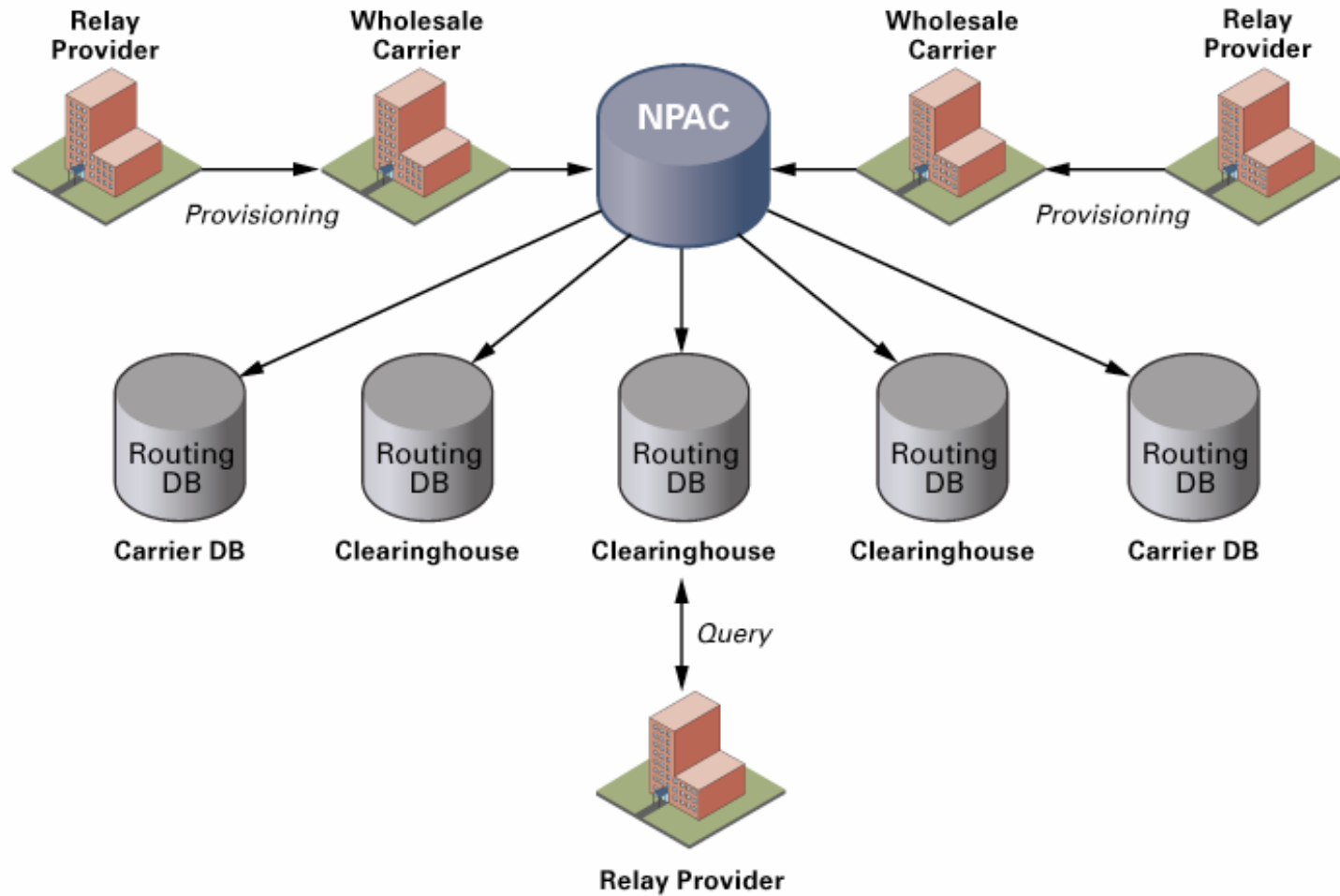# Telephone numbers for Relay Users (TRU)

