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February 13, 2009

Via Electronic Filing

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: *Ex Parte* Notice, CG Docket No. 03-123 & WC Docket No. 05-196

Dear Ms. Dortch:

In its December 19, 2008 Order, the Commission adopted additional requirements governing consumer premises equipment (“CPE”) that has been supplied by one Internet-based telecommunications relay service (“iTRS”) provider but is being used with a default provider other than the one that issued the CPE.¹ The Commission encouraged iTRS providers to work together to develop standards to facilitate compliance with the new rules,² and noted that Sorenson had committed to move forward to create an industry standard.³

¹ *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities; E911 Requirements for IP-Enabled Service Providers*, CG Docket No. 03-123 & WC Docket No. 05-196, Second Report and Order and Order on Reconsideration, FCC 08-275, ¶¶ 63-68 (rel. Dec. 19, 2008) (*December 19 Order*).

² *Id.* ¶ 68.

³ *Id.* ¶¶ 62, 64; *see also* letter from Ruth Milkman to Marlene Dortch, CG Docket No. 03-123 & WC Docket No. 05-196 (Dec. 18, 2008) (discussing the idea of expanding Sorenson’s proposed standard to accommodate 10-digit dialing for point-to-point calls).

Following the release of the Commission's order, Sorenson worked to revise the standard it originally circulated on November 18, 2008, to accommodate the new requirements, including the requirement that an iTRS provider's CPE that is being used with a new default provider must be capable of: "(1) accepting a URI or IP address that the new provider uses for call setup purposes; and (2) allowing a user to dial a number the CPE automatically forwards to the new default provider."⁴ Sorenson has circulated the revised standard to the other iTRS providers for their review. The providers are meeting regularly to discuss technical issues and Sorenson is hoping for the adoption of an industry standard in an expeditious manner. For the Commission's convenience, a copy of the proposed revised standard is attached to this letter.

Pursuant to the Commission's rules, this letter is being submitted for inclusion in the public record of the above-referenced proceeding.

Sincerely,

/s/ Gil M. Strobel
Gil M. Strobel

cc: Nicholas Alexander
Scott Bergmann
Thomas Chandler
Scott Deutchman
William Dever
Heather Hendrickson
Nicole McGinnis
Julie Veach

Attachment

⁴ December 19 Order ¶ 63.

Relay Provider Interface

**Revision 2.0
February 6, 2009**

**Contribution Originator:
Sorenson Communications, Inc.**

NOTICE

This document was prepared as a proposal to video relay service providers. This contribution is offered as a basis for discussion and is not a binding proposal on Sorenson Communications, Inc., which reserves the right to amend or withdraw the statements contained herein at any time.

Table of Contents

- 1. Overview3
- 2. RPI and Videophone Requirements3
- 3. Protocol Selection.....3
- 4. Components3
- 5. Account Management.....3
 - 5.1 Authentication.....3
 - 5.2 Provider Dialog.....3
 - 5.3 Changes to a User’s Phone Number or Password.....3
 - 5.4 Registering with the Registrar3
 - 5.4.1 Detecting the Public IP3
 - 5.4.2 UTC Time3
 - 5.4.3 Refreshing a Registration.....3
 - 5.5 Porting Away From a Provider.....3
- 6. Placing and Receiving Calls3
 - 6.1 Caller ID.....3
 - 6.2 Dialing by Phone Number3
- 7. Issues to Be Resolved.....3

1. Overview

This document describes a "Relay Provider Interface" (RPI) for the support of phone number porting between VRS providers and the various types of videophones provided and/or supported by those providers. The term "videophone" is a general term that includes any type of hardware or software implementation of videophone functionality.

