**CRTC INTERCONNECTION STEERING COMMITTEE**

**TIF REPORT**

**Date Submitted:              12 June 2025**

**WORKING GROUP: CSCN**

**REPORT #:        152A                                     File ID: CNRE152A**

**REPORT TITLE: Supplemental Report for Methods to Address the High Assignment Rate of Non-Geographic (6YY) CO Codes**

**OUTCOME: CONSENSUS**

**RELATED TASK(s) #: 112**

**BACKGROUND:**

The CSCN submitted [CNRE138B](https://crtc.gc.ca/public/cisc/cn/CNRE138B.docx) to the CISC on 22 April 2024 with a note that the CSCN would be submitting a follow-up report to address the number of digits to expand to.

**CONCLUSIONS:** The CSCN concluded that the industry should implement 1+14-digit expansion in the format1-6YY-XXX-XXXX-XXXX with assignments made in blocks of 10,000 telephone numbers.

**RECOMMENDATIONS:**

The CSCN recommends that:

1. The CNA and service providers that seek new Non-Geographic numbering resources must be capable of using the expanded 1+14-digit format, no later than 3 years after the date of the Decision;
2. The CNA and service providers implement the extended digit NPAs 677 and 688 in the format of 1-6YY-XXX-XXXX-XXXX where X is a number range from 0 to 9, and the D-digit would change from an N (2 through 9) to an X (0 through 9); and
3. The CNA and service providers implement a block size of 10,000 TNs in 1+14-digit NPAs, resulting in the administered digits being the bolded characters in the following format: 1+6YY-**DEF-GHIJ**-XXXX.

**ATTACHMENTS:**

Supplemental Report - Methods to Address the High Assignment Rate of Non-Geographic (6YY) CO Codes

**Supplemental Report**

**Methods to Address the High Assignment Rate of Non-Geographic (6YY) CO Codes**

# Introduction

On 2 April 2024, the Canadian Steering Committee on Numbering (CSCN) submitted CNRE138B, Methods to Address the High Assignment Rate of Non-Geographic (6YY) CO Codes. In this Report, the Canadian Steering Committee on Numbering (CSCN) examined Full Solutions (i.e., expanding 6YY codes to either 1+12 (Option 7A) or 1+14 digits (Option 7B) to delay exhaust of non-geographic resources. Further, the CSCN provided the Commission with several partial solutions that would make additional 6YY NXXs available. With respect to the full solution the CSCN was unable to reach consensus on whether to adopt Option 7A or 7B and agreed that further industry discussion is required before making a final recommendation. In Section 8 of the Report, Matters for Further Consideration, the CSCN stated:

TIF 112 will continue working on this task to resolve the particulars of the Extended 6YY NPAs solution (Option 7). Another report will be filed no later than 31 December 2024. This new report will include a recommendation for the implementation of 1+12 digits (with or without digit locking) or 1+14 digits.

The CSCN agreed to postpone submitting its supplemental report until after reviewing the North American Numbering Council (NANC) Internet of Things (IoT) working group's report (published December 13, 2024) and informed the Commission that the supplemental report would be delayed. Following its publication, the CSCN reviewed the NANC report, which revealed that the 1+14 digit numbering format was presented as an option, not a recommendation and made no mention of the 1+12 digit format which suggests it's not currently under consideration in the US.

In light of the NANC report, the balance of this report examines the various alternatives within Option 7, considering the pros and cons of each and continues to recommend the reservation of unassigned Numbering Plan Areas (NPAs) 677 and 688 for the 1+14-digit expansion. The CSCN notes the expanded format must utilize unassigned NPAs such as 677 and 688 to allow for new software development on network and Information Technology (IT) platforms maintained by Telecommunications Service Providers (TSPs), infrastructure vendors, and numbering administrators.

Since the NANC report only presented the 1+14 digit expansion as an option, not a recommendation, there is potential for the US to choose a different solution to mitigate non-geographic resource exhaustion. Given the respective sizes of our markets, it is likely that Canada would significantly benefit from following the recommended options that are ultimately adopted in the US. As such, the impact of any alternative choice by the US would require analysis by the CSCN in a future report to the Canadian Radio-television and Telecommunications Commission (CRTC).

An expanded numbering format will require significant investment in network infrastructure, support systems, and the Canadian Numbering Administrator’s (CNA's) numbering administration system. As such, following a CRTC Decision and approved Guidelines carriers would require three years to implement this option. Should Canada’s current number inventory deplete, prior to the implementation of the expanded format solution, or another solution is ultimately adopted, the CSCN recommends requesting additional non-geographic resources from the North American Numbering Plan Administrator (NANPA) for allocation in Canada.

