

**LNPA Working Group Report on the
Migration of Numbers Associated with
Type 1 Interconnection Arrangements**

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1. Executive Summary

The FCC has ordered that the wireless industry participate in Local Number Portability and Telephone Number Pooling beginning on November 24, 2002. The order includes porting between wireline and wireless carriers as well as wireless-to-wireless porting.

Among the topics being addressed by various industry bodies is the issue of Type 1 Wireless Interconnection Trunks and their associated telephone numbers. These telephone numbers are assigned to wireless customers and, therefore, are functionally wireless numbers. These numbers physically reside in wireline switches, and calls are routed to them through wireline end office switches to the Type 1 Interconnection Trunk Groups. Calls traverse the Type 1 trunk groups to the wireless switch where they are terminated to the wireless customer.

Porting telephone numbers associated with Type 1 interconnection wireless service involves a wireline carrier even if the customer is moving from one wireless carrier to another. Therefore, wireline-porting procedures must always be used. This imposes undesirable constraints on the wireless carrier and involves complex porting situations for the wireline carrier.

In contrast, wireless telephone numbers that use Type 2 Wireless Interconnection Trunks actually reside in the wireless switches. Since the numbers reside in the wireless switches, wireless-to-wireless porting processes can be used unless a wireline carrier is involved in the port (i.e., the donating or recipient carrier). This removes the wireline constraints from a pure wireless-to-wireless port.

The Wireless Number Portability Operations (WNPO) team and the Local Number Portability Administration Working Group (LNPA-WG) propose that service providers be allowed to “migrate” the telephone number blocks associated with Type 1 Interconnection Trunks from the wireline switches into the wireless switches where they will interface the Public Switched Telephone Network over Type 2 Interconnection Trunks. Migrating the numbers into the wireless switches offers advantages to the wireless carriers, and it minimizes the number of complex porting activities undertaken by the wireline carriers. This is viewed to be a win-win situation.

It is not proposed to force migration of the Type 1 telephone number blocks. Wireless and wireline carriers who wish to migrate blocks of numbers would jointly agree to a project plan and timeline. Details of the proposal are described further in this document.

2. Background Information

In the First Report and Order, the FCC established rules mandating number portability for both Local Exchange Carriers¹ (LEC) and Commercial Mobile Radio Service (CMRS) Providers². A separate timetable was established for CMRS providers, and the completion date has been ex-

¹ Or Wireline Service Providers

² Or Wireless Service Providers

tended on two occasions. The latest schedule requires that CMRS carriers be integrated into Local Number Portability by November 24, 2002. In addition to the current capability to port between wireline carriers, it is required that customers be able to port between wireless carriers and between wireless and wireline carriers after November 24, 2002.

Wireless carriers must interconnect with the Public Switched Telephone Network (PSTN) in order to complete calls to/from wireline carrier customers and to complete calls to/from other wireless carrier customers. Wireless carriers normally connect to the PSTN through Type 1 Interconnection Arrangements or through Type 2 Interconnection Arrangements.³

2.1. Type 1 Interconnection

The Type 1 interconnection is at the Point of Interface (POI) of a trunk between a wireless service provider (WSP) switch and a local exchange carrier (LEC) end office switch. The WSP establishes connections to the telephone numbers served by this LEC end office and numbers served by other end offices (including other carriers) through this interconnection arrangement.

Calls are handled through the Type 1 interconnection using multifrequency (MF) signaling.⁴ The LEC switch contains special software referred to as Trunk with Line Treatment (TWLT). With this software, the LEC switch routes calls and records billing information for calls originating in the WSP switch as if they are from an ordinary line. Calls going to the WSP switch/customer are routed to the Type 1 interconnection trunk group by the LEC switch. The telephone number of the wireless customer is transmitted to the WSP switch using MF signaling. Calls from the WSP switch to the LEC end office switch look like line originations to the LEC switch: dialed digits are collected, and call processing proceeds.