In June, 2008, the FCC issued an order that mandates that all VRS providers begin assigning "real" (functionally-equivalent) telephone numbers to their videophone users and integrate E-911 for emergency calling. The order further mandates that assigned telephone numbers should be portable by the relay customer to an alternate VRS provider. The order also requires that "every Internet-based TRS provider must ensure that all CPE they have issued, leased, or otherwise provided to Internet-based TRS users delivers routing information or other information only to the user's default provider, except as is necessary to complete or receive 'dial around' calls on a case-by-case basis."¹

Videophones have been largely distributed by a user's originating provider and routing information is acquired by that provider through proprietary communication with the videophone and a backend system. There has been no standard approach to the acquisition of routing information and videophones are currently only capable of communicating this information to their originating provider. To fulfill the FCC mandate, a standard must be established for videophones to communicate routing information with any ported videophone to the default VRS provider's system.

A follow-up order issued by the FCC in December, 2008 requires all videophones to support dialing by phone number for both point-to-point and deaf-to-hearing calls. This RPI specification addresses this requirement by describing a mechanism for dialing point-to-point and deaf-to-hearing calls by phone number.

The goal of the RPI is to specify: 1) the details of what is expected from each VRS provider's system in order to support registration from any videophone, and 2) the videophone requirements to support this ported videophone mode. In order for number portability to work industry wide with a variety of CPE all VRS providers would have to support this standard both on their videophones and on their backend systems with which the videophones would communicate.

¹ *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, E911 Requirements for IP-Enabled Service Providers, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 11591, ¶ 61 (2008) ("Numbering Order"); 47 C.F.R. § 64.611(c).*

2. RPI and Videophone Requirements

The RPI has the following requirements:

- Must provide authentication to ensure that only authorized videophones are allowed to communicate with the RPI.
- Must provide a means for a videophone to discover its Public IP address.
- Must provide the means for a videophone to be ported to another VRS provider.
- Must provide the ability for a phone number to be changed.
- Must provide a way for a videophone to get UTC time.
- Must provide support for videophones to dial by phone number for VRS and point-to-point calls.
- Must provide support for handling 911 calls.

Videophones have the following requirements:

- Must be able to register its Public IP address and one or more URIs.
- Must be able to update its registration data.
- Must send its Caller ID in the call set up.
- Must only allow an authenticated phone number to be transmitted as Caller ID.
- Must support dialing by phone number for VRS and point-to-point calls.

3. Protocol Selection

There are several communication protocols that could provide the communication infrastructure between videophones and the RPI. The top three possibilities evaluated were XML, H.323, and SIP. An analysis of the pros and cons of each of these options led to the selection of the Session Initiated Protocol (SIP) as the best approach for meeting the requirements of the RPI.

Videophones will not be required to implement a full SIP protocol. The proposal is to implement a subset of the SIP standard required to communicate with Registrars and Redirect servers. Videophones will need to continue to support H.323 for call signaling because H.323 is currently the interoperable protocol for videophones. Initially, H.323 URIs will continue to be required for all videophones connected by NeuStar's iTRS ENUM Database. SIP URIs are also supported, however a discussion of a full transition to SIP is outside the scope of this document.

Having H.323 videophones use SIP to communicate with the RPI is the best choice based on:

- SIP is an established communication standard giving the industry a basis of systems, technology, and standards that can be built on to meet the requirements.
- Using SIP as the basis of the RPI will help move the industry toward full SIP compliance without requiring investment in other solutions such as H.323. H.323 RPI solutions would be throw-away work when the industry fully adopts SIP.
- The SIP Registrar fully supports H.323 addressing. The opposite is not true, because H.323 does not support SIP addressing.
- The SIP Registrar and Redirect server work well together. Because of their compatibility, they can easily be configured to meet the necessary requirements described earlier in this document.
- All entry points into the RPI must be protected by security credentials. The SIP Registrar and Redirect server offer the necessary security mechanisms to meet this requirement.
- The SIP protocol already has good support among VRS providers.

This document describes the communication between the videophone and the Registrar and Redirect server. It does not describe the details of the communication between the Registrar or Redirect server and NeuStar's system. Each provider must extend their Registrar and Redirect server of choice to communicate with NeuStar.

