

Dial Plan Elements Agenda

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- CallManager Call Routing Logic
- External Routes in CallManager
- Partitions and Calling Search Spaces
- **Automated Alternate Routing**
- Other Tools

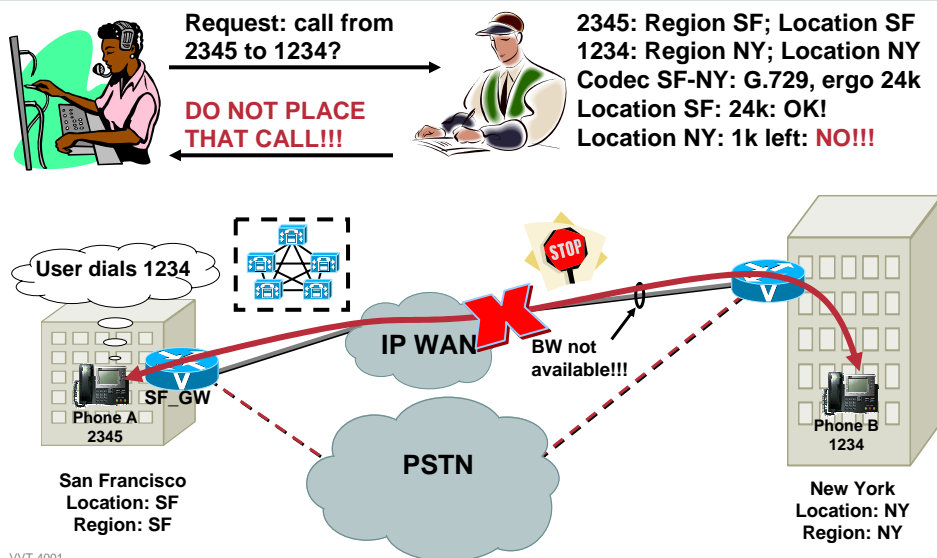
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Automated Alternate Routing (AAR) Call Admission Control without AAR

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Automated Alternate Routing (AAR) AAR Group Assigned to DN

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- DNs are assigned to an AAR group
- But, the CSS used for AAR calls is on the device (see next slide)

SystemRoute PlanServiceFeatureDeviceUserApplicationHelpLogout

Cisco CallManager Administration

Configure Device (SEPABC123ABC123)

Directory Number Configuration

Devices using this Directory Number: SEPABC123ABC123 (Line 1)

Directory Number: 55678 (ALL_IPPHONES)

Status: Ready

Update Delete Reset Devices

Directory Number

Directory Number * 55678

Partition ALL_IPPHONES

Directory Number Settings

Voice Mail Profile <None>

Calling Search Space <None>

AAR Group San Francisco

User Hold Audio Source <None>

Network Hold Audio Source <None>

Call Waiting Default

Auto Answer Auto Answer Off

Call Forward and Pickup Settings

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Automated Alternate Routing (AAR) Calling Search Space Assigned to Device

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- Be mindful of this for Extension Mobility
- This is how an AAR-specific gateway can be chosen
- You could also, since this is a CSS, have a route list that matches the dialed number
- This would let you choose any combination of WAN or PSTN paths

SystemRoute PlanServiceFeatureDeviceUserApplicationHelpLogout

Cisco CallManager Administration

Add a new phone
Add/Update Speed Dials
Subscribe/Unsubscribe Services
Back to Find/List Phones

Phone Configuration

Phone: SEPABC123ABC123 (SF reception)

Registration: Unknown

IP Address:

Status: Ready

Copy Update Delete Reset Phone

Phone Configuration (Model = Cisco 7960)

Device Information

MAC Address * ABC123ABC123

Description SF reception

Device Pool * SF (View details)

Calling Search Space Local_SF

AAR Calling Search Space Local_SF

Media Resource Group List <None>

User Hold Audio Source <None>

Network Hold Audio Source <None>

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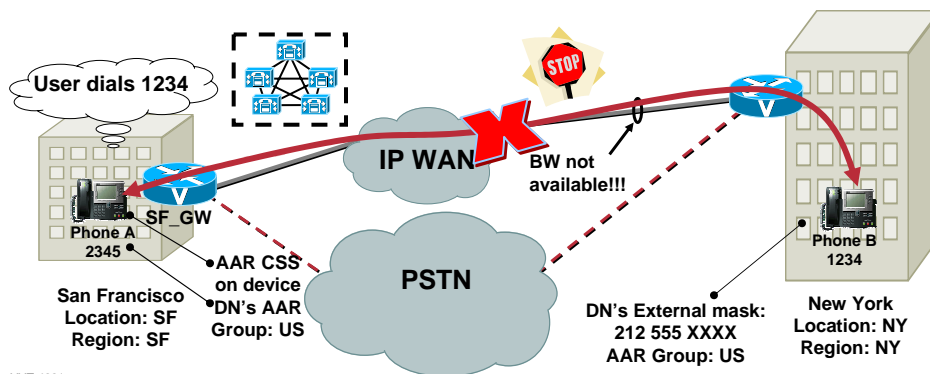
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Automated Alternate Routing (AAR) Configuration Details

