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In the Matter of	)	
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Telephone Number Portability	)	**CC Docket No. 95-116**
	)	**RM 8535**

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INTERIM STATUS REPORT OF THE SEATTLE LOCAL AREA NUMBER PORTABILITY TRIAL

U.S. Intelco, as manager of and on behalf of certain participants in the Seattle Local Area Number Portability Trial

Date: September 12, 1995

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Summary

The carriers and vendors participating in the Seattle trial have prepared this interim report to respond to the Federal Communications Commission's (Commission's) request for comment to its July 13, 1995 Notice of Proposed Rulemaking in CC Docket No. 95-116, and to clarify the nature and scope of this trial. The trial participants joining in this report include: Electric Lightwave, Inc., Stratus Computers, Teleport Communications Group, U.S. Intelco, and U S WEST Communications.

As explained herein, U.S. Intelco, as trial administrator, believes that the Seattle local area number portability (LANP) trial has provided it and the other trial participants with valuable information about the technical and administrative issues and impacts involved with deployment of the LANP, even in the limited implementation in the trial, that is, a service-provider-only solution using AIN as the triggering methods. U.S. Intelco and the participants look forward to sharing this information with the Commission and others in the telecommunications industry in the form of a summary trial report to be issued in October 1995.

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INTERIM STATUS REPORT OF THE SEATTLE LOCAL AREA NUMBER PORTABILITY TRIAL

The Commission has requested public comment on the trial of local area number portability (LANP) now being conducted in Seattle, Washington Ñ the first trial of local number portability ("LNP") to utilize data base call routing and to take advantage of Advanced Intelligent Network ("AIN") features.[1]

The carriers and vendors participating in the Seattle trial ("trial participants")[2] have prepared this interim report to respond to the Commission's request for comment and to clarify the nature and scope of this trial.[3] While the LANP approach being trialed has the potential to support all three forms of number portability (service provider, location, and service), the trial itself is focused on service provider portability.

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[1] *See* Notice of Proposed Rulemaking, CC Docket No. 95-116, FCC 95-284, at 16 | 40, 17 | 47 and 18 | 49 (July 13, 1995)(Notice). This report uses the term, LNP, to describe local telephone number portability generally; the term, LANP, best describes the particular approach being trialed in Seattle.

[2] The trial participants joining in this report include: Electric Lightwave, Inc. (ELI), Stratus Computers, Teleport Communications Group, U.S. Intelco ("USI"), and US WEST Communications. USI is managing the trial as a neutral third-party. Stratus is supplying the data base (Service Control Point) platform and the applications program for the SCP. GTEINS and ITN are providing the signaling switches (STPs), and GTE is making available its Carrollton, Texas test bed. ELI and Teleport are making their Seattle switches available for the trial. US WEST made its Boulder test bed available for the trial as well as one of its 5ESS switches in Seattle.

[3] There appears to be some misunderstanding concerning the origin of the Seattle trial. Participation in the trial by all parties was voluntary. The trial was not commenced under mandate or guidance of a state commission. *Compare* Notice at 12 | 28.

I. The Seattle Trial Generally

The Seattle local area number portability (LANP) trial has defined objectives and is limited to evaluating certain aspects of service provider LNP. A limited amount of *ad hoc* testing of location portability was performed early in the trial, but the trial itself is focused on service provider portability.[4]

The Seattle trial is, moreover, a "proof-of-concept" trial only. Consequently, the trial will not, at least directly, lead to the implementation of a working LANP system in the Seattle metropolitan area or elsewhere. Of course, the trial results will be very helpful in evaluating workable LNP systems which the industry is now considering. The trial will also provide information regarding deployment, operational, and administrative issues generic to LNP regardless of the particular LNP approach the industry ultimately may utilize.