4. Components

The diagram in Figure 1 shows the proposed components of a given VRS provider's RPI infrastructure and their relationship to the NeuStar system and a videophone device. Although the diagram shows the RPI components as separate entities, they may be implemented on the same physical system or even as parts of a single application.

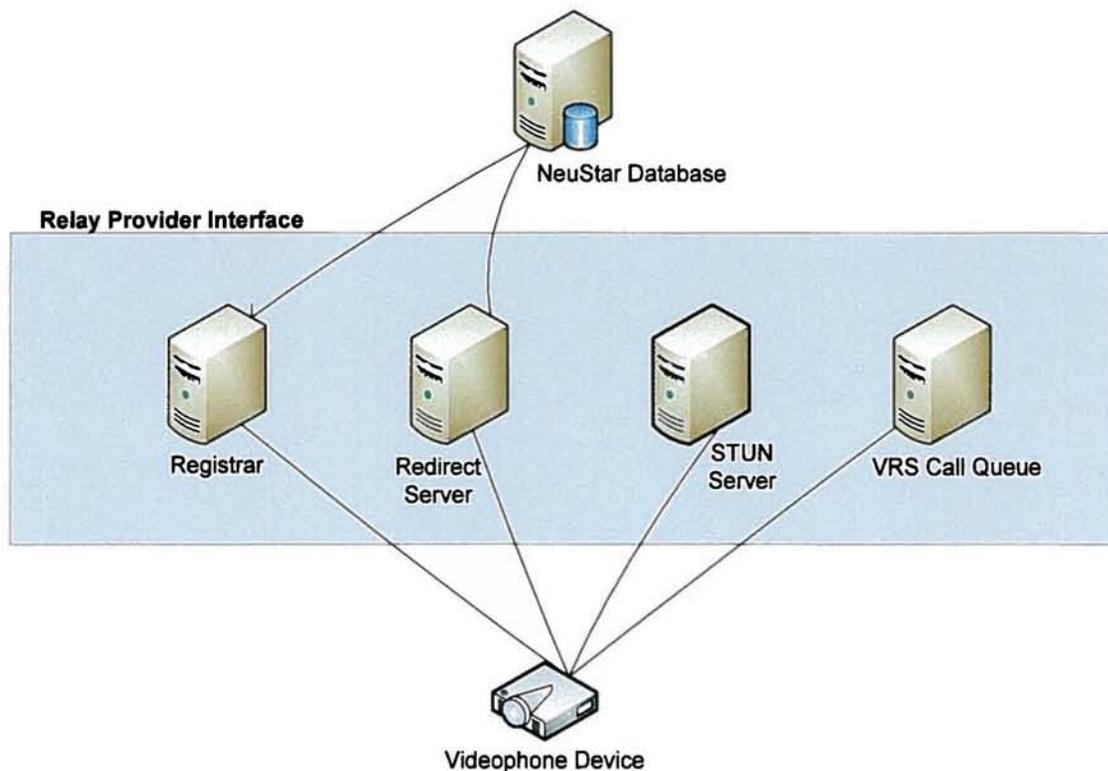


Figure 1: RPI Components

The components in the above diagram are defined as follows:

NeuStar

NeuStar's iTRS ENUM database which provides global directory services.

Registrar

A VRS provider's Registrar is a SIP entity that receives registration requests sent by videophones to associate phone numbers to URIs. The Registrar sends the URI routing information to NeuStar for use in its global directory services.

Redirect Server

A VRS provider's Redirect server is a SIP entity that receives requests from videophones to resolve phone numbers into URIs. The Redirect server will then communicate with NeuStar to resolve the phone number received from the videophone.

Specification Proposal, Rev 2.0

STUN Server

A VRS provider's STUN server provides videophones with their public IP addresses. The STUN server responds to a videophone's request for its public IP address by returning the IP address from which it received the videophone's request. A videophone's public IP address is published in the global directory so that other devices can use the address to contact the videophone.

