Understanding and Troubleshooting Analog E&M Start Dial Supervision Signaling

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Contents

Introduction

This document discusses analog recEive and transMit (E&M) Start Dial Supervision signaling. Start Dial Supervision is the line protocol that defines how the equipment seizes the E&M trunk and passes the address signaling information (sends dual tone multifrequency (DTMF) digits). The three main start dial supervision protocols used on E&M circuits are Immediate Start, Wink Start, and Delay Dial.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these hardware versions:

- Cisco 1750, 2600, 2800, 3600, 3800, and VG200 routers

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Background Information

You can use this document as a troubleshooting reference for Start Dial supervision problems between Cisco router/gateways and private branch exchange (PBX)/Telco equipment.

For an overview of Analog E&M, refer to Voice – Analog E&M Signaling Overview.

For information on Analog E&M interface Types (I – V) and wiring issues, refer to Understanding and Troubleshooting Analog E & M Interface Types and Wiring Arrangements.

Wink Start Signaling

Wink is the most commonly used protocol. This is the Wink Start operation process (see the diagram):

1. Originating side seizes the trunk by going off–hook.
2. Terminating side remains idle (on–hook) until the digit collection equipment is attached.
3. Once the terminating side is ready, it sends a wink. A wink is an on–hook to off–hook to on–hook transition. This transition period ranges from 100 to 350 ms (see the diagram).
4. Once the origination side receives the wink, (which is interpreted as an indication to proceed), it sends the address (digits) information.
5. The call is then routed to its destination.
6. When the distant end answers, the terminating side signals answer supervision towards the originating side by going off–hook.
7. Both ends remain off–hook for the duration of the call.
8. Either end can disconnect the call by going on–hook.

The main reason for Wink Start (over Immediate Start) is to ensure that the side that receives the DTMF digits is ready to receive them. For PBX and central office (CO) products, the DTMF receivers are a shared resource and there may be less of them than there are total lines and trunks. Another reason is the glare reduction. Glare occurs when both ends of the trunk attempt to seize the trunk at the same time.
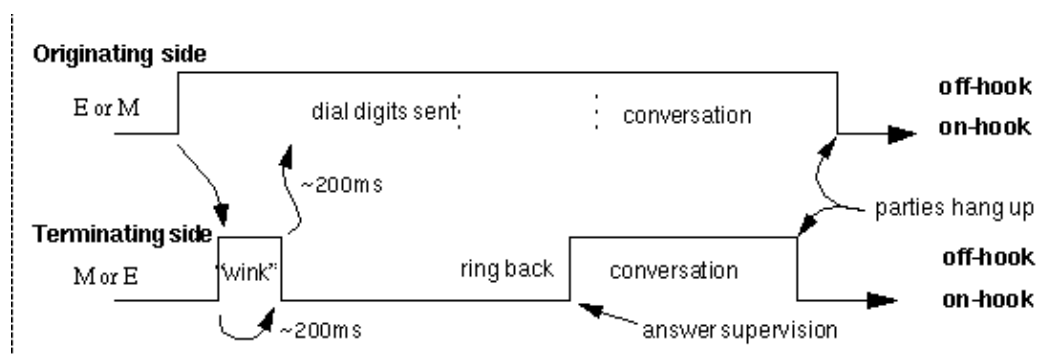
In Cisco 1750, 2600, 2800, 3600, 3800, and VG200 routers (using an E&M Voice Interface Card [VIC]), (with an E&M analog personality module [APM]), the default wink delay is 200 ms. See the Verify Wink Start Signaling Delay output for more information on how to verify and modify the wink delay parameters.