Brian Rosen

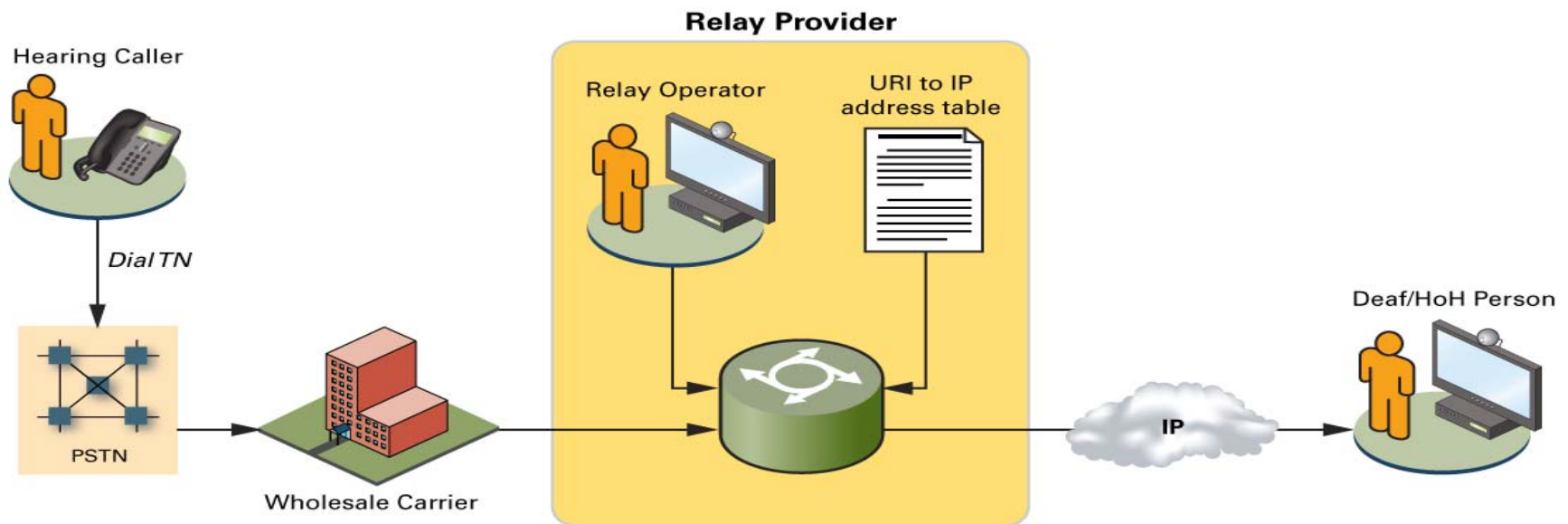NeuStar

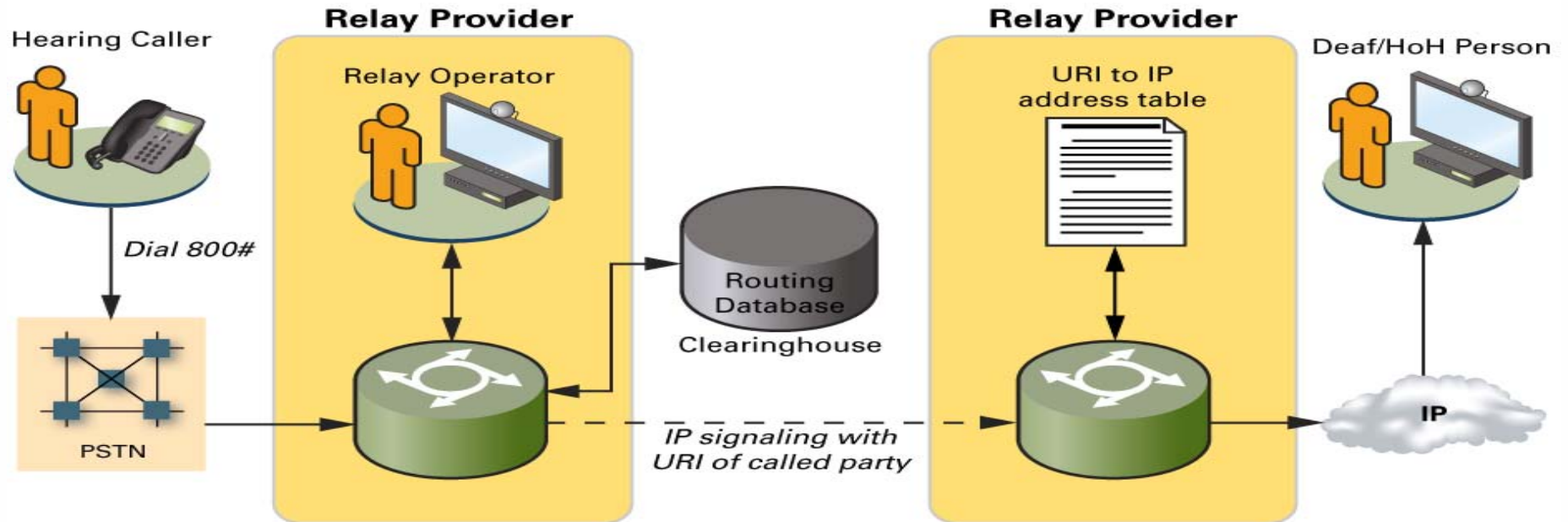# NPAC