# Background

In Section 4.7 of [CNRE138B](https://crtc.gc.ca/public/cisc/cn/CNRE138B.docx), the CSCN identified the following two Relief Options that would significantly extend the lifespan of Canada’s non geographic resources:

- Option 7A, use of 1+12-digit TNs [Telephone Numbers] in an unused 6YY NPA and Option 7B, use of 1+14-digit TNs in unused 6YY NPAs. Both solutions were identified as full solutions in that they are expected to provide sufficient non-geographic numbers for Canada’s needs until the NANPE [North American Numbering Plan Expansion] relief date, which support inter-network communication between non-geographic IoT [Internet of Things] applications and that can be achieved by the Commission and the Canadian industry independently (i.e., with no reliance on NANPA).

Option 7 A and B are further described as follows:

# Option 7: Extended 6YY NPAs

Option 7 makes more [Telephone Numbers] TNs available in unassigned 6YY NPAs by extending the number of digits from 1+10 to 1+12 (Option 7A) or 1+14 (Option 7B). Several European countries have adopted a form of this method for IoT/M2M services.[[1]](#footnote-1)

Both Options 7A and 7B would require at least two to three years to implement. This is due to required upgrades to carrier network elements and support systems, and the CNA’s number administration system. During this time period, more 6YY NPAs will be assigned, leaving fewer available 6YY NPAs for extension. However, the quantity of additional TNs that can be made available by extending the unused 6YY NPAs would be very high.

Both Options 7A and 7B would require that the CSCN consider the optimum block size for assignment.[[2]](#footnote-2) Also, NRUFs [Numbering Resource Utilization Forecasts] would have to be adjusted to accommodate the large volume of TNs that would become available.

# Option 7A: Use 1+12-digit TNs in unused 6YY NPA

Option 7A makes more TNs available in unused 6YY NPAs by expanding the number of digits from 1+10 to 1+12 (i.e., 1-688X-XNXX-XXXX.) Option 7A uses the fourth digit excluding the Country Code (the D-digit) to identify an extended number format. This option aligns with the 2002 NANPE plan.

Option 7A would be implemented in two phases. Phase 1 would be applied only to unassigned NPAs (i.e., 1-6880-XNXX-XXXX). The “0” in the D-digit (the fourth digit in a TN, excluding the Country Code) would allow for the ready detection of an expanded TN across any expanded-digit 6YY NPAs. Phase 1 would increase the number of phone numbers in an NPA by a factor of 10 (i.e., from 8,000,000 TNs to 80,000,000 TNs).

Phase 2 would unlock the D-digit to be any number from 0 to 9. The resulting format would be 1-688X-XNXX-XXXX. This is, in effect, implementation of the NANPE solution and would increase the quantity of telephone numbers by a factor of 10 compared to Phase 1, or a factor of 100 (i.e. from 8,000,000 TNs to 800,000,000 TNs) compared to 1+10. However, phase 2 can only be implemented after a 1+12-digit dialling plan has been implemented across all 6YY NPAs including assigned 6YY NPAs, thus implementation of phase 2 would entail extensive industry coordination and expense. Since the NANPE solution could be changed upon the next industry review, it would be prudent to defer the implementation of phase 2 to avoid unnecessary expenditure of resources.

# Option 7B: Use 1+14-digit TNs in unused 6YY NPAs

Option 7B makes more TNs available in unused 6YY NPAs by expanding the number of digits from 1+10 to 1+14 (i.e., 1-6YY-NXX-XXXX-XXXX). This is compliant with ITU-T E.164 standard. This would increase the quantity of telephone numbers by a factor of 10,000, so each 1+14 digit 6YY NPA would have about 80 billion TNs.

Even more TNs can be made available by unlocking the D-digit so that it can be any value from 0 to 9 (i.e., 1-6YY-XXX-XXXX-XXXX). This is compliant with ITU-T E.164 standard. This would increase the quantity of telephone numbers by an incremental 20 billion so each affected 6YY NPA would have about 100 billion TNs.

Unfortunately, the CSCN was unable to reach consensus about the 1+12 or 1+14 expansion options, with at least one carrier suggesting that a two-phase approach is not cost effective, and a single-phase approach would be preferable (i.e., change to 1+14 without an interim phase). As such, the CSCN submitted its preliminary report on 2 April 2024 to the CRTC recommending several partial solutions, while it further considered the full solution in an effort to reach consensus.