While the functionality of the LANP data base (service control point or SCP) was frozen early in the trial, the LANP approach itself has undergone a significant evolution over time. This evolution has occurred as a result of incorporating lessons learned during the trial and the related paper studies conducted by the trial participants. Consequently, problems and issues uncovered in the trial, which are touched upon below, are not necessarily representative of the current, evolved LANP approach.[5]

Another aspect of the trial involved the requirement that no new network functionality be introduced to the participants' networks — other than arranging access to

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[4] The trial is not evaluating service portability, although the LANP approach should be capable of supporting this form of portability as well. *See* Notice at 6-7 ¦ 13 for definitions of these different types of portability.

[5] The LANP approach, as it has evolved, has been extensively presented industry fora, such as the Industry Numbering Committee ("INC") Number Portability Workshop. *See* INC contributions PORT-82, which describes the latest enhancements to LANP, as well as PORT-83, 75, 71, 68, 61, 60, 59, 56, 49, 48, 39, 25, and 23.

the LANP SCP and related switch-based AIN trigger provisioning to enable queries to be launched to the SCP. Modifications to switch software, signaling systems (*e.g.*, STPs), and operational support systems were not considered.

This self-imposed requirement on the part of the participants had the effect of requiring the LANP approach trialed to use existing functionality within the public switched telecommunications network ("PSTN"). The trial participants wanted to evaluate existing functionality in the hope that LNP capabilities can be deployed more quickly and cheaply than LNP approaches requiring development.[6]

The second consequence of this no-development requirement was to constrain the trial to testing primarily call routing and feature transparency issues of service provider portability. Other areas for which there are known impacts inherent in LNP, and for which development would be required in order to trial effectively (*e.g.*, billing, service order processing, and switch line/maintenance testing systems), are not being evaluated extensively.

The chief objective of the Seattle trial has already been demonstrated successfully: verifying the concept of using existing AIN triggers and an external LANP data base in routing ported telephone numbers to the appropriate switch of the local exchange provider serving the called customer. Other objectives of various trial participants include:

- Evaluate methods of supporting data base LANP using existing (or readily available) network capabilities in the hope the industry can avoid having to

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[6] Both the AT&T (LRN) approach, and to a lesser extent, the MCI Metro (CPC) approach, require varying levels of new switch software development. The trial participants' "no-development" requirement makes comparisons to other LNP approaches more difficult with respect to functional differences in the long term, because further development for switches and signaling will improve this approach's capabilities as well.

rely on new features requiring additional standards, additional vendor development, or both;

- Identify technical and administrative issues which must be addressed before a reliable data base LANP plan can be implemented on a wider scale;

- Evaluate the types of loads data base LANP imposes on various components within carrier networks so planners have the facts they need to size their networks to accommodate data base LANP when deployed on a wider scale; and

- Begin to investigate the impact data base LANP will have on existing network services and features such as Caller ID and E911 and existing operations support and billing systems.

The Seattle trial is being conducted in four phases. Phase O of the trial was designed to test the LANP approach (including a LANP SCP) with a single switch, where a subscriber's number was ported intra-switch using the CNA/NNA scheme utilized by LANP. This phase was successfully completed in January 1995 using ELI's Seattle-based DMS-100/200. During this phase, a Seattle number was "location ported" to Virginia to verify LANP's routing flexibility, and specifically, the fact that the NNA returned by the SCP need not be local. This phase further confirmed that interconnecting interexchange carriers were not affected by transporting a toll call resulting from an SCP routed call.

The second phase, Phase 1, was completed on May 24, 1995, and the trial results are summarized in Section II below. Phase 2, described in Section III, will begin shortly and is expected to be completed in September. Phase 3, described in Section IV, was completed on August 15, 1995. The trial participants plan to prepare a trial summary report by October, and this report will be made available to both this Commission and the industry.

The challenge for any LNP system is that most telephone numbers are inherently non-portable because the first six digits of a dialed number -- the NPA-NXX -- identify a particular switch operated by the local exchange provider currently serving the called party, and all networks in North America have been designed to use these dialed digits in routing the call to this switch.[7] For example, this Commission's general telephone number is 202-418-0200. All calls to the Commission are routed through the Bell Atlantic switch directly serving the Commission, and that switch has been assigned a unique NPA-NXX code combination: 202-418. With this assignment, other carriers processing calls to the Commission know precisely where they must route such calls simply by examining the first six digits of the dialed telephone number.

The easiest portable number routing arrangement is for carriers to continue to terminate the call attempt to the old carrier's switch (*e.g.*, 202-418), and have that switch re-direct the call attempt to the switch of the provider currently serving the called party (which has been assigned a different, and unique, NPA-NXX). This is the method used by the interim LNP methods discussed in the Notice.[8] These interim arrangements, however, often result in inefficient routing, can impose unnecessary costs, and may deprive customers having ported numbers from enjoying certain services and features (because of technical limitations associated with these interim approaches).

The alternative is for carriers to use a number different from the dialed digits for routing call attempts to completion. With this new routing arrangement, the dialed digits (*e.g.*, 202-418-0200) would continue to identify the person being called, and this is the number callers would continue to dial. Carriers would also continue to use the dialed digits,

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[7] *See* Notice at 5 ¦ 9.

[8] *See* Notice at 19-22 ¦ ¦ 55-63.

but they would do so, not to route the call, but rather to obtain the "real" routing information associated with the called party -- information which would identify the particular carrier serving the called party and, if possible, to identify the particular switch serving the called party (to facilitate efficient network routing).

Several new routing schemes have been proposed by the industry, and they are discussed in the Notice.[9] The Seattle trial uses one of these proposals, the LANP or so-called "two-domain" approach, first developed by Stratus Computer, U.S. Intelco ("USI"), and ELI.

Under a "two-domain" approach, each telephone number is placed into two domains reflecting the two different functions a number has been used in the past: a Customer Name Address (CNA) domain, and a Network Node Address (NNA) domain. Consumers not changing local service providers would keep their existing number, and that same number would be both a CNA and a NNA, much like today. If, however, a person changed service providers and retained his or her telephone number, the existing number would become a CNA, and a different NNA would be assigned and used by carriers in routing calls to completion. The NNA, also in a 10-digit, NPA-NXX format, would identify the particular switch now serving the called party (and, necessarily, the service provider operating the switch).

This "two-domain" approach is perhaps best understood by way of an example. Today, a telephone number identifies both the person being called and the particular switch serving that called party. For instance, the Commission is uniquely identified by the digits, 202-418- 0200, because no one else in World Zone 1 has been assigned this particular 10-digit number. The switch serving the Commission is also uniquely identified by the first six

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[9] *See* Notice at 14-16 ¦ ¦ 36-39.

digits of the dialed number (*i.e.*, 202-418). In this situation, the Customer Name Address (or CNA) and the Network Node Address (or NNA) are identical.

Assume the Commission were to begin using a local service provider other than Bell Atlantic. Callers would continue to reach the Commission by dialing 202-418-0200, and this number would remain uniquely assigned to the Commission in the CNA domain. Upon changing carriers, however, the Commission could no longer be assigned the same number in the NNA domain because 202-418 identifies a Bell Atlantic switch in Washington, D.C. Instead, the Commission would be assigned a new number from the NNA domain, and carriers would use this NNA number in routing call attempts to the Commission. This NNA would uniquely identify the switch operated by the new provider serving the Commission: the NPA-NXX would uniquely identify the switch, and the current service provider could use the last four digits of the NNA number to identify the particular customer served by its switch — in this case, the Commission.