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Called DN's External Party Phone Number mask: 212555XXXX
AAR Groups tell me to prefix 91, so new destination is: 912125551234
AAR CSS of originating device contains R.P. 91[2-9]XX[2-9]XX XXXX pointing to SF_GW.
Let's request a call from 2345 to SF_GW



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Automated Alternate Routing (AAR) Rerouting the call

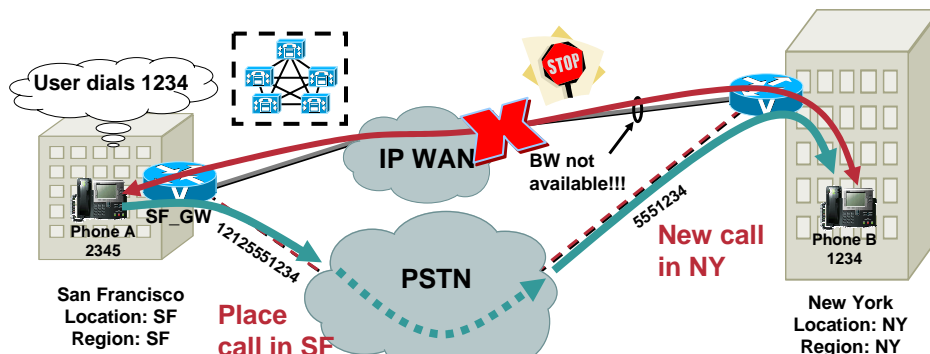
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Request: call from 2345 to SF_GW?
Go ahead!!!



2345: Region SF; Location SF
SF_GW: Region SF; Location SF
Codec SF-SF: G.711, ergo 80k
Same Location: OK!
GO!



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- Partitions and Calling Search Spaces
- Automated Alternate Routing
- **Other Tools**

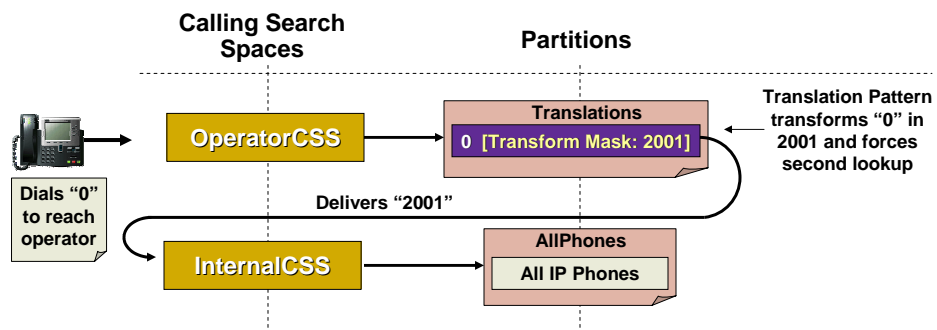
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Other Tools Translation Patterns: The Basics

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- Looks like a Route Pattern, allows digit manipulation
- Instead of sending calls outside via a Route List, forces second lookup in CallManager, using a (possibly different) Calling Search Space

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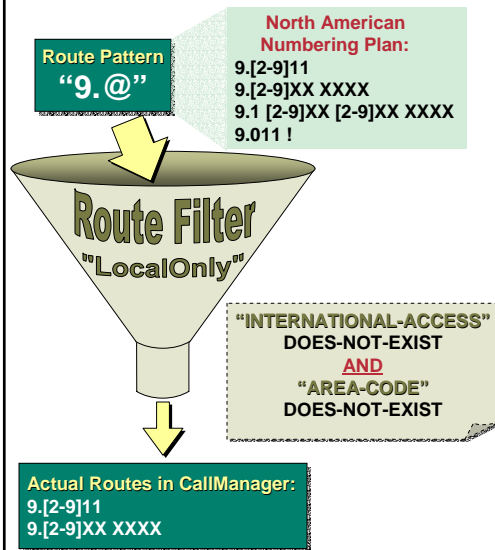
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Other Tools

Route Filters: The Basics

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- The "@" wildcard represents all the routes defined in the national Numbering Plan
- CallManager identifies **tags** in each number:
 - INTERNATIONAL-ACCESS
 - AREA-CODE
 - OFFICE-NUMBER ...
- Route Filters are logical expressions that operate on these tags
- Useful for blocking 900, Caribbean, international...