On 30 November 2024, the CNA sent out an email message to Canadian carriers with the following content:

In CSCN TIF Report CNRE138B, the CSCN agreed that future Non-Geographic NPAs 677 and 688 would be set aside as extended digit format NPAs but wanted to define the extended digit format in a subsequent report. In a recent contribution CNCO272A, it was proposed that the extended digit format to be used should be 1+14-digits and use 1 or 0 in the D-digit (first digit after 6YY) to indicate that the incoming number will be 1+14-digits.

A report making the final recommendation on the extended digit format is due very soon and so carriers areto report back to the [Secretary-CSCN@cnac.ca](mailto:Secretary-CSCN@cnac.ca) by **27 November 2024** if their organization has any objections to this 1+14 with D-digit approach.

The CNA did not receive a definitive response by the due date. Over the past few months, the CSCN has carefully considered these two options, reviewing the pros and cons of each, and have reached a consensus. The rationale and key considerations behind this decision are detailed below.

# Considerations

The following options have been identified by the CSCN for consideration:

1+12 digit

A 1+12-digit number would be 1+ABC-DEF-GHIJKL where digits ABC represent the NPA.

1+14-digit

A 1+14-digit number would be 1+ABC-DEF-GHIJ-KLMN where digits ABC represent the NPA.

NXX format vs XXX format

An extended digit number using the NXX format (where N is between 2 and 9 and X is any number from 0 to 9) would create 800 blocks in an NPA. Using the XXX format would create 1,000 blocks in an NPA. If using the D-digit indicator in conjunction with the NXX format, the blocks from 000 through199 (which are outside the conventional NXX blocks of 200 through 999) would create 200 extended format blocks.

D-digit indicator

A D-digit indicator of 0 or 1 could be used in both of the 1+12-digit and 1+14-digit implementations. A 0 or 1 would be used to indicate that a number is in an extended digit format whereas if the D-digit was a 2 through 9, it would indicate a 1+10-digit number.

Block size

Non-geographic blocks are assigned based on the DEF digits. Assuming the XXX format is being used in a 1+14-digit NPA, this would create 1,000 blocks of 100 million TNs. Using more digits to identify the blocks (i.e., DEFG, etc.) would create smaller blocks but increase the number of available blocks.

# Analysis

1+12 digit

Originally an option of a 1+12 digit NPA was considered in case some carriers were able to support 1+12 digits more quickly than 1+14 digits with the goal of eventually transitioning to 1+14 digits. There were no carriers that participated in CSCN discussions that indicated they could not support 1+14-digits and so it was deemed more efficient to go straight to 1+14 digits and only update network functionality once. This would mean that the changes would only need to be implemented once rather than in two phases.

The NANC IoT working group report published on 13 December 2024 included the 1+14 digit numbering format as an option. While 1+12 digits was discussed in the working group, it was not included in the report which would indicate that 1+12 digits is not being considered in the US.

The CSCN does not recommend the 1+12-digit format.

1+14-digits

A 1+14 digit NPA offers significant advantages as it would provide 100 times more individual TNs in an NPA than a 1+12-digit implementation and 10,000 times more numbers than the current implementation of 1+10 digits. Further, this format represents the maximum length for an E.164-compliant number with a 1-digit country code and would provide the maximum quantity of TNs per NPA.

Since the 1+14 digit number format was the only expansion format included in the NANC IoT working group report, which indicates it is being considered by the US industry as an option for extending the life of non-geographic NPAs.

Existing 1+10 digit non-geographic NPAs that are not exhausted prior to the implementation of an extended digit format NPA will continue to be available for assignment for those carriers that may require additional time to support the extended digit format in their networks.

Considering the significant quantity of TNs the 1+14 digit format will provide, the CSCN prefers the 1+14-digit resources be made available for assignment upon the implementation date regardless of the remaining inventory of 1+10 digit resources.

NXX format vs XXX format

An additional consideration that was raised during the new TIF 112 discussions was whether or not non-geographic numbers required codes being assigned in the traditional NXX format since they do not require any traditional network switch provisioning nor are they portable. The CSCN concluded that the former NXX number block identifier could be assigned in the XXX format to make more TNs available.

The CSCN prefers the use of the XXX format in the DEF positions for non-geographic numbers where the D-digit can be any number from 0 to 9. TNs would be assigned in the format of 1-6YY-XXX-XXXX-XXXX which would provision 100 billion TNs per NPA.