A key point about telephone numbers that are used in the Type 1 interconnection arrangements is that they reside in the LEC switch as opposed to the WSP switch. The WSP arranges with the LEC to use a block (or blocks) of numbers that are assigned to the WSP customers. In some cases, an entire NPA-NXX may be *dedicated* to a WSP. In other cases, the WSP has a smaller block or blocks, and the LEC is using some of the numbers in the NPA-NXX as well in a *shared* arrangement. Any calls to WSP subscribers that are assigned these numbers are routed through the LEC end office switch and over the Type 1 interconnection trunk group to the WSP switch for termination to the customer.

Another key point is that a port of a WSP customer served by a Type 1 interconnection arrangement is actually a port to or from a LEC (or wireline) switch rather than a WSP (or wireless) switch. Therefore, a port that appears to be solely between two wireless carriers may actually involve a wireline carrier.

³ Detailed information about wireless interconnection arrangements can be found in GR-145-CORE, "Compatibility Information for Interconnection of a Wireless Services Provider and a Local Exchange Carrier Network," Issue2, May 1998. Contact Telcordia for information about purchasing this document.

⁴ There is a variation to MF signaling that is based on a National ISDN arrangement, but it is not widely used. More information can be obtained from GR-145-CORE, or from the companies that offer it. The ISDN arrangement allows some advanced service capability that is not inherent to the MF arrangement.

Although not supported by GR145-CORE Issue 2, May 1998, SS7 signaling capability for Type 1 interconnection trunks is available in specific geographic areas and from specific wireline service providers. For most Type 1 customers, advanced services such as caller ID cannot be offered to customers whose telephone numbers are served by the MF trunks.

2.2. Type 2A Interconnection

The Type 2A interconnection is at the POI of a trunk between a WSP and a LEC tandem switch. Through this interface, the WSP can establish connections to the LEC end offices and to other carriers accessible through the tandem.

With a Type 2A interconnection arrangement, the telephone numbers are assigned to the WSP and actually reside in the WSP switch. In this regard, the WSP switch functions similarly to an end office. Calls from the PSTN to the WSP customers route through the LEC tandem directly to the WSP switch.

Originally, Type 2A trunks used only MF signaling, but, in recent years, SS7 signaling capability has been developed. SS7 signaling allows advanced services such as caller ID to be offered to the WSP customer.

2.3. Type 2B Interconnection

The Type 2B interconnection is at the POI of a trunk between a WSP and LEC end office switch. The Type 2B interconnection only provides connections between the WSP and telephone numbers served by the end office to which it is interconnected. A Type 2B interconnection is used in conjunction with the Type 2A interconnection on a high-usage basis to serve large volumes of traffic between the WSC and the LEC end office. Just as with the Type 2A, the telephone numbers reside in the WSP switch.

Like the Type 2A interconnection arrangement, the SS7 capability has been developed for in recent years. Advanced services requiring SS7 signaling can be offered over this interconnection.

3. Type 1 Interconnection Issues

3.1. Inability to Offer Advanced Services

Many WSPs would like to move customers that are served using Type 1 interconnection arrangements into their own switches and serve them using Type 2 interconnection arrangements. This would be advantageous for a number of reasons, but one major reason is so that they could offer customers advanced services that require SS7 signaling capability, which is not available with Type 1 interconnection. Until the advent of LNP, moving the customer into the WSP switch required a telephone number change. With LNP, the customer telephone number can be ported from the LEC switch into the WSP switch.

3.2. Wireline Porting Procedures Must be Used

As previously mentioned, telephone numbers that use the Type 1 interconnection arrangement actually reside in the LEC rather than a WSP switch. When a WSP customer served by Type 1 interconnection decides to port to another WSP, wireline porting procedures will have to be used rather than wireless porting procedures.

3.3. LEC Switch Translation Changes and LSR Processes are Complex

LEC end office switch software uses coding similar to the coding used with Direct-Inward-Dialing (DID) trunk groups. The switch translations that have to be established for the Type 1 interconnection trunk groups are complex. When a telephone number is ported out of a Type 1 interconnection trunk group, it must be removed from the group translations. This equates to taking the group apart and rebuilding it. This is a time consuming and complex operation that puts customer service at risk.

