           INETPhone: Telephone Services and Servers on Internet

Status of this Memo

   This memo provides information for the Internet community. It does
   not specify an Internet standard of any kind. Distribution of this
   memo is unlimited.

IESG Note

   Internet Engineering Steering Group comment from the Transport Area
   Director: Please note well that this memo is an individual product of
   the author. Work on standards and technology related to this topic
   is additionally taking place in the IETF in the Multiparty MUltimedia
   SessIon Control Working Group (MMUSIC).

Abstract

   INETPhone is a true telephone service through the Internet. It
   integrates the local telephone networks and the Internet using
   INETPhone servers. Thus a long distance call can be split into two
   local calls and an Internet connection, which is transparent to end
   users. Such a phone service through Internet will be a major step
   towards integrated services on Internet. In order to support the
   INETPhone and lay down the ground rules of the service, a scheme of
   "open partnership" is proposed, so that the entire Internet community
   can have the equal opportunity and benefits from the INETPhone
   service.

1. Introduction

   The success of traditional Internet services, such as the electronic
   mail, the file transfer, and the remote machine access, has inspired
   a row of new network applications -- the world-wide information web,
   voice and video conferencing, and network telemarketing are just a
   few to mention. With the further development in infrastructure and
   the architecture of integrated, multimedia information services
   [1,2,3], certainly the Internet will play a crucial role in shaping
   up the future of so-called information super-highway.

   Among many new applications, the voice communication through Internet
   bears perhaps the most potential impact, since it competes directly
   with the telephone communication, which has become an indispensable

part of the modern society. Recently, many software packages are
available, either commercially or as public free-ware, which supports
voice communication on Internet. Some of these products are targeted
directly as possible substitution for long distance telephone
services. However, so far, all such products only support voice
communications using a computer that is on the Internet or is
connected, via a SLIP link, to the Internet [4].

This RFC presents a true telephone service, called INETPhone, which
supports voice communication through the Internet. INETPhone
integrates the local phone network with the Internet. The phone
network provides local access of INETPhone service with the existing
telephone facilities, whereas the Internet delivers the packets of
voice communication over long distances. The service of INETPhone is
illustrated by the following scenario. Assuming a user at area A
wants to call another user in area B. The user first makes a local
call to an INETPhone server in area A. After the connection, the user
keys in the remote phone number in area B to the server. Then the
server in area A makes a connection to another INETPhone server in
area B, and requests the remote server to dial, as a local call, the
phone number in area B. Therefore, a long distance phone connection
between users in area A and B is established via two local phone
connections and one Internet connection between two INETPhone
servers.

The INETPhone provides a general service of voice communication on
Internet compatible to the existing telephone service. The
motivation in developing and experimenting the INETPhone service can
be two-folds: on the one hand, a general telephone service on the
Internet will be a major step towards integrated services on Internet
and a great challenge to the future development of Internet
infrastructure and protocol architecture; on the other hand, the
entire Internet community can take the advantage from the cheap and
convenient voice communication of the INETPhone service.

2. Design Philosophy

The design philosophy of the INETPhone differs from the most of
current voice communication services on Internet in three basic
aspects: integrating the existing telephone networks with the
Internet; using the INETPhone servers to carry out the task of voice
packet delivery on Internet; and an open-partnership of establishing
the INETPhone service on Internet. The discussion of each of these
aspects is given as follows.

The conventional telephone service is the most popular and convenient
means for voice communication across distances. Any serious effort to
integrate voice communication on the Internet should take the full

advantage of this well-established service. The INETPhone bridges
the existing telephone network with the Internet, so that the access
of the INETPhone service will be totally based on the local phone
services and facilities. This will lead to a much easier access and
broader user population than the approaches of computer-based access.

The INETPhone service is based on the client-server model, in which a
group of INETPhone servers are responsible for accepting/initiating
local calls and deliverying voice packets across the Internet. The
general users (as clients) can easily access the service through a
conventional phone with a local call. The creation of such INETPhone
servers eases the burden from general users, and provides services of
voice communication on the Internet in a more efficient and
manageable manner.

Hundreds even thousands of INETPhone servers will be required for the
wide coverage of INETPhone services on the Internet (to cover all
areas within US, at least one server needs to be installed in each
area of phone area code). Instead of letting few industrials
monopolize such a service on the Internet, an alternative approach
based on an open-partnership scheme of INETPhone service is proposed
(see Section 5), which will give equal opportunity and benefits to
the entire Internet community.

3. INETPhone Servers

The central components of the INETPhone service are its servers on
Internet. The server acts as a gateway between the telephone network
and the Internet. For this purpose, the server will have both
interfaces to a computer network and the telephone network.
Currently, there are many commercial telephone interface cards
available on the market (such as Dialogic's Voice Boards [5]), which
support various telephone operations of detecting/generating
telephone signals (ring, DTMF, etc. [6]), receiving/initiating phone
calls, recording (digitizing and compressing) or playing back audio
signals, and monitoring the progress of a phone call.

With the support of necessary hardware interfaces, the function of an
INETPhone server includes:

   (a) Receive a local call or accept a connection from a remote
       server;

   (b) Identify the PIN of a local call and determine if to proceed
       the call or not;

   (c) Accept a phone number for remote dialing from a local call;

    (d) Look up the local directory for a remote server of a
        requested call;

    (e) Make a connection to a remote server;

    (f) Make a local phone call upon the request of a remote server;

    (g) Maintain full-duplex, real-time exchanges of voice packets
        via Internet;

    (h) Maintain information exchanges with Directory Servers (see
        Section 4);

    (i) Handle exceptional conditions, such as long delay or drop of
        voice packets;

    (j) Monitor quality of service and keep accounting information.

The above listed functions represent probably the minimal
requirements for each INETPhone server. Some further important
features, such as compression/decompression, security, multicasting,
and voice mail need also to be considered when a real service of
INETPhone is launched on the Internet. Since a general public of the
Internet community might be involved in this proposed INETPhone
service, it is probably necessary to set an open standard in the
building of INETPhone servers (see Section 5).

4. Directory Servers

The main philosophy behind the INETPhone service is to reduce a long
distance phone call into two local calls and an Internet connection.
Therefore, an INETPhone server will always be identified by its IP
address with its local area code of the phone number (also possibly
with its sub-regional number). In order to support a dynamic
configuration of INETPhone servers on the Internet, a Directory
Server(s) (DS) will be required to map between IP address and area
code of INETPhone servers, which in some sense, is similar to the
functions of a Name Server (such as the BIND [7]). After an
INETPhone server is installed on the Internet, it needs to register
itself with a DS. The mapping information at DS will be disseminated
to INETPhone servers for the search of a remote server in response to
a requested phone call. Local cache of mapping information may also
be maintained at INETPhone servers to alleviate communications
between INETPhone servers and Directory Server(s). Again, the
function of a Directory Server for the INETPhone may require another
open specification.

5. Open Partnership

   Voice communication and telephone service are important parts for
   providing integrated information services over the Internet. With
   the current trends of commercialized services over the Internet,
   sooner or later, some kind of telephone services will be launched on
   the Internet by some private companies. On the other hand, the
   operation of the INETPhone service will depend on the installment of
   enough INETPhone servers over the Internet, which can be achieved
   through a cooperative effort of the entire Internet community. This
   RFC proposes an open-partnership scheme for the INETPhone service,
   which provides equal opportunity and benefits to the entire Internet
   community.

   An outline of the proposed open-partnership scheme is listed as
   follows:

      (a) Any organization or individual person can join or withdraw
          from this open-partnership on a voluntary base.

      (b) In order to join the partnership (therefore becoming a member
          of the partnership), an organization or a person should at
          least install and maintain an INETPhone server on the
          Internet with the equal capacity of lines for call-in and
          dial-out services.

      (c) Each member of the partnership has the equal right to use the
          INETPhone service through any INETPhone servers on the
          Internet. All services will bear the same charges based on
          the number of bytes transmitted through the Internet and
          whatever the rate (if any) laid down by the Internet
          authority.

      (d) A not-for-profit consortium will be formed from the
          representatives of all members of the partnership. The main
          task of the consortium is to establish all regulations and
          specifications of the INETPhone service, and to coordinate
          the execution of these rules by all the members.

7. Recommendation

   If there is enough interests in the INETPhone service from the
   Internet community, the IAB may need to consider forming a special
   task force or working group to further look into the matter.

8. References

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   [6] Noll, M., "Introduction to Telephones and Telephone Systems", 2nd
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   [7] Albitz, P., and C. Liu, "DNS and BIND", O'Reilly & Associates,
       Sebastopol, Calif., 1992.

8. Security Considerations

   Security will be an important issue in the INETPhone service. As a
   general proposal, however, this RFC chooses to leave this topic for
   future discussions.

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