is the database
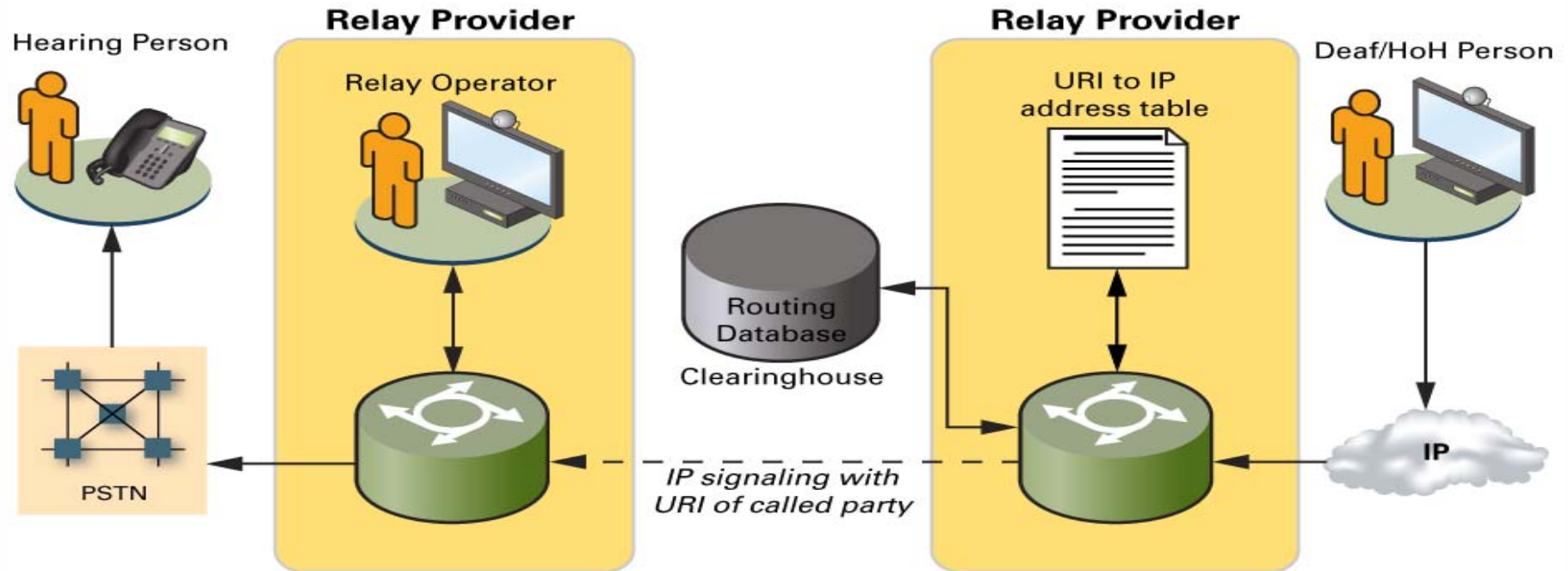
Alternate Provider Hearing to Deaf/HoH

