



## NETWORKERS 2004

### TROUBLESHOOTING IP TELEPHONY NETWORKS: ELEMENTS OF DIAL PLAN FUNCTIONALITY

SESSION VVT-3020

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## Session Objectives

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- Understand Cisco CallManager Call Routing and Digit Analysis
- Understand Cisco IOS® Voice Gateway Call Routing
- Understand Cisco IOS Gatekeeper Call Routing

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## What You Should Know

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- **CCM configuration and operation**
- **Cisco IOS Voice Gateway basics**

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## Agenda

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- **Call Routing in Cisco CallManager**
- **Call Routing on Cisco IOS Gatekeepers**
- **Call Routing on Cisco IOS Voice Gateways**

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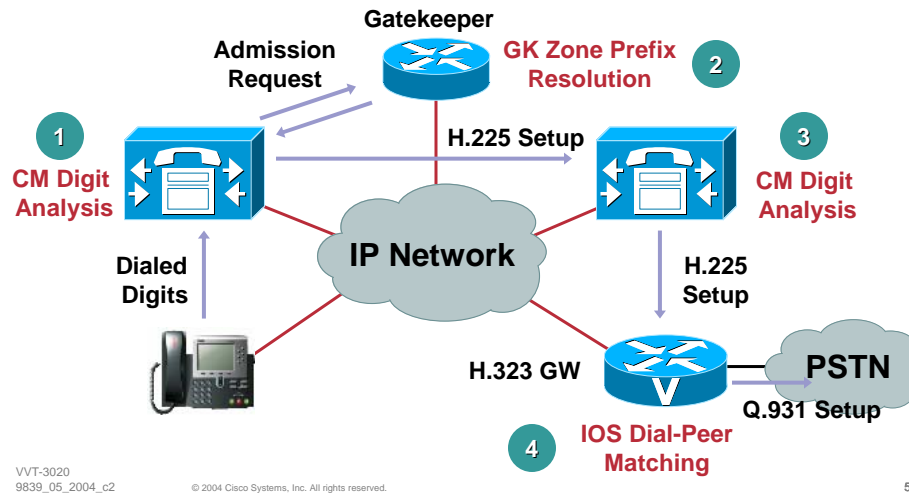
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## Sample Call Flow

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### Various Devices Are Responsible For Routing a Call Through an IP Telephony Network



## Agenda

Cisco.com

- Call Routing in Cisco CallManager
- Call Routing on Cisco IOS Gatekeepers
- Call Routing on Cisco IOS Voice Gateways

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## Call Routing: Digit Analysis

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- **The heart of call routing in Cisco CallManager is digit analysis**
- **Primary job: select the destination whose address is the best match for a sequence of dialed digits**
- **Secondary job: modify the caller ID/called number before extending the call to the selected destination**

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## Elements of Call Routing

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- **Route Patterns**
- **Route Filters**
- **Transformations**
- **Translation Patterns**
- **Partitions and Calling Search Spaces**

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## Route Patterns

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- A route pattern is an numerical address
- Some addresses, such as directory numbers, match only one dialed digit string (1000, 2000, 561212, etc...)
- Other addresses, such as gateway route patterns, match a range of dialed digit strings (1XXX, [2-9]XXXXXX, 9.@, etc...)

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## Wildcards: Range Matching

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Wildcard	Description
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, *, #	Match Exactly One Digit
X	Any Single Digit in the Range 0-9
[xyz...]	One Occurrence of Any of the Digits in the Brackets
[x-y]	One Occurrence of Any Digit from x to y
[^x-y]	Any Digit that Is <b>Not</b> Between x and y
!	One or More Digits in the Range 0-9
wildcard?	Zero or More Occurrences of the Previous Wildcard
wildcard+	One or More Occurrences of the Previous Wildcard
@	Matches the NANP—Discussed Later

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## Pattern Examples

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<b>1111</b>	<b>Matches 1111</b>
<b>*1*1</b>	<b>Matches *1*1</b>
<b>12XX</b>	<b>Matches Numbers Between 1200 and 1299</b>
<b>13[25-8]6</b>	<b>Matches 1326, 1356, 1366, 1376, 1386</b>
<b>13[^3-9]6</b>	<b>Matches 1306, 1316, 1326, 13*6, 13#6</b>
<b>13!#</b>	<b>Matches Any Number that Begins with 13, Is Followed by One or More Digits, and Ends with #; 135# and 13579# Are Example Matches</b>

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## Closest-Match Routing

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- **Cisco CallManager matches dialed digits to the route pattern that is the most explicit match**
- **Cisco CallManager performs digit analysis on a digit-by-digit basis**
- **Cisco CallManager has a concept of matches and potential matches**
  - A match means the dialed digits match a configured route pattern (i.e. 1000 matches 1XXX, 100X, 1000, etc...)**
  - A potential match is a route pattern that might match given the dialed digits if more digits are dialed to complete the match (i.e. if you dial 10 then 1XXX is a potential match)**
- **A call is extended when there is a match and there are no more potential matches (or the inter-digit timeout expires) —with the exception of urgent priority route patterns**

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# Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

\_\_\_\_\_

CallManager Actions:

## Configured Route Patterns

1111
1211
1[23]XX
131
13[0-4]X
13!

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# Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

<off hook>

CallManager Actions:

Provide Dial Tone  
Wait

## Configured Route Patterns

1111	Potential Match
1211	Potential Match
1[23]XX	Potential Match
131	Potential Match
13[0-4]X	Potential Match
13!	Potential Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
pss="PA:Line1:Cisco:Local:Long Distance:International", dd="")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

1

CallManager Actions:

Break Dial Tone  
Wait

### Configured Route Patterns

1111	Potential Match
1211	Potential Match
1[23]XX	Potential Match
131	Potential Match
13[0-4]X	Potential Match
13!	Potential Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

12

CallManager Actions:

Wait

### Configured Route Patterns

1111	Doesn't Match
1211	Potential Match
1[23]XX	Potential Match
131	Doesn't Match
13[0-4]X	Doesn't Match
13!	Doesn't Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="12")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

121

CallManager Actions:

Wait

### Configured Route Patterns

1111	Doesn't Match
1211	Potential Match
1[23]XX	Potential Match
131	Doesn't Match
13[0-4]X	Doesn't Match
13!	Doesn't Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="121")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

1211

CallManager Actions:

No Other Patterns could  
Match; Extend Call to the  
Best Match

### Configured Route Patterns

1111	Doesn't Match
1211	Match!
1[23]XX	Match!
131	Doesn't Match
13[0-4]X	Doesn't Match
13!	Doesn't Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1211")  
Digit analysis: potentialMatches=NoPotentialMatchesExist
```

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# Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

1211

Matches 1  
Digit String

Matches 200 Digit  
Strings

## Configured Route Patterns

1111	Doesn't Match
1211	Match!
1[23]XX	Match!
131	Doesn't Match
13[0-4]X	Doesn't Match
13!	Doesn't Match

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1211")  
Digit analysis: potentialMatches=NoPotentialMatchesExist
```

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# Example 1: Closest-Match Routing

Cisco.com

User's Dial String:

1211

Matches 1 Digit  
String

Select as Closest Match

Matches 200 Digit  
Strings

## Configured Route Patterns

1111	Doesn't Match
1211	Match!
1[23]XX	Match!
131	Doesn't Match
13[0-4]X	Doesn't Match
13!	Doesn't Match

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1211")  
Digit analysis: potentialMatches=NoPotentialMatchesExist
```

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## Example 1: Closest-Match Routing

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### CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1211")
Digit analysis: analysis results
|PretransformCallingPartyNumber=15644
|CallingPartyNumber=15644
|DialingPartition=Line1
|DialingPattern=1211
|DialingRoutePatternRegularExpression=(1211)
|DialingWhere=
|PatternType=Enterprise
|PotentialMatches=NoPotentialMatchesExist
|DialingSdlProcessId=(2,34,1020)
|PretransformDigitString=1211
|PretransformTagsList=SUBSCRIBER
|PretransformPositionalMatchList=1211
|CollectedDigits=1211
|UnconsumedDigits=
|TagsList=SUBSCRIBER
```

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

\_\_\_\_\_

CallManager Actions:

### Configured Route Patterns

1111
1211
1[23]XX
131
1[0-4]XX
13!

