



Dial Planning

A dial plan essentially describes the number and pattern of digits that a user dials to reach a particular telephone number. Access codes, area codes, specialized codes, and combinations of the number of digits dialed are all part of a dial plan. For instance, the North American public switched telephone network (PSTN) uses a 10-digit dial plan that includes a 3-digit area code and a 7-digit telephone number. Most PBXs support variable length dial plans that use 3 to 11 digits. Dial plans must comply with the telephone networks to which they connect. Only totally private voice networks that are not linked to the PSTN or to other PBXs can use any dial plan they choose.

Dial plans on Cisco routers are manually defined using dial peers. Dial peers are similar to static routes; they define where calls originate and terminate and what path the calls take through the network. Attributes within the dial peer configuration determine which dialed digits the router collects and forwards to telephony devices. Dial peer configuration allows you to implement both fixed- and variable-length dial plans for your existing voice network and enables you to adjust to future scalability needs that may arise as your voice network expands or contracts.

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Fixed-Length Dial Plans

Fixed-length dialing plans, in which all the dial peer destination patterns have a fixed length, are sufficient for most voice networks because the telephone number strings are of known lengths. Some voice networks, however, require variable-length dial plans, particularly for international calls, which use telephone numbers of different lengths.

If you enter the timeout T-indicator at the end of the destination pattern in an outbound voice-network dial peer, the router accepts a fixed-length dial string and then waits for additional dialed digits. The timeout character must be an uppercase T. The following dial peer configuration shows how the T-indicator is set to allow variable-length dial strings:

```
dial-peer voice 1 voip
destination-pattern 2222T
session target ipv4:10.10.1.1
```



In the example, the router accepts the digits 2222, and then waits for an unspecified number of additional digits. The router can collect up to 31 additional digits, as long as the interdigit timeout has not expired. When the interdigit timeout expires, the router places the call.

The default value for the interdigit timeout is 10 seconds. Unless the default value is changed, using the T-indicator adds 10 seconds to each call setup because the call is not attempted until the timer has expired (unless the # character is used as a terminator). You should therefore reduce the voice-port interdigit timeout value if you use variable-length dial plans. You can change the interdigit timeout by using the **timeouts inter-digit** command in voice-port configuration mode.

The calling party can immediately terminate the interdigit timeout by entering the # character. If the # character is entered while the router is waiting for additional digits, the # character is treated as a terminator; it is not treated as part of the dial string or sent across the network. But if the # character is entered before the router begins waiting for additional digits (meaning that the # is entered as part of the fixed-length destination pattern), then the # character is treated as a dialed digit.

For example, if the destination pattern is configured as 2222 . . T, then the entire dialed string of 2222#9999 is collected, but if the dialed string is 2222#99#99, the #99 at the end of the dialed digits is not collected because the final # character is treated as a terminator. You can change the termination character by using the **dial-peer terminator** command.


Note

In most cases, you must configure the T-indicator only when the router uses two-stage dialing. If direct inward dialing (DID) is configured in the inbound plain old telephone system (POTS) dial peer, the router uses one-stage dialing, which means that the full dialed string is used to match outbound dial peers. The only exception is when the **isdn overlap-receiving** command is configured; the ISDN overlap-receiving feature requires the T-indicator.

Variable-Length Dial Plans

In most voice configurations, fixed-length dialing plans, in which all the dial peer destination patterns have the same length, are sufficient because the telephone number strings are all the same length. However, in some voice network configurations, variable-length dial plans are required, especially if the network connects two or more countries where telephone number strings could be different lengths.

If you enter the “T” timer character in the destination pattern for your dial peer, the router can be configured to accept a fixed-length dial string, and then wait for additional dialed digits. For example, the following dial peer configuration shows how the T character can be set to allow variable-length dial strings:

```
dial peer voice 1 pots
destination-pattern 2222T
port 1/1
```

In this example, the router accepts the digits 2222, and then waits for an unspecified number of dialed digits. If digits continue to be entered before the interdigit timeout expires, then the router will continue to gather up to 31 additional digits. Once the interdigit timeout expires, however, the router places the call. You can configure the interdigit timeout value by using the **timeouts inter-digit** command in voice-port configuration mode.

The interdigit timeout timer can be terminated by entering the “#” character. If the # character is entered while the router is waiting to accept additional digits, the # character is treated as an end-dial accelerator. The # character is not treated as an actual digit in the destination pattern and is not sent as part of the dialed string across the network.

However, if the # character is entered before the router is ready to accept additional digits (meaning before the “T” character is entered in the destination pattern), then the # character is treated as a dialed digit. For example, if a destination pattern is configured with the string 2222...T, then the digits 2222#####1234567 can be gathered, but the digits 2222#####1234#67 cannot be gathered because the final # character is treated as a terminator.

The default value for the interdigit timeout is 10 seconds. If the duration is not changed, using the “T” timer adds 10 seconds to each call setup time because the call is not attempted until the timer expires (unless the # character is used as a terminator). Because of this dependency, if a variable-length dial plan is used, the interdigit timeout should be reduced to reduce the call setup time. For more information, refer to the [Variable-Length Matching](#) section.

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