



GUIDELINES FOR THE IMPLEMENTATION AND PROVISION OF VOICE OVER INTERNET PROTOCOL (VOIP) SERVICES

1. Introduction

Convergence in communication technologies is today leading to the development of next generation telecommunication networks that deliver audio, video and data both on wireless and wired networks. Information and communication networks are being restructured to leverage on the advantages of Internet protocol (IP) technologies.

There can be no question that VoIP represents an innovative technological advancement, which confers economic advantage to users. There can equally be no doubt that VoIP allows for choice and affordability and promotes competition.

In a bid to confer the advantages that this technology presents to end-users, the Commission has, through the post exclusivity regulatory strategy, adopted a technology neutral regulatory framework that will facilitate the use of IP based technologies including VoIP. The implementation of the framework will allow licensed infrastructure providers such as Internet Backbone and Gateway Operators (IBGOs), Broadcast Signal Distributors (BSDs), Commercial VSAT Operators (CVOs) and Public Data Network Operators (PDNOs), to carry any form of multimedia traffic including IP traffic e.g. VoIP. licensed application providers and in particular Internet Service Providers have been allowed to offer end-users VoIP services.

This consultation document proposes guidelines on the implementation and provision of VoIP services and seeks views from network operators, service providers and users of the VoIP on the implications of the proposed guidelines. These guidelines cover the following areas:

- Definition of VoIP
- Technical implementation of VoIP
- Obligations to infrastructure and application service providers

2. Definition

Voice over Internet Protocol (VoIP) facilitates the conversion of analog voice signals into digital format and the transmission of such digital information in packets over networks utilizing the Internet Protocol (IP). The technology allows the transmission of voice over data networks, which may be the public Internet or private managed IP network. Voice over Internet Protocols including H323, Media Gateway Control Protocol (MGCP), Simple Gateway Control Protocol (SGCP), Session Initiation Protocol (SIP) etc allows for transmission of voice signals over data networks. IP telephony is an emerging technology that enables voice and video communication over existing IP-based Local Area Networks (LANs), Wide Area Networks (WANs) and the Internet.

VoIP shall be defined as the transmission of voice over IP based networks.

3. Technical implementation

Advances in technology allow telephone calls to be delivered through the public Internet and over IP enabled networks. The Commission encourages network operators to deploy IP-based networks to deliver affordable and innovative services to end-users. The deployment of this technology is expected to confer benefits to operators

including optimization of the public switched telephone network (PSTN) and transmission infrastructure, reduction of network costs, increased network redundancy and resilience and facilitation of support and flexibility in the provision of innovative and next generation services.

A situational analysis of the use of VoIP services reveals the following modes of service provision and implementation:

3.1. PC to PC

The VoIP communication is established by individual users who make Internet call from one computer to another. This form of communication comes at no additional cost to the users other than the Internet connectivity and access charges.

Since the service is not for commercial purpose, no regulatory requirements will be needed for this self-provided or Do-it-yourself (DIY) VoIP classification.

3.2. PC/IP Phone to PSTN

Due to the limitations associated with availability of PCs and Internet connectivity and the high cost of international calls delivered over legacy TDM switched networks, telephone calls are originated from PCs or IP phones and terminated on the PSTN. The only significant cost for these calls (usually long distance and International calls) is the local call charge applied by the terminating PSTN operator.

In this classification the caller would originate a call from a PC or an IP telephone by dialing a complete traditional E.164 number that would be terminated on PSTN over the public Internet. The network architecture of the IP to PSTN topology is controlled by VoIP gateways that define and route the call to the terminating gateway. On the remote end, the terminating VoIP gateway connects to the local PSTN network. SIP, H.323 and MGCP VoIP protocols have been developed to support VoIP and have been utilized to interconnect the IP network to the PSTN.

The provision of this class of VoIP service shall be by licensed Internet Service Providers (ISPs) and infrastructure providers as carriers. .

3.3. IP Phone to IP Phone

IP network architecture differs from the traditional TDM Switched network as the underlying Internet Infrastructure consists of a dumb core network and Intelligent Customer Premise Equipments (CPEs) while the PSTN consists of an intelligent core network and dumb CPEs.

The application of IP to IP phone conversations are common within Intra-corporate private networks i.e. local and wide area networks. The utilization of VoIP reduces the cost of communication in corporate communications between branch offices. In some instances, however, there may be a need to integrate remote ends to the PSTN described above as PC/IP Phone to PSTN.

The utilization of this class of VoIP service shall be restricted to licensed private networks and leased networks from infrastructure providers.