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

<off hook>

CallManager Actions:

Provide Dial Tone  
Wait

### Configured Route Patterns

1111	Potential Match
1211	Potential Match
1[23]XX	Potential Match
131	Potential Match
1[0-4]XX	Potential Match
13!	Potential Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

1

CallManager Actions:

Break Dial Tone  
Wait

### Configured Route Patterns

1111	Potential Match
1211	Potential Match
1[23]XX	Potential Match
131	Potential Match
1[0-4]XX	Potential Match
13!	Potential Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
                    pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

13

CallManager Actions:

Wait

### Configured Route Patterns

1111	Doesn't Match
1211	Doesn't Match
1[23]XX	Potential Match
131	Potential Match
1[0-4]XX	Potential Match
13!	Potential Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
pss="PA:Line1:Cisco:Local:Long Distance:International", dd="13")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

131

CallManager Actions:

Keep Waiting; More  
Digits Might Cause a  
Different Pattern to Match

### Configured Route Patterns

1111	Doesn't Match
1211	Doesn't Match
1[23]XX	Potential Match
131	Match!
1[0-4]XX	Potential Match
13!	Match and Potential Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
pss="PA:Line1:Cisco:Local:Long Distance:International", dd="131")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

1311

CallManager Actions:

Keep Waiting; More  
Digits Might Cause a  
Different Pattern to Match

CCM Trace Shows:

```
Digit analysis: match(fqcn="9195555644", cn="15644",  
pss="PA:Line1:Cisco:Local:Long Distance:International", dd="1311")  
Digit analysis: potentialMatches=PotentialMatchesExist
```

### Configured Route Patterns

1111	Doesn't Match
1211	Doesn't Match
1[23]XX	Match!
131	Doesn't Match
1[0-4]XX	Match!
13!	Match and Potential Match

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

1311<timeout>

CallManager Actions:

Extend Call to the **Best**  
Match

### Configured Route Patterns

1111	Doesn't Match
1211	Doesn't Match
1[23]XX	Match!
131	Doesn't Match
1[0-4]XX	Match!
13!	Match!

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

1311<timeout>

Matches 200 Digit Strings ←

Matches 500 Digit Strings ←

Matches ∞ Digit Strings,  
However for the Purposes of  
Closest Match Routing in  
this Case, this Matches 100  
Digit Strings Because You  
Only Consider the Number of  
Potential Strings **Given the  
Number of Digits Dialed**

### Configured Route Patterns

1111	Doesn't Match
1211	Doesn't Match
1[23]XX	Match!
131	Doesn't Match
1[0-4]XX	Match!
13!	Match!

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## Example 2: Inter-Digit Timeout

Cisco.com

User's Dial String:

1311<timeout>

Matches 200 Digit Strings ←

Matches 500 Digit Strings ←

Matches ∞ Digit Strings,  
However for the Purposes of  
Closest Match Routing in this  
Case, this Matches 100 Digit  
Strings Because you Only  
Consider the Number of  
Potential Strings **Given the  
Number of Digits Dialed**

### Configured Route Patterns

1111	Doesn't Match
1211	Doesn't Match
1[23]XX	Match!
131	Doesn't Match
1[0-4]XX	Match!
13!	Match!

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## Example 2: Inter-Digit Timeout

Cisco.com

### CCM Trace Shows:

```
|PretransformCallingPartyNumber=15644
|CallingPartyNumber=15644
|DialingPartition=
|DialingPattern=13!
|DialingRoutePatternRegularExpression=(13X+)
|DialingWhere=
|PatternType=Enterprise
|PotentialMatches=PotentialMatchesExist
|DialingSdlProcessId=(2,84,7)
|PretransformDigitString=1311
|PretransformTagsList=SUBSCRIBER
|PretransformPositionalMatchList=1311
|CollectedDigits=99915644
|UnconsumedDigits=
|TagsList=SUBSCRIBER
|PositionalMatchList=1311
```

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## Special Wildcards

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- **@ wildcard** is a macro for many patterns that encompass the configured National Dial Plan; (default is the North American Numbering Plan (NANP))
- **‘.’** denotes a portion of a route pattern that can be stripped when the pattern matches (not really a wildcard at all)

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## @ Wildcard

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- A macro that causes the Cisco CallManager to add 166 patterns for the NANP
- Use **digit discarding instructions** to control which digits are sent as the called number
- Use **route filters** to add fewer patterns and restrict outside dialing

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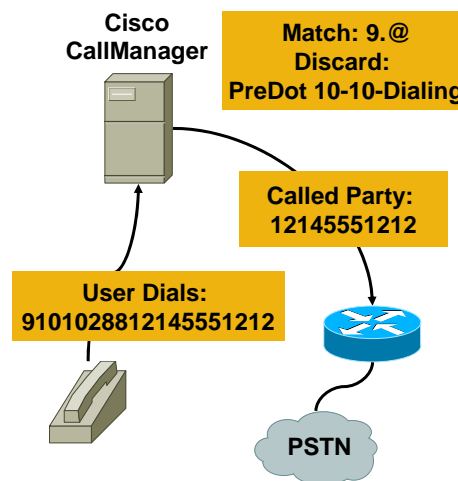
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## @ Wildcard: Digit Discarding Instructions

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- Use **digit discarding instructions** to discard whole sections of the dialed number



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## Digit Discarding Instructions

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### If the Pattern Is 9.8@...

Instructions	Dialed/Discarded Digits	Used for
PreDot	98 1 214 555 1212	Access Codes
PreAt	98 1 214 555 1212	Access Codes
11D/10D→7D	98 1010321 1 214 555 1212	Toll Bypass
11D→10D	98 1010321 1 214 555 1212	Toll Bypass
IntlTollBypass	98 1010321 011 33 1234 #	Toll Bypass
10-10-Dialing	98 1010321 1 214 555 1212	Suppressing Carrier Selection
Trailing-#	98 1010321 011 33 1234 #	PSTN Compatibility

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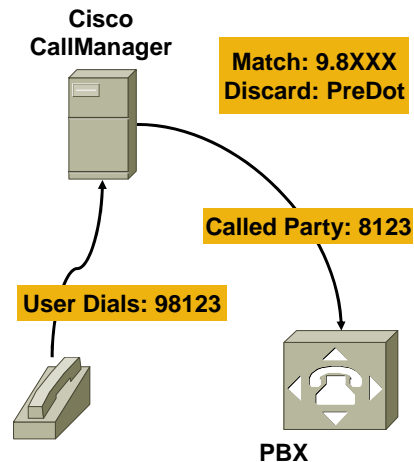
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## Using '.' with Digit Discarding Instructions

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- Use **Digit Discarding Instructions (DDI)** to strip initial digits
- With the exception of **NoDigits** and **PreDot**, DDIs only apply to patterns that contain the **@ wildcard**



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## Elements of Call Routing

Cisco.com

- Route Patterns
- **Route Filters**
- Transformations
- Translation Patterns
- Partitions and Calling Search Spaces

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## Route Filters: Limiting the @ Wildcard

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- Eliminates or constrains route patterns added by the @ pattern
- Relies on tags, named substrings of the dial plan file
- Uses three operators: exists, does not exist, and == <value>
- Operators connected with AND and OR

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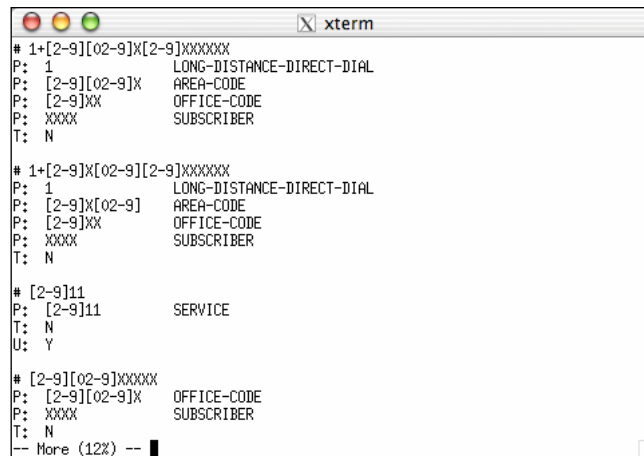
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## Route Filters: NANP File

Cisco.com

To See All the Route Pattern that Encompass the @ Wildcard when Using the NANP, Open the File C:\Program Files\Cisco\DialPlan\NANP



```
xterm
# 1+[2-9][02-9]X[2-9]XXXXXX
P: 1 LONG-DISTANCE-DIRECT-DIAL
P: [2-9][02-9]X AREA-CODE
P: [2-9]XX OFFICE-CODE
P: XXXX SUBSCRIBER
T: N

# 1+[2-9]X[02-9][2-9]XXXXXX
P: 1 LONG-DISTANCE-DIRECT-DIAL
P: [2-9]X[02-9] AREA-CODE
P: [2-9]XX OFFICE-CODE
P: XXXX SUBSCRIBER
T: N

# [2-9]11
P: [2-9]11 SERVICE
T: N
U: Y

# [2-9][02-9]XXXXX
P: [2-9][02-9]X OFFICE-CODE
P: XXXX SUBSCRIBER
T: N
-- More (12%) --
```

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## Important Points: @ Wildcard and Route Filters

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- Closest match routing works on the **individual** patterns of an @ pattern, not on the pattern as a whole
- Route filters don't block calls in and of themselves; they restrict which patterns are added to digit analysis at initialization time

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## Elements of Call Routing

Cisco.com

- Route Patterns
- Route Filters
- **Transformations**
- Translation Patterns
- Partitions and Calling Search Spaces

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## Transformations

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- Digit analysis' secondary job is to change the caller ID and/or called party number before extending a call to a device
- Calling party transformations change the caller ID
- Called party transformations change the called party number

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## Calling Party Transformations

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- Use Calling Party's External Phone Number Mask checkbox
- Calling Party Transformation Mask
- Prefix digits to calling party number (as of Cisco CallManager 3.2)
- Can restrict Calling Number Presentation (private number) by setting the Calling Party Presentation to Restricted in Cisco CallManager 3.3 or Calling Line ID Presentation in Cisco CallManager 4.0 and later
- Can restrict Calling Party Name presentation by setting the Calling Name Presentation to Restricted in Cisco CallManager 4.0 and later

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## Calling Party Transformations

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- Calling Party Number Presentation can be overridden on the Gateway Configuration page
- Calling Party Number can be overridden by the 'Caller ID DN' parameter on the Gateway Configuration page

Outbound Calls	
Calling Party Presentation*	Default
Calling Party Selection*	Originator
Called party IE number type unknown*	Cisco CallManager
Calling party IE number type unknown*	Cisco CallManager
Called Numbering Plan*	Cisco CallManager
Calling Numbering Plan*	ISDN
Number of digits to strip*	0
Caller ID DN	
SMDI Base Port	0

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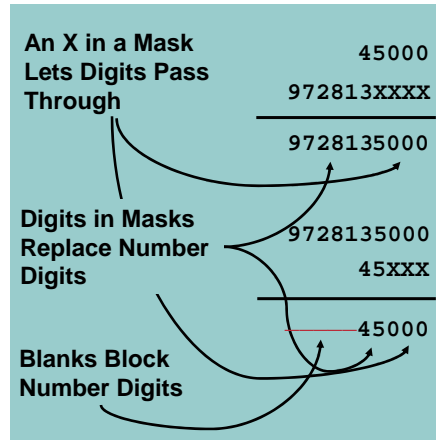
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## About Masks

Cisco.com

- Can contain digits 0-9, \*, # and X
- Mask is applied to a number in order to extend or truncate it
- If the result of a mask operation still contains wildcards, the whole number is discarded



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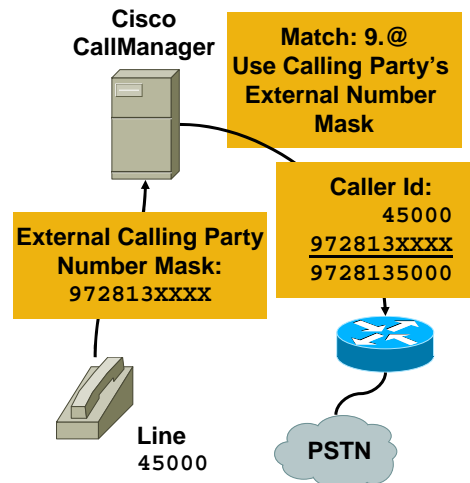
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## Use Calling Party's External Phone Number Mask Checkbox

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- When checked, Cisco CallManager masks two phone parameters to determine the caller ID



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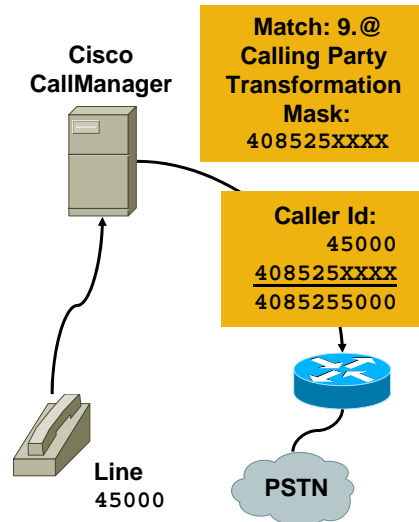
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## Calling Party Transformation Mask

Cisco.com

- Cisco CallManager applies the specified mask to the caller ID



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## Calling Party Transformation Order

Cisco.com

- Apply the Use External Phone Number Mask checkbox
- Apply the Calling Party Transformation Mask

Directory Number	45000
External Phone Number Mask	97281XXXXX
Calling Party Transformation Mask	9728145000
Caller ID	408525XXXX
	4085255000

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## Called Party Transformations

Cisco.com

### Three Kinds of Transformations for Called Party Number:

- Digit Discarding Instructions (DDI)
- Called Party Transformation Mask
- Prefix Digits

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## Digit Discarding Instructions

Cisco.com

- Covered earlier in this presentation
- Used primarily with the @ wildcard
- Allows you to throw away whole sections of the dialed number, like area code or carrier code

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## Called Party Transformation Mask

Cisco.com

- Works just like Calling Party Transformation Mask
- Affects the called number, not the caller ID

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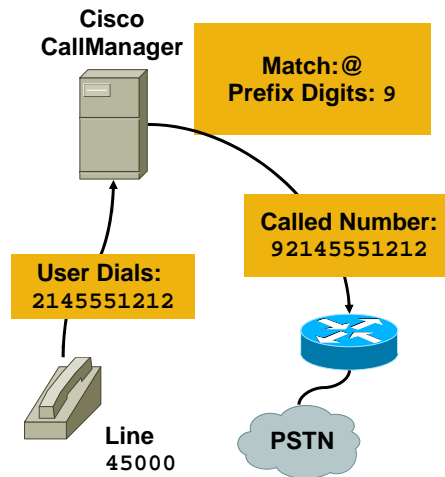
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## Prefix Digits

Cisco.com

- Cisco CallManager prepends the specified digits to the called number



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# Called Party Transformation Order

Cisco.com

- Apply Digit Discarding Instructions
- Apply the Called Party Transformation Mask
- Apply Prefix Digits

Dialed Number	9 1010321 12145551212
Digit Discarding Instructions	<u>10-10-Dialing</u>
	9 12145551212
Called Party Transformation Mask	<u>XXXXXXXXXX</u>
	2145551212
Prefix Digits	<u>8</u>
Called Number	82145551212

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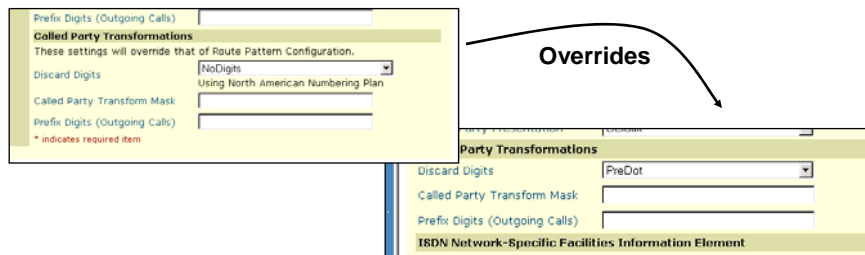
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# Called Party Transformation Order

