

Network Working Group
Request for Comments: 2458
Category: Informational

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November 1998

Toward the PSTN/Internet Inter-Networking
--Pre-PINT Implementations

Status of this Memo

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Abstract

This document contains the information relevant to the development of the inter-networking interfaces underway in the Public Switched Telephone Network (PSTN)/Internet Inter-Networking (PINT) Working Group. It addresses technologies, architectures, and several (but by no means all) existing pre-PINT implementations of the arrangements through which Internet applications can request and enrich PSTN telecommunications services. The common denominator of the enriched services (a.k.a. PINT services) is that they combine the Internet and PSTN services in such a way that the Internet is used for non-voice interactions, while the voice (and fax) are carried entirely over the PSTN. One key observation is that the pre-PINT implementations, being developed independently, do not inter-operate. It is a task of the PINT Working Group to define the inter-networking interfaces that

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will support inter-operation of the future implementations of PINT services.

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1. Introduction

This document contains the information relevant to the development of the inter-networking interfaces underway in the Public Switched Telephone Network (PSTN)/Internet Inter-Networking (PINT) Working Group. It addresses technologies, architectures, and several (but by no means all) existing pre-PINT implementations of the arrangements through which Internet applications can request and enrich PSTN telecommunications services. The common denominator of the enriched services (a.k.a. PINT services) is that they combine the Internet and PSTN services in such a way that the Internet is used for non-voice interactions, while the voice (and fax) are carried entirely over the PSTN.

The organization of the document is as follows. First, the basic terminology and a short "intuitive" description of the PINT services are provided. The rest of the information deals, in one way or the other, with the pre-PINT support of these services where they are used as a benchmark. Thus, an architectural overview common to all present solutions is presented. The flow of the document then divides into two streams: one is dedicated to the Intelligent Network (IN)-based solutions; the other explores alternative means (i.e., CallBroker and Computer-Telephony Integration (CTI) approach). At this point, the emerging standards are explored, in particular, the Session Initiation Protocol (SIP), which promises an elegant solution to the PINT problem. Each of the above developments is addressed in a respective section. The final sections of the document contain the overall security considerations, conclusion, acknowledgments, appendix, and a set of references. The security section summarizes the PINT security requirements derived from the pre-PINT experiences and the appendix presents a tutorial on the PSTN, IN, and Call Center functions.

2. Terminology

This document uses the following terminology:

Authentication -- verification of the identity of a party.

Authorization -- determination of whether or not a party has the right to perform certain activities.

PINT Gateway -- the PSTN node that interacts with the Internet.

User or Customer -- the person who asks for a service request to be issued. In the context of PINT Services, this person will use an Internet host to make his or her request. The term "user" is also used to describe a host originating the PINT service request on behalf of this person.

3. PINT Services

This document addresses four services initially identified by the PINT Working Group and presently supported by pre-PINT implementations. These services are: click-to-dial-back, click-to-fax, click-to-fax-back and voice-access-to-content.

Note that the word "click" should not be taken literally. It is rather used to point out that initiation of the related services takes place on the Internet, where point and click are the most prevalent user actions. In other words, a service request could originate from any type of IP-based platforms. There is no implication that these services must be implemented by a device within the PSTN or the Internet running a Web server.

The common denominator of the PINT services is that they combine the Internet and PSTN services in such a way that the Internet is used for non-voice interactions, while the voice (and fax) are carried entirely over the PSTN. (An example of such a service is combination of a Web-based Yellow Pages service with the ability to initiate PSTN calls between customers and suppliers in a manner described in what follows.)

Some of the benefits of using the PSTN are high quality of the voice, an ability to route the call to different locations depending on pre-set criteria (for example, time of the day, day of the week, and geographic location), outstanding security and reliability, and access to flexible, low cost, and secure billing and charging systems. The benefits of using the Internet are the uniform, well-defined, and widely-used interfaces available anywhere, anytime.

Click-to-Dial-Back

With this service, a user requests (through an IP host) that the PSTN call be established between another party and himself or herself. An important pre-requisite for using this service is that the user has simultaneous access to both the PSTN and Internet.

One example of an application of this service is on-line shopping: a user browsing through an on-line catalogue, clicks a button thus inviting a call from a sales representative. Note that (as is the case with the all-PSTN Free-Phone, or "800", service) flexible

billing arrangements can be implemented here on behalf of the service provider. In addition (and also similarly to the Free-Phone/800), the PSTN could route the call depending on the time of day, day of week, availability of agents in different locations, and so on.

Click-to-Fax

With this service, a user at an IP host requests that a fax be sent to a particular fax number. In particular this service is especially meaningful when the fax is to be sent to someone who has only a fax machine (but no access to the Internet). Consider, as an example, a service scenario in which a Web user makes a reservation for a hotel room in Beijing from a travel service page containing hotel information of major cities around the world. Suppose a specific Beijing hotel chosen by the user does not have Internet connection but has a fax machine. The user fills out the hotel reservation form and then clicks a button sending out the form to the travel service provider, which in turn generates a fax request and sends it together with the hotel reservation form to the PSTN. Upon receiving the request and the associated data, the PSTN translates the data into the proper facsimile format and delivers it to the Beijing hotel as specified in the fax request.

Click-to-Fax-Back

With this service, a user at an IP host can request that a fax be sent to him or her. (Consider the user of the previous example, who now requests the confirmation from the Beijing Hotel. Another useful application of the service is when size of the information that a user intends to get is so large that downloading it to the user's PC over the Internet will require a long time and a lot of disk space.)

Voice-Access-to-Content

With this service, a user at an IP host requests that certain information on the Internet be accessed (and delivered) in an audio form over the PSTN, using the telephone as an informational appliance. One application of this service is to provide Web access to the blind. (This may require special resources--available in the PSTN--to convert the Web data into speech.)

4. Architectural Overview

4.1 Public Switched Telephone Network

From an application perspective, Internet nodes are interconnected directly, as shown in Figure 1. When two machines are to communicate, they will have the address of the destination end system, and will

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