3.4. PSTN via IP to PSTN

Most operators are today migrating traditional circuit switching systems based on TDM technology to IP technology particularly for the provision of long distance services due to the inherent technical limitations and cost of implementation. Carriers and telecommunications operators have adapted and integrated VoIP switching for long distance communications reducing overall costs and improving quality in seamless end-to-end connection to subscribers.

In this model, end-users would dial a traditional E.164 number, and the call is routed from the PSTN through a VoIP gateway over an IP network and offloaded to the PSTN and vice versa. To facilitate this arrangement fixed and mobile operators would enter into commercial bilateral and service level agreements (SLAs) for call termination to reduce call delivery costs with VoIP carriers.

VoIP carriers or operators setup VoIP Gateways and platforms to interface with local PSTN networks globally creating virtual VoIP networks for long distance calls completely transparent to end users. As a result they become carriers of telephony on the existing infrastructure. In this arrangement VoIP operators would purchase bulk voice minutes for resale within a country for example through the use of calling cards, where the end user would be required to dial a toll free or unique number to gain access to international or long distance telephony services.

In this classification, VoIP providers who shall be licensed Internet Service Providers (ISP) may obtain toll free numbers from network providers to facilitate the provision of the VoIP services. . Consequently, the existing ISP licenses shall be amended as appropriate to facilitate reliable provision of this service. Existing ISPs who have complied with regulatory requirements shall be issued with the amended license upon surrender of the ISP license they are currently holding. Additionally, equipment utilized for the provision of this service and connected to the public networks shall be subject to type approval by the Commission.

3.5. PSTN to IP Phone

VoIP providers have advanced the requirement to provision telephony services from traditional PSTN networks to IP Phones as opposed to just call termination to PSTN. To achieve this objective, ENUM has been developed to converge the PSTN and the IP network.

ENUM enables the mapping of a traditional E.164 telephone numbers from the Public Switched Telephony Service (PSTN) to Internet services through the conversion of traditional E.164 telephone numbers to Universal Resource Locator (URL). This emerging technology provides enormous possibilities including the creation of virtual telephony operators who would be issued with E.164 telephone numbers.

The Commission will initiate the process of ENUM redelegation and develop further policies and guidelines to govern this emerging technology.

4. Technical implementation classifications

The Commission shall take into consideration different technical architectures for the implementation of VoIP, which shall be broadly classified as follows:

- PC/IP phone to PSTN: Self- provisioning
- IP phone to IP phone: Intra-corporate VoIP
- PSTN via IP to PSTN: Carrier/operator public VoIP provisioning

The Commission is, however, cognizant of the fact that with the fast pace of convergence of voice and data, there may be no distinction of the three classes of services in the future. This classification shall, therefore, be subject to review from time to time.

5. Obligations

For successful implementation of VoIP services, ISP and infrastructure providers shall be required to meet certain obligations, including:

- Interconnection
- Universal Access
- Numbering and Naming
- Quality of Service levels
- Legal Interception
- Billing
- Directory Services

5.1. Interconnection

Internet Service Providers being Application Service Provider (ASPs) do not own infrastructure, and shall, therefore, utilize the infrastructure of licensed network operators to provide and/or interconnect their systems to

facilitate provision of VoIP services. Network operators shall be required to provide interconnection in accordance with the Kenya Communications Regulations, 2001

5.2. Universal Access

Globally VoIP is envisioned as the dominant means of the provision of voice services in the future. Consequently, to ensure equitable access to these services, both ISPs and infrastructure providers shall be subjected to universal services obligations as may be prescribed by the Commission.

5.3. Numbering and Naming

In order to access end-users on either an IP address-based network or the PSTN, a global numbering/addressing scheme across both PSTN and IP address-based networks including ENUM, shall be required. VoIP providers shall, therefore, be required to comply with the Commission's numbering plan.

5.4. Quality of Service

Cognizant of the fact that best effort is applied in the provision of services delivered over IP based networks, providers of VoIP service shall implement efficient routing mechanisms and appropriate pricing. End users/customers must be informed of both quality of service and pricing. In addition, the service providers shall adhere to quality of service standards as set out by the Commission from time to time..

5.5. Legal Intercept

The provision of VoIP services shall be subject to monitoring by the Commission to ensure that providers adhere to the provisions of the license, the Regulations, the Act and the laws of the country.

5.6. Billing

VoIP providers shall be required to adhere to license conditions with regard to billing accuracy.

5.7. Directory Services

VoIP service providers shall be required to comply with the Commission's license conditions as regards to directory services.

6. Other Conditions

This consultation document does not constitute legal, commercial or technical advice and the Commission is not bound by its contents. These guidelines are subject to review by the Commission from time to time without any reference to the affected parties.

**DIRECTOR-GENERAL
COMMUNICATIONS COMMISSION OF KENYA**

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