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# Advanced Options for Voice Services

This appendix provides additional information about configuring advanced options for voice services.

**STEP 1**

- **Optimizing Fax Completion Rates**
- **Configuring Dial Plans**

## Optimizing Fax Completion Rates

Issues can occur with fax transmissions over IP networks, even with the T.38 standard, which is supported by the ATA. You can adjust several settings on your ATA to optimize your fax completion rates.

**STEP 1** Ensure that you have enough bandwidth for the uplink and the downlink.

- For G.711 fallback, it is recommend to have approximately 100 kbps.
- For T.38, allocate at least 50 kbps.

**STEP 2** Click **Voice** in the menu bar, and then click **Line 1** or **Line 2** in the navigation tree.

**STEP 3** In the *Network Settings* section, enter the following settings:

- **Network Jitter Level**: very high
- **Jitter Buffer Adjustment**: no

**STEP 4** In the *Supplementary Service Subscription* section, enter the following settings:

- **Call Waiting Serv**: no
- **Three Way Call Serv:** no

**STEP 5** In the *Audio Configuration* section, enter the following settings to support T.38 fax:

- **Preferred Codec**: G.711u (USA) or G.711a (rest of the world)
- **Use pref. codec only**: yes
- **Silence Supp Enable**: no
- **Echo Canc Enable**: no
- **FAX Passthru Method:** ReINVITE

**STEP 6** Click **Submit** to save your settings or click **Cancel** to abandon the unsaved settings.

**STEP 7** If you are using a Cisco media gateway for PSTN termination, disable T.38 (fax relay) and enable fax using modem passthrough. For example:

```
modem passthrough nse payload-type 110 codec g711ulaw

fax rate disable

fax protocol pass-through g711ulaw
```

**Note:** If a T.38 call cannot be set-up, then the call automatically reverts to G.711 fallback.

**STEP 8** If you are using a Cisco media gateway, make sure the Cisco gateway is correctly configured for T.38 with the dial peer. For example:

```
fax protocol T38

fax rate voice

fax-relay ecm disable

fax nsf 000000

no vad
```

### Fax Troubleshooting

If you have problems sending or receiving faxes, complete the following steps:

**STEP 1** Verify that your fax machine is set to a speed between 7200 and 14400.

**STEP 2** Send a test fax in a controlled environment between two ATAs.

**STEP 3** Determine the success rate.

**STEP 4** Monitor the network and record the statistics for jitter, loss, and delay.

**STEP 5** If faxes fail consistently, capture a copy of the configuration as described below. You can then send this file to Technical Support.

a. In your web browser, enter the path for the configuration file:
`http://<ATA_Local_IP_Address>/admin/config.xml&xuser=<admin_user>&xpassword=<admin_password>`

b. On the **File** menu, choose **Save As**, and save the file with a filename such as *MyConfiguration.xml*.

**STEP 6** To enable logging, go to the *Voice > System* page, and set the IP address of your syslog and/or debug server. Set the Debug Level to 3. For more information, see **System, page 48**.

**NOTE:** You can also capture data using a sniffer trace.

**STEP 7** Identify the type of fax machine connected to the ATA.

**STEP 8** Contact technical support:

- If you are an end user of VoIP products, contact the reseller or service provider that supplied the equipment.
- If you are an authorized Cisco partner, contact Cisco technical support. For contact options, see: www.cisco.com/go/sbsc

# Configuring Dial Plans

Dial plans determine how dialed digits are interpreted and transmitted. They also determine whether the dialed number is accepted or rejected. You can use a dial plan to facilitate dialing or to block certain types of calls such as long distance or international. This section includes information that you need to understand dial plans, as well as procedures for configuring your own dial plans.

To edit a dial plan, click **Voice** on the menu bar, and then click **Line 1** or **Line 2** in the navigation tree. Scroll down to the *Dial Plan* section, and then enter the digit sequences in the **Dial Plan** field. For more information and examples, see the following topics:

- **Digit Sequences**
- **Acceptance and Transmission of the Dialed Digits**
- **Dial Plan Timer (Off-Hook Timer)**

- Interdigit Long Timer (Incomplete Entry Timer)
- Interdigit Short Timer (Complete Entry Timer)
- Resetting the Control Timers

## Digit Sequences

A dial plan contains a series of digit sequences, separated by the pipe character: | The entire collection of sequences is enclosed within parentheses. Each digit sequence within the dial plan includes a series of elements, which are individually matched to the keys that the user presses.