Direct Dialed Deaf/HoH to Hearing
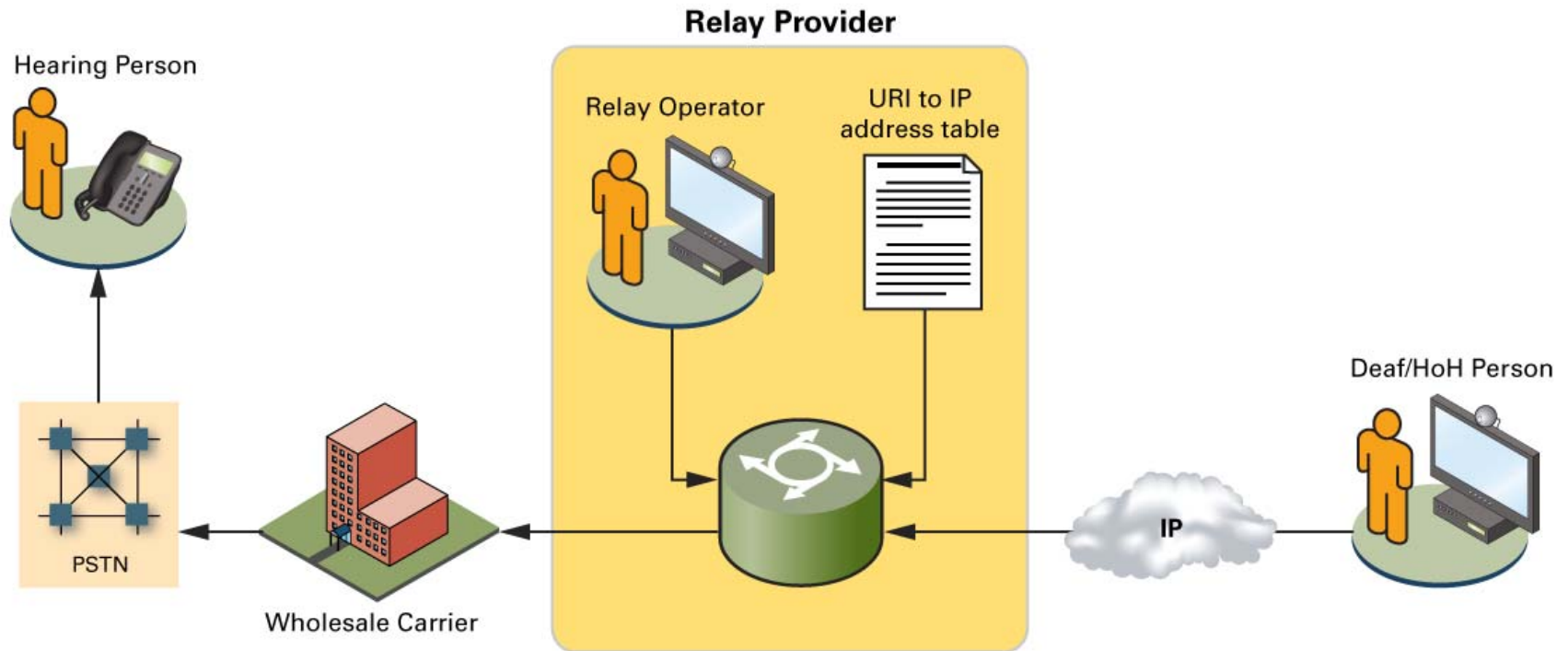
Deaf/HoH to Hearing using Alternate Provider
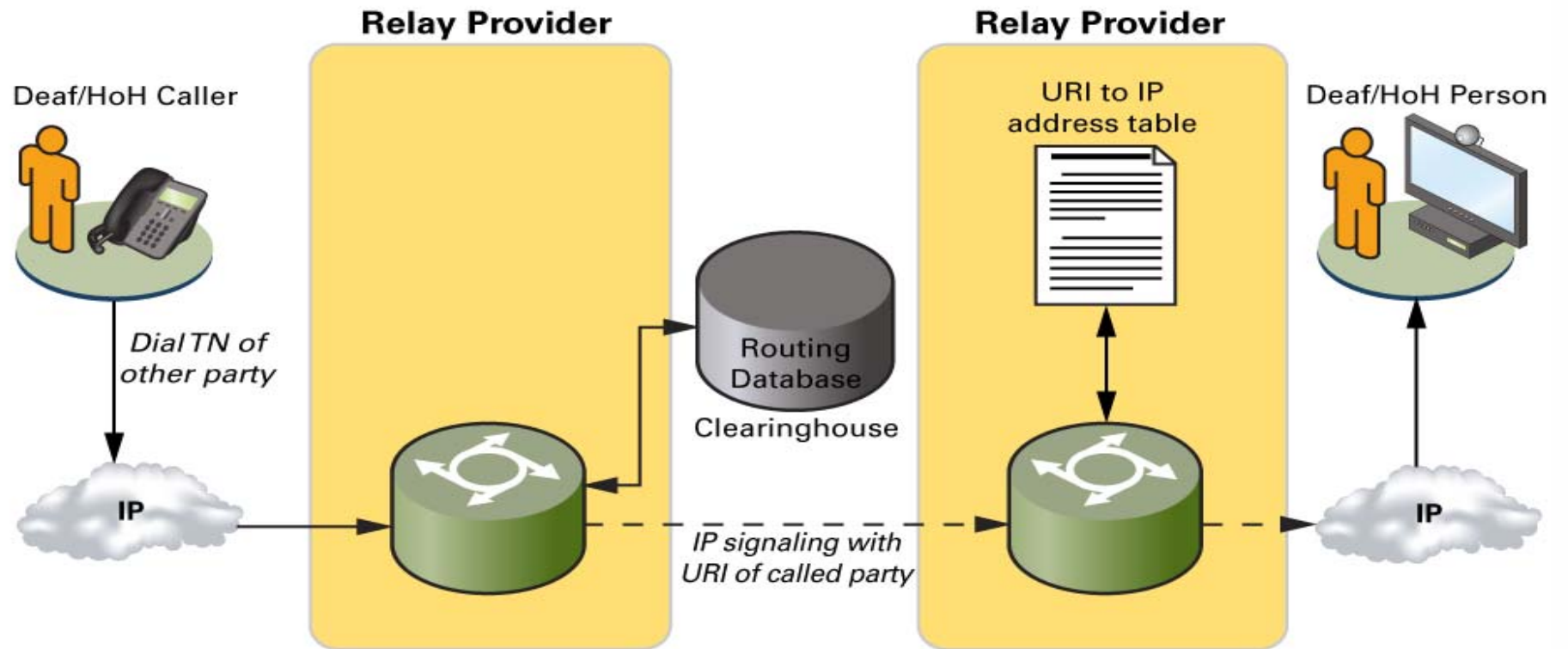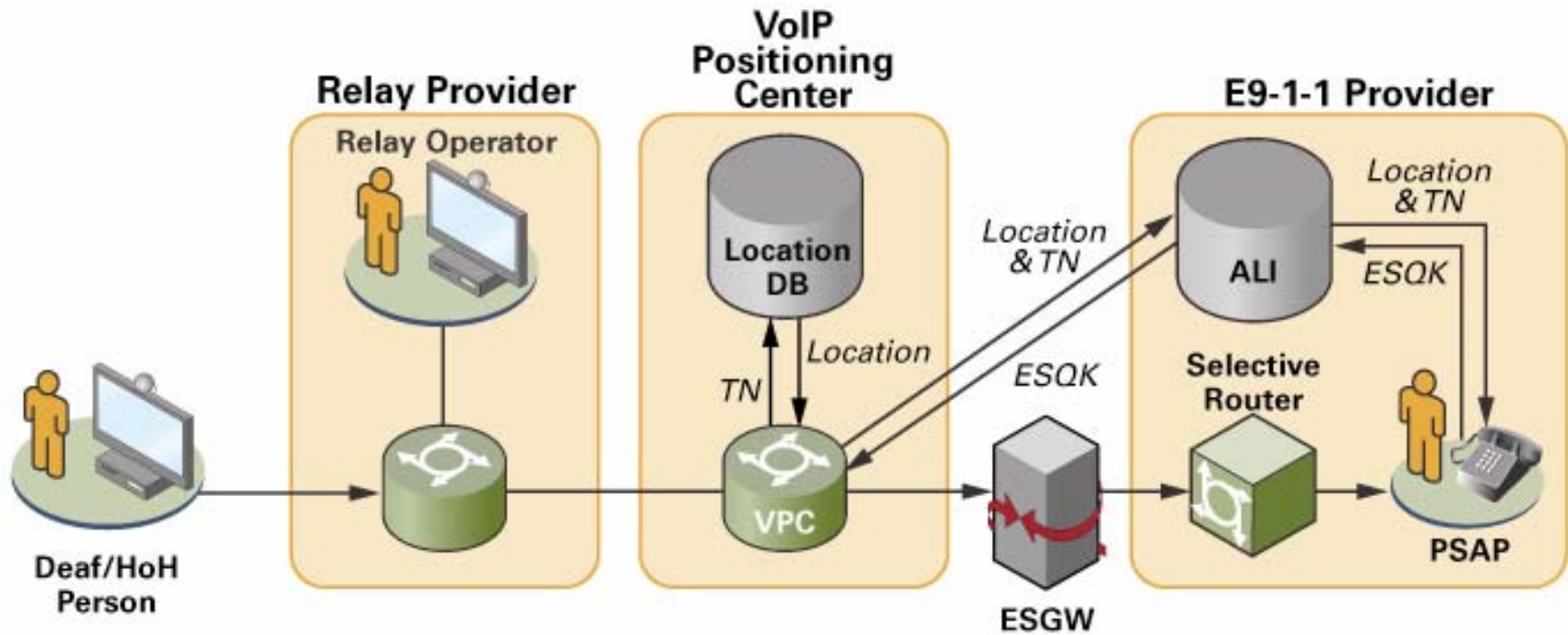
- The proposed CENTRAL database is the Number Portability Administration Center (NPAC)

  – The NPAC maps telephone numbers to the service provider currently providing service to the number

  – An extension (new field) to the NPAC is proposed which is the URI of the device associated with the number

- The NPAC is centralized, but real time queries are performed against a copy of the database

  – Per the INC report, NeuStar recommends all relay providers use one of the available NPAC service providers who receive NPAC updates and provide a real time IP based query service

  – The protocol typically used by these service providers is ENUM

  – NeuStar operates such a competitive service

- NPAC record has SPID of underlying telco + URI

- NPAC record is static, typically changes once per port

- NeuStar operates the NPAC under contract to NAPM, a limited liability corporation

- Relay providers may update the URI through their underlying carrier, or may be permitted by the underlying carrier to update the record themselves through the "Low Tech Interface" or NPAC help desk

- NeuStar proposes only authorized NPAC service providers have access to the database for queries. Relay providers must use an authorized service provider, as recommended by the INC report

- The database maps TN to URI. A gatekeeper or registrar at the default provider maps URI to IP address

- An industry standards process exists to update and download the NPAC

There are Three Ways to Update the NPAC

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- SERVICE ORDER ADMINISTRATION (SOA)
  - Operating Support System (customer provisioning) operated by the underlying telco
  - Would need an update for the new field to support TRS
  - Updates may take some time to be completed
  - For this use, the SOA may never be updated, but that is up to the telco
- LOW TECH INTERFACE – Web server operated by NeuStar
  - Telco may use this method for the URI update, or may permit the relay provider to use it for their TNs
  - Available as soon as the field is available
  - With LOA from the underlying telco, relay providers can immediately begin loading URIs in the NPAC as soon as new telephone numbers are assigned or ported
- HELP DESK – accepts email or phone calls for update
  - Telco may use this method for the URI update, or may permit the relay provider to use it for their TNs
  - Available as soon as the field is available
  - With LOA from the underlying telco, relay providers can immediately begin loading URIs in the NPAC as soon as new telephone numbers are assigned or ported

Getting the field in the NPAC

- A "change order" is

  – Discussed in Local Number Portability Administration (LNPA) work group in the North American Numbering Council (NANC) an FCC advisory group

  – Sent to the North American Portability Management LLC (NAPM) who contracts with NeuStar to operate the NPAC

- Change order proposals have been received by LNPA, but have not been forwarded to NAPM

