proposes the following administrative charges.[16] These charges are to be paid on an annual basis.

(a) Public communications networks *Lm 20,000*
(b) Publicly available telephone services *Lm 20,000*
(c) Television and radio distribution services *Lm 20,000 plus Lm 0.15 per subscriber*
(d) other publicly available electronic communications services *Lm 1,000*
(e) non-public electronic communications services *Lm 1,000*
(f) private electronic communications networks and/or private electronic communications services *Lm 100*

Furthermore undertakings providing any of the services under (b), (c), (d) or (e) shall also pay to the Authority the following:

(i) one and one half per cent (1.5%) of the first ten (10) million of the total gross revenue or part thereof;
(ii) one per cent (1%) of the second ten (10) million of the total gross revenue or part thereof, and
(iii) one half per cent (0.5%) of any remaining gross revenues.

[16] See Eleventh Schedule of Electronic Communications Networks and Services (General) Regulations, 2004.

Consultation Question 16

Given the proposed rights and obligations listed above for undertakings providing either ECS or specifically PATS, please provide your comments.

Consultation Question 17

Would the rights, obligations and charges as proposed have any bearing on how your organisation would seek authorisation?

7 Conclusion

The voice communications sector is poised for radical reshaping due to the expected exponential rate of uptake of VoIP services. This watershed in personal communications will most likely cause a complete review of regulatory practices originally intended for fixed line telephony operators with SMP.

As VoIP flourishes, both businesses and consumers alike will harness the advanced capabilities that the technology offers – capabilities that far exceed anything currently available using the traditional telephone. Given the right environment, VoIP can dramatically alter operations and even business models, allowing large and mid-size businesses to lower costs and, more importantly, giving smaller businesses the critical competitive edge they need to be able to compete more effectively.

Providing phone calls over the Internet, or Internet-like networks, will surely lead to the convergence of voice communications with all other types of communication platforms including e-mail, IM and video conferencing. As more undertakings adopt VoIP telephony, it will gradually become the standard telephone system taking over from the PSTN. The technology has matured to enable high quality real-time voice traffic to be transported across data networks.

In many cases PSTN networks have reached capacity and are being replaced. Competition for voice revenue has intensified as call minutes in many markets have peaked and mobile and cable companies are proving to be serious competitors to fixed line service providers. This competition is resulting in significant price erosion, and the need for service providers to look beyond their traditional business for opportunities for new revenues and cost savings. It appears that legacy business models adopted by operators will have to be abandoned, as value will increasingly be found in infrastructure ownership and in converged services.

The role of the regulator is to ensure that the right environment does exist to ensure that this exciting transition does take place as soon as possible and with the maximum

beneficial economic effects. However, this has to be achieved in a manner that is equitable and that respects operators' investments and their right to make a suitable return.

Undertakings need to be forward looking and must seek to make their business sustainable through the adoption of the right business models. Undertakings also need to be aware of the rights they enjoy and obligations they must comply with when opting to start providing some form or another of voice services.

The proposed subsidiary legislation, in line with the NRF, is based on the principle of technology neutrality and no longer makes any distinction (as in the previous framework) based on technological criteria. Instead, classification is service based. The classification categories for electronic communications services include those for publicly available telephony services and universal service provision.

This document has discussed several issues associated with an undertaking providing some form of VoIP services. It is essential that this document is viewed in the light of the proposed *Electronic Communications Networks and Services (General) Regulations, 2004,* that have also been published recently.

Many operators were essentially caught by surprise at the speed with which VoIP services have established market presence. It now appears certain that legacy circuit switched telephony is heading for a swifter than expected demise to be replaced by a cloud of innovative converged services that will dramatically change ways, and costs, of communications. Regulators will now have to balance the need to encourage new services with the need to ensure that infrastructural investment is sustained. Regulators have the difficult task of attempting to establish legal clarity and long-term visibility in order to construct a regulatory framework that is conducive to attracting investment and enlarging the electronic communications sector at a juncture where, and when, there are a myriad of new technological developments and commercial possibilities.

8 Consultation Framework

The MCA wishes to invite comments from interested parties in relation to any of the issues and questions raised in this document. The consultation period will run until **12.00 pm on Friday 1st October 2004**.

Comments in response to this document should be sent (preferably **in electronic format)** to:

The Chief Technical Officer

Malta Communications Authority
"Il-Piazzetta" Suite 43/44
Tower Road
Sliema SLM 16
MALTA
Tel: +356 21 336 840

E-mail: technical@mca.org.mt

Receipt of comments will be acknowledged. Comments will be made publicly available by the MCA and on the MCA website unless declared confidential. Respondents are therefore asked to separate out any confidential material into a clearly marked annex.

