mca
Malta Communications Authority

Voice over IP:
Systems, Services & Regulation

Consultative Paper

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1 Introduction

Traditional telephone networks were originally designed to carry only voice traffic. The technology used in these networks is referred to as “circuit-switched” since a circuit is literally set up and torn down for every single phone call. However, circuit-switched networks can be inefficient since they reserve an entire channel for each conversation (even when no one's talking). In this fashion, the network's available bandwidth is clearly not used in the most efficient way.

Over the last two decades, both service providers and enterprises have begun to use packet technologies (such as frame relay, ATM, and IP – see Glossary) to transport data. In a packet network, packet switching interleaves and consolidates bits (binary digits) and bytes of traffic from many users on to common facilities, using the network's available bandwidth far more efficiently.

However, since these two types of networks have been used for a single service only, service providers and enterprises have had to invest in two separate networks if they wanted to transport both voice and data traffic. Building, managing, and maintaining these "overlay" networks has proven to be very expensive.

The answer to this problem is to “unify” the voice and data networks. Service providers and enterprises agree that the next generation of networks offer combined voice and data communications over a single integrated platform built on packet technology. Internet Protocol (IP), the packet technology used on the Internet, has proven its ability to efficiently integrate voice traffic into the flow of data on IP networks, enabling voice and data services to be delivered to users from a single, multi-service network.

Now that IP networks are able to offer the performance and reliability characteristics that voice services requires, Voice over IP is ready to provide major benefits to service providers, enterprises and consumers. These include:

- *Sustainable cost reduction for service providers and enterprises:* VoIP lowers capital and operating costs by converging separate voice and data networks into a single, multiservice network.

- *Increased revenues for service providers:* VoIP raises the value of voice service, with new applications such as video calling, unified messaging, and Web-enabled multimedia call centers. With multiple services available on a single customer link, providers have lots of opportunities to bundle, cross-sell, and upsell services.

- *Enhanced productivity for enterprises:* New applications such as collaboration and unified messaging enable enterprise employees, wherever they happen to be, to team more effectively and be more productive.

- *Increased choice and cost savings for consumers:* New entrants on the market can utilise VoIP to deliver voice services in competition to existing operators, usually at lower prices.

- *Convergence of voice and data improves convenience for consumers:* The long run benefits of VoIP include integration with multimedia and multiservice applications, something which today's traditional telephone system can struggle to compete with. The ability to link phone calls to web sites and/or e-mails is expected to prove extremely attractive.

New voice service providers can therefore develop product offerings rapidly by utilising new or existing data networks for voice transport. This technological evolution, now rapidly gaining popularity overseas, 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.

In this document, the Authority seeks to consult with all interested parties about a regulatory regime applicable to packet switched voice services, typified by Voice over IP. This regime has to be congruent with current Maltese legislation as well as European Union guidance that should eventually be adopted.

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

On 10 January 1998, the Commission to the European Parliament published a notice setting out the status of Voice on the Internet under **Directive 90/388/EEC** concerning competition on the markets for telecommunications services, as amended.

This Directive defines voice telephony. According to Article 1, "voice telephony" means the *commercial provision for the public of the direct transport and switching of speech in real-time between public switched network termination points, enabling any user to use equipment connected to such a network termination point in order to communicate with another termination point.*

This definition is crucial, as it enables the determination of services which should be subject to the regime applied to voice telephony operators, including the securing of an appropriate licence and its associated obligations such as providing or contributing to universal service.

Furthermore, four criteria were listed, which, if met, categorised a voice service as "voice telephony". If any of these criteria were not met, then a service could not be classified as "voice telephony" and could not be regulated as such. The criteria to evaluate whether a given service is voice telephony are based on elements relating to the nature and the quality of the service offering, and are not determined by the technology employed (technology neutral principle).

1. **Telephony must be the subject of a commercial offer** - Commercial should be understood in the common sense of the word, where the transport of voice is provided as a separate commercial

activity, i.e. provided against payment and with the intention of making a profit.

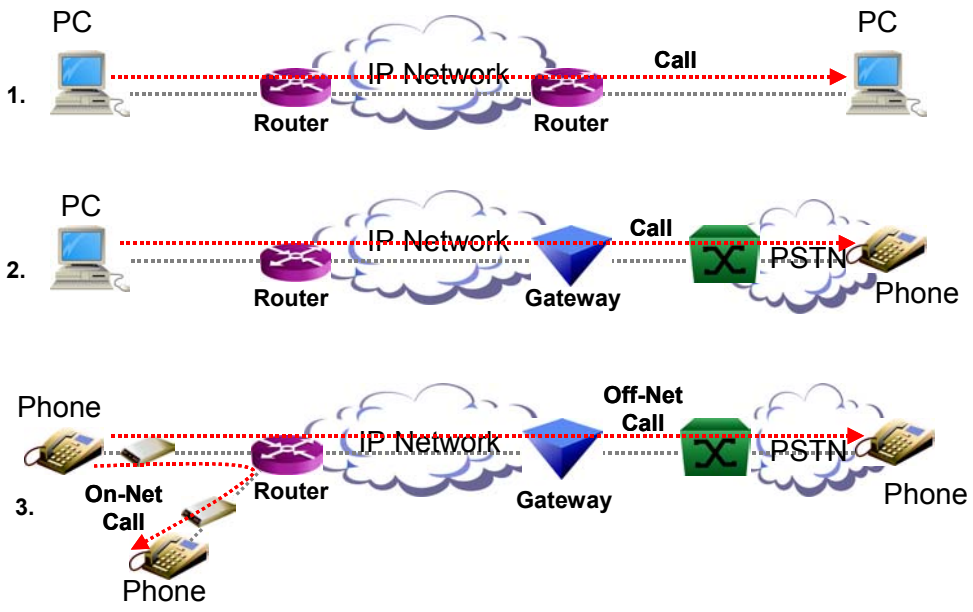
2. **Telephony must be provided for the public** – the service is available to all members of the general public on the same basis

3. **Telephony must be provided to and from public switched network termination points** - Between public switched network termination points means that the voice communication service has to connect two network termination points on the PSTN at the same time. These termination points are those defined as subscribers using numbers from the national telephone numbering plan. Consequently, if access to the Internet is obtained via leased circuits for example, the service could never be considered as voice telephony, even if the call terminates on the public switched network.

4. **Telephony must involve direct transport and switching of speech in real time** – this implies that to qualify as telephony a, voice service has to have bounded and guaranteed connection intervals.

The Commission has also defined three basic types of Voice over Internet Protocol scenarios:

1. computer to computer
2. computer to phone (also phone to computer)
3. phone to phone (on-net and off-net scenarios)



From the above criteria, it is clear that only “phone to phone” VoIP services and systems could ever be classified to be “voice telephony” using the Commission’s definitions. These categories were not presented by the 1998 notice as entailing direct legal consequences, but used for descriptive purposes. The assessment of the regulatory status of Internet voice services does not hinge on these categories, but on whether the four conditions set out above are met. These categories remain broadly applicable but they are increasingly blurred by the technical convergence of terminal equipment, while the creativity demonstrated by suppliers undermines any attempt to further categorise services mixing speech and data. The Notice deemed that when all the criteria of the voice telephony definition were satisfied, those Internet Service Providers offering a dial out service from and to any telephone number would then be considered providers of voice telephony services under Community law.

In the 1998 notice, the Commission took note that in the case of the Internet, in most cases the commercial provision of the transport of voice is not the principal aim of access providers and Internet telephony is only an additional feature offered by Internet access which is chosen by the customer for a number of reasons, such as browsing, e-mail and downloading of files and data.

Only where phone-to-phone Internet telephony is marketed in the European Union as an alternative form of voice telephony service, would the organization concerned be considered to be making a commercial offer.

In its review of the Notice of 1998 in 2000 (Communication from the Commission Status of voice on the Internet under Community law, and in particular, under Directive 90/388/EEC), the Commission said the new Communications directives will put an end to the distinction between voice telephony and other telecommunications services. All electronic

communications services, whatever their commercial features, will be submitted to the same legal regime.

In the review the Commission said it considers Internet Telephony in general continues to fall outside the definition of voice telephony, except where Internet Telephony meets each of the conditions established in the Directive as set out in the 1998 notice.

This means, except in very specific cases where the aforementioned conditions are satisfied, that Member States should normally continue to allow Internet access/service providers to offer voice on Internet under data transmission general authorizations, and that no mandatory requirement for an individual licence is justified.

Conversely, voice communication services fulfilling the four conditions enshrined in the Directive and therefore appearing as substitutes for voice telephony services provided by traditional means should be regarded as voice telephony and be submitted to the relevant regulatory regime, in consideration of the principle of technological neutrality.

A distinction must be drawn between voice over the Internet protocol (VoIP) and voice over the Internet. The former encompasses all kinds of conveyance of voice using the Internet protocol as a routing and transmission technology. The latter is a subset of the former and covers only such voice services that are provided over the public Internet, defined as a network of networks.

Telecommunications operators increasingly use the Internet Protocol (IP) as a transmission technology for voice services in the core of their networks, as an alternative or a substitute to other transmission technologies such as asynchronous transfer mode (ATM) or synchronous digital hierarchy (SDH).

The European Commission in its review said that the 1998 notice does not mean that all IP-based voice services fall outside the field of voice telephony. Rather, the use of or the migration to IP technology within the core of public switched telephone networks does not affect the regulatory position of the companies concerned, nor require any change in the licences or authorizations under which they operate.

2.2 Maltese Legislation

The following definitions are found in the Telecommunications (Regulation) Act (Cap.. 399):

- network termination point
- public telecommunications system
- public telecommunications service
- publicly available voice telephony services
- system-less service provider
- telecommunications, system and service
- telephony

The definition of telephony in Maltese law is similar to that used by the EU and basically requires the same 4 criteria, since it is *"the commercial provision for the public of direct transport of real-time speech through the public switched network or networks such that any user can use equipment connected to a network termination point to communicate with another user connected to another termination point."*

Under the Telecommunications (Regulation) Act (Cap. 399), no person shall install or operate a telecommunications system or provide a

telecommunications service in Malta unless registered as an authorised provider.

A telecommunications system is defined under the Act as *a system for the conveyance through the agency of electric, magnetic, electromagnetic, electro-chemical or electro-mechanical energy of –*
speech, music and other sounds;
visual images;
signals serving for the impartation (whether as between persons and persons), things and things or persons and things) of any matter otherwise than in the form of sounds or visual images; or
signals serving for the actuation or control of machinery or apparatus.

Cap. 399 defines a telecommunications service as (amongst others)
"a service consisting in the conveyance by means of a telecommunications system, of any form of telecommunications, without regard to the content of the messages transmitted."

The definitions of telecommunications, telecommunications system and telecommunications service in Cap. 399 are widely encompassing and would also apply to VoIP.

An authorized provider under Cap. 399 "*means a person who holds a valid licence or permit to operate a telecommunications system or to provide a telecommunications service under this act, or is registered under this Act as a person authorized aforesaid*."

The licence to operate a telecommunications system or to provide a telecommunications service may be granted in the form of an individual licence or in accordance with a general authorization by the Malta Communications Authority.

The provision of VoIP is captured by these definitions. VoIP systems and services constitute or require a telecommunications system or service. In terms of Maltese law, every VoIP system or service has to be authorised. However, it has also been established that not all VoIP services are considered to be telephony. It is this distinction that has to be outlined at this stage as the classification of the VoIP service as telephony or otherwise will have important ramifications as to the applicable licensing regime.

3 Technology & Architectures

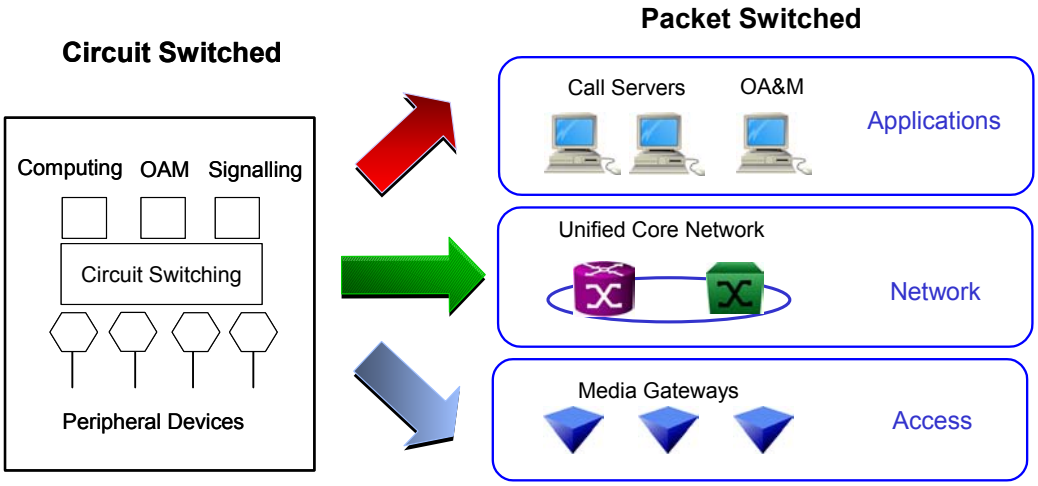
While this document is mainly intended to discuss the authorisation provisions for packet switched voice services, it is important to establish a common technical platform from which to launch into the discussion of the provision and regulation of the appropriate systems and services. The following technical information is purely intended to provide background information and is not a comprehensive treatise of the subject.

Frame Relay, IP and ATM are known as *packet* or *cell* switching technologies, where packets (or cells) are groups of binary digits (bits). This is in contrast to the public telephone network, which uses a circuit switching technology, designed to carry voice transmissions. The packet switching and cell switching networks can dynamically allocate bandwidth to various links based on their transmission activity. Since bandwidth is not reserved for any specific path, the available bandwidth is allotted according to network needs at any particular time. Traditional voice networks, in which a path is dedicated to the transmission for the duration of the call, use a continuous bit stream. This is known as *time-division multiplexing* or TDM. The line is monopolized by a call until it is terminated, even when the caller is put on hold or during periods of silence. This guarantees reliable and immediate (real-time) transmission of voice, but the consequence is very inefficient use of the network's capacity. A channel is dedicated to a telephone call and cannot be utilized by other traffic.

Packet switched networks were originally designed to handle bursty (non-constant) data traffic and are inherently less efficient than circuit switched networks in dealing with voice. To achieve good voice quality, the delay of voice packets across the network must be minimal and limited. Due to the shared nature of the packet/cell switching network, it might take differing amounts of time for transmissions to travel across the network. A

transmission can be delayed because of network congestion. For example, it might "get stuck" behind a long data transmission that delays other packets. Network congestion can also result in dropped packets, which also detrimentally affects the integrity of voice transmissions. Differentiation between circuit switched (real time) and packet switched (non-real time) voice could therefore be established. Good voice quality provides a faithful recreation of the conversation, with the same tone, inflection, pauses and intonation used by the speakers. Long durations (delay) and variable intervals (jitter) between packets result in unnatural speech and are considered to interfere with the conversation. Dropped or lost packets result in clipped speech. Facsimile (fax) transmissions are even more sensitive to the quality of the network path and are less tolerant of dropped packets than voice.

The traditional solution for minimising network delays is to over-engineer the network in such a way as to ensure that there is abundant bandwidth available to traffic. This means that packets carrying voice do not encounter delays when travelling from source to destination. Although this is feasible in the network core, it is a costly and ineffective solution in the access network, defeating the "bandwidth sharing" benefits of packet networks. This problem threatened to negate the benefits of a unified infrastructure. However, new traffic engineering and quality of service (QoS) technologies have now progressed to a point where perfectly acceptable voice qualities can be achieved over packet switched networks. In many cases, users are unable to distinguish a conversation carried over a packet switched network from one carried over a traditional voice network. The diagram below illustrates the evolution from circuit switched to a packet switched environment.



Evolution from Circuit to Packet Switching Architectures

In the circuit switched environment, most of the elements are concentrated into a single device – the switch itself, usually located in an exchange building. In the packet switched scenario, the elements can be widely distributed throughout a network, providing resiliency and efficiency.

3.1 Network Architectures

VoIP networks involve a number of elements, which may or may not all be present. These elements typically are:

Call server — Also called "softswitch," this element is the “brains” of the network, providing call control, gateway control, service intelligence, and other centralized functions. A call server may consist of a single entity, or be made up of multiple devices.

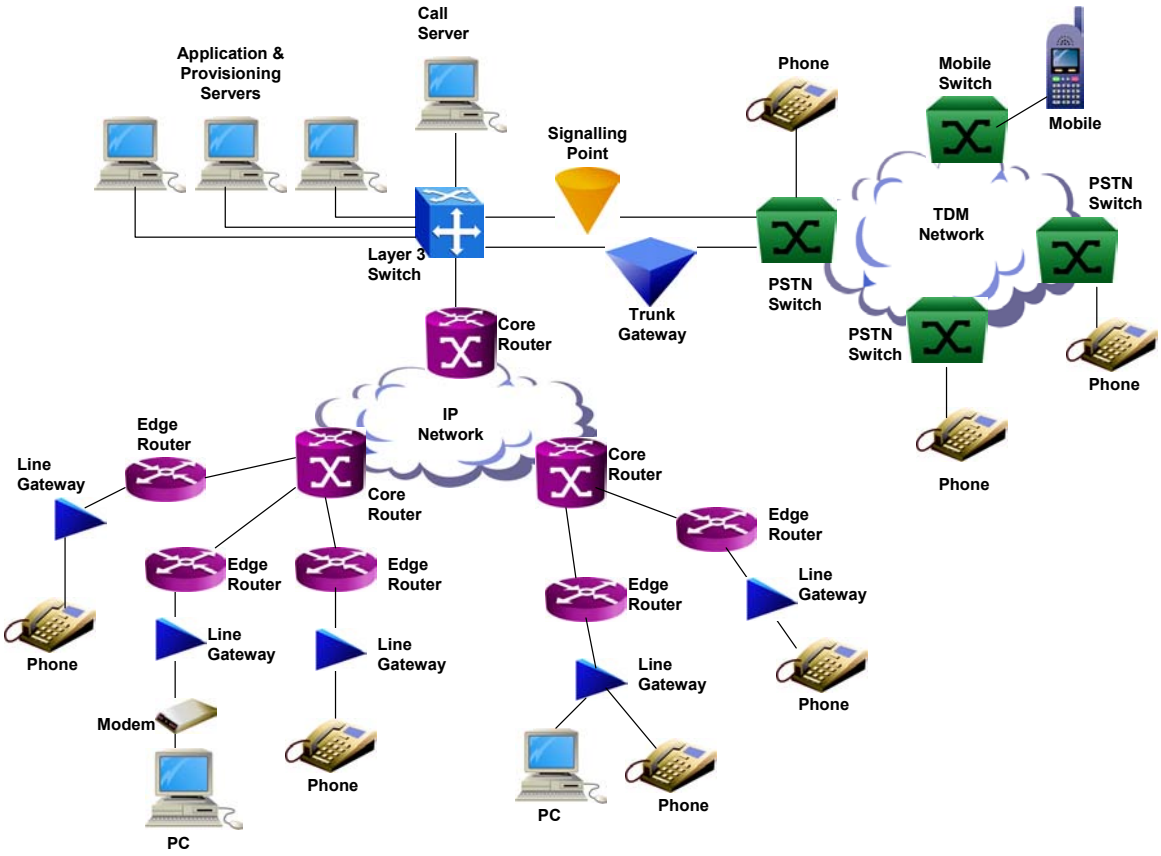
Signalling point — This element enables the Voice over IP network to exchange signalling information with the SS7 (Signalling System 7) system used in traditional public switched telephone networks (PSTN).

Line and trunk gateways — These elements provide interconnectivity between the VoIP network and other networks (either the local line or long-haul trunk segments, respectively).

Switches and routers — These direct traffic from the edge through the core of the IP network by determining the optimal path for packets in order to reach the various elements of that network.

Application servers — These provide voice, data, or multimedia services either from a central location in the IP network, or on a distributed basis. Other servers are required for provisioning subscribers and maintaining call and billing records.

The network diagram below illustrates the typical architecture encountered in a VoIP environment. This illustrates various interconnection scenarios that clearly may not all be present in every VoIP deployment.



Comprehensive VoIP Architecture illustrating interconnection possibilities with PSTN

3.2 Accessing VoIP Networks

Various methods exist of accessing a VoIP network. These include:

1. **personal computer (PC)**: a personal computer, equipped with certain hardware and software, can be used to covert speech into digital signals. This PC is connected to a service provider network. The digital traffic is then directed to the intended recipient. If the recipient uses a traditional phone, then the VoIP traffic will have to be converted into circuit switched format by a gateway in the traffic path. H.323 is usually the protocol used.
2. **voice over DSL**: strictly speaking this is more a case of VoATM rather than VoIP due to the fact that ATM underpins most digital subscriber line (DSL) systems. This solution has proved popular in unbundled local loop scenarios since alternate operators can provide combined voice and data services over copper lines.

3. **cable modem:** special cable modems exist that provide both a data and an analogue voice port connection. Thus both a standard phone and a PC can be connected simultaneously to the cable modem. Software in the cable modem itself provides the gateway functionality.
4. **Set top box (STB):** this is very often a combination of the above, where the STB is a simplified PC using a TV as the display device and an infra red keyboard as the input device. The STB is normally equipped with a broadband (cable, DSL, wireless) connection to the service provider network. In a triple-play scenario (voice, video, data) the STB would have an RJ-11 connection for an analogue phone.
5. **IP Phone/IP-PABX:** a VoIP-enabled PABX is usually installed in corporate premises. Special IP phones (or adapters that allow a standard phone to be used instead) are connected to the IP-PABX over a data network (e.g. Ethernet). The advantage of an IP-PABX is that it allows a single network infrastructure to be built for data and voice services. The IP-PABX then has gateway functionality that allows interconnection with the PSTN.

The multiple scenarios involved indicate that attempting to classify packet switched voice services for regulatory purposes would be a futile exercise since it is clearly impossible to legislate for every different type of technical solution. Keeping to a technology neutral principle as far as possible is the sensible option. This is also a fundamental principle of the latest EU regulatory framework, and will be the philosophy adopted to guide the regulatory process as far as possible.

4 Types of Voice over IP

Voice over IP (VoIP) is very often used interchangeably with several other terms such as Voice over the Internet, IP Telephony, Internet Telephony and others. These do not all mean the same thing and there may be differing regulatory implications for each. It is vital therefore to define and categorise the various types of packet switched voice communications.

a. **Voice over Internet** – refers to communications services — voice, facsimile, and/or voice-messaging applications — that are transported via the Internet, rather than the public switched telephone network (PSTN). The basic steps involved in originating an Internet telephone call are conversion of the analogue voice signal to digital format and compression/translation of the signal into Internet protocol (IP) packets for transmission over the Internet; the process is reversed at the receiving end. Since no end-to-end QoS (quality of service) standards are currently in force on the public Internet, only a best effort voice service can be implemented. This type of service can therefore not be termed as "voice telephony" under Maltese and EU legislation. Similar terms used in this scenario are Voice on the Net (VON) or Internet Telephony.
b. **IP Telephony** – refers to communications services - voice, facsimile, and/or voice-messaging applications — that are transported via a network that utilises the Internet protocol rather than the public switched telephone network (PSTN). This does not mean that the network forms part of the public Internet. IP telephony is often marketed as a direct replacement for traditional voice services and may have comparable QoS and lifeline availability. If an IP telephony system claims to be a PSTN-like service then it is considered to be "voice telephony" if the voice path is phone-to-phone. This means that users will be unable to differentiate between IP telephony and the PSTN.
c. **Voice over IP/ATM/FR –** refers to voice, facsimile, and/or voice-messaging applications that are transported via a network, parts of which use the Internet Protocol, Asynchronous Transfer Mode or Frame Relay. For example, an office may use VoIP when an IP-enabled PABX is used for intra-office voice communications. Alternatively an existing telco may decide to route long distance trunks over an ATM network. In other words this is a generic term that is used to encapsulate non-circuit switched voice.