This CNA/NNA approach is attractive for several reasons. One, networks have been designed to route calls based upon the first six digits of the dialed number, the NPA-NXX. Because LANP's NNA numbers use the same format as today's numbers, carriers can implement the new routing scheme without modifying existing routing software. Two, it appears that the same CNA/NNA arrangement can be used by carriers in supporting location portability. Three, the CNA/NNA arrangement would impose minimal burdens on the supply of telephone numbers because, as proposed by Stratus, USI, and ELI, the same telephone number can be used as both a CNA and a NNA.[10] In fact, the CNA/NNA

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[10] As noted, if the Commission were to use a different local service provider, its number, 202-418-0200, would become a CNA and the Commission would be assigned a new NNA number, the first six digits of which would identify the switch now serving the Commission (*i.e.*, 202-NXX). As proposed by Stratus, USI, and ELI, the number, 202-418-0200, in the NNA domain could then be re-assigned to another Bell Atlantic customer.

arrangement has the potential to increase the efficiency (and, therefore, the life) of the North American Numbering Plan ("NANP") because carriers can begin using as CNAs unused numbers in small rural offices.

The challenge posed by the CNA/NNA arrangement is that the same telephone number can be either a CNA or a NNA, and the current signaling protocols (*e.g.*, SS7 initial address messages or IAMs) have been designed to accommodate only one type of called party number at any point in the call path. Consequently, to route a call correctly, carriers need to know whether a given called party number appearing in an IAM is a CNA (which requires conversion to a NNA for routing) or is a NNA (which they can use in routing the call to completion). This challenge is discussed more fully in Section II below.

II. The Phase 1 Test Has Been Successfully Completed

Phase 1 of the trial was designed to test the interoperability of multiple switches in accessing an external LANP data base for routing ported numbers to the correct service provider using existing capabilities in the public switched network.

Phase 1 was conducted in two steps. In the first step, the test plan was performed in a captive lab environment in U S WEST's Boulder, Colorado, laboratory. A 5ESS and DMS-100 switch were used to perform both intra-switch and inter-switch testing.

The second step involved performing these same tests using live network switches in Seattle (although no live traffic was directly involved with the trial). An ELI DMS-100/200 switch was paired with both a U S WEST 5ESS switch and a Teleport 5ESS switch. All the switches in the trial were equipped with AIN version 0.1 software and service switching point ("SSP") functionality. The switches were connected *via* their existing SS7 network to signaling transfer points ("STPs") provided by GTEINS and ITN. The STPs, in turn, were

connected to a service control point ("SCP"), a computer (or data base) containing LANP applications software developed by Stratus Computer.

Both steps of Phase 1 were successfully completed. Specifically, this phase demonstrated that:

(a) AIN 0.1-equipped switches are capable of initiating a LANP routing query to an external data base (Service Control Point);

(b) the SCP is capable of returning the correct routing information (specifically, an NNA); and

(c) the switch serving the calling party (and the one launching the routing query) is able to use this information in routing the call to the proper switch -- namely, routing calls using the NNA rather than the CNA.

In this regard, Phase 1 was eminently successful, for the test suggests that, in addition to the so-called "interim" methods, Advanced Intelligent Network features can also be used to support service provider local area number portability.

Phase 1 was successful in another respect: it provided useful information which carriers can use in developing a workable and reliable AIN-based LANP solution. The lessons the trial participants learned can be grouped into two broad categories: administrative and technical.

Administrative Lessons. In Phase 1, the trial participants discovered that the administrative issues associated with establishing a LANP system using AIN and SS7 were far more complex than they had first anticipated. Among other things, the trial participants learned:

- Administration of data fill within SS7 networks (*e.g.*, sub-system numbers, global title translations, point codes) is an exacting endeavor. Even minor errors in any of these numbers can result in queries not being generated, queries being misdirected, or SCP responses being misdirected. However, these problems are no different than those faced when deploying any AIN or call routing SCP.

- Different switches have unexpected capabilities and limitations. For example, the trial planned to use the digits, 95, for the sub-system number ("SSN"). One switch type supported this number; the other did not.

- Different results can be encountered when calls originate within the AIN portion of the switch (within the switch trigger range) as opposed to the non-AIN portion of the switch (outside the trigger range). For example, in one part of the test plan, the participants encountered the expected results of a call being routed to the announcement, "The call cannot be completed as dialed." However, when the call originated in the non-AIN portion of the switch, the call was instead routed to the announcement, "It is not necessary to dial a 1 . . . ."