VRS Call Queue

A VRS provider's VRS Call Queue manages calls to the provider's VRS interpreters. Deaf-to-Hearing calls will be directed to this queue.

Videophone

The term "videophone" is a general term that includes any type of hardware or software implementation of videophone functionality.

5. Account Management

5.1 Authentication

Videophones must use HTTP digest authentication when connecting to the Registrar or Redirect server. Of all the various authentication methods considered, HTTP digest was deemed to provide an appropriate level of security for the RPI. See RFC 3261, Section 22 for implementation details. (Also see **Figure 1: Registration** and **Figure 3: Dialing by Phone Number** for examples).

Although the Registrar and the Redirect server are logical entities, they may be implemented on the same physical system or even as parts of a single application. To keep authentication as simple as possible, both the Registrar and the Redirect server must use the same credentials when authenticating a videophone. This requirement mandates that the two logical entities either look at the same authentication database or the RPI needs to provide a synchronization method for the two entities.

In order to authenticate a request from a given videophone, the RPI must already have an account set up before that videophone will be able to successfully communicate with the Registrar or Redirect server. The default VRS provider is responsible for creating this account.

After an account is created, the user of a videophone will need to know the default provider's domain, the registered phone number for the user's account, and the account's registered password in order to be able to successfully set up the videophone.

5.2 Provider Dialog

All videophones must know how to connect to their associated VRS provider's Registrar and Redirect server by knowing the VRS provider's domain and the required login credentials (i.e., phone number and password). The expectation is that all videophones will provide a means whereby the required connection information can be obtained by the videophone. One possible solution would be to design the videophone user interface such that the required VRS provider information can be specified by the videophone user.

The minimal amount of VRS provider information that must be specified and stored is:

- The VRS provider's domain (e.g., svrs.tv).
- The phone number assigned to the videophone user's account.
- The password assigned to the videophone user's account.

The option to change the required VRS provider information must be presented to the user if an attempt to register with the user's current default provider returns a 404 failure response (this failure indicates that the specified provider is no longer the default provider for the user). The ability of the user to specify the required VRS provider information may also be required during the initial setup of a videophone.

The new provider must not allow registration from a videophone being ported until the porting process is complete in the NPAC (and thus in the iTRS ENUM database). Until the port is complete, routing data is sent to the old VRS provider. After the porting is complete, routing data will be sent to the new provider.

5.3 Changes to a User's Phone Number or Password

If a user requests that the VRS provider allow the user to change his or her phone number or password, the videophone must be updated with the new account information, otherwise the videophone will fail authentication with the Registrar or Redirect server. Once the change is implemented by the VRS provider, the videophone will receive a 401 response from the Registrar or Redirect server which will enable the user to manually enter the changes in the Provider Dialog.

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Note that a 401 response can indicate invalid credentials were sent or were not sent at all. The videophone will know the difference between these two states because the videophone itself knows whether it sent its credentials in the original request.

5.4 Registering with the Registrar

The default provider's Registrar must be able to process a SIP REGISTER request as defined by RFC 3261. If the Registrar receiving a REGISTER request is not the default provider's Registrar the Registrar must respond to the request with a failure response (see RFC 3261, Section 10.3, Step 5). This response will cause the videophone to request that the user update the authentication information (phone number and password) and/or to which VRS provider the registration information is to be sent.

The videophone issues a REGISTER request which must use as its address of record (in the *To* header field), its phone number and the domain name to which it is registered. For example, if the videophone's phone number is "18015551234" and the domain name is "svrs.tv", then the *To* header field would look like this: "sip:18015551234@svrs.tv". The videophone must send one H.323 binding and may optionally send one additional SIP binding in the Contact header field using its public IP address and optional port. The following are examples of valid addresses:

- h323:+18015551212@63.226.84.92
- h323:+14355551212@63.226.84.93:49158
- sip:+14355551212@63.226.84.93

The Registrar will respond to a successful registration with a 200 (OK) response. In addition to other required and optional data, the response must include a Date header field expressed in the UTC time.