Once more, it becomes evident that care has to be taken when attempting to pigeonhole any VoIP-type services. It is only in specific instances that these

services can be categorised as “voice telephony” and thus be subject to the concomitant regulations.

Consultative Question 1:
Are you in agreement with these classifications? If not, please provide your suggestions.

5 Proposed Regulatory Framework for VoIP Service Providers

It is expected that within the timeframes laid out in this document (see Section 10), any authorisation granted to VoIPSPs (VoIP Service Providers) will be effected under the extant licensing regime, although this is currently under review.

5.1 Regulatory Considerations

There are various regulatory considerations that need to be addressed when dealing with VoIP. These will have an impact on the development of VoIP and the voice telephony market in Malta.

The question that has to be asked is "Who can use, provide or benefit from VoIP in Malta?". Potential answers include:

- Telecom companies that own their own infrastructure (such as Maltacom and Melita Cable and some of their subsidiaries)
- ISPs
- New entrants using new or existing systems
- Local Internet-based companies who might not be ISPs but who can provide telephony services (e.g. "click to talk") via their websites
- Foreign Internet companies who sell their services over the Web
- Closed user groups
- Private networks
- Companies that encourage take up of VoIP networks since they import, install, configure & support the requisite equipment

While the regulation of existing telecommunications companies and new entrants can be determined and imposed, it would be hard if not impossible to regulate or impose regulations on web-based operations that may be able to offer a service without needing a license (as is already the case).

Several regulatory regimes in other jurisdictions were considered in order to assess how the situation was tackled. It is the Authority's opinion that a

country that has a legislative and regulatory environment that closely mirrors the Maltese one is the United Kingdom. In the United Kingdom, the telecommunications regulator, OFTEL, has taken the following approach. VoIP is regulated as public telephony if it meets one of three conditions:

1. The service is marketed as a substitute for traditional Public Switched Telecommunications Network (PSTN) voice services; or
2. The service appears to the customer to be a substitute for public voice telephony; or
3. The service providers the customer's sole means of access to the traditional circuit switched PSTN.

It is therefore being suggested that Malta's approach should be similar to OFTEL's in view of the similarity in the legislation and the definition of telephony and voice telephony. That would mean that phone-to-phone communications would be considered as voice telephony if they match one of three parameters described above.

5.2 Proposed licensing regime

In accordance with Cap. 399, any operator that offers VoIP will need a licence to operate a telecommunications system or to provide a telecommunications service. This may be granted either in the form of an individual license or in accordance with a general authorization. To date, Malta has not granted any general authorisations. Hence any VoIP service provider will need an individual license until the necessary structures are in place to permit general authorisations.

A major differentiating factor that will be considered when a VoIPSP applies for authorisation is the ownership of infrastructure. Currently two legal notices, 151/2000 and 167/2001, describe the license conditions applicable to various telecommunications systems. If a VoIPSP is to construct one such system then the appropriate legislation will be applied.

If the service provider is to be system-less (i.e. it does not own a telecommunications infrastructure), then other considerations are to be made, such considerations being dealt with later in the document. If the voice service is to be carried over the public Internet then this service can be considered to be an integrated Internet service. Access to the public Internet in Malta can only be made via a licensed Internet Service Provider. It is therefore possible for an ISP to deliver VoIP services to subscribers as one of a number of data services and in many cases it will be close to impossible to distinguish the voice service from the other data services.

Consultative Question 2:
Do you agree with the proposed format for the regulatory framework for VoIP services? If not, please provide reasons and alternatives.