Verify Wink Start Signaling Delay

```
3660-2#show voice port 1/0/0

recEive And transMit 1/0/0 Slot is 1, Sub-unit is 0, Port is 0
 Type of VoicePort is E&M
 Operation State is DORMANT
 Administrative State is UP
```

```
No Interface Down Failure
Description is not set
Noise Regeneration is enabled
Non Linear Processing is enabled
Non Linear Mute is disabled
Non Linear Threshold is -21 dB
Music On Hold Threshold is Set to -38 dBm
In Gain is Set to 0 dB
Out Attenuation is Set to 0 dB
Echo Cancellation is enabled
Echo Cancellation NLP mute is disabled
Echo Cancellation NLP threshold is -21 dB
Echo Cancel Coverage is set to 8 ms
Playout-delay Mode is set to adaptive
Playout-delay Nominal is set to 60 ms
Playout-delay Maximum is set to 200 ms
Playout-delay Minimum mode is set to default, value 40 ms
Playout-delay Fax is set to 300 ms
Connection Mode is normal
Connection Number is not set
Initial Time Out is set to 10 s
Interdigit Time Out is set to 10 s
Call Disconnect Time Out is set to 3 s
Ringing Time Out is set to 180 s
Wait Release Time Out is set to 30 s
Companding Type is u-law
Region Tone is set for US

Analog Info Follows:
Currently processing none
Maintenance Mode Set to None (not in mtc mode)
Number of signaling protocol errors are 0
Impedance is set to 600r Ohm
Station name None, Station number None
Translation profile (Incoming):
Translation profile (Outgoing):

Voice card specific Info Follows:
Operation Type is 2-wire
E&M Type is 1
Signal Type is wink-start
Dial Out Type is dtmf
In Seizure is inactive
Out Seizure is inactive
Digit Duration Timing is set to 100 ms
InterDigit Duration Timing is set to 100 ms
Pulse Rate Timing is set to 10 pulses/second
InterDigit Pulse Duration Timing is set to 750 ms
Clear Wait Duration Timing is set to 400 ms
Wink Wait Duration Timing is set to 200 ms
Wait Wink Duration Timing is set to 550 ms
Wink Duration Timing is set to 200 ms
Delay Start Timing is set to 300 ms
Delay Duration Timing is set to 2000 ms
Dial Pulse Min. Delay is set to 140 ms
Percent Break of Pulse is 60 percent
Auto Cut-through is disabled
Dialout Delay is 70 ms
```

Modify the Wink Timing Parameters

To adjust the maximum amount of time to wait for the wink signal after it sends seizure, use the voice-port command **timing wait-wink** *<msec>* . The default is 550 ms.

To adjust the duration of the wink, use the voice–port command **timing wink–duration** *<msec>* . The default is 200 ms.

To adjust the amount of time which the voice–port waits for a wink from a connected system, use the voice–port command **timing wink–wait** *<msec>* . The default is 200 ms.

```
3660-2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
3660-2(config)#voice-port 1/0/0
3660-2(config-voiceport)#timing ?
  clear-wait         time of inactive seizure signal to declare call cleared in
                     milliseconds
  delay-duration     Max delay signal duration for delay dial signaling in
                     milliseconds
  delay-start        Timing of generation of delay start sig from detect
                     incoming seizure in milliseconds
  dial-pulse         dial pulse
  dialout-delay      delay before sending out digit or cut-thru
  digit              DTMF digit duration in milliseconds
  hookflash-in       Hookflash input duration in milliseconds
  inter-digit        DTMF inter-digit duration in milliseconds
  percentbreak       the break period of a dialing pulse
  pulse              pulse dialing rate in pulses per second
  pulse-inter-digit  pulse dialing inter-digit timing in milliseconds
  wait-wink          Max time to wait for wink signal after sending outgoing
                     seizure in milliseconds
  wink-duration      Max wink duration for wink start signaling in
                     milliseconds
  wink-wait          Time to wait before sending wink signal after detecting
                     incoming seizure in milliseconds

3660-2(config-voiceport)#timing wait-wink ?
  <100-5000>  milliseconds
3660-2(config-voiceport)#timing wait-wink 300
3660-2(config-voiceport)#timing wink-duration ?
  <50-3000>  milliseconds
3660-2(config-voiceport)#timing wink-duration 250
3660-2(config-voiceport)#timing wink-wait ?
  <100-5000>  milliseconds
3660-2(config-voiceport)#timing wink-wait 350
```

For more information on the timing commands, refer to Multiservice Applications Commands.

Immediate Start Signaling

Immediate Start signaling is the most basic protocol. The originating side goes off–hook, waits for a finite period of time (200 ms, for example), then sends the dial digits without regard to the far end (refer to the diagram).