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Other Tools

Route Filters: Configuration

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Route Filter Configuration

Choose a Dial Plan* North American Numbering Plan

Route Filter Name: Domestic calls
Clause: (AREA-CODE EXISTS AND INTERNATIONAL-ACCESS DOES-NOT-EXIST)
 Status: Ready
 Copy Update Delete Reset Devices Cancel Changes

Route Filter Name* Domestic calls
 To add a clause within this route filter, click 'Add Clause'. Add Clause

Remove Clause

AREA-CODE	EXISTS	AND
COUNTRY-CODE	NOT-SELECTED	AND
END-OF-DIALING	NOT-SELECTED	AND
INTERNATIONAL-ACCESS	DOES-NOT-EXIST	AND
INTERNATIONAL-DIRECT-DIAL	NOT-SELECTED	AND

LIMITATION:

Entire Route Filter can contain up to 1024 characters (excludes "NOT-SELECTED" fields)

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Other Tools DNA and IDP

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- **Dialed Number Analyzer Tool**
Dial plan troubleshooting tool: simulate calls from specific IP phones/gateways/trunks or from a certain CSS and observe routing behaviour (Ships as a plugin with CCM 3.3(4) and 4.0(1))
- **International Dial Plan Tool**
Allows SE's/CSE's to create country-specific numbering plans and import them into CCM to enable use of the "@" macro (First few NPs will be available soon on CCO)

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DESIGN GUIDELINES



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Design Best Practices Agenda

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- **Building Classes of Service**

- Traditional CSS Approach**

- Line/Device CSS Approach

- Classes of Service for SRST (COR)

- **Multi-site Deployments**

- **Extension Mobility Considerations**

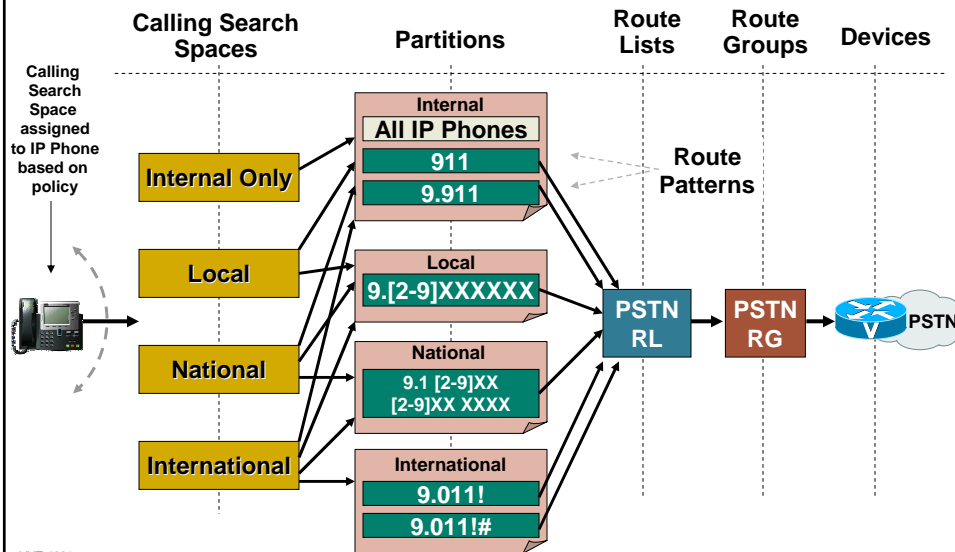
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Traditional CSS Approach Example of Composite View

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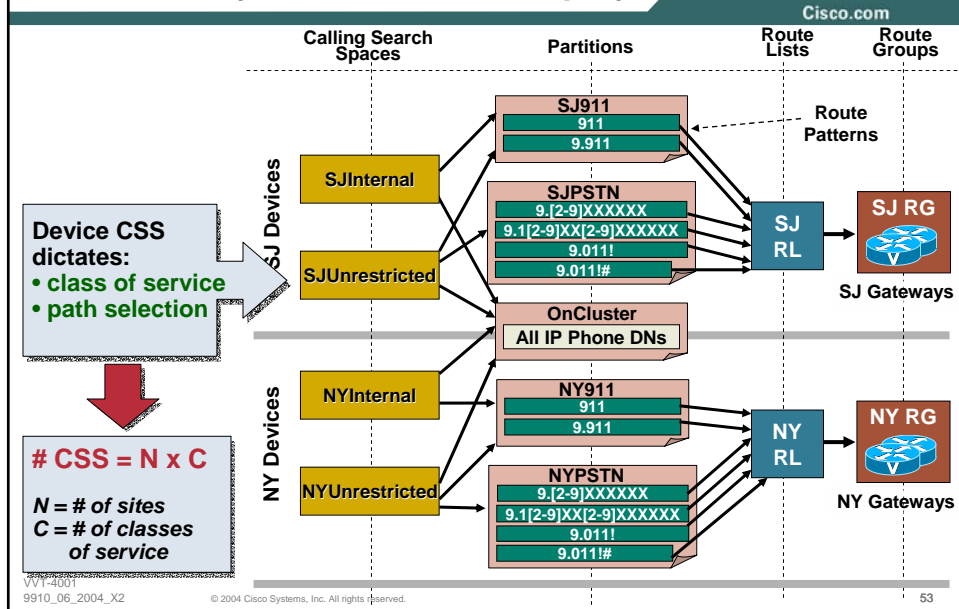


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Traditional CSS Approach Scalability for Centralized Deployