ATIS/SIP Forum NNI Task Force IPNNI-2014-00075R000
August 7, 2014

**Contribution**

**TITLE:** Per-TN Implementation - Without the Use of Shared Industry Infrastructure

**SOURCE\*: Verizon**

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**ABSTRACT**

This document describes three approaches SPs choosing to implement the per-TN method can use today that does not require changes to or the creation of common industry infrastructure.

It is proposed that this text be added to the next release of IPNNI-2014-064R2 in

Section 5 describing Per-TN implementations.

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**Section 5.3 – Per-TN Routing Implementation (**Without the Use of Shared Industry Infrastructure)

Some SPs have shown interest in the per-TN approach to exchanging routing data, whereas some others have plans to or have already implemented the Aggregation Method described in Section X. Yet, there are many more SPs that have yet to determine what method best fits their operational capabilities and business interests. These varying needs among SPs are indicative of how the industry is still evolving, and why a per-TN solution SPs can implement without impacting other SPs is warranted. Three approaches allowing SPs to implement a per-TN solution independently and in cooperation with like-minded SPs is described in this section.

**5.3.1 - Implementation**

No new industry systems development or standards are required to implement this method. SPs can maintain their existing internal core network IP routing service, and develop/evolve their provisioning systems autonomously based upon their operational and business needs. In general, per-TN SPs can agree to correlate some or all of their TNs with routing data to create a per-TN database that is shared with other SPs, either directly or indirectly using one or more Service Bureaus.

Referring to Figure 1, each set of arrows lettered A thru C (and color coded) represent three possible per-TN implementations. The black arrows represent the manual exchange of domain names and IP address for use when resolving per-TN routing data, e.g., SIP URIs. Note that this manual exchange is also required for the per-TN model using a shared industry registry describe elsewhere in this section.

* The green arrows (lettered A) depict the direct exchange where each SP obtains a copy of the others per-TN routing database. This may be attractive to SPs having the operational capability that prefer not to outsource the data exchange functionality.
* The blue arrows (lettered B) depict the use of a common Service Bureau to exchange per-TN routing data where both SPs have chosen the same Service Bureau to outsource data exchange functionality.
* The red arrows (lettered C) depict how SPs may use a Service Bureau to exchange routing data on their behalf with SPs subscribed to a different Service Bureau. Here again, Service Bureaus may provide additional functionality based upon the needs of their SP subscribers.

**5.3.2 - Provisioning**

A Provisioning diagram is shown below in Figure 1:

In this provisioning example, SP1 provisions (black arrows) its Routing Service and DNS based upon information provided by SP2. SIP URIs are correlated with SBC interconnect IP addresses and domain names provided by SP2.

The SP1 and SP2 exchange (either directly or via Service Bureaus as described above) its per-TN database and periodic updates based upon an agreed frequency. For example, TNs can be correlated with a URI that is a full SIP URI (e.g., sip:+13036614567@example.mso-a.com;user=phone ) but without the tel URI number portability parameters as defined in RFC 4694. How SP1 designs its routing service to use per-TN routing data is specific to SP1’s implementation.

Figure 1

# 5.3.3 - Call Flow

An example of the Call Flow is shown below in Figure 2:

1. Pat (non-roaming subscriber of SP1) makes a session request (e.g., places a call) to Mike (subscriber of SP2). SP1’s network provides originating services based on Pat’s subscription.
2. SP1’s application server queries its routing service in real time using the called number to determine how to forward the request. The routing service first portability corrects the called number, and then determines that it is not subscribed to SP1. It then checks to see whether the code holder associated with the telephone number[[1]](#footnote-1) is covered by an IP interconnection agreement. If so, the SP1 routing service supplies[[2]](#footnote-2) the application server with the ingress point through which SP2 has requested that session requests directed to this telephone number enter its network.
3. The application server identifies SBC-2 and (if applicable) SBC-1 in SIP ROUTE headers, and forwards the resulting session request onward. SP1’s L3 processing resolves the host portion of the topmost ROUTE header (using DNS) to the IP address of SBC-1.
4. SBC-1 removes the topmost ROUTE header (which identifies itself) and forwards the session request based on the next one (which identifies SBC-2). To do so it resolves (using DNS) the host portion of that header, yielding the IP address of SBC-2.
5. SBC-2 removes the topmost ROUTE header (which identifies itself) and admits the message to SP2’s network, forwarding it to an application server, and eventually to Mike. How SP2 performs these functions is SP specific.

Figure 2

1. The “code holder” is a term used to refer to the SP serving the TN, which can be identified in LERG data using the LRN or the NPA-NXX of the telephone number (if not shown in the NPAC, e.g., ported or pooled). [↑](#footnote-ref-1)
2. How this is accomplished is implementation specific. Messages from an application server to a routing service is typically an ENUM query, but in some networks a SIP message is sent to a proxy collocated with the ENUM service, which sends back a 302 “redirect” response. [↑](#footnote-ref-2)