D-digit indicator

Non-geographic numbers in Canada are assigned using the 1+10-digit format of Country Code + 3-digit NPA + 3-digit NXX + 4-digit line number = 1+ABC-DEF-GHIJ. The CSCN recommends that the 1+14-digit number should be implemented and have the format 1+ABC-DEF-GHIJ-KLMN.

In this case, DEF represents the NXX where N is between 2 and 9 and X is any number from 0 to 9. Using a D-digit indicator of 0 or 1 would allow systems to expect a 14-digit format by just looking for a 0 or 1 in the D-digit.

For the purposes of this D-digit analysis, the CSCN assumed that blocks would be assigned using the DEF digits. This would allow for a consistent analysis between the different D-digit options. This is not meant as a recommendation on block size.

Table 1: Implementation of 14 digits with a D-Digit indicator:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NPA | CO code block start | CO Code block end | # of digits | # of blocks | # of TNs per block | Total # of TNs in the NPA |
| 677 | 000 | 199 | 1+14 | 200 | 100,000,000 | 20,000,000,000 |

Table 2: Implementation of 14 digits without a D-Digit indicator using NXX format (6YY-NXX):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NPA | CO code block start | CO Code block end | # of digits | # of blocks | # of TNs per block | Total # of TNs in the NPA |
| 677 | 200 | 999 | 1+14 | 800 | 100,000,000 | 80,000,000,000 |

Table 3: Implementation of 14 digits without a D-Digit indicator using XXX format (6YY-XXX):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| NPA | CO code block start | CO Code block end | # of digits | # of blocks | # of TNs per block | Total # of TNs in the NPA |
| 677 | 000 | 999 | 1+14 | 1,000 | 100,000,000 | 100,000,000,000 |

As shown in Table 1, by using the D-digit indicator (the D-digit can be any number from 0-9) to make 200 1+14 digit blocks, it would allow for a total of 20 billion TNs in a non-geographic NPA. If the entire NPA is designated as 1+14-digits using the NXX format, that creates 80 billion TNs in an NPA (see Table 2). If the entire NPA is designated as 1+14-digits and uses the XXX format, 100 billion TNs are created in an NPA (see Table 3). As can been seen from Table 2 and Table 3, omitting the D-digit indicator will provide at least 4 times as many numbers in an NPA compared to using the D-digit indicator.

The CSCN prefers the D-digit not be used as an indicator for an expanded digit format and the D-digit can be any number from 0 to 9.

Block size

When considering block size, one 1+14-digit NPA has 100 billion TNs. The smaller the number of TNs in a block size, the more efficiently the resource can be distributed among carriers.

The following table compares the options for dividing up a 1+14-digit NPA into various block sizes:

| Option | Block size  (# of TNs per block) | # of Blocks per 1+14 digit NPA | Administered Digits (block identifier digits)  (in bold) |
| --- | --- | --- | --- |
| 1 | 100M | 1K | 1+ABC-**DEF**-XXXX-XXXX |
| 2 | 10M | 10K | 1+ABC-**DEF-G**XXX-XXXX |
| 3 | 1M | 100K | 1+ABC-**DEF-GH**XX-XXXX |
| 4 | 100K | 1M | 1+ABC-**DEF-GHI**X-XXXX |
| 5 | 10K | 10M | 1+ABC-**DEF-GHIJ**-XXXX |

The 10K block size is the traditional block size (CO Code) that service providers have been using and is the preferred block size going forward because the smaller the block size, the more efficiently it can be administered. The CSCN considered a smaller block size (1K TNs per block) but concluded that since non-geographic numbers are not limited to Exchange Areas and could be utilized Canada-wide, a smaller block size would not be more efficient when considering the additional administrative burden. Whereas geographic CO Codes are limited to being assigned in individual Exchange Areas, a single non-geographic code can be utilized Canada-wide. Consequently, a carrier can use their entire non-geographic inventory to provide services across Canada instead of being restricted by Exchange Areas, as is the case with geographic CO Codes.