6 Guidelines for regulating VoIP Service Providers

Despite the multiplicity of technical solutions and service implementations, it is envisaged that the variety of scenarios in which packet voice systems and services will be implemented locally will basically fall into one of three categories. The Authority is therefore recommending three classes of licenses or authorisations for entities providing some form of Voice over IP system and/or service. These would be categorised as follows:

1. PSTN equivalent operator

- Requires system/infrastructure
- Owns switch & gateways to PSTN
- VoIP in access & core networks
- Licensed under LN 151/2000 and/or LN167/2001
- All obligations & responsibilities of authorised provider

2. VoIP Service Provider

- ISP or other data network operator
- Does not own access infrastructure, switch
- May own gateway to PSTN
- Likely to be used mainly for international calls
- Licensed under ISP type authorisation

3. Private Network

- Private network not accessible to general public
- Multiple sites can be linked by leased lines
- PABX acts as gateway to PSTN
- Use of general authorisation
- Notification to MCA required prior to deployment

It is felt that these categories, or combinations thereof, should be adequate to cater for the majority of envisaged VoIP implementations. Other potential permutations would be given consideration by the Authority on a per case basis. The guidelines are not meant to be an "all or nothing" package but rather an indicative framework of how the MCA would view operators or service providers.

Consultative Question 3:
Do you feel that the above guidelines are reasonable and adequate? If not please provide reasons, referring to the specific categories by their number. Please provide any other categories that you feel should be included.

7 Obligations of VoIP Service Providers

These obligations are listed and described in order to enable current players and new entrants to gauge what their responsibilities prior to commencing the delivery of any packetised voice service will be:

- Interconnection
- Universal Service Obligations
- Numbering and Naming
- Service Offering
- Data protection
- Legal Interception
- Itemised Billing
- Directory Services
- Codes of Practice

7.1 Interconnection

Operators designated as having dominant market power by the Authority have to offer interconnect arrangements. Non-dominant market power operators are free to negotiate interconnect arrangements between themselves. It is not necessary for these interconnections to use existing circuit switched PSTN technology, although it would be the norm for the DMP operator to specify interconnection interface specifications and procedures in a *reference interconnect offer*.

7.2 Universal Service

Following the publication of a consultative paper on the subject earlier this year, the MCA is evaluating the feedback received prior to reaching a decision. VoIPSPs would then be required to abide by any eventual decision.

7.3 Numbering & Naming

It is currently possible to originate calls from IP address-based networks to other networks, but it is uncommon to terminate calls from other networks to IP address-based networks. Rather, calls are generally terminated on the PSTN, so the called party can only use a terminal device connected to those networks. In order to access a subscriber on an IP address-based network from the PSTN, some sort of global numbering/addressing scheme across both PSTN and IP address-based networks still needs to be developed and implemented.

When VoIP services are provided using traditional E.164 telephone numbers (Global Switched Telephone Numbers (GSTN)/E.164 addresses are commonly called "telephone numbers") callers may not be *a priori* aware that they are calling a customer connected to a VoIP service. When providing a VoIP service that uses E.164 numbers, operators should take account of the quality of service that a caller would normally expect when calling an E.164 telephone number. Any packet switched voice service provider that requires E.164 numbers to be assigned to VoIP services may use any number range in the national numbering plan as allocated by the MCA. One option under consideration is that for subscribers to be able to easily recognise calls that may benefit from being conveyed wholly or partly over IP networks, the Authority would grant specific number ranges for this purpose. In future, the use of the ENUM [1] system may become necessary

[1] (ENUM is a protocol that is the result of work of the Internet Engineering Task Force's (IETF's) Telephone Number Mapping working group. The scope of this working group was to define a Domain Name System (DNS)-based architecture and protocol for mapping a telephone number to a Uniform Resource Identifier (URI) which can be used to contact a resource associated with that number)

7.4 Service Offering

The MCA has the responsibility of determining quality of service standards for telecommunications operators and service providers. Rather than imposing any particular standard outright, it would prefer to establish a service level regime in full consultation with the industry.

Currently, the VoIP market seems to consist mostly of private networks and conveyance over public networks. Voice over IP from one computer to another, as a replacement for conventional telephony, appears at present to be a niche market. It therefore remains to be seen whether it will become a permanent feature on the telecoms landscape.

Only now is equipment appearing on the market that is capable of managing the level of traffic encountered on the traditional telephone network, providing a mass market service. Quality of service seems to be a problem as well.

Service quality is more or less assured in a homogenous technological environment such as operator networks using IP cores and private networks. The same cannot be said for the end-to-end service over heterogeneous networks since this requires the quality of service to be assured at the level of each sub-network as well as knowledge of the performance and quality parameters in all of the networks used.

Decades of PSTN experience have set some key quality parameters for the end user such as virtually all call completion, no disconnection, high voice quality and low delay. However, users making say international calls may be willing to accept lower-quality international calls at a lower-price, possibly the price of a local call or less than that. Consumers tend to be cost-conscious and more flexible than business customers regarding quality and convenience.

If concerns surrounding quality of service and security are to be taken into account at the regulatory level, this will require agreement on the relevant criteria and their values. Moreover, subjective criteria, such as speech quality and ease of conversation, as well as additional factors linked to the service itself, billing and even customer care quality, could also be taken into account within a broader notion of quality.

Nevertheless, end users must eventually be informed of both pricing and quality of the products on offer. For this, independent bodies could measure the quality of offers prior to their market launch.