Cisco.com

- Transformations performed on the Route Group Details page of a Route List override the settings configured on a Route pattern
- For example, if a Route Pattern has a DDI of “Pre-Dot” and the Route Group Details of a Route List says “NoDigits”, the “Pre-Dot” configuration on the route pattern is ignored



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## Elements of Call Routing

Cisco.com

- Route Patterns
- Route Filters
- Transformations
- **Translation Patterns**
- Partitions and Calling Search Spaces

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## Translation Patterns

Cisco.com

- Almost exactly like route pattern—uses wildcards, transformations, etc.
- Results of transformations are the input for another trip through digit analysis
- Use to handle extension mapping among other things
- **All Translation Patterns are Urgent Priority route patterns**; a call is routed immediately to an urgent priority route pattern when a match is made, even if there are potential matches left

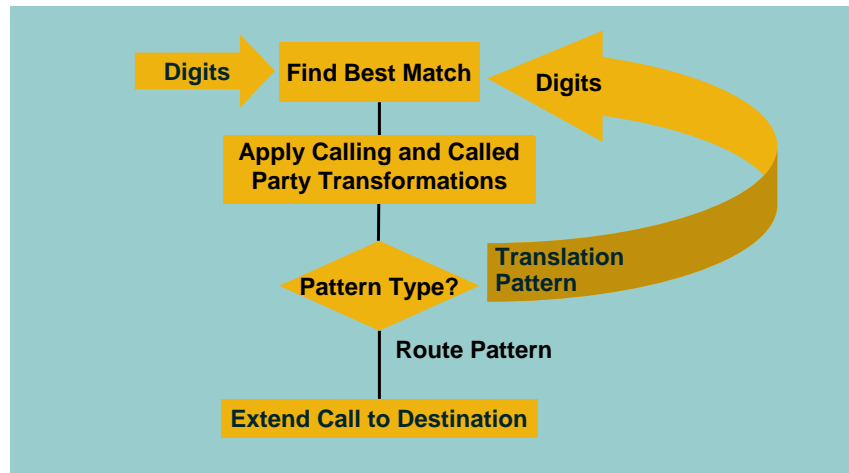
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## Routing Flowchart

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## Elements of Call Routing

Cisco.com

- Route Patterns
- Route Filters
- Transformations
- Translation Patterns
- **Partitions and Calling Search Spaces**

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## Partitions and Calling Search Spaces

Cisco.com

- Partitions and Calling Search Spaces cause the majority of Call Routing configuration errors
- Allow toll bypass from one geographical region to another
- Allow different outside calling privileges by class of calling user
- Allow multiple tenants with overlapping dial plans to be served by the same Cisco CallManager

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## Partitions and Calling Search Spaces Analogy

Cisco.com

Rita Wants to Call Dave

To Do So, She Needs to Know Dave's Number

Miami Yellow Pages

Dave 305 555 5000

Dave Lists His Number in a Directory



Rita



Dave

305 555 5000

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# Partitions and Calling Search Spaces Analogy

Cisco.com

To Look up Numbers, Rita Looks Through the Directories She Owns

If She Doesn't Have the Right Directory...

**Miami Yellow Pages**  
Dave 305 555 5000

Rita's List of Directories

- Dallas White Pages
- Outlook Address Book
- Little Black Book

...She Can't Place the Call



Rita



Dave

305 555 5000

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# Partitions and Calling Search Spaces Analogy

Cisco.com

But if She Has the Directory Dave Has Listed His Number in...

**Miami Yellow Pages**  
Dave 305 555 5000

Rita's List of Directories

- Dallas White Pages
- Miami Yellow Pages**
- Little Black Book

...the Call Will Go Through



Rita



Dave

305 555 5000

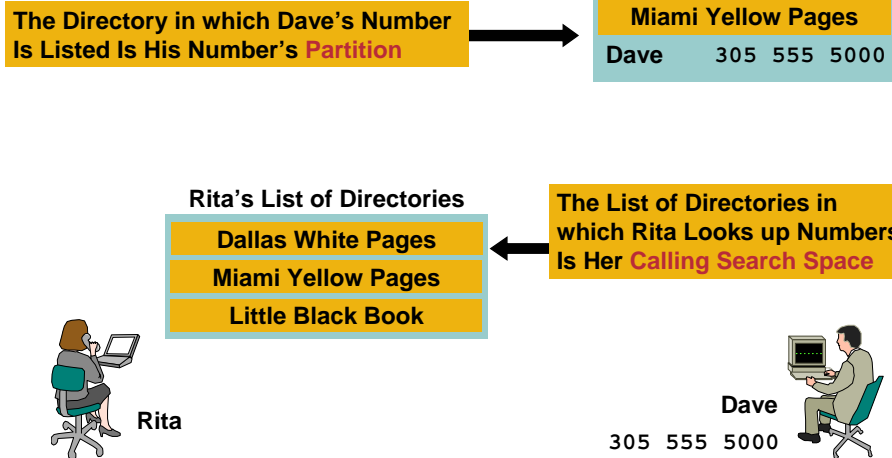
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## Partitions and Calling Search Spaces Analogy

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## Partitions and Calling Search Spaces Definition

Cisco.com

- **Partition**—a logical grouping of patterns; all patterns in a partition are equally reachable
- **Calling search space**—an **ordered** list of partitions; digit analysis looks through the caller's list of partitions when searching for the closest match for the caller's dialed number

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## Partitions and Calling Search Space Rules

Cisco.com

- Calling entities (phones, lines, gateways, applications) have calling search spaces
- Called entities (route patterns, translation patterns, directory numbers, feature codes) have partitions

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## Partitions and Calling Search Space Rules

Cisco.com

- Digit analysis looks through every partition in a calling search space and looks for the best match
- The order of the partitions listed in the calling search space is used **only to break ties** when there are equally good matches in two different partitions
- Contrary to popular belief, the partition the **calling party's** line is in has **NO** effect on where you can call from that line; only the Calling Search Space for that phone/device matters

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## Partitions and Calling Search Space Rules

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- If no partition is specified for a pattern, the pattern is listed in the null partition
- All callers look in the null partition (as well as any partitions specified in their calling search space) to resolve dialed digits
- The null partition is always the last partition in any Calling Search Space
- Closest-match routing takes precedence over the partition ordering in a Calling Search Space, so a closer match in the null partition will be used to route a call over a less-explicit match in a partition

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## Cisco CallManager Is Choosing 9.@ over My Specific Pattern

Cisco.com

- The @ pattern causes many individual patterns to be added on the user's behalf
- If an individual pattern in the @ wildcard is a better match than the user's pattern, then the @ pattern will be chosen
- Look in the NANP file to see the list of patterns or look in the CCM trace to see which pattern was matched

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## Why Is there a Calling Search Space on a Line and on a Phone?

Cisco.com

- The Calling Search Space assigned to line applies to all phones that share the line
- The Calling Search Space assigned to a phone applies to all lines on that phone
- If a Calling Search Space is configured in both places, both search spaces are used
- The Calling Search Space on the line comes before the Calling Search Space on the phone (only when there is a tie)

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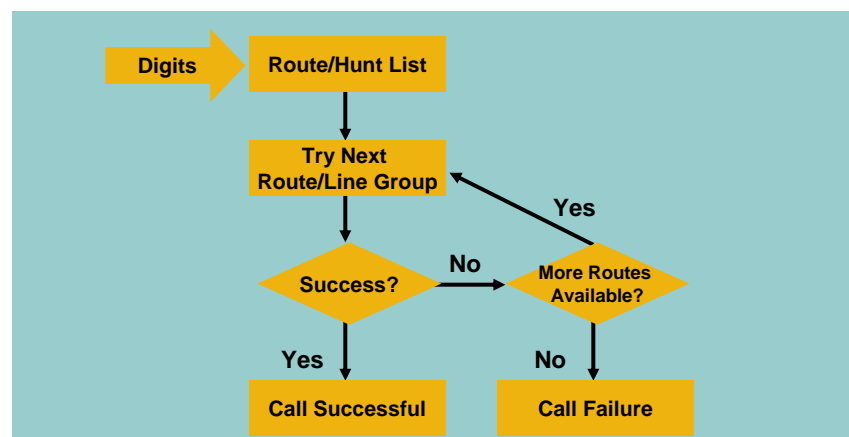
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## Route List/Route Group Selection

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After Digit Analysis Finds the Best Match the Call Is Extended to either a Device or a Route/Hunt List



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## Route List/Route Group Selection

Cisco.com

- **CCM trace shows Route/Hunt List Selection after the Digit Analysis results:**

```
DeviceManager::findDeviceInfoGivenKey - Name=RTP-GK-List
RouteList - RouteListName='RTP-GK-List'
RouteList - RouteGroup count='2'
RouteListCdr - RouteGroup count = 2
RouteListCdr - Device count = 3
RouteListCdr::null0_CcSetupReq - Selecting a device.
DeviceManager::findDeviceInfoGivenKey - Name=RTP-AMER-GK
```

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## CallManager: Dialed Number Analyzer

Cisco.com

- **Cisco Dialed Number Analyze was for an administrator to leverage the digit analysis engine without having to test all cases**
- **Allows for digit analysis based on CSS**
- **Allows for device specific digit analysis (i.e.: a phone, a GW, a trunk, etc.)**
- **Allows for displaying the current dialing forest**

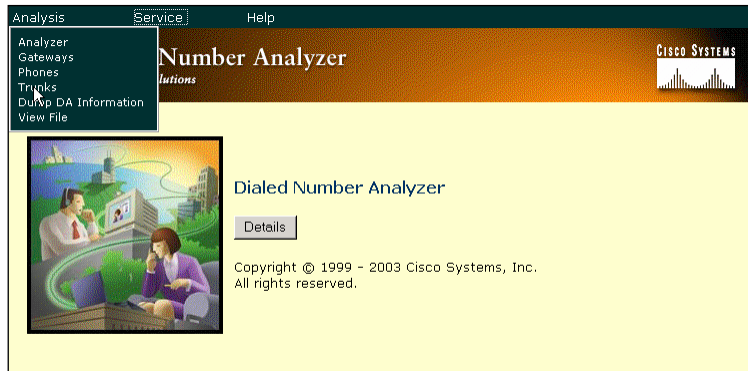
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# CallManager: Dialed Number Analyzer

Cisco.com



**Administrator Can Do Dialed Number Analysis from Gateway, Phone or Trunk Device**

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# CallManager: Dialed Number Analyzer

Cisco.com

The screenshot shows the 'Cisco Dialed Number Analyzer' web interface. The header includes 'Analysis', 'Service', and 'Help' tabs, and the title 'Cisco Dialed Number Analyzer For Cisco IP Telephony Solutions'. The main section is titled 'Analyzer' and contains an 'Analyzer Input' form with the following fields:

- Calling Party\*:
- Dialed Digits\*:
- Calling Search Space:

A note below the fields states '\* indicates required item'. At the bottom are 'Do Analysis' and 'Clear' buttons.

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# CallManager: Dialed Number Analyzer

Cisco.com

**Cisco Dialed Number Analyzer**  
For Cisco IP Telephony Solutions

[Save Result](#)

## Dialed Number Analyzer Results

- Results Summary
  - Calling Party Information
    - Dialed Digits = 919725552000
    - Match Result = RouteThisPattern
  - Matched Pattern Information
    - Called Party Number = 919725552000
    - End Device = RL\_SJDialing
    - Device Location = OffNet
    - InterDigit Timeout = NO
  - Outside Dial Tone
- Call Flow
  - Route Pattern / Hunt Pilot : Pattern= 9.1972XXXXXXX
  - Route/Hunt List : Route/Hunt List Name= RL\_SJDialing
- Alternate Matches

All Information Stored in an XML Format that Can Be Sent to Cisco for Evaluation; All Results Can Be Expanded or Collapsed

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# CallManager: Dialed Number Analyzer

Cisco.com

**Cisco Dialed Number Analyzer**  
For Cisco IP Telephony Solutions

[Save Result](#)

## Call Flow

- Route Pattern / Hunt Pilot : Pattern= 9.1972XXXXXXX
  - Positional Match List = 9:19725552000
  - DialPlan = North American Numbering Plan
  - Route Filter
    - PreTransform Calling Party Number = 2056
    - PreTransform Called Party Number = 919725552000
  - Calling Party Transformations
  - Connected Party Transformations
  - Called Party Transformations
- Route/Hunt List : Route/Hunt List Name= RL\_SJDialing
  - RouteGroup : RouteGroup Name= Gatekeeper-Dialing
    - PreTransform Calling Party Number = 2056
    - PreTransform Called Party Number = 919725552000
    - Calling Party Transformations
    - Called Party Transformations
    - Device : Type= H225Trunk-GatekeeperControlled
  - RouteGroup : RouteGroup Name= SanJose-PRI

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# CallManager: Dialed Number Analyzer

Cisco.com

**Cisco Dialed Number Analyzer**  
For Cisco IP Telephony Solutions

[Save Result](#)

- [-] **Route/Hunt List** :Route/Hunt List Name= RL\_SJDialing
  - [-] **RouteGroup** :RouteGroup Name= Gatekeeper-Dialing
    - PreTransform Calling Party Number = 2056
    - PreTransform Called Party Number = 919725552000
    - [-] **Calling Party Transformations**
      - External Phone Number Mask = On
      - Calling Party Mask =
      - Prefix =
      - Calling Party Number = 2056
    - [-] **Called Party Transformations**
      - Called Party Mask =
      - Discard Digits Instructions = PreDot
      - Prefix =
      - Called Number = 919725552000
    - [-] **Device** :Type= H225Trunk-GatekeeperControlled
      - End Device Name = SJ\_CM\_GK\_Trunk
      - PortNumber = 0
      - Device Status = Registered
      - AAR Group Name =
      - AAR Calling Search Space =
      - AAR Prefix Digits =
      - [-] **Calling Party Transformations**
        - Terminal Type = Gateway
    - [-] **RouteGroup** :RouteGroup Name= SanJose-PRI

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# CallManager: Dialed Number Analyzer

Cisco.com

## Information Provided:

- When outside dial tone will be played
- Route pattern matched
- Route group selection and number transformations
- Route group device selection
- Alternate matches including gateways and transformations

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# CallManager: Dialing Forest

Cisco.com

- CallManager stores every dialable number in memory...called dialing forest
- Dialing forest is useful for finding overlapping patterns in different partition
- Every dialable number belongs to a partition
- Any phone can dump the memory table into the trace files by dialing **'\*\*##\*4'**

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# CallManager: Dialing Forest

Cisco.com

CCM|Digit analysis: match(pi="1",fqcn="2056", cn="2056", pss="IPMA\_Everyone:IPMA\_partition", dd="\*\*##\*4,)

05/21/2004 11:54:54.825 CCM||DialingForest=

```
{
|DigitForest=Dialing
{
|Partition=
|Patterns=
{
|(2041) (Intercept)
|(2040) ← DN on a Phone
|(2059)
|(2056) (Intercept) ← CFA/CFB/CFNA
|(2056)
|(2055) (Intercept)
|(2050) (Intercept)
|(2074)
|(2264)
}
```

DN on a Phone

CFA/CFB/CFNA

```
|(8883)
|(8881)
|(8882)
|(8880)
|(8)(XXXX) ← Part of 9.@
|(9)(101)(XXXX)(0)([2-9][02-9]X)(XXXX)
|(9)(101)(XXXX)(0)([2-9][02-9]X)([2-9]XX)(XXXX)
|(9)(101)(XXXX)(0)([2-9]X[02-9])(XXXX)
|(9)(101)(XXXX)(0)([2-9]X[02-9])([2-9]XX)(XXXX)
|(9)(1)([2-9]X[02-9])([2-9]XX)(XXXX)
|(9)(1415555XXXX)
|(9)(1212XXXXXX)
|(b00111101001)
|(b00111101002) ← Conference Bridges
}
```