If more than one binding is sent and a priority is to be expressed, the priority must be expressed using the "q" parameter in the Contact header field (see RFC 3261, Sections 10.2.1, 16.6, and 20.10).

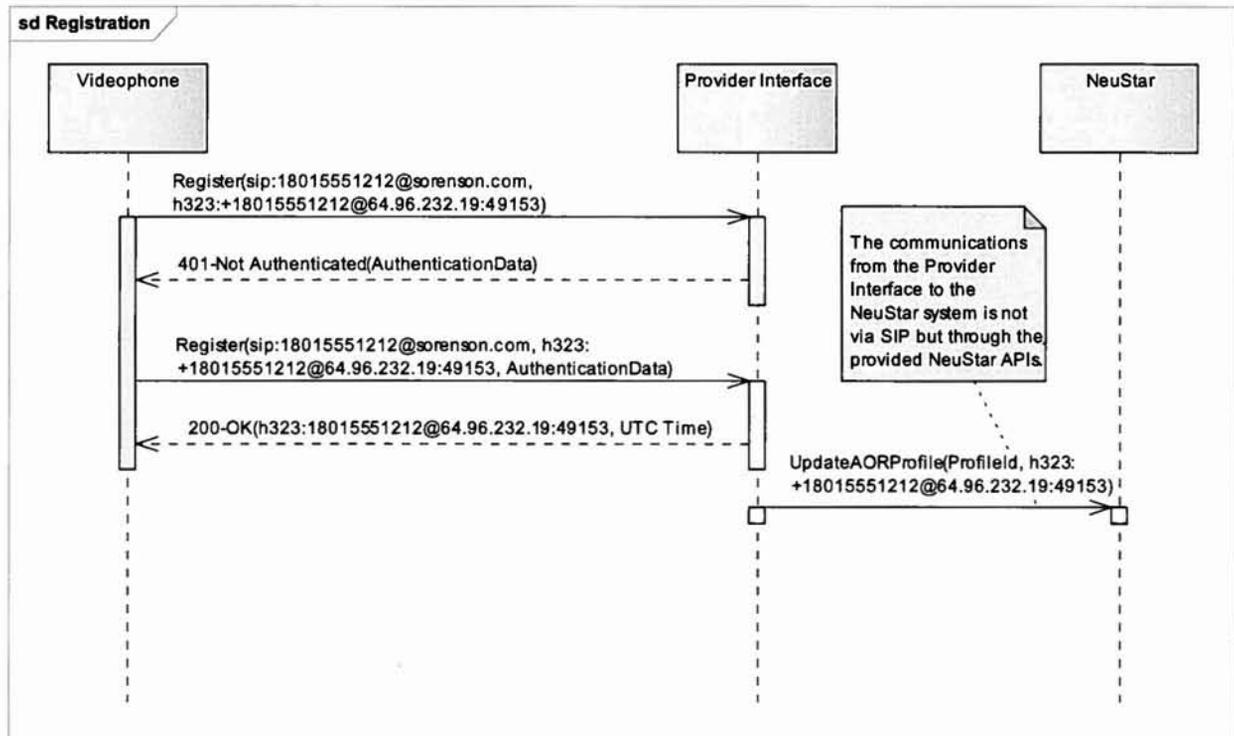


Figure 2: Registration

5.4.1 Detecting the Public IP

The videophone must communicate with a STUN server to detect its public IP address. The STUN server responds to a videophone's request for its public IP address by returning the IP address from which it received the videophone's request. A videophone's public IP address is published in the global directory so that other devices can use the address to contact the videophone. The videophone and the RPI must implement STUN in accordance with RFC 3489.

5.4.2 UTC Time

Because some videophones will have a need to update their time setting, 200 (OK) responses to the REGISTER requests must return a Date header field containing the UTC time per RFC 3261.