The Immediate Start signaling method is less reliable than Wink Start. In Immediate Start, there is no wink from the end that receives the call to signify that it is ready to accept digits. In some situations, the PBX may be under heavy load and not able to switch a DTMF receiver in place quickly enough to receive the digits from the Cisco product. In that case, the call fails to complete because the Cisco product sends the DTMF digits before the PBX is ready to accept them. Therefore, for maximum reliability, Wink Start is preferred over Immediate Start.
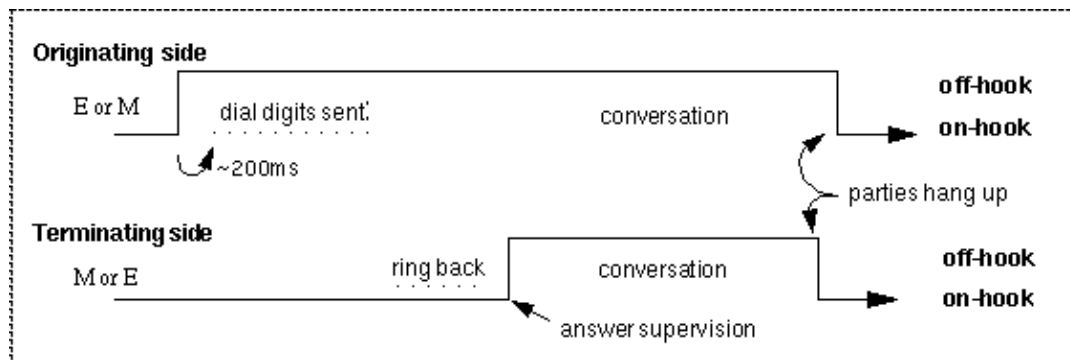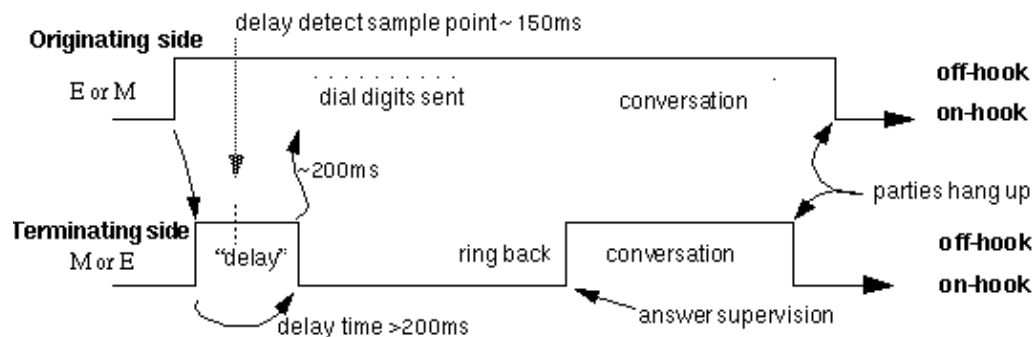
Delay Dial Signaling

The Delay Dial operation process is shown here (refer to the diagram):

1. The originating side seizes the trunk by going off–hook.
2. The terminating side responds to the seizure by going off–hook.
3. The terminating side remains off–hook until it is ready to receive address information.
4. When the terminating side is ready, it goes on–hook. The off–hook interval is the delay dial signal.
5. The originating side starts sending address information.
6. The call is routed to its destination.
7. When the distant end answers, the terminating side signals answer supervision towards the originating side by going off–hook.
8. Both ends remain off–hook for the duration of the call.
9. Either end can disconnect the call by going on–hook.

Delay Dial is created because there are still problems in the field with Wink Start. There is equipment in the field that sends a wink, but it was not ready to receive digits the very instant after it sent the wink.

In Cisco 1750, 2600, 2800, 3600, 3800, and VG200 (using an E&M VIC), the default wink delay is 200 ms. See the Verify Delay Dial Signaling Delay sample output for more information on how to verify and modify the Delay Dial signaling parameters.