**NOTE** White space is ignored, but may be used for readability.

| Digit Sequence | Function |
|---|---|
| `0 1 2 3 4 5 6 7 8 9 0 * #` | Enter any of these characters to represent a key that the user must press on the phone keypad. |
| `x` | Enter `x` to represent any character on the phone keypad. |
| `[sequence]` | Enter characters within square brackets to create a list of accepted key presses. The user can press any one of the keys in the list.<br>▪ Numeric range: For example, you would enter `[2-9]` to allow the user to press any one digit from 2 through 9.<br>▪ Numeric range with other characters: For example, you would enter `[35-8*]` to allow the user to press 3, 5, 6, 7, 8, or *. |
| .<br>(period) | Enter a period for element repetition. The dial plan accepts zero or more entries of the digit. For example, `01.` allows users to enter 0, 01, 011, 0111, and so on. |

| Digit Sequence | Function |
|---|---|
| <dialed:substituted> | Use this format to indicate that certain dialed digits are replaced by other characters when the sequence is transmitted. The dialed digits can be zero or more characters.<br><br>**EXAMPLE 1**: `<8:1650>xxxxxxx`<br><br>When the user presses 8 followed by a seven digit number, the system automatically replaces the dialed 8 with 1650. If the user dials **85550112**, the system transmits **16505550112**.<br><br>**EXAMPLE 2**: `<:1>xxxxxxxxxx`<br><br>In this example, no digits are replaced. When the user enters a 10-digit string of numbers, the number 1 is added at the beginning of the sequence. If the user dials **9725550112**, the system transmits **19725550112.** |
| ,<br><br>(comma) | Enter a comma between digits to play an "outside line" dial tone after a user-entered sequence.<br><br>**EXAMPLE:** `9, 1xxxxxxxxx`<br><br>An "outside line" dial tone is sounded after the user presses 9, and the tone continues until the user presses 1. |
| !<br><br>(exclamation point) | Enter an exclamation point to prohibit a dial sequence pattern.<br><br>**EXAMPLE:** `1900xxxxxxx!`<br><br>The system rejects any 11-digit sequence that begins with 1900. |
| *xx | Enter an asterisk to allow the user to enter a 2-digit star code. |
| S0 or L0 | Enter S0 to reduce the short inter-digit timer to 0 seconds, or enter L0 to reduce the long inter-digit timer to 0 seconds. |

### Digit Sequence Examples

The following examples show digit sequences that you can enter in a dial plan.

In a complete dial plan entry, sequences are separated by a pipe character (|), and the entire set of sequences is enclosed within parentheses.

**EXAMPLE:** `([1-8]xx | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx | 8, <:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! | 9, 011xxxxxx. | 0 | [49]11 )`

**NOTE** Red text is used to highlight the elements that are explained in the examples.

- **Extensions on your system**

  ( **[1-8]xx** | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx | 8, <:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! | 9, 011xxxxxx. | 0 | [49]11 )

  **[1-8]xx** Allows a user dial any three-digit number that starts with the digits 1 through 8. If your system uses four-digit extensions, you would instead enter the following string: [1-8]xxx

- **Local dialing with seven-digit number**

  ( [1-8]xx | **9, xxxxxxx** | 9, <:1>[2-9]xxxxxxxxx | 8, <:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! | 9, 011xxxxxx. | 0 | [49]111)

  **9, xxxxxxx** After a user presses 9, an external dial tone sounds. The user can then dial any seven-digit number, as in a local call.

- **Local dialing with 3-digit area code and a 7-digit local number**

  ( [1-8]xx | 9, xxxxxxx | **9, <:1>[2-9]xxxxxxxxx** | 8,<:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! 9, 011xxxxxx. | 0 | [49]11 )

  **9, <:1>[2-9]xxxxxxxxx** This example is useful where a local area code is required. After a user presses 9, an external dial tone sounds. The user must enter a 10-digit number that begins with a digit 2 through 9. The system automatically inserts the 1 prefix before transmitting the number to the carrier.

- **Local dialing with an automatically inserted 3-digit area code**

  ( [1-8]xx | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx | **8, <:1212>xxxxxxx** | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! | 9, 011xxxxxx. | 0 | [49]11 )

**8, <:1212>xxxxxxx** This is example is useful where a local area code is required by the carrier but the majority of calls go to one area code. After the user presses 8, an external dial tone sounds. The user can enter any seven-digit number. The system automatically inserts the 1 prefix and the 212 area code before transmitting the number to the carrier.