5.4.3 Refreshing a Registration

The videophone is responsible for keeping the bindings refreshed and should therefore follow RFC 3261, Section 10.2.4. The registration needs to be refreshed before it expires.

When a REGISTER request is sent, the videophone has the opportunity to suggest a time for expiration. Ultimately, the policies on the Registrar will prevail for accepting a suggested time or returning a different time for expiration to the videophone. The videophone must adhere to the expiration time returned in the Registrar's response and refresh the registration before it expires.

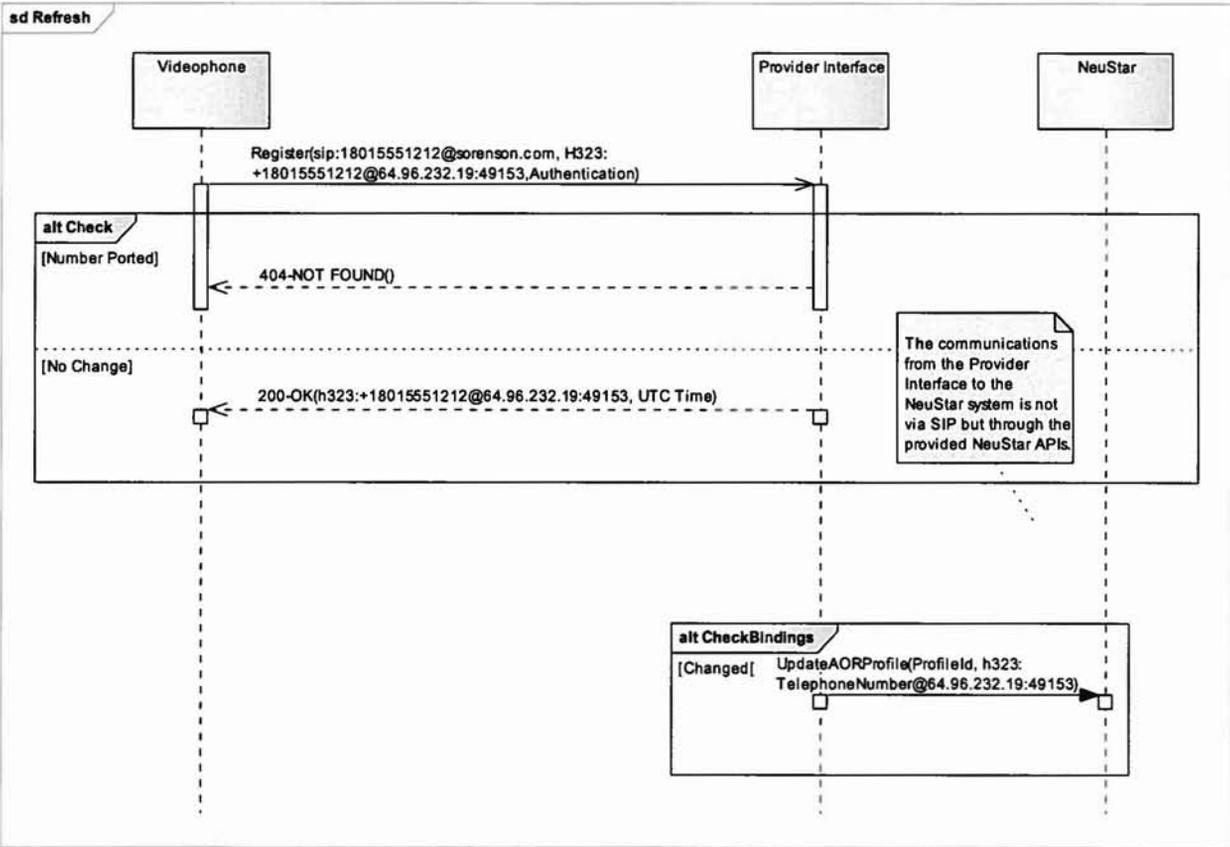


Figure 3: Refreshing a Registration

5.5 Porting Away From a Provider

After the old VRS provider is made aware that a videophone user has been ported away, the old VRS provider must remove the address of record in the Registrar (and the Redirect server if it is maintained separately) so the videophone device can no longer communicate with the old provider's Registrar and Redirect server. After porting, when the videophone attempts another REGISTER request the old provider's Registrar must respond to the request with a failure response.