The vast majority of these administrative issues, which pertain primarily to the establishment of a LANP system, were overcome through the dogged determination of the trial participants; a handful of issues remain under investigation. The trial participants learned that implementation of any AIN-based LANP solution is complex, and that a suitable testing and soaking period will almost certainly be necessary.

Technical Lessons. While Phase 1 successfully achieved its objective of verifying the ability to port numbers between different carriers' switches using AIN triggers and SCPs, the trial results had two other consequences: first, they confirmed the expected inefficiencies

of using existing AIN triggers to implement full re-use of CNA and NNA values, as was purposely tested in the trial; second, they also revealed unexpected call parameter screening in certain switch trunks.

The first factor (CNA/NNA re-use) can result in additional, unnecessary, queries to the SCP when using existing AIN triggers. This has the net effect of increasing the average number of data base queries per call to above one per call, with the resulting additional call setup delay and processing overhead (SCP queries processed, *etc.)*. In call scenarios where the second factor (call parameter screening) occurs as well, the data base was unable to detect these redundant queries and respond accordingly, leading to incompleted calls. These issues are discussed further below.

The long-term benefits of preservation of the North American Numbering Plan ("NANP") from the LANP approach stem from the proposal that CNA and NNA numbers belong to separate numbering domains and can — and should — be re-used. NANP preservation is maximized if NNA values used for call routing can also be used as CNAs elsewhere. Accordingly, re-use of CNA/NNA values is a long-term goal of LANP.

At the current time, existing digit prefix triggers (such as the six-digit, AIN 0.1 PODP triggers used in the Seattle trial) are unable to utilize any additional parameters to control whether the trigger should launch a query. Consequently, if a call is routing with an NNA whose NPA-NXX also matches a valid CNA prefix, a PODP trigger in effect for the CNA prefix will launch a redundant query. The query is redundant because, in this case, the call has already been dipped and the called party number ("CdPN") already contains an NNA. Redundant queries were expected on those tests which used overlapping CNA/NNA values because the trial participants intentionally tested the redundant query suppression mechanisms implemented in the SCP as a fail-safe.

One cause of the redundant queries was the use of ANI II digits as a "dip/no dip" indicator. All data base methods of LNP require some indication whether a data base query has already been made so a carrier can determine whether the called party number in the initial address message (or IAM) of the SS7 protocol can be used to route the call to completion. This is especially the case where CNA/NNA values are re-used in any two-domain LNP scheme, such as the LANP approach employed in the Seattle trial (because the same telephone number can be either a CNA or a NNA).

A call signaling parameter used for this purpose is generically called a forward-dip indicator. Without such an indicator, a routing query (or data base dip) would potentially occur at each subsequent switch in the call path, a redundant activity that optimally should be avoided.

In other cases, this problem manifested itself in additional redundant queries because of the current implementation of AIN functionality — in certain test calls, three queries were launched on one local call (involving two switches).[11] Again, these redundant queries were generated as a result of testing CNA/NNA re-use with existing triggers, the issue being the ability to ensure correct call processing even when redundant queries do occur, regardless of the cause.

One option for addressing this need would be for the industry to standardize a forward-dip indicator ("dip/no dip") and to develop a new AIN trigger specialized for LNP to

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[11] At times, two queries were generated at the originating switch. A second query was launched when the routing number returned from the first query (NNA) is also a CNA, because current AIN triggers are designed to originate queries each time a certain parameter (*e.g.*, CNA) is met. (Fortunately, the continue message generated by the SCP prevented yet additional queries being launched from the originating switch.)