Porting an individual telephone number in a Type 1 trunk group is a complex port rather than a simple port. As described, there are switch translation issues, but processing the LSR involves time consuming processing as well.

3.4. Migration of Telephone Numbers that use Type 1 Interconnection

Because of the complexities of porting individual numbers out of Type 1 interconnection trunk groups, many LECs would prefer to work with the WSPs to use porting and/or pooling techniques to migrate all the numbers associated with the trunk groups on a project managed basis rather than port them on a one-by-one basis.

Migrating the numbers into the WSP switches on coordinated projects would:

- Give WSPs more control over their customers.
- Allow WSPs to offer advanced services to these customers.
- Minimize the quantity of numbers using Type 1 interconnection that a LEC would have to port out individually.
- Allow future ports of the migrated telephone numbers to be ported to other WSPs using wireless porting rules.

Migrating these telephone numbers to the wireless switches is a win-win proposal for both the LECs and the WSPs.

4. Migration of Type 1 Interconnection Dedicated NPA-NXX

When a WSP uses an entire NPA-NXX (i.e., all 10,000 numbers), LNP techniques should not be used to migrate the numbers to the WSP switch. If the WSP and the LEC mutually agree that moving the NPA-NXX into the WSP switch is the appropriate action, changes are made to the Local Exchange Routing Guide (LERG) to indicate the new routing information using the appropriate industry guidelines. Appropriate changes are made in the switch translations for the WSP and the switch translations for the LEC. Other service providers must make any switch translations changes necessary to route calls based on the new LERG data.

Moving dedicated codes does not involve LNP, so service providers could pursue moving these codes immediately if desired.

5. Migration of Type 1 Interconnection Shared NPA-NXX

When a WSP shares an NPA-NXX with the LEC, number portability or number pooling techniques must be used to migrate the Type 1 interconnection numbers because the NPA-NXX will reside in more than one switch. Migration of blocks of numbers in shared NPA-NXXs is dependent on both LEC and WSP switches being LNP capable. The switches must be equipped with LNP software and must have sufficient processor and termination capacity available to accommodate any increased load.

5.1. Multiples of 1K Sequential Blocks of Numbers

When the numbers under consideration for migration form a sequential block of 1000 (1K) as defined by the Industry Numbering Committee Guidelines (INC), number pooling techniques rather than number porting techniques can be used to accomplish the migration. This would transfer ownership of the block from the LEC to the WSP. It must be emphasized that it will be necessary to follow INC Pooling Guidelines⁵ when this procedure is used.

Paragraphs 3.11 and 8.4 of the INC Guidelines refer to the transfer of assignment of a thousands-block from one service provider to another. While the migration of a thousands-block of Type 1 interconnection numbers is similar to the description in the referenced paragraph, the conditions are not met exactly. While it seems advantageous to use transference of assignment, a contribution would have to be submitted to and approved by the INC to broaden the definition to include this situation.

If accepted and approved, this procedure would only be applicable for complete 1K blocks. For example, if the telephone numbers NPA-NXX-2000 through NPA-NXX-3499 make up a block to be migrated, NPA-NXX-2000 through NPA-NXX-2999 could be migrated using assignment transfer as described in the INC guidelines, or by using LNP techniques. NPA-NXX-3000 through NPA-NXX-3499 would have to be migrated using LNP techniques.

When the involved carriers agree to transfer the assignment of a 1K block of numbers, a project with a timeline should be established. The Pooling Administrator may be involved in the process to ensure that all transference requirements are met and that all necessary documentation is provided.

5.2. Blocks Smaller than 1K

When the group of Type 1 interconnected numbers is less than a 1K block, number porting techniques must be used. When both carriers involved (the WSP and the LEC) agree that a group of numbers is to be migrated, a project with a timeline should be established. The numbers will be

⁵ See the Industry Numbering Committee (INC) Thousands-Block Number (NXX-X) Pooling Administration Guidelines, INC 00-0127-023, June 21, 2002.

ported to the WSP and, once activated, be disconnected in the LEC switch. Porting individual Type 1 interconnected telephone numbers requires the LEC to extract the number from the DID trunk group translations. This is a time consuming process and places other numbers in the group at risk of service loss. When the numbers are migrated (ported) as a group, the entire group can be disconnected. There are economies of scale realized in the laborious activities, and since the entire group is moved, there are no working numbers left at risk.