A failure response of 404 received from the Registrar or Redirect server is an indication to the videophone that it should allow the user to update the videophone with the new VRS provider's domain and the newly-assigned account password. The user account must have already been created on the new VRS provider's system (see the 5.1 Authentication subheading on Page 3).

After a phone number has been ported, the old VRS provider must de-provision that phone number for emergency services in order to avoid conflicts with the new VRS provider.

6. Placing and Receiving Calls

6.1 Caller ID

Implementing Caller ID can be achieved by sending the phone number as part of the call setup in standard fields. For H.323 terminals, the transfer of Caller ID data must be done by changing the Q.931 portion of the "Setup" message to include the *Calling party number* fields containing the registered phone number for the videophone. The portion of the setup message that will be used looks like this:

```

Calling party number: '18005550136'
  Information element: Calling party number
  Length: 12
  .... 0001 = Numbering plan: E.164 ISDN/telephony numbering (0x01)
  .010 .... = Number type: National number (0x02)
  1... .... = Extension indicator: last octet
  Calling party number digits: 18005550136
  E.164 Calling party number digits: 18005550136

```

See the section entitled "Calling Party Number" in the Q.931 specification for more details.

In order to provide the required 911 support, videophones must support Caller ID. By sending this information in the call-setup messages, the VRS system receiving the incoming call will have the information needed to identify the caller and to look up the 911-provisioned address. Without the Caller ID data, videophone users will have to communicate their address information to their interpreters at the beginning of their calls.

6.2 Dialing by Phone Number

To provide support for the dialing of any valid phone number, this specification describes the use of a "Redirect server" that would operate alongside a VRS provider's Registrar. The role of the Redirect server is to support direct dialing of valid phone numbers by videophone users for both their Deaf-to-Deaf (Point-to-Point) and Deaf-to-Hearing calls.

When a videophone user dials a call by entering a valid phone number, the videophone issues a SIP INVITE request to the VRS provider's Redirect server. The Redirect server then contacts NeuStar to request the URI for the entered phone number. If the phone number is found, the associated URI is returned to the videophone. If the phone number is not found, the Redirect server assumes that the call was intended for a hearing person's telephone number rather than the number of a videophone user. The Redirect server then responds with the URI of the VRS provider's call queue. After receiving the Redirect server's response to its INVITE request, the videophone then connects to the indicated endpoint, either: 1) a user's videophone, or 2) a VRS provider's call queue.

The Redirect server's response to an INVITE request will be returned as a 302 (Moved Temporarily) or 380 (Alternative Service) response (see Sections 8.3, Redirect Servers, and 21.3, Redirection 3xx, of RFC 3261 for more details).

Videophones must send the dialed phone number as part of the call setup in standard fields. For H.323 terminals, the transfer of data must be done by changing the Q.931 portion of the "Setup" message to include the Called party number fields containing the dialed phone number.

Specification Proposal, Rev 2.0

The portion of the Setup message that will be used to send the phone number looks like this for a Called Party:

```
Called party number: '18002791122'  
Information element: Called party number  
Length: 12  
.... 0001 = Numbering plan: E.164 ISDN/telephony numbering (0x01)  
.010 .... = Number type: National number (0x02)  
1... .... = Extension indicator: last octet  
Called party number digits: 18002791122  
E.164 Called party number digits: 18002791122
```

See the section entitled "Called Party Number" in the Q.931 specification for more details.