- **U.S. long distance dialing**

  ( [1-8]xx | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx |8, <:1212>xxxxxxx | **9, 1 [2-9] xxxxxxxxx** | 9, 1 900 xxxxxxx ! | 9,011xxxxxx. | 0 | [49]11 )

  **9, 1 [2-9] xxxxxxxxx** After the user presses 9, an external dial tone sounds. The user can enter any 11-digit number that starts with 1 and is followed by a digit 2 through 9.

- **Blocked number**

  ( [1-8]xx | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx |8, <:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | **9, 1 900 xxxxxxx !** |9, 011xxxxxx. | 0 | [49]11 )

  **9, 1 900 xxxxxxx !** This digit sequence is useful if you want to prevent users from dialing numbers that are associated with high tolls or inappropriate content, such as 1-900 numbers in the United States. After the user press 9, an external dial tone sounds. If the user enters an 11-digit number that starts with the digits 1900, the call is rejected.

- **U.S. international dialing**

  ( [1-8]xx | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx | 8, <:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! | **9, 011xxxxxx.** | 0 | [49]11 )

  **9, 011xxxxxx.** After the user presses 9, an external dial tone sounds. The user can enter any number that starts with 011, as in an international call from the United States.

- **Informational numbers**

  ( [1-8]xx | 9, xxxxxxx | 9, <:1>[2-9]xxxxxxxxx | 8, <:1212>xxxxxxx | 9, 1 [2-9] xxxxxxxxx | 9, 1 900 xxxxxxx ! | 9, 011xxxxxx. | **0 | [49]11** )

**0 | [49]11** This example includes two digit sequences, separated by the pipe character. The first sequence allows a user to dial 0 for an operator. The second sequence allows the user to enter 411 for local information or 911 for emergency services.

## Acceptance and Transmission of the Dialed Digits

When a user dials a series of digits, each sequence in the dial plan is tested as a possible match. The matching sequences form a set of candidate digit sequences. As more digits are entered by the user, the set of candidates diminishes until only one or none are valid. When a terminating event occurs, the ATA either accepts the user-dialed sequence and initiates a call, or else rejects the sequence as invalid. The user hears the reorder (fast busy) tone if the dialed sequence is invalid.

The following table explains how terminating events are processed.

| Terminating Event | Processing |
|---|---|
| The dialed digits do not match any sequence in the dial plan. | The number is rejected. |
| The dialed digits exactly match one sequence in the dial plan. | ▪ If the sequence is allowed by the dial plan, the number is accepted and is transmitted according to the dial plan.<br>▪ If the sequence is blocked by the dial plan, the number is rejected. |
| A timeout occurs. | The number is rejected if the dialed digits are not matched to a digit sequence in the dial plan within the time specified by the applicable interdigit timer.<br>▪ The Interdigit Long Timer applies when the dialed digits do not match any digit sequence in the dial plan. Default setting: 10 seconds<br>▪ The Interdigit Short Timer applies when the dialed digits match one or more candidate sequences in the dial plan. Default setting: 3 seconds |

| Terminating Event | Processing |
|---|---|
| The user presses the # key. | ▪ If the sequence is complete and is allowed by the dial plan, the number is accepted and is transmitted according to the dial plan.<br>▪ If the sequence is incomplete or is blocked by the dial plan, the number is rejected. |

## Dial Plan Timer (Off-Hook Timer)

You can think of the Dial Plan Timer as "the off-hook timer." This timer starts counting when the phone goes off hook. If no digits are dialed within the specified number of seconds, the timer expires and the null entry is evaluated. Unless you have a special dial plan string to allow a null entry, the call is rejected. Default setting: 5

### Syntax for the Dial Plan Timer

`(Ps<:n> | dial plan )`

- s: The number of seconds; if no number is entered after `P`, the default timer of 5 seconds applies.
- n: (optional): The number to transmit automatically when the timer expires; you can enter a valid number. No wildcard characters are allowed because the number will be transmitted as shown. If you omit the number substitution, <:n>, then the user hears a reorder (fast busy) tone after the specified number of seconds.