5.3. “Snap-Back” on Disconnect

LNP rules state that when a customer disconnects a telephone number that has been ported, it is returned, or “snapped-back,” to the Code Holder or Block Holder, as appropriate, for reassignment. Migration of Type 1 numbers presents some challenges to that rule.

If the block of numbers migrated is a sequential 1K block and the ownership is transferred as described above, the WSP becomes the block holder, and, even after subsequent ports, the number will snap-back to the WSP if disconnected.

If the block is less than 1K, then code/block ownership stays with the LEC. If a migrated number is subsequently ported to another carrier (wireless or wireline), then disconnects, the number will be returned to the code/block holder. In this case, the disconnected number would snap-back to the LEC. For simplicity, it is recommended that this process not be changed.

6. Trunk Group Resizing

When numbers that currently use Type 1 interconnection arrangements are moved into the WSP switch, they will then access the PSTN through Type 2A/B interconnection arrangements. It will be necessary for the WSP to reevaluate the sizing of the individual Type 2A/B trunk groups to ensure that the additional call volumes can be accommodated. It is likely that this will need to be done in conjunction with the serving LEC.

In most cases, the size of the Type 1 trunk groups can be reduced after migration. In some cases, it is possible that the trunk group can be removed in its entirety. It must be remembered that sometimes wireless SPs utilize Type 1 trunks to access 911 services, operator services, N11 services, and possibly other special services. Therefore, it may be necessary to leave some Type 1 trunk groups in service.

7. Switch Capacity

The WSP should ensure that adequate switch capacity exists to move the Type 1 numbers into their switch. Conversely, the LEC should assure that adequate capacity exists at the tandem switch (Type 2A) or at the end office (Type 2B) to terminate the additional trunking and process the additional traffic.

8. Extended Area Service and Other Dialing/Billing Arrangements

Extended Area Service (EAS) arrangements must be considered since the Type 2A serving tandems may not have the same calling area as the previous serving Type 1 end office. Even though Type 2B interconnection trunks connect to LEC end offices, they do not provide the same service that Type 1 interconnection trunks provide. Type 2B trunks are strictly high-usage direct connections between a particular LEC switch and a particular WSP switch. Calls do not “tandem” through the LEC end office to the PSTN using Type 2B.

In some instances, special dialing arrangements or billing arrangements are in effect. The impacts must be analyzed on a case-by-case basis.

9. E911 Delete Issues

When numbers using Type 1 interconnection are migrated from the LEC switch to the WSP switch, the losing LEC should ensure that the numbers are deleted from the E911 Automatic Location Identification (ALI) database.

10. Path Forward

Migration of Type 1 interconnected telephone numbers in dedicated NPA-NXXs can begin at any time. It is not necessary that switches be LNP capable to move these numbers. Since the entire 10,000 numbers would be moved at once by making changes to the LERG and appropriate switch routing changes, there is no technical reason that this cannot be done now. It will be dependent, however, on whether or not there are existing tariffs for these changes and/or both carriers reach agreement for completion of the project.

Migration of Type 1 interconnected telephone numbers in shared NPA-NXXs requires that both the WSP and the LEC switches are LNP capable. Currently, the FCC mandate requires the wireless industry to begin service provider portability on November 24, 2002. The provider serving the customer is not changing with Type 1 telephone number migration. Therefore, if both the LEC and the WSP agree and both involved switches are LNP capable, migration could occur prior to that date.

It will be necessary to provide a contribution to the INC to request a modification to the wording of the Number Pooling Guidelines to allow the transfer of ownership of 1K blocks of Type 1 interconnected numbers.

The WNPO and the LNPA-WG acknowledge that migration of telephone numbers that use Type 1 interconnection into the WSP switches can benefit both involved service providers. Migration is recommended as a strategy to be used whenever both involved service providers agree to such activity.