It was also discovered that a third query was generated by the terminating switch if the NNA contained in the IAM (translated from a CNA by the originating switch) is also a CNA, because that number matched a CNA-triggered number at that switch.

ensure only one LNP routing query per call regardless of the extent of CNA/NNA re-use.[12] Developing an LNP-specialized trigger may also eliminate feature interaction problems which occur when using existing trigger capabilities (such as AIN or even IN/800 triggers) for LNP — a purpose for which they were not originally designed. As noted, the trial participants wanted to evaluate a possible LNP solution using existing network capabilities. Fortunately, CNA/NNA re-use is not expected to occur frequently early in the deployment of LNP.[13] Consequently, the new LNP trigger can be deployed to support wide scale re-use as the competitive market matures.

The trial participants decided to use the ANI II digits to identify whether a query has already been performed (and that the number in the IAM has already been translated from a CNA to an NNA). The test discovered that, while the SCP was capable of returning the specified ANI II digits, existing intraLATA switch software (TR317) was incapable of populating these digits within the IAM and forwarding that information to the terminating switch. The terminating switch, not knowing whether the number in the IAM was a CNA or NNA, generated another, completely redundant query.[14]

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[12] The allocation of a permanent forward-dip indicator and the development of new LNP-specialized triggers to work with this parameter, was proposed by Stratus at INC in January 1995, prior to completion of Phase 0 of the Seattle trial. *See* INC contribution PORT-48.

[13] Re-use occurs only when a local service provider provides service to a new customer — that is, assigns a new number for a customer from an NXX code it has obtained and is using primarily for receiving ported customers it obtains from other local service providers. Even then, re-use occurs only if the subscriber ports out of the service of that local service provider. The LANP approach being trialed in Seattle currently supports this capability through either additional administrative load or at the potential expense of incurring more than one query per call, due to redundant dips. However, this temporary limitation may not have practical significance because CNA/NNA re-use will likely occur only infrequently during the early deployment of LNP.

[14] In some call attempts, the problem was much worse than merely generating an additional query. The terminating switch, not knowing whether the number was a CNA or an NNA, did its own SCP query, and the SCP returned a number causing that switch to redirect the call attempt to the originating switch. In one part of the Phase 1 test plan, the two switches continued to redirect the call attempt to the other switch a total of five times before the switch maximum redirection counter was triggered, resulting in the call being routed to reorder (meaning the call was not completed).

The problem with use of AIN II digits as a "dip/no dip" indicator is that currently deployed switch generics are not yet compliant with the latest revision of TR317, which specifies that ANI II forwarding should be provisionable on a trunk-group basis.[15] This deficiency precluded optioning the ANI II digits to be forwarded on some trunks interconnecting the participating switches, thereby causing the ANI II digits returned by the SCP to be screened (not forwarded) from the outgoing call subsequent to the dip. While switch compliance with TR317 will undoubtedly improve over time, thereby making ANI II more ubiquitous, the use of ANI II itself as a forward-dip indicator in LANP is being used on an interim basis only — until a forward-dip indicator is standardized and available. It bears emphasis that ANI II was adopted in the trial simply to facilitate forward dip indication using an existing parameter in which new values could be innocuously introduced without affecting call processing.[16]

An additional issue these tests raised is the need to define a standardized LEC-to-LEC trunk type for interconnecting competing LECs serving the same market. Existing trunk interworking standards, such as TR394 and TR317, and existing trunk groups, such as toll or EAS trunks, were not intended to address competitive LEC-to-LEC requirements, and do not necessarily provide the needed signaling parameters (such as ANI and ANI II) and AMA recording capabilities required between LECs in a competitive local marketplace, independent of LNP.

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[15] *See* Bellcore, TR-NWT-000317, Issue I, Revision 1994.

[16] While the use of ANI II for forward-dip indication should not conflict with the existing uses of ANI II, the absence of a participating interexchange carrier ("IC") in the trial precluded full testing of this supposition. The theoretical lack of interaction stems from the use of an N-1 policy on trigger placement, in which case the LANP use of ANI II occurs in the final call legs from the next-to-last carrier ("N-last") to terminating carrier. The conventional use of ANI II, which is to type calls being forwarded from LEC to IC, occurs on the originating call legs and should therefore not interfere. There are other uses for ANI II (*e.g.*, wireless), similar to that proposed by LANP which might assume end-to-end transport of ANI II and therefore conflict in certain call scenarios. In any case, the proposed use of ANI II is purely interim.