- No reason this could not be completed in 60 days

- Field update is estimated to be a two week implementation cycle

- Field can be introduced in the monthly maintenance period

Numbering Resources

- Relay providers will obtain numbers from their underlying certified telephone company (or a reseller such as a VoIP service provider)

- Relay providers will supply them to relay users

- Numbers will be geographic numbers

  - Underlying telcos may not serve all rate centers

  - Relay providers may use more than one telco to increase coverage

  - Consumers may select a number which is close, but not in their local rate center

  - As a last resort, relay provider will obtain a number from a local exchange carrier and use Remote Call Forwarding

    - RCF is relatively more expensive, and services such as caller ID are lost

- Relay providers may provide more than one telephone number to a household or user, and may provide numbers to hearing users who acquire devices to contact deaf/HoH users directly (e.g. Video Phone for signing hearing users)

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- Relay users can port their numbers:

  – From one relay service to another (same or different modality)

  – From a Wireline/Mobile/VoIP service to any relay service

  – From any relay service to Wireline/Mobile/VoIP

- Existing number portability processes and procedures are used

  – New service provider initiates the port

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- NeuStar proposes relay providers be subject to identical E9-1-1 obligations as VoIP providers

- Relay providers select their own VPC/ESGW in the competitive marketplace

- NeuStar has proposed two options for improved user experience due to the unique circumstances of relay

  - Option 1: If an alternate relay provider handles a 9-1-1 call, the alternate provider's CA initiates the call leg towards the PSAP through the default relay provider who forwards it to the default provider's VPC

    - Always using the default provider's VPC means all calls get correct ALI

  - Option 2: Relay providers cooperate to automatically forward 9-1-1 calls to a provider who has an available interpreter.

    - Requires cooperation among relay providers to see queue status of each other

    - Uses Option 1 to always have the correct VPC handle the call

    - Avoids user having to hang up and redial an alternate provider without knowing if they have an available call taker

    - Subject to abuse if relay provider understaffs

    - Too complex for initial deployment. If it happens, must be delayed

- Today, VRS users are instructed to open firewalls to their device

- This is an unacceptable security risk, not encountered by other telecommunications services

- NeuStar strongly urges providers be required to not expose their users to this risk

- Requires the same processes and procedures that VoIP services use

  - Devices "register" with the default relay provider when they boot

  - Registration requires "credentials"

  - Since the device initiates the registration, firewall permits messages back from service to device

  - All calls are sent to the default relay provider

  - All calls are received ONLY from the relay provider

  - Relay providers only accept calls from another relay provider or their PSTN connection

- This makes a closed system, which mitigates fraud and protects users

- Normal firewall operation is possible

- This is a standards based solution; no special processes or procedures are required

- Off the shelf systems (and open source code) support this

- Historically, the FCC has required device interoperability (H.323)
  - This requirement is not uniformly supported; for example, some relay providers use web cams and downloaded software which does not support H.323
  - Some devices have full featured proprietary protocols and minimal featured H.323

- Instead of device interoperability, TRU suggests provider interoperability
  - As with any other regulated telecom service, require providers to interchange traffic with all other providers on a fair and equal basis
  - Require providers to implement standard based signaling between them
  - If the firewalls are closed, all the signaling must run between providers

- Could make the standard SIP; providers need SIP to contact the VPCs anyway
  - Allow devices to be H.323 or even proprietary
  - Relay providers would have to interwork from what the device does to the standards based signaling between providers

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- If provider interoperability is implemented, the only requirement on devices is that they do gatekeeper/proxy server registration with credentials and forward all calls to the default relay provider

  - Some devices may not currently support provisioning of a gatekeeper/proxy server. These may require a software upgrade

  - They can be used in the system, but firewalls would have to remain open

  - NeuStar suggests a 6 month extension beyond the conversion deadline for this update if needed

  - This is a SECURITY requirement, not a database requirement

- TRU does not require any special equipment or software

- TRU does not require modifications to the design of forthcoming end user equipment other than the above

- TRU requires protocol compatibility between providers, not devices. Providers must interwork device protocols to standard protocols (SIP)

- Only authorized NPAC service providers are allowed access to the NPAC itself

- Only authorized relay providers will be allowed access to the real time query interface by NPAC service providers

- Only telcos, or relay providers operating under a letter of agency are allowed to update the database

- Only the default relay provider, and its contracted VPC have location information, which is not shared with any other entity except 9-1-1

- No parts of the database are public

- NeuStar suggests firewalls be re-enabled and inter-provider signaling be used to exchange calls
  - This forms a closed system with users equipment only allowing calls from their default provider and relay providers only allowing calls from their subscriber or other relay providers
  - Relay providers should be issued "X.509 Certificates" to allow cryptographic authentication, integrity checking and privacy of inter-provider call signaling
  - End devices should be encouraged to provider similar cryptographic protection of their signaling

Extension/Expandability

- Optional data fields have been added to the NPAC, adding a new field is now much easier, process should be faster for this and subsequent field additions

- NeuStar endorses the concept that relay providers be authorized to provide TNs and service to qualified non-deaf/HoH users

- The neutral industry managed database exists, the neutral third party operator exists and the processes and procedures exist

- The new field change request has been accepted by the LNPA and awaits forwarding to NAPM and then to NeuStar

  - If the FCC decided on the NPAC approach, this could be completed very quickly.

  - The estimated NPAC implementation time is two weeks

- Providers must upgrade their systems and processes

  - NeuStar proposals use off-the-shelf systems, no custom code should be necessary (except for E9-1-1 option 2)

  - This step is likely the longest pole (3-4 months) and can be completed in parallel with the NPAC tasks

- Underlying telcos may choose to upgrade their SOA systems, but this can be done completely independently, and if they use the LTI or help desk, or issue a letter of agency to the relay providers to do so, can be implemented in well under a month, and the processes can be worked out in parallel with all other work

- Relay providers must implement VoIP-style E9-1-1 processes. This takes new VoIP vendors less than 90 days, and can be completed in parallel with the other system changes at the relay provider

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- Testing of inter-provider signaling must be completed. This is a "pair-wise" test. Approximately 30 days are required. Most of the provider upgrades must be completed before this testing is possible

- Numbers must be acquired from telcos, and new telco facilities must be implemented. 90 days is sufficient and can be done in parallel with relay provider system upgrades

- Numbers must be assigned to users and the database provisioned. The process could start in as little as 60 days, if the NPAC field was available but the numbers could not be used until upgrades at the relay provider were completed and inter-provider testing was completed

- End devices that cannot be provisioned for gatekeeper/proxy server registration/routing must be updated. This update is not necessary to use telephone numbers, but is necessary to close firewalls. NeuStar suggests an additional 6 months be allowed for these updates to be completed

- Assignment of numbers, user training, etc takes time. Providers will have limits on the number of such upgrades they can complete per day. Larger providers need sufficient time to upgrade all of their users

Costs -- NPAC

- NPAC receives between $.75 and $.95 per provisioning event (e.g., once per port) depending on overall NPAC transaction volume. These costs are shared by the telecommunications carriers.

Costs -- Telco

- Telcos have process changes and may decide to implement SOA updates. NeuStar is unable to estimate the costs for this kind of update, but believe that it is relatively small.

- TRU can be implemented without telco SOA changes using NeuStar's LTI or Help Desk

- Telcos charge resellers $.25-.50/TN/mo.

- Additional charges for incoming and outgoing calls, with trunking to Points of Presence will be incurred.

- NPAC service providers charge fractions of a cent per query. When providing this query service, NeuStar currently charges $0.005 per query with a minimum charge of $500/mo/provider. This is a competitive market; other service providers' charges may vary.

- VPCs and ESGWs charge per subscriber per month and total less than $1/mo/sub

- Standards based devices need no upgrade. If devices cannot be provisioned for gatekeeper/proxy server registration and routing, a software update may be needed. NeuStar is unable to estimate what this will cost

- There are one time upgrades required of relay providers. It is difficult to estimate the costs per provider because there are many different ways to go about making the upgrades. Using COTS systems may cost $150K for a medium sized relay provider.

- The continuing costs to the fund should be less than $25/user/year. With an estimated 100,000 users, that would be $2.5M/year.   The one time costs should be in the range of $3M, averaging the expected costs to upgrade relay providers systems.