The following table of historic non-geographic assignments (as of 16 April 2025) illustrates that each of the seven carriers listed have more than one code assignment. Therefore, all of the carriers are already using more than 10,000 TNs. Given the limited number of companies currently using the resource and no carrier currently has only 1 code assigned, the CSCN believes that a block size smaller than 10,000 would not provide more efficiency.

|  |  |  |
| --- | --- | --- |
| **OCN** | **Company Name** | **# of Non-Geographic Codes Assigned** |
| 6574 | Bell Mobility | 140 |
| 154E | Iristel Inc | 120 |
| 346J | Iristel Inc | 50 |
| 8821 | Rogers Communications Canada Inc. (Wireless) | 44 |
| 9868 | SaskTel Mobility | 3 |
| 8086 | TELUS | 7 |
| 8303 | TELUS Mobility | 712 |

The January 2025 NRUF forecast notes that in the next 22 years, 8,433 blocks of 10,000 6YY TNs will be required. If a 1+14-digit NPA were used to address this forecast demand, that means that after 22 years, there would still be 9,991,567 (10,000,000 minus 8,433) blocks available for assignment in just one 1+14-digit NPA. The CSCN believes that a 1+14-digit NPA will likely have a significantly long lifespan based on current forecasts.

The CSCN noted that using a block size larger than the 10K block would require extensive IT and network infrastructure regression testing. Further, using a block size greater than 10K could leave more unused TNs in a block when a smaller amount is needed. Carriers that require more than 10,000 TNs can request multiple blocks to meet their demand forecasts. Therefore, the CSCN’s recommendation is to assign numbers based on the DEF-GHIJ block identifiers, which would provide 10 million blocks of 10,000 TNs per NPA.

# Conclusions

The CSCN has determined that the expanded digit format would require significant investment in network infrastructure, support systems, and the CNA's numbering administration system. As such, after the CRTC issues a Decision, the industry would require 3 years to implement this option. After the Decision, the CSCN would also need to update the *Canadian Non-Geographic Code Assignment Guideline.* Should Canada’s current non-geographic numbering inventory deplete, prior to the implementation of the 1+14-digit solution, or another solution is ultimately adopted, the CSCN recommends requesting additional non-geographic resources from NANPA for allocation in Canada.

The CSCN notes that IoT will consume many numbering resources and some of the 6YY IoT numbering resources may be expanded to meet this demand by extending the 6YY digit format from 1+10 digits to 1+14 digits. To accommodate this transition, it must be done on unassigned NPAs such as 677 and 688 to allow for new software development on network and IT platforms maintained by TSPs, infrastructure vendors, and numbering administrators.

The CSCN considered the use of a D-digit indicator and concluded that omitting the D-digit indicator will provide at least 4 times as many numbers in an NPA compared to using the D-digit indicator.

The CSCN considered block sizes within the 1+14 digit NPAs. The CSCN believes that utilizing a traditional block size of 10,000 TNs strikes the best balance between the efficient use of numbering resources and minimizing the impact on all infrastructure.

As the NANC report only explored alternative addressing and viability of potential options for IoT and does not provide a recommendation, ongoing monitoring of US developments is necessary.

Both Canada and the US can format non-geographic code resources with autonomy, as any roaming agreement would be based on International Mobile Subscription Identity (IMSI), not TN. Service providers would typically use non-geographic code resources for intercompany routing. The CSCN believes that any differences between Canada and the US in approach to TN length, block size or number format will not impact roaming between Canada and the US with devices using non-geographic code resources.

# Recommendations

The CSCN recommends that:

1. The CNA and service providers that seek new Non-Geographic numbering resources must be capable of using the expanded 1+14-digit format, no later than 3 years after the date of the Decision;
2. The CNA and service providers implement the extended digit NPAs 677 and 688 in the format of 1-6YY-XXX-XXXX-XXXX where X is a number range from 0 to 9, and the D-digit would change from an N (2 through 9) to an X (0 through 9); and
3. The CNA and service providers implement a block size of 10,000 TNs in 1+14-digit NPAs, resulting in the administered digits being the bolded characters in the following format: 1+6YY-**DEF-GHIJ**-XXXX.

1. CSCN TIF 112 Serial 6 (2022-Oct-11) and [Numbering: The IoT SIM move to 15 digits](https://www.orange-business.com/en/numbering-iot-sim-move-15-digits) (<https://www.orange-business.com/en/numbering-iot-sim-move-15-digits>) [↑](#footnote-ref-1)
2. Too long a block would be wasteful for Carriers with few devices to support. Too short a block would be inefficient in terms of assignment and would make it difficult to find large blocks of numbers for very large IoT applications. Further, it would be desirable for an extended 6YY code to align with the anticipated NANP Expansion (NANPE) format (e.g., phase 1: 1-688(0 or 1)-XNXX-XXXX phase 2: 1-688X-XNXX-XXXX). [↑](#footnote-ref-2)