As noted, that technical issues arose as a result of the Phase 1 trial was fully anticipated. The trial participants are currently examining ways to address these issues. It is important to emphasize, however, that the technical issues which arose appear to be due to the current design of signaling protocols and AIN, and not the concept of service provider LANP.

III. Phase 2 Load Testing

Phase 2 is designed to evaluate the impact on various network elements if local area number portability is implemented on a wider scale. Phase 2 is scheduled to commence in early September and will last approximately two weeks.

The Seattle test is designed to originate queries on the first six digits of the dialed telephone number (NPA-NXX), With this approach, data base queries are made on all call attempts directed to numbers assigned within this NXX, not just portable numbers within the NXX. Use of NPA-NXX triggers will result in a significant increase in signaling queries which, in turn, may impact switching capacity, signaling network capacity, and the capacity of LANP applications data bases. Consequently, the use of NPA-NXX triggers for Phase 2 represents a worst-case triggering methodology for which the Phase 2 load testing would then be representative of worst-case loads a carrier's networks could be expected to support.

The purpose of Phase 2 is to test the effects of using an AIN 0.1 LANP solution upon the performance of the various network elements involved in the system — specifically, the switch (SSP) and the LANP data base (SCP).

Ideally, each element in the system would be tested separately, then as a system under live conditions. However, to protect the integrity of both the public switched telephone network and carrier's SS7 signaling networks, the performance tests will be confined to a lab environment, using GTE's laboratory in Carrollton, Texas.

In Phase 2, the trial participants will install load boxes on the switches, SS7 network and LANP SCP. By measuring traffic from the load boxes, the test hopes to evaluate several parameters, including transaction-per-second capacity (both CPU and peripheral equipment), trigger capacity, post-dial delay, and blocking.

IV. Phase 3 Service Feature Testing

Phase 3, conducted at U S WEST's Boulder lab, was completed on August 15, 1995. Phase 3 was designed to evaluate the impact this form of local area number portability will have on existing features and services -- that is, determine whether existing services and features can be supported in the new addressing environment.

Among the features and capabilities which were evaluated are Custom Calling features like CLASS services (*e.g.*, automatic callback, Caller ID, selective call forwarding); billing and alternative billing services (*e.g.*, calling card, collect, coin sent-paid); number services (*e.g.*, 500, 800, 900); class of service capabilities (*e.g.*, payphones, hotel/motel); PBX trunks; Centrex trunks; ISDN lines; measured service lines; emergency services (911/E911); directory assistance; and multi-party lines.[17] Having just completed Phase 3, the trial participants are currently analyzing the test results and will present their findings in the summary report to be published at the conclusion of the trial.

One preliminary result of the Phase 3 testing involves the provisioning issues of ensuring the correct ANI or, more precisely, the calling party number ("CgPN"), is generated for calls originating from ported subscribers' lines. Many call features rely on the CgPN to indicate the call-back number of the line or subscriber originating a call (*e.g.*, Caller ID, call screening, automatic callback/auto-recall). As was anticipated, different

[17] Because of time constraints and technical limitations, only some of these features and capabilities were tested in the lab. Capabilities not tested in the lab will be reviewed with a paper analysis.

switch-based number administration techniques were required to provision the CgPN correctly for a ported subscriber, depending upon the type of switch.