Verify Delay Dial Signaling Delay

```
3660-2#show voice port 1/0/1

recEive And transMit 1/0/1 Slot is 1, Sub-unit is 0, Port is 1
 Type of VoicePort is E&M
 Operation State is DORMANT
 Administrative State is UP
 No Interface Down Failure
 Description is not set
 Noise Regeneration is enabled
```

```
Non Linear Processing is enabled
Non Linear Mute is disabled
Non Linear Threshold is -21 dB
Music On Hold Threshold is Set to -38 dBm
In Gain is Set to 0 dB
Out Attenuation is Set to 0 dB
Echo Cancellation is enabled
Echo Cancellation NLP mute is disabled
Echo Cancellation NLP threshold is -21 dB
Echo Cancel Coverage is set to 8 ms
Playout-delay Mode is set to adaptive
Playout-delay Nominal is set to 60 ms
Playout-delay Maximum is set to 200 ms
Playout-delay Minimum mode is set to default, value 40 ms
Playout-delay Fax is set to 300 ms
Connection Mode is normal
Connection Number is not set
Initial Time Out is set to 10 s
Interdigit Time Out is set to 10 s
Call Disconnect Time Out is set to 3 s
Ringing Time Out is set to 180 s
Wait Release Time Out is set to 30 s
Companding Type is u-law
Region Tone is set for US

Analog Info Follows:
Currently processing none
Maintenance Mode Set to None (not in mtc mode)
Number of signaling protocol errors are 0
Impedance is set to 600r Ohm
Station name None, Station number None
Translation profile (Incoming):
Translation profile (Outgoing):

Voice card specific Info Follows:
Operation Type is 2-wire
E&M Type is 1
Signal Type is delay-dial
Dial Out Type is dtmf
In Seizure is inactive
Out Seizure is inactive
Digit Duration Timing is set to 100 ms
InterDigit Duration Timing is set to 100 ms
Pulse Rate Timing is set to 10 pulses/second
InterDigit Pulse Duration Timing is set to 750 ms
Clear Wait Duration Timing is set to 400 ms
Wink Wait Duration Timing is set to 200 ms
Wait Wink Duration Timing is set to 550 ms
Wink Duration Timing is set to 200 ms
Delay Start Timing is set to 300 ms
Delay Duration Timing is set to 2000 ms
Dial Pulse Min. Delay is set to 140 ms
Percent Break of Pulse is 60 percent
Auto Cut-through is disabled
Dialout Delay is 300 ms
```

Modify the Delay Dial Parameters

To adjust the delay signal duration, use the voice-port command **timing delay-duration** *<msec>* . The default is 2000 ms.

To adjust the minimum delay before line seizure for outbound calls, use the voice-port command **timing delay-start** *<msec>* . The default is 300 ms.

```
3660-2(config)#voice-port 1/0/1
3660-2(config-voiceport)#timing ?
  clear-wait        time of inactive seizure signal to declare call cleared in
                    milliseconds
  delay-duration    Max delay signal duration for delay dial signaling in
                    milliseconds
  delay-start       Timing of generation of delay start sig from detect
                    incoming seizure in milliseconds
  dial-pulse        dial pulse
  dialout-delay     delay before sending out digit or cut-thru
  digit             DTMF digit duration in milliseconds
  hookflash-in      Hookflash input duration in milliseconds
  inter-digit       DTMF inter-digit duration in milliseconds
  percentbreak      the break period of a dialing pulse
  pulse             pulse dialing rate in pulses per second
  pulse-inter-digit pulse dialing inter-digit timing in milliseconds
  wait-wink         Max time to wait for wink signal after sending outgoing
                    seizure in milliseconds
  wink-duration     Max wink duration for wink start signaling in
                    milliseconds
  wink-wait         Time to wait before sending wink signal after detecting
                    incoming seizure in milliseconds

3660-2(config-voiceport)#timing delay-duration ?
  <100-5000>  milliseconds
3660-2(config-voiceport)#timing delay-duration 1000

3660-2(config-voiceport)#timing delay-start ?
  <20-2000>  milliseconds
3660-2(config-voiceport)#timing delay-start 100
```

For more information on the timing commands, refer to Multiservice Applications Commands.

Start Dial Supervision Mismatches

At times, the PBX has a different Start Dial Supervision protocol for inbound and outbound calls. This can lead to erratic behavior if the far end is not configured to properly handle this condition. This general rule set applies:

- An Immediate Start interface can usually originate a call to a Wink Start interface.
- An Immediate Start interface can usually place a call to a Delay Dial interface *if* the delay pulse is shorter than the Immediate Start delay. Otherwise, operation is erratic.
- A Wink Start interface can usually originate a call into a Delay Dial interface *if* there is a delay pulse. Otherwise, the call hangs with a 50 percent chance of working or not.
- A Delay Dial interface can originate a call into an Immediate Start or Wink Start interface.

Related Information

- **Voice – Analog E&M Signaling Overview**
- **Understanding and Troubleshooting Analog E&M interface Types and Wiring Arrangements**
- **Multiservice Applications Commands**
- **Configuring Voice Ports**
- **E&M Cable Pinouts Connecting Cisco 1750/2600/3600 E&M VIC to Lucent PBX G3R E&M Trunk**
- **E&M Cable Pinouts to Connect Cisco 1750/2600/3600 E&M VIC to Nortel PBX Option 11 E&M Trunk**
- **Voice Technology Support**
- **Voice and IP Communications Product Support**

- **Troubleshooting Cisco IP Telephony** ⬀
- **Technical Support – Cisco Systems**

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