Number Normalization

Phone number normalization is used to translate a phone number into a standard, or normal, form. If numbers are not normalized, it is difficult to compare two phone numbers to see if they are the same. By changing all numbers into a normal form, Streem Center can check and handle them efficiently.

The opposite of a normalized number is a localized number. This is a number that has been converted to the appropriate local form so that it is ready to be dialed.

Streem Center accepts two types of normalized phone numbers:

1. **A phone number that can be dialed from anywhere in the world, that starts with a country code and includes area code, city code, etc. (that is, 15203638594).** In other words, all the information necessary to dial the number should be in place.
2. **A phone number that starts with an 'x' with an extension that cannot be dialed from outside your company (that is, x643).**

> **Note:** A PBX extension which can be dialed directly from outside should be normalized to the international number form.

There are several places in **Master Configuration** where phone numbers need to be normalized. These are:

- **Number Normalization** section of **Master Configuration** is the master normalization table for Streem Center. Among its uses are normalizing numbers for fax broadcasts. It must be very complete.
- **Called Number Pattern Translation** option in **Port Configuration** normalizes inbound calls so Streem Center knows how to process them. The called number is what the caller dials to reach you.
- **Calling Number Pattern Translation** option in **Port Configuration** shows how the phone number received from the source is translated into a fully normalized number for Streem Center use. This table is only used where the phone company that serves the Streem Center site provides ANI or DNIS. The calling number is the number the caller calls from.
- **How to Dial A Phone Number** in the **Dialing** section in **Port Configuration** is created and works like the number normalization table. It is used to de-translate the normalized phone number into one the local switch understands so it can be dialed.

The rules discussed below apply to number normalization regardless of where in **Master Configuration** it is being performed.

How To Normalize Phone Numbers

Streem Center uses several tables to normalize phone numbers. In each one, there are two columns. The first column, or *pattern*, contains a list of non-normalized numbers as they might present to Streem Center. This number is the input. The second column, or *translation*, contains the normalized form of the number. This number is the output, after normalization.
When a number is going to be normalized, Streem Center scans the first column of the table for a match. When a match is found, the number is translated according to the entry in the second column. For example, the table might contain a line like this:

`5551234  12015551234` (add country and area code)

If Streem Center had to normalize the number `5551234,` it would scan the table until it found this line. The normalized number would be `12015551234`. (The country code, `1`, and the area code, `201`, are added).

Of course, the table cannot contain every possible phone number and its translation, so you can use two wildcard characters as shortcuts. Wildcards make it possible to use a single line of the table to normalize a whole category of phone numbers.

The first wildcard is the question mark (?). When used in the first column of the table, it represents any single digit. For example, the table might contain a line like this:

`555123?  1201555123?` (add country and area code)

In this case, ? represents `0,1,2,3,4,5,6,7,8`, and `9`; the line would match the numbers `5551230,5551231,5551232`, and so on up to `5551239`. The question mark in the second column tells Streem Center that the digit in the normalized number should match the digit in the original number of the first column. For example, `5551232` would be normalized as `12105551232.`

The second wildcard is the plus sign (+). It must be used as the last character of a number, and it represents all the rest of the digits. For example, the table might contain a line like this:

`555+  1201555+` (add country and area code)

In this case, the line would match any number starting with `555.` The plus sign in the second column tells Streem Center to put all the rest of the digits into the normalized number. For example, `5558734` would be normalized as `12015558734.`

When Streem Center looks for a number match, it scans the left column of the table from the top down. It stops looking at the first match it finds.

Note: The order of the lines in the table is important.

The normalization tables all include UP and DOWN buttons that let you move the lines in the table to their correct position.

Tips for Normalizing International Phone Numbers

North American phone numbers are always the same lengths (3-digit area code, 3-digit exchange

code, and the final four digits), but the whole world does not use this pattern. This makes it more difficult to normalize international numbers.

> **Note:** A Streem Center system installed in North America does not usually require information about international numbers in the Called Number or Calling Number tables, so this problem usually applies only to the Number Normalization table.

One shortcut is to mark international numbers with a special flag and leave the rest of the number unchanged. For example, the standard digits to begin dialing an international call from North America are 011. The line in the Number Normalization table to do this would be:

```
+          011+
```

Since this number matches any number, you should make this the last line in the table. This way, all other types of numbers will match earlier lines in the table, and those numbers that fail to match any other pattern are the international numbers.