In the case of a DMS-100, for example, only the NNA of a subscriber's line needed to be "opened" in the switch because the DMS-100 enables the CNA to be provisioned on the line as the CgPN for all calls originated by line.[18] This was successfully demonstrated on the DMS-100 during the trial; however, it is not applicable for the 5ESS. One option for the 5ESS switch is to provision the subscriber's line with the CNA value opened, as is done today with non-ported numbers, to ensure the CgPN is generated correctly without invoking the data base on all originating calls.[19] The LANP approach has recently proposed the use of different switch-based number administration policies, depending upon the type of switch(es) and operational support systems employed by a carrier, to best adapt to the carrier's existing switches and network infrastructure.[20]

V. Post-Trial Activities

As noted, the Seattle LANP trial is a "proof-of-concept" test only. The trial participants entered into this trial to obtain valuable experience relative to the issues of

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[18] Opening a number in a switch involves: configuring the switch translation and routing tables to recognize the NPA-NXX as one "owned" by (or local to) the switch; and configuring the switch translation tables to recognize the directory number (NXX-XXXX) according to its use. Switches have varying limitations on the number of NPA-NXXs that may be opened at one time, and varying levels of work involved in administrating line numbers within opened NXXs.

[19] While this option was not tested during the Seattle trial, a work-around simulating this option was tested. Theoretically, the data base could be employed to provide the correct CgPN where not generated directly by the switch. However, even though this work-around was tested, originating queries from lines with ported numbers are not practical nor desirable. In addition to the significant load generated, there are numerous originating feature interactions resulting from the use of an originating AIN trigger, as well as impacts to 911/E911 and other facilities that do not interact with originating triggers. Consequently, originating triggers for CgPN generation must be avoided.

[20] *See* U.S. Intelco INC contribution PORT-82.

AIN-based LANP solutions, including technical issues, planning issues, and impacts on current services and systems.

In this light, the Seattle trial has been eminently successfully. The concept of using AIN triggers and external data bases has been confirmed, the CNA/NNA numbering/addressing scheme continues to look promising, and important issues for additional exploration have been identified.

VI. Conclusion

To summarize, U.S. Intelco, as trial administrator, believes that the Seattle LANP trial has provided it and the other trial participants with valuable information about the technical and administrative issues and impacts involved with deployment of the LANP, even in the limited implementation in the trial, that is, a service-provider-only solution using AIN as the triggering method. U.S. Intelco and the participants look forward to sharing this information with the Commission and others in the telecommunications industry in the form of a summary trial report to be issued in October 1995.

Using the lessons learned in the Seattle LANP trial and drawing upon the comments made by a wide range of industry participants on papers U.S. Intelco and Stratus Computer have submitted to the Industry Numbering Committee, both companies have continued substantial development of the LANP approach. Accordingly, the solution has matured significantly beyond what is being tested in Seattle. For example, the current LANP approach employs three additional triggering modes (AIN 0.0, IN, and ISUP) not tested in Seattle. Use of these triggering methods will allow implementation of LNP by a much broader range of industry participants with different switching capabilities than those involved in the Seattle trial. Further improvements in the approach include:

- Triggering Assists: A number of call routing and translations facilities have been identified for the LANP approach that could be used in a live implementation to eliminate problems with existing industry implementations of AIN 0.1 generics, eliminating the need for costly switch software upgrades and patches. These triggering assists were not tested in Seattle due to the limited scope of that trial.

- Ten Digit Global Title Translation (GTT): This capability can be employed in the LANP SCP to verify correct operation of calling card verification, IS-41, and certain CLASS features.

U.S. Intelco expects that these and other enhancements of the LANP solution will be evaluated as part of the upcoming trial of number portability to be held in Rochester, under the guidance of the New York Public Service Commission. U.S. Intelco believes that these and other trials, such as the Manhattan trial, that have been or will be operated in the public switched network with broad industry participation are necessary prerequisites to producing solutions that are both practical and implementable.

Respectfully submitted,

U.S. Intelco, as manager of and on behalf
of certain participants in the Seattle Local
Area Number Portability Trial

September 12, 1995

Certificate of Service

I, Nicola A. Chenosky, do hereby certify that on this 12th day of September, 1995, copies of the foregoing **Interim Status Report of the Seattle Local Area Number Portability Trial** were hand delivered to the parties listed below:

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