Part of 9.@

Conference Bridges

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## CallManager: Dialing Forest

Cisco.com

```
|Partition=IPMA_Managers
|Patterns=
{
|(4201)
|(4101)
|(4XXX) (Translation)
}
|Partition=IPMA_Managers
|Patterns=
{
|(4201)
|(4101)
|(4XXX) (Translation)
}

|Partition=IPMA_Everyone
|Patterns=
{
|(2006)
|(2051)
|(2050)
|(2050) (Intercept)
|(2053)
|(2045)
|(2101)
|(2266)
|(2229587) (Translation)
|(2959573) (Intercept)
|(2959574) (Intercept)
|(5201)
|(5555)
|(1000)
}
```

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## Agenda

Cisco.com

- Call Routing in Cisco CallManager
- **Call Routing on Cisco IOS Gatekeepers**
- Call Routing on Cisco IOS Voice Gateways

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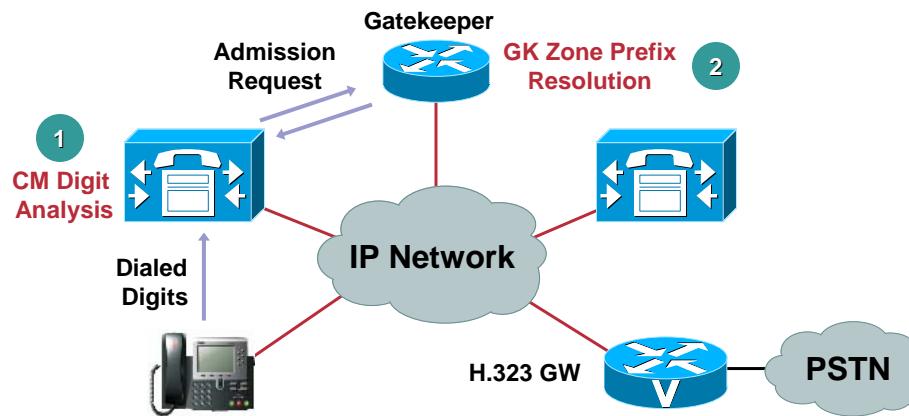
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## Sample Call Flow

Cisco.com

### Various Devices Are Responsible For Routing a Call Through an IP Telephony Network



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## H.225 RAS Protocol Elements

Cisco.com

- **Gatekeeper Discovery**
  - GatekeeperRequest (GRQ)
  - GatekeeperConfirm (GCF)
  - GatekeeperReject (GRJ)
- **Terminal/Gateway Registration**
  - RegistrationRequest (RRQ)
  - RegistrationConfirm (RCF)
  - RegistrationReject (RRJ)
- **Terminal/Gateway Unregistration**
  - UnregistrationRequest (URQ)
  - UnregistrationConfirm (UCF)
  - UnregistrationReject (URJ)
- **Location Request**
  - LocationRequest (LRQ)
  - LocationConfirm (LCF)
  - LocationReject (LRJ)
- **Call Admission**
  - AdmissionRequest (ARQ)
  - AdmissionConfirm (ACF)
  - AdmissionReject (ARJ)
- **Disengage**
  - DisengageRequest (DRQ)
  - DisengageConfirm (DCF)
  - DisengageReject (DRJ)

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## Cisco IOS Gatekeeper: Common Terms

Cisco.com

- **Zone**—a collection of nodes for routing calls (can be H.323 clients, CallManager clusters, or H.323 Gateways)
- **Zone Prefix**—a string of numbers used associate a dialed number to a zone
- **RAS**—Registration, Admission and Status
- **Tech Prefix**—a unique string used to group endpoints of the same type together
- **Default Technology**—Gateways that register with a tech prefix that are used for default routing of any E.164 address that is otherwise unresolved

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## Cisco IOS GK Configuration Basics

Cisco.com

```
gatekeeper
zone local <zone_name> <domain>
zone remote <zone_name> <domain> <ip_addr>
zone prefix <zone_name> <E.164 string>
gw-type-prefix <E.164 string> <option>
bandwidth <interzone | remote | session | remote> <kbps>
```

**<zone\_name>**—the logical name of the zone (ie. SJ, DAL, RTP, etc)

**<domain>**—domain of the zone (ie. cisco.com, sj.cisco.com)

**<E.164 string>**—the prefix that a given zone will handle (972\*, 408\*, 919\*)

**<option>**—other options to further influence call routing (ie. default-technology, static GW and zone hopoff)

**<kbps>**—the amount of bandwidth to allow within and between zones (G711 = 128kbps, G729 = 16kbps)

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## Gatekeeper: Configuration

Cisco.com

```
gatekeeper
zone local SJ cisco.com
zone local SF cisco.com
zone local DAL cisco.com
zone remote RTP cisco.com 172.16.14.130 1719
zone prefix SJ 1408*
zone prefix SF 1415*
zone prefix RTP 1919*
zone prefix DAL 1972*
gw-type-prefix 1#* default-technology
arq reject-unknown-prefix
bandwidth interzone default 512
bandwidth remote 64
no shutdown
```

Send call to any gateway in a zone that registers with a #1 prefix

Allow up to 4 g711 in Local Zone and 4 g729 to Remote Zones

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## Gatekeeper: Cisco CallManager

Cisco.com

Gatekeeper Information	
Gatekeeper Name*	172.16.14.34
Terminal Type*	Gateway
Technology Prefix	1#
Zone	SJ

\* indicates required item

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## Gatekeeper: Show Commands

Cisco.com

```
Av-2620-3#show gatekeeper gw-type-prefix
GATEWAY TYPE PREFIX TABLE
=====
Prefix: 1#*      (Default gateway-technology)
Zone DAL master gateway list:
  172.16.242.13:1112 DAL_CM_GK_Trunk_1
Zone SJ master gateway list:
  172.16.242.216:2955 SJ_CM_GK_Trunk_2
  172.16.242.121:4042 SJ_CM_GK_Trunk_1
Zone SF master gateway list:
  172.16.14.134:1720 R16-3640
```

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## Gatekeeper: Show Commands

Cisco.com

### Show What E164 Prefixes Are Associated with a Gatekeeper Zone for Number Resolution

```
Av-2620-3#show gatekeeper zone prefix
ZONE PREFIX TABLE
=====
GK-NAME          E164-PREFIX
-----          -
SJ                1408*
SF                1415*
RTP              1919*
DAL              1972*
```

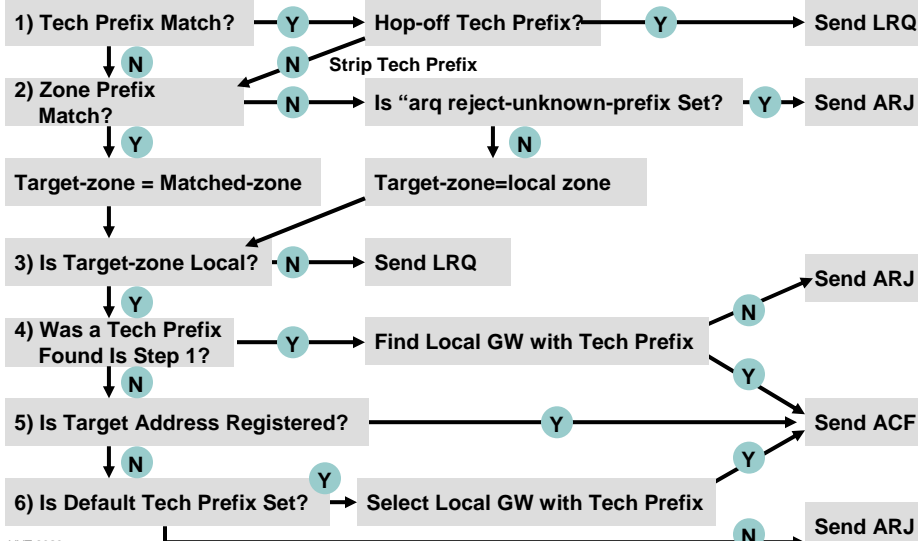
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## Gatekeeper: Route Selection