7.5 Data Protection

All VoIPSPs would have to take the necessary steps to conform to all data protection legislation, including telecommunications sector specific data protection requirements.

7.6 Legal Interception

All VoIPSPs will have to make facilities and data available to the appropriate law enforcement agencies such that these may carry out legal interception on any electronic communications passing through their systems, obviously within the parameters allowed by law.

7.7 Itemised Billing

All VoIPSPs will have to produce an itemised bill as per the decision notice DN01/02 issued by the MCA earlier this year (http://www.mca.org.mt/images/library/decision%20Notice%20DN01.pdf).

7.8 Directory Services

VoIPSPs using E.164 addresses allocated out the national numbering plan for any customers will have to comply with the MCA decision notice issued in July 2002 with regards to directory services.

7.9 Codes of Practice

VoIPSPS will be bound to publish and abide by appropriate codes of practice.

Consultative Question 4:
Do you consider these obligations to be reasonable and justified. If not, please list the grounds of any objections and suggest possible alternatives.

7 Conclusion

The MCA considers that a VoIP service should be regulated *as public voice telephony if any of the following conditions apply*:

- The service is described and marketed as a substitute for the Public Switched Telecommunications Network (PSTN) voice services; or
- The service appears to the customer to be a substitute for public voice telephony; or
- The service provides the customer's sole means of access to the traditional circuit switched PSTN.

Clearly, the above will only be applicable in cases where all four criteria listed in local and European law regarding the classification of telephony apply. Where a service is considered to be public voice telephony, the relevant obligatory requirements will have to be met. For example, these include requirements to provide access to emergency services, directory enquires and operator services.

However, where a VoIP service is clearly being offered as an addition to the traditional circuit switched PSTN voice telephony service or as a secondary service, it is likely not to be considered as public voice telephony.

The MCA will have a technology-neutral approach to VoIP regulation. Therefore, regulation that is relevant to voice telephony and interconnection is likely to be relevant irrespective of the technology. However, not all VoIP services are considered to be public voice telephony. For example, many Internet telephony services are not used, and cannot be used, by customers as a substitute for their existing telephone service.

Any organisation intending to become an operator of:

- Public fixed telecommunications systems and services
- Fixed wireless telecommunications systems and services
- Cable Systems

needs to obtain the relevant licence and be bound by its obligations.

ISPs are only permitted to offer Internet access in their present license. However, voice over the Internet using a PC does not as yet constitute telephony and as such cannot be regulated accordingly also because customers can use other websites and not their ISP to benefit from such a service. Customers can make international calls but the quality of service is not guaranteed. It is therefore proposed that Internet Service Providers will be free to offer VoIP as long as this does not meet any of the three criteria mentioned previously.

Specialised VoIPSPs will be subject to a licensing regime that is similar to that of Internet Service Providers.

Companies installing private networks will still require authorization from the MCA. Special attention will be given to networks that span more than a single entity or physical location. It is not envisaged that any licensing conditions will be imposed on private networks, or the deployment of IP-enabled PABXs.

It is the Malta Communications Authority's intention therefore to obtain feedback from all interested parties as part of a consultative process. All inputs will be carefully considered and a decision on the final format of the regulatory regime pertaining to packet voice services will be taken on the basis of the received information.

8 Proposed Timeframes

The MCA is of the opinion that VoIP service providers can submit applications to be able to commence operations as from the 1st January 2003 so as to be in a position to avail themselves of opportunities due to the market changes that are expected to occur as a consequence of the telecommunications' market complete liberalisation taking place from that specific date.

Maltese legislation does not differentiate between testing and actual service rollout, so any voice trials cannot commence before the above date.

Consultative Question 8:
Do you agree with the proposed timeframes? If not, how should they be modified?

9 Consultation Framework

The MCA wishes to invite comments from interested parties in relation to any of the issues raised in this document. The consultation period will run until **12.00pm on Friday 1st November 2002**.

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

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Receipt of comments will be confirmed. Comments will be made publicly available at the MCA unless declared confidential. Respondents are therefore asked to separate out any confidential material into a clearly marked annex. Respondents are also kindly requested to refer their comments to the specific sections of this document.

10 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.

Frame Relay
Frame relay is a telecommunication service designed for cost-efficient data transmission for intermittent traffic between local area networks (LANs) and between end-points in a wide area network (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 continous, dedicated connection without having to pay for a full-time leased line, while the service provider figures out the route each frame travels to its destination and can charge based on usage.

IP (Internet Protocol)
The IP (Internet Protocol) 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.

PSTN
PSTN (public switched telephone network) 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.

TDM (Time Division Multiplexing)
TDM (Time Division Multiplexing) 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 analog to digital long distance trunking. This term is often used interchangeably with the term "circuit-switched."