### Examples for the Dial Plan Timer

**NOTE** Red text is used to highlight the elements that are explained in the examples.

- **Allow more time for users to start dialing after taking a phone off hook.**

  (**P9** | (9,8<:1408>[2-9]xxxxxx | 9,8,1[2 9]xxxxxxxxx | 9,8,011xx. | 9,8,xx.|[1-8]xx)

  **P9** After taking a phone off hook, a user has 9 seconds to begin dialing. If no digits are pressed within 9 seconds, the user hears a reorder (fast busy) tone. By setting a longer timer, you allow more time for users to enter the digits.

  xx This code allows the entry of one or more digits. Do not use a single x,

allowing 0 or more digits. This setting will produce unwanted results especially if you are deploying timers.

- **Create a hotline for all sequences on the System Dial Plan**

  (**P9**<:23> | (9,8<:1408>[2-9]xxxxxx | 9,8,1[2-9]xxxxxxxxx | 9,8,011xx. | 9,8,xx.|[1-8]xx)

  **P9**<:23> After taking the phone off hook, a user has 9 seconds to begin dialing. If no digits are pressed within 9 seconds, the call is transmitted automatically to extension 23.

- Create a hotline on a line button for an extension

  **(P0 <:1000>)**

  With the timer set to 0 seconds, the call is transmitted automatically to the specified extension when the phone goes off hook.

## Interdigit Long Timer (Incomplete Entry Timer)

You can think of this timer as the “incomplete entry” timer. This timer measures the interval between dialed digits. It applies as long as the dialed digits do not match any digit sequences in the dial plan. Unless the user enters another digit within the specified number of seconds, the entry is evaluated as incomplete, and the call is rejected. Default setting: 10 seconds

**NOTE** This section explains how to edit a timer as part of a dial plan. Alternatively, you can modify the Control Timer that controls the default interdigit timers for all calls. See **Resetting the Control Timers, page 146**.

**Syntax for the Interdigit Long Timer**

L:*s,* ( *dial plan* )

s: The number of seconds; if no number is entered after `L:`, the default timer of 5 seconds applies. The timer sequence appears to the left of the initial parenthesis for the dial plan.

**Example for the Interdigit Long Timer**

**L:15,** (9,8<:1408>[2-9]xxxxxx | 9,8,1[2-9]xxxxxxxxx | 9,8,011xx. | 9,8,xx.|[1-8]xx)

**L:15,** This dial plan allows the user to pause for up to 15 seconds between digits before the Interdigit Long Timer expires.

## Interdigit Short Timer (Complete Entry Timer)

You can think of this timer as the “complete entry” timer. This timer measures the interval between dialed digits. It applies when the dialed digits match at least one digit sequence in the dial plan. Unless the user enters another digit within the specified number of seconds, the entry is evaluated. If it is valid, the call proceeds. If it is invalid, the call is rejected. Default setting: 3 seconds

**Syntax for the Interdigit Short Timer**

**SYNTAX 1:** S:*s,* ( *dial plan* )

Use this syntax to apply the new setting to the entire dial plan within the parentheses.

**SYNTAX 2:** *sequence* Ss

Use this syntax to apply the new setting to a particular dialing sequence.

s: The number of seconds; if no number is entered after S, the default timer of 5 seconds applies.

**Examples for the Interdigit Short Timer**

**Set the timer for the entire dial plan.**

**S:6,**(9,8<:1408>[2-9]xxxxxx | 9,8,1[2-9]xxxxxxxxx | 9,8,011xx. | 9,8,xx.|[1-8]xx)

**S:6,** While entering a number with the phone off hook, a user can pause for up to 15 seconds between digits before the Interdigit Short Timer expires.

**Set an instant timer for a particular sequence within the dial plan.**

(9,8<:1408>[2-9]xxxxxx | **9,8,1[2-9]xxxxxxxxxS0** | 9,8,011xx. | 9,8,xx.|[1-8]xx)

**9,8,1[2-9]xxxxxxxxxS0** With the timer set to 0, the call is transmitted automatically when the user dials the final digit in the sequence.

## Resetting the Control Timers

You can use the following procedure to reset the default timer settings for all calls.

**NOTE** To edit a timer setting only for a particular digit sequence or type of call, you can edit the dial plan. See **Digit Sequences, page 139**.

**STEP 1** Log in to the configuration utility. If prompted, enter the administrative logon provided by the Service Provider. The default username and password are both **admin**.

**STEP 2** Under the Voice menu, click **Regional**.

**STEP 3** In the *Control Timer Values* section, enter the desired values in the *Interdigit Long Timer* field and the *Interdigit Short Timer* field. See the definitions at the beginning of this section.