Cisco.com



## Gatekeeper: ARQ/ACF Message

Cisco.com

An Incoming ARQ Request to the Gatekeeper; Important Information about Dialed Number, Source Signaling Address and Bandwidth Are Seen Using "debug h225 ans1"

```

*Mar 7 21:03:57.339: RAS INCOMING PDU ::=
value RasMessage ::= admissionRequest :
destinationInfo
  dialedDigits : "19725552000"
  ip 'AC10F279'H
  port 4042
  bandwidth 1280
  callReferenceValue 14
  gatekeeperIdentifier {"SJ"}
}
*Mar 7 21:03:57.355: ARQ (seq# 11652) rcvd
  
```

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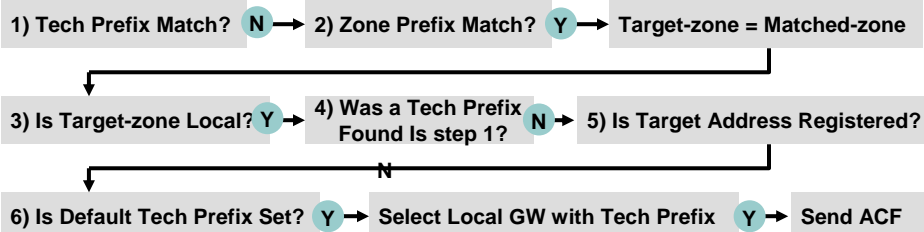
92

# Gatekeeper: Number Resolution

Cisco.com

## Sample Call Flow Through Gatekeeper Logic to Illustrate Zone Selection Criteria Using the Debug Command "debug gate main 5"

```
*Mar 8 18:30:08.577: gk_rassrv_arg: arqp=0x81B89578, crv=0x14, answerCall=0
*Mar 8 18:30:08.581: gk_dns_query: No Name servers
*Mar 8 18:30:08.581: rassrv_get_addrinfo: (19725552000) Tech-prefix match failed.
*Mar 8 18:30:08.581: rassrv_get_addrinfo: (19725552000) Matched zone prefix 1972 and remainder 5552000
*Mar 8 18:30:08.601: gk_rassrv_arg: arqp=0x81AA488C, crv=0x8014, answerCall=1
```



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# Gatekeeper: ARQ/ACF Message

Cisco.com

## An Outgoing ACF Response from; Information about Target Signaling IP Address Are Seen Using "debug h225 ans1"

```
value RasMessage ::= admissionConfirm :
  requestSeqNum 11652
  bandwidth 1280
  destCallSignalAddress ipAddress :
    ip 'AC10F20D'H ← Target Device IP Address 172.16.242.13
    port 2031

*Mar 7 21:03:57.375: IPSOCK_RAS_sendto: msg length 46 from 172.16.14.34:1719 to 172.16.242.121: 2432
*Mar 7 21:03:57.379: RASLib::RASSendACF: ACF (seq# 11652) sent to 172.16.242.121
```

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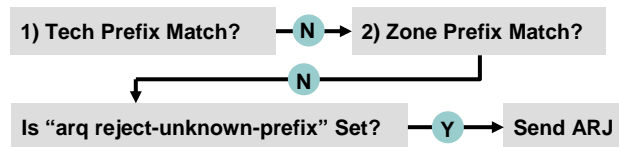
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## Gatekeeper: Failure Situation

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Sample Call Flow Through Gatekeeper Logic to Illustrate a Failure to Determine a Target Zone Using the Debug Command “**debug gate main 5**” and “**debug ras**”

```
*Mar 18 22:52:27.709: ARQ (seq# 30059) rcvd
*Mar 18 22:52:27.709: gk_rassrv_arq: arqp=0x81B89A1C, crv=0x3C, answerCall=0
*Mar 18 22:52:27.709: gk_dns_query: No Name servers
*Mar 18 22:52:27.709: rassrv_get_addrinfo: (12125552000) Tech-prefix match failed.
*Mar 18 22:52:27.713: rassrv_get_addrinfo: (12125552000) unresolved zone prefix
*Mar 18 22:52:27.713: gk_rassrv_sep_arq: rassrv_get_addrinfo() failed (return code = 0x103)
*Mar 18 22:52:27.713: RASLib::RASSendARJ: ARJ (seq# 30059) sent to 172.16.242.121
```



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## Agenda

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- Call Routing in Cisco CallManager
- Call Routing on Cisco IOS Gatekeepers
- **Call Routing on Cisco IOS Voice Gateways**

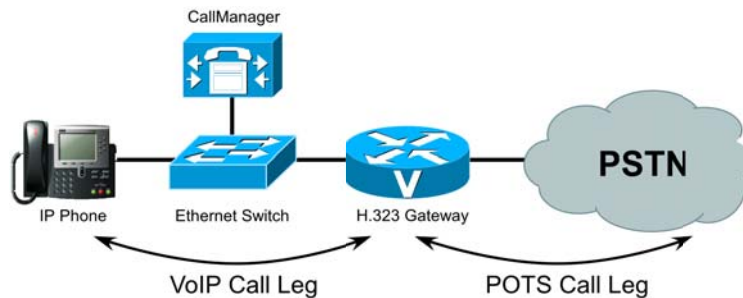
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## Call Legs

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- Outbound call legs are used for call routing and setting outbound call attributes
- Inbound call legs set the call attributes in the reverse direction
- We will discuss two types of call legs:
  - Telephony (POTS)
  - VoIP

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## Introduction to Dial Peers

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- Dial-peer: single “static route” within the dial-plan (similar to a route pattern in CallManager)
- POTS dial peers map a dial string to a specific voice port (FXS, FXO, E&M, BRI, PRI, T1/E1 CAS) and define the attributes of the telephony connection
- VoIP dial peers map a dial string to an ip endpoint and defines the attributes of the network connection (i.e. codec, VAD, dtmf-relay, etc.)

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## Architecture of a POTS Dial Peer

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Syntax of a pots dial-peer:

```
dial-peer voice <tag> pots
destination-pattern <number>
port <port #>
<other configurable options>
```

**tag** is a numeric value that has local significance

**destination-pattern <number>**—number needed to route a call (valid characters are 0-9, A-D, \*, #, ., T)

**port <port#>**—voice-port where the call is sent once a destination-pattern is matched

**<other configurable options>**  
application (i.e. ivr), DID, number translation, etc.

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## POTS Dial Peers

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- Matching digits are stripped by default
- Remaining digits are forwarded
- Behavior can be modified with the following configuration options:
  - (no) digit-strip
  - forward-digits
  - prefix

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## POTS Dial Peers

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**Note**—pots peers strip the pattern that is a match and forwards the rest

dial-peer voice 123 pots destination-pattern 2.. port 1/1/0 <i>prefix 2</i>	dial-peer voice 123 pots destination-pattern 2 port 1/1/0 <i>no digit-strip</i>
--	--

**Prefix**—digits to prepend to the outgoing dial string

**Example:** An inbound VoIP call to 201 will result in a match on peer 123; the router will by default strip the 2 and forward the remaining digits of 01 to the PBX; the prefix command will prepend the 2 back onto the dial string so the router forwards all 3 digits (201) to the PBX

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## Architecture of a VoIP Dial Peer

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**Syntax of a VoIP dial-peer:**

```
dial-peer voice <tag> voip  
destination-pattern <number>  
session target <data address>  
<other configurable options>
```

**tag** is a numeric value that has local significance only

**destination-pattern <number>**—number needed to route a call (valid characters are 0-9, A-D, \*, #, ., T)

**session target <data address>**—where the router is going to send the call when it matches the destination-pattern [phone number to IP address mapping]

**<other configurable options>**  
codec, ip dscp, dtmf-relay, VAD, fax-rate, etc.

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## Dial Peer Matching: Outbound

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### Rules for Matching an **Outbound** Dial Peer When Using a Fixed Length Dial-Plan:

1. Most exact longest match of destination-pattern
2. Lowest preference

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## Dial Peer Matching: Outbound

