# SoundStructure VoIP Interface Tech Tip Understanding Digit Maps

The SoundStructure VoIP Interface dialing software is smart. So smart that it knows when the number you've dialed is ready to be sent to the PBX without you having to manually press the 'Send' key. How does it do that? The SoundStructure VoIP Interface uses a digit map to solve this problem.

This tech tip describes how to use and modify digit maps and the digit map time-outs for the SoundStructure VoIP Interface. For additional information, see the Polycom UC Administrators Guide http://support.polycom.com/global/documents/support/setup_maintenance/products/voice/UC_Software_Admin_Guide_v4_0_1.pdf or Technical Bulletin TB11572 http://support.polycom.com/PolycomService/support/us/support/voice/soundpoint_ip/VoIP_Technical_Bulletins_pub.html.

## What's a digit map?

Digit maps are templates that match different sequences of digits that users dial as part of their interaction with their phone system. Digit maps only apply to *off-hook* dialing, i.e., when the user first takes the phone off-hook and then begins dialing digits, because with *on-hook* dialing, the digits are fully entered before the phone is taken off-hook. With off-hook dialing, when there is a match between the digits dialed and the digit map, the SoundStructure VoIP Interface sends the digits to the PBX to initiate the call. If there is not a match, the system waits for the user to enter more digits or press the send key to indicate dialing is complete. Digit maps were defined as part of the IETF and the detailed RFC may be found here: http://tools.ietf.org/html/rfc3435#section-2.1.5.

As an example of how a digit map can be used, consider that some end-users dial 4-digit extensions and want the phone to dial as soon as that 4$^{th}$ digit is entered while other end-users dial 5-digit extensions and only want the phone to dial as soon as the 5$^{th}$ digit is entered. Clearly the end-users dialing 5-digit extensions wouldn't be happy if the phone dialed immediately after the 4$^{th}$ digit was entered.

How do you specify when the phone number will be sent directly to the PBX? Well, you do this either by:

- Dialing the digits and then taking the phone off-hook  (on-hook dialing), or
- Taking the phone off-hook, dialing the digits and then pressing the Send button within SoundStructure Studio when you are done dialing the digits, or
- Using a digit map that is customized for how your end users dial phone numbers so the number will be dialed automatically once there is a match with the digit map.

Since most end users are familiar with the PSTN network where there is no 'send' key required, end users prefer to have the digits sent automatically once they've dialed a phone number.

The digit map of the default configuration of the Polycom SoundStructure VoIP Interface is defined in the VoIP configuration file, site.cfg, if you are using provisioning files, or from the Web Configuration Utility from Settings > SIP. If the digit map is set in the Web Configuration Utility, it will override any value set with the VoIP configuration files. You can reset the web configuration digit map to the default value with the Web Configuration Utility by clicking the **Reset to Default** button. The instructions provided in this tech note are applicable either to the site.cfg file or to the Web Configuration Utility.

To understand the digit map, let's look at the default digit map in the SoundStructure VoIP Interface:

$$[2\text{-}9]11|0T|011xxx.T|[0\text{-}1][2\text{-}9]xxxxxxxxx|[2\text{-}9]xxxxxxxxx|[2\text{-}9]xxxT \qquad (1)$$

This digit map shows there are 6 matching options, each separated by the vertical bar "|". Digit maps are processed left to right so generally the more specific matches are positioned earlier in the map and the more general matches are at the end of the digit map. The following table looks at each matching option in more detail.

| | |
|---|---|
| **[2-9]11** | This will match any 3 digit extension that starts with any of the numbers 2 through 9 and then has the digits 1 and 1. This matches the sequences of 211, 311, …, 911 and will then dial those digits immediately once a match has been found. |
| **0T** | This will match the digit 0 and, after a time-out of 3 seconds (defined in the Digit map Time-out), will send the 0 digit to the PBX. The "T" is what specifies that a time-out will be used to determine when to send the digits to the PBX. |
| **011xxx.T** | This will match any number starting with 011 and then has three more digits between 0 and 9 and then has zero or more digits after that. The '.' means it will match zero or more occurrences of the preceding construct, which in this case is any digit. A dial string that matches will be dialed after a time out of 3 seconds after the last digit is entered. This is the typical international long distance dialing string used in the US. An example match is: 0114512345678. |
| **[0-1][2-9]xxxxxxxxx** | This will match any number starting with a 0 or a 1 followed by any digit between 2 and 9 and then followed by 9 digits. This is the typical 10-digit long distance dialing in North America. An example match is 17703504100. |
| **[2-9]xxxxxxxxx** | This will match any number starting with a 2 through 9 and then followed by any 9 digits. This is the typical 10-digit local calling requirement of many North America regions. An example match is 7703504100. |
| **[2-9]xxxT** | This will match any four digit extension starting with the digits 2 through 9 followed by 3 more digits. After the last digit is entered the system will pause for the time-out and then dial the extension. An example match is: 2587. |

## Changing the Digit map

With the default digit map, it is not possible to dial 3-digit extensions and have the system dial automatically. If we want the system to dial a 3-digit extension automatically, we need to add a 3-digit extension into the digit map.  To do this we can edit the original digit map shown in (1) to the following digit map:

[2-9]11|0T|011xxx.T|[0-1][2-9]xxxxxxxxx|[2-9]xxxxxxxxx|[2-9]xxx|**[2-9]xxT**            (2)

In digit map (2) we removed the "T" time-out after the 4-digit map string so 4-digit extensions will be dialed immediately, and added the text "[2-9]xxT" to match any 3-digit extensions starting with 2 through 9 and added a time-out of 3 seconds before dialing the digits that have been collected.  The time-out was added to prevent the system from immediately dialing after three digits have been entered.  This allows us to support both 3-digit and 4-digit dialing as long as the fourth digit is entered before the default digit map time out of 3 seconds.

Alternatively we could have changed the digit map to support arbitrary extension dialing by changing the digit map as shown in (3).

[2-9]11|0T|011xxx.T|[0-1][2-9]xxxxxxxxx|[2-9]xxxxxxxxx|**[2-9]xx.T**            (3)

In digit map (3) the text "[2-9]xxxT" was changed to "[2-9]xx.T" which will match any 3-digit or longer extension that starts with the digits 2 through 9.  After the last digit is dialed, the system will wait for 3 seconds and then dial the extension.

Continuing, we could consolidate the digit map further to digit map (4).

[2-9]11|0T|011xxx.T|[0-1][2-9]xxxxxxxxx|[2-9]xx.T            (4)

The text "[2-9]xx.T" in digit map (4) will match any 10-digit number that starts with 2 through 9, and the number will be dialed after the time-out has expired.  In fact, any extension that starts with 2 through 9 and is at least 3 digits long will be dialed after the time-out.  In digit map (3), the same 10-digit number would be dialed as soon as the tenth digit was received because we did not have a 'T' in the [2-9]xxxxxxxxx entry.


## Generating Dial-Tone

If your users are used to dialing one or more digits and then hear local dialtone in the room, for example by dialing the digit 8, it is possible to have dial tone re-generated by using the text "," in the digit map.  As an example, consider the following digit map (5) where we included the ability to dial 7 digit numbers by first dialing the digit 8.

[2-9]11|0T|011xxx.T|[0-1][2-9]xxxxxxxxx|**8,[2-9]xxxxxxT**|[2-9]xx.T            (5)

After entering the digit "8", dial tone would be played again and then the resulting 7-digit number can be dialed. Because a total of 8 digits would be dialed, the PBX will receive the 8 digit sequence that starts with the initial "8" and the remaining 7 digits that were dialed.  In this example, if you also have a 4-digit extension that begins with 8

then you would hear dial tone after the first "8" was dialed because the digit 8 would match the 8 in the digit map.

If you don't want the "8" to be dialed but do need it to generate dial tone in the room, you can use a replacement mapping using the special character "R" to replace one string with a different string by using the expression: R*string$_1$*R*string$_2$*R to replace *string$_1$* with *string$_2$*. In this example we would change the digit map as shown next:

$$[2\text{-}9]11|0T|011xxx.T|[0\text{-}1][2\text{-}9]xxxxxxxxx|\textbf{R8RR,[2-9]xxxxxxT}|[2\text{-}9]xx.T \qquad (6)$$

In this example the digit 8 is replaced with an empty string which causes only the remaining 7 digits to be dialed as the "8" is not sent to the PBX.

## Digit map time-out

You can change the time-out from 3 seconds to any arbitrary value by editing the digit map time-out. By default the digit map time-out string has the form 3|3|3|3|3|3 where each vertical bar "|" is used to separate the time-outs to match the format of the digit map. To change the time-out for a particular entry, change the digit in the corresponding location in the digit map time-out.

As an example, consider digit map (7) shown below,

$$[2\text{-}9]11|0T|011xxx.T|[0\text{-}1][2\text{-}9]xxxxxxxxx|[2\text{-}9]xx.T \qquad (7)$$

To change the last time-out to 7 seconds you must set the digit map time-out to: 3|3|3|3|7 because the entry for which we are interested in extending the time-out is the fifth entry in the digit map as defined by the vertical bars "|". If you have too many digit map time-out values, they are ignored. If you have too few values, they default to 3 seconds.

Once you have made any changes to the Web Configuration Utility, click **Save** to store the changes in the SoundStructure VoIP interface. The SoundStructure VoIP Interface will automatically reboot once the digit map settings are changed. Remember, a custom digit map set in the Web Configuration Utility will take precedence over a digit map specified in a site.cfg configuration file if a provisioning server is used.

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