If you use this method, then make an entry in the **Dialing** table to match any number starting with 011 and translate it to a dialable form. The following example applies if your PBX requires an 8 to reach a special trunk group for international calls:

```
011+       8011+
```

Number Normalization Table

This table is used to normalize phone numbers in fax broadcasts. As the broadcast list is being submitted to Streem Center, each number is normalized according to this table before being added to the fax queue. This table should have a line that matches each of the variations that might be used when faxes are being submitted for broadcast. Since these numbers usually come from fax broadcast lists, it should be very complete. For example, the list might contain short versions of numbers assumed to be local phone calls, or very short numbers assumed to be internal extensions. Some numbers might include an area code but not a country code. Some numbers might be complete and should not be changed.

The following example is a typical Number Normalization table:

```
x8???          12015558???          Extensions starting with 8 can be called from outside
x+             x+                   All other extensions are internal calls only.
8???           12015558???          4-digit numbers starting 8 can be called from outside.
????           x????                All other 4-digit numbers are internal extensions.
555????        1201555????          7-digit numbers, 555 exchange, assumed in area 201.
??????????     1??????????         10-digit numbers assumed to be in North America.
1+             1+                   A full North American number needs no change.
+              011+                 All other numbers assumed to be international.
```

Called Number Translation Table

The **called number** is the number dialed by the person calling Streem Center. The **Called Number Translation** table normalizes the called number. This table should contain a line to match each type of number that will be received as a called number. Since the called numbers all come from the same source (the phone system or the Port Group list), you can easily determine

the types of numbers.

For example, suppose the company uses a toll-free number `1-800-555-4321` to take customer calls. Once these calls reach the PBX, they are routed to extension `321`. Streem Center receives the digits from the PBX in a non-normalized form like `321` or `x321`. Use a line like one of the following to add the country code, area code, and exchange, which provides the normalized form of the number:

321	18005554321
x321	18005554321

The phone system may also be configured to send calls from PBX extensions to Streem Center, perhaps to make internal calls to test the system. The called numbers may not be reachable from outside the PBX, so they cannot be normalized to the international form. In that case, put a line like one of the following in the table:

439	x439	The number is an internal extension.
x439	x439	No change needed.
x+	x+	No change needed for any extension.
???	x???	Any 3-digit number is an extension.

Calling Number Translation Table

The **calling number** is the number from which the call to Streem Center was made. It is not always available, unless the phone system has a special feature such as ANI or DNIS, for example. This table normalizes the calling number. Because Streem Center supports several types of connections to phone systems, the content of the table will depend on the source of the incoming call information. This table should contain a line to match each type of number that will be received as a calling number. Since the calling numbers all come from the same source (the phone system), the types of numbers are easily determined.

In most cases, the phone system will provide the calling number in a nearly complete form. In North America, it should include the area code and the rest of the number. It may or may not include the country code. You may put a line like one of the following:

+	1+
`??????????`	`1??????????`

How to Dial a Phone Number

This table in the **Dialing** section of **Port Configuration** works the same as the various normalization tables, but its purpose is exactly the opposite; it is used to localize a number so it can be dialed out from Streem Center. This table has normalized numbers in the first column, and the second column shows how to dial that number in the selected port group. There is a separate table for each port group because different groups may be connected to different types of trunks that use different dialing methods. The table should contain a line for each type of normalized number likely to be encountered. Numbers that do not match any line in this table will not be dialed.

In a typical PBX, outside numbers need to be preceded by 9. Calls to local exchanges may have to omit the area code. In some cases a different digit such as 8 may precede international calls. Calls to internal extensions should be dialed according to the conventions of the PBX. Calls to numbers that are on the same PBX can be dialed as internal calls to avoid using outside trunks. Lines such as the following will cover these situations:

12015438+	8+	All calls to 5438xxx can be dialed internally.
1201555+	9555+	Local call. Do not dial area code.

1+	91+	All other N. American calls.
011+	8011+	International calls.
x+	+	Internal calls. Do not dial x

The table might also contain lines to handle special cases. For example, the PBX to extension `323` might rout a call to `555-9898` in area code `201`. (This might be a number for a fax machine, for example.) In that case, add a line to have Streem Center call the fax machine as an internal call:

12015559898	323

In rare situations, you may use this table to correct phone numbers. For example, if you have scheduled a fax broadcast and learn that one of the fax numbers in the list is incorrect, an entry in this table could translate the incorrect number. The line might look like this:

12015559428	12015559248

However, keep this type of translation to a minimum, and remove these lines as soon as practical.