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### Example 1:

dial-peer	destination-pattern	preference	session-target
1	4085551048	0	voip1
2	408555....	0	voip2
3	408555....	1	pots1
4	.....	1	pots2
5	.....	0	voip3

So, if the Called Number Is 4085551048, the Order of Attempts will be 1,2,3,5,4

### Example 2:

dial-peer	destination-pattern	preference
1	408555....	0
2	4085551048	1
3	4085551...	0

And the Number Dialed Is 4085551048, the Order will be 2, 3, 1; Note that Digits Matched Supercedes Precedence

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## Dial Peer Matching: Outbound

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### Rules for Matching an **Outbound** Dial Peer When Using a Variable Length Dial-Plan:

1. If DNIS is received one digit at a time then shortest complete matching dial-peer is selected if digit "T" is not used; (T is similar to ! on CallManager)
2. Longest match is still followed if all destination-patterns have "digit T"
3. If DNIS is received en-bloc, then longest match wins

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## Dial Peer Matching: Outbound

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### Example 1:

dialpeer	destination-pattern	preference	session-target
1	4085551048	0	voip1
2	408...	1	voip2
3	408...	0	voip3

So, if the Called Number Is 4085551048, the Order of Attempts will be 3 then 2 and Only 408555 will be Collected by the Router; Peer 1 Will Never Be Used; if the Call Is an Inbound ISDN or H.323 Call with Called Party=4085551048, then Peer 1 Will Be Matched

### Example 2:

dialpeer	destination-pattern	preference	session-target
1	408555104.T	1	voip1
2	408...T	0	voip2

So, if the Called Number Is 4085551048, the Order of Attempts Will Be 1 then 2

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## Dial Peer Matching: Inbound VoIP

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### Rules for Matching Dial Peers where the Inbound Call Leg Is VoIP:

1. If the type (voip) is matched, try to match the **called** number (DNIS) with the command:  
“incoming called-number <string>”
2. Else if the type is matched, try to match the **calling** number (ANI) with:  
“answer-address <string>”
3. Else if the type is matched, try to match **calling** number with:  
“destination-pattern <string>”
4. Else match **Peer ID 0 (PID = 0)**

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## Peer ID 0 (PID=0)

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- Peer ID 0 is a non-configurable dial-peer used for inbound matching only
- The matched inbound peer defaults to PID=0 if no other inbound peer is found based on matching criteria
- PID 0 has a default configuration that cannot be changed
- PID 0 for inbound VoIP peers has the following configuration:
  - any codec the router supports (based on complexity config)
  - ip dscp 0
  - vad enabled
  - no rsvp support
  - fax-rate voice (Cisco fax relay enabled)
- PID 0 for inbound pots peers has the following configuration:
  - no ivr application

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## Dial Peer Matching: Inbound VoIP

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An Incoming VoIP Call (Dialed Number 200) to Voice Gateway; Here Are Various Scenarios Illustrating How to Troubleshoot How Inbound VoIP Peers Are Matched Based on the Output of “`debug voip ccapi inout`”

### Scenario 1: No VoIP dial peers configured on VoIP gateway

```
*Mar 2 01:19:50.561: cc_api_call_setup_ind (vdbPtr=0x815CAA28, callInfo={called=200, calling=100, fdest=1 peer_tag=0}, callID=0x816AAEC0)
```

### Scenario 2: destination-pattern configured

```
dial-peer voice 1234 voip
destination-pattern 1..
session target ipv4:10.1.1.1
```

```
*Mar 2 01:22:14.089: cc_api_call_setup_ind (vdbPtr=0x815CAA28, callInfo={called=200, calling=100, fdest=1 peer_tag=1234}, callID=0x816AAEC0)
```

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## Dial Peer Matching: Inbound VoIP

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### Scenario 3: overriding dial-peer match by using answer-address

```
dial-peer voice 1234 voip
destination-pattern 1..
session target ipv4:10.1.1.1
!
dial-peer voice 9876 voip
answer-address 100
```

```
*Mar 2 01:28:03.173: cc_api_call_setup_ind (vdbPtr=0x815CAA28, callInfo={called=200, calling=100, fdest=1 peer_tag=9876}, callID=0x816AAEC0)
```

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## Dial Peer Matching: Inbound VoIP

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**Example 4:** overriding answer-address dial peer match with incoming called number

```
dial-peer voice 1234 voip
destination-pattern 1..
session target ipv4:10.1.1.1
!
dial-peer voice 9876 voip
answer-address 100
!
dial-peer voice 5678 voip
incoming called-number .
```

```
*Mar 2 01:29:11.089: cc_api_call_setup_ind (vdbPtr=0x815CAA28, callInfo=
{called=200, calling=100, fdest=1 peer_tag=5678}, callID=0x816AAEC0)
```

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## Dial Peer Matching: Inbound POTS

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### Rules for Matching Dial Peers where the Inbound Call Leg Is POTS:

1. If PRI/BRI POTS port, follow rules from inbound VoIP matching
2. Else find first POTS dial-peer with the inbound port the call came in on if and only if the peer has at least one of the following configured:
  - Destination-pattern
  - Answer-address
  - Incoming called-number
3. Else match Peer ID (PID) 0

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## Dial Peer Matching: Inbound POTS

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Here Are Various Examples Illustrating How Inbound POTS Peers Are Matched and How to Troubleshoot This Using the Output of “**debug voip ccapi inout**”

### Example1:

```
dial-peer voice 100 pots
destination-pattern 100
port 1/0/0
```

```
*Mar 2 01:57:22.793: cc_api_call_setup_ind (vdbPtr=0x81683FF4, callInfo=
{called=, calling=100, fdest=0 peer_tag=100}, callID=0x814A8E20)
```

### Example2:

```
dial-peer voice 100 pots
port 1/0/0
```

```
*Mar 2 01:57:53.633: cc_api_call_setup_ind (vdbPtr=0x81683FF4, callInfo=
{called=, calling=, fdest=0 peer_tag=0}, callID=0x814A8E20)
```

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## Dial Peer Matching: Inbound POTS

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### Example3:

```
dial-peer voice 100 pots
answer-address 12345
port 1/0/0
```

```
*Mar 2 01:58:17.077: cc_api_call_setup_ind (vdbPtr=0x81683FF4, callInfo=
{called=, calling=12345, fdest=0 peer_tag=100}, callID=0x814A8E20)
```

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## Troubleshooting Dial Peer Issues

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### Command to Look at Dial-Plan at a Glance:

```
vnt-3660-33a#show dial-peer voice summary
dial-peer hunt 0
```

TAG	AD	TYPE	MIN	OPER	PREFIX	DEST-PATTERN	PRE	PASS	FER	THRU	SESS-TARGET	PORT
5552104		pots	up	up					0			
555		pots	up	up	99915506	555[0-1,3-9]...			0			2/0:23
5552		voip	up	up	5552...				0	syst	ipv4:192.168.0.10	

- Useful command to test what dial peer a gateway will select for a particular called number:

**show dialplan number <number>**

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## Troubleshooting Dial Peer Issues

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### The Most Useful Command to Use to Determine what Dial Peers Were Matched for Each Call Leg Is:

```
vnt-3660-33a#show call active voice brief
Telephony call-legs: 1
SIP call-legs: 0
H323 call-legs: 1
Total call-legs: 2

11EF : 69116hs.1 +1438 pid:555 Answer 9199915622 active
dur 00:01:16 tx:4331/86620 rx:4330/86600
Tele 2/0:23:15: tx:86610/86610/0ms g729r8 noise:0 acom:-14 i/0:-44/-44 dBm
11EF : 69402hs.1 +1152 pid:5552 Originate 5552687 active
dur 00:01:16 tx:3812/76240 rx:4354/87080
IP 192.168.0.10:18408 rtt:2ms pl:82130/0ms lost:0/1/0 delay:69/69/70ms g729r8
```

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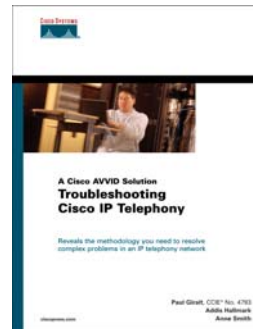
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## Recommended Reading

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