Respondents are also kindly requested to preferably refer their comments to the numbered consultative questions. Respondents may also make comments on any aspect of the consultation by referring to the specific sections of this document when making their submissions.

9 Glossary

ATM (Asynchronous Transfer Mode)

ATM is a network transmission technology that supports voice, video, and data. It uses switches to establish a logical, end-to-end circuit for each call, guaranteeing quality of service (QoS). However, unlike circuit switches, unused bandwidth in an ATM network can be readily used for other calls and services. ATM is widely used as a backbone technology in carrier and enterprise data networks.

ADSL (Asynchronous Digital Subscriber Line)

ADSL is a method for moving data over regular phone lines. It can support voice, video and data. An ADSL circuit is much faster than a regular phone connection, and the wires coming into the subscriber's premises are the same (copper) wires used for regular phone service. An ADSL circuit must be configured to connect two specific locations, similar to a leased line. A commonly discussed configuration of ADSL would allow a subscriber to receive data (download) at speeds of up to 1.544 Megabits per second, and to send (upload) data at speeds of 128 kilobits per second. Thus the 'Asymmetric' part of the acronym.

Cable (or Cable Modem)

Cable Modem is a modem designed to operate over cable TV lines. In fact the connection is shared by the data and TV. Because the coaxial cable used by cable TV provides much greater bandwidth than telephone lines, a cable modem can be used to achieve extremely fast access to the World Wide Web. This infrastructure can support voice, video and data as well.

DDI (Direct Dialling In)

DDI is a facility that can be implemented on a PABX to enable callers to directly reach someone within an enterprise environment and thus avoid having to go via the switchboard.

E.164

A global scheme used to assign numbers for telephone services.

Frame Relay

Frame relay is a telecommunication service designed for cost-efficient data transmission for intermittent traffic between LANs and between end-points in a WAN. Frame relay puts data in a variable-size unit called a frame and leaves any necessary error correction (retransmission of data) up to the end-points, which speeds up overall data transmission. For most services, the network provides a permanent virtual circuit (PVC), which means that the customer sees a continuous, dedicated connection without having to pay for a full-time leased line.

IP (Internet Protocol)

The IP is used to route messages within an IP network. Each IP packet contains its own header, which provides the information that allows it to reach its destination. IP packet can vary in size, providing great flexibility in transporting traffic and maximizing use of available network bandwidth.

ISDN (Integrated Services Digital Network)

ISDN is a system of digital phone connections which allows voice and data to be transmitted simultaneously across the world using end-to-end digital connectivity. There are two basic types of ISDN service: Basic Rate Interface (BRI) and Primary Rate Interface (PRI). BRI is a basic service is intended to meet the needs of most individual users. PRI is intended for users with greater capacity requirements.

PDA (Personal Digital Assistant)

A PDA is a small hand-held computer that in the most basic form, allows you to store names and addresses, prepare to-do lists, schedule appointments, keep track of projects, track expenditures, take notes, and do calculations. Depending on the model, you also may be able to send or receive e-mail; do word processing; play MP3 music files; get news, entertainment and stock quotes from the Internet; play video games; and have an integrated digital camera or GPS receiver.

PABX (Private Automated Branch Exchange)

Private Branch Exchange. A telephony device typically installed in an enterprise that efficiently handles incoming and outgoing calls without the need to resort to an individual phone line per user.

POTS

See PSTN.

PSTN (Public Switched Telephone Network)

PSTN is the world's collection of interconnected voice-oriented public telephone networks, both commercial and government-owned. It's also referred to as the Plain Old Telephone Service (POTS). Today, it is almost entirely digital in technology except for the final link from the central (local) telephone office to the user.

SIP (Session Initiation Protocol)

SIP is an Internet standard specified by the Internet Engineering Task Force (IETF). SIP is used to initiate, manage, and terminate interactive sessions between one or more users on the Internet. SIP is increasingly used for Internet telephony signalling, in gateways, PC phones, softswitches, and softphones, but it is not limited to Internet telephony, and can be used to initiate and manage any type of session, including video, interactive games, and text chat.

TDM (Time Division Multiplexing)

TDM is a transmission technology that enables a network to transmit multiple signals simultaneously over a single transmission path. TDM enabled telephone companies to migrate from analogue to digital high-capacity circuits. This term is often used interchangeably with the term "circuit-switched."

Wi-Fi or WLAN (Wireless Fidelity or Wireless Local Area Network)

WiFi or WLAN is a LAN that transmits over the air typically in an unlicensed frequency such as the 2.4GHz band. A WLAN does not require lining up devices for line-of-sight transmission like IrDA. Wireless access points (base stations) are connected to an

Ethernet hub or server and transmit a radio frequency over an area of several hundred to a thousand feet and can penetrate walls and other non-metal barriers.