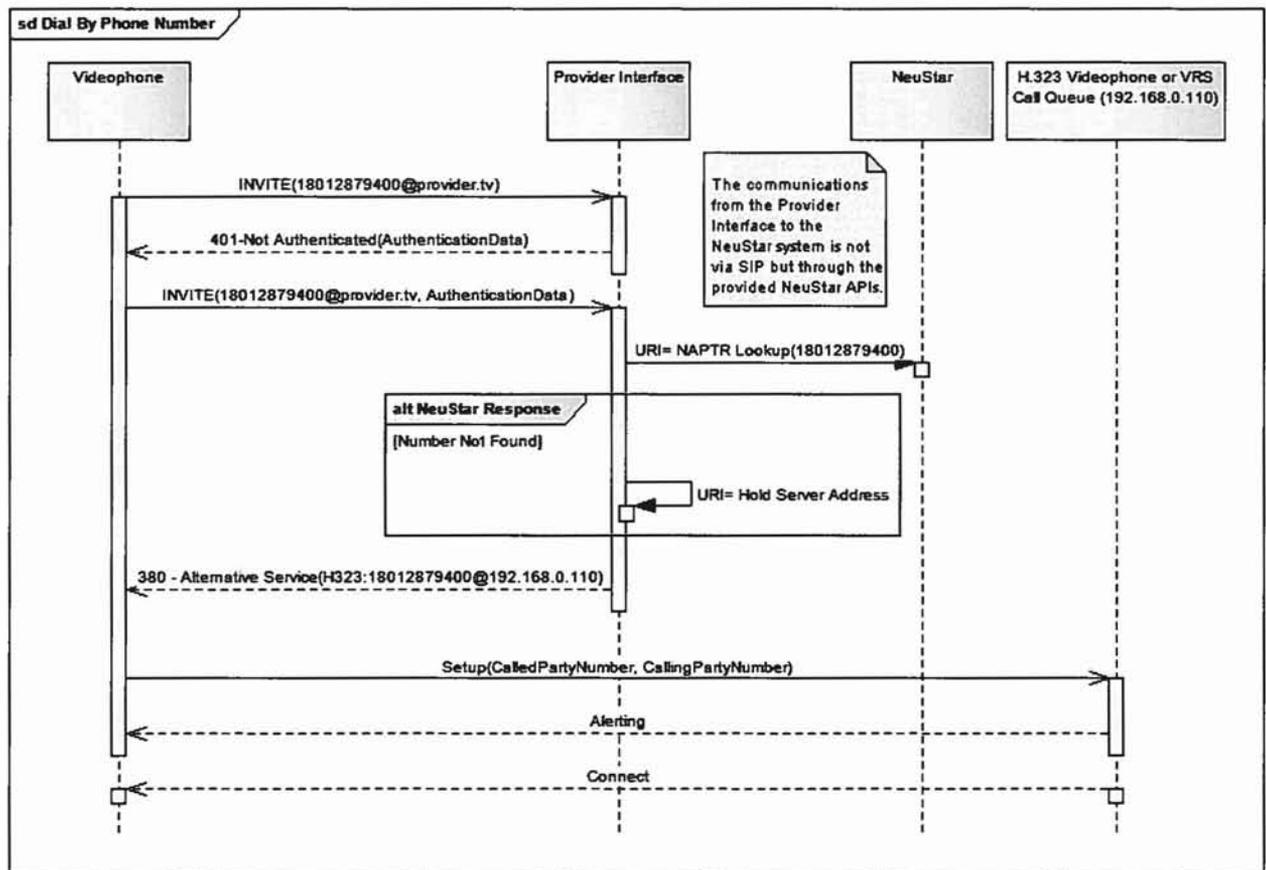


Figure 4: Dialing by Phone Number

7. Issues to Be Resolved

VRS providers will have to know that a port of a videophone has happened or is going to happen and make a change on their system to signal to the videophone that it should now connect to another provider. Providers will also need to know that they should start or stop updating the iTRS for that videophone. In order to make this process as seamless as possible to the user, the old and the new VRS providers need to be alerted that a change in default provider has occurred. Although the current porting process gives this information, it may not be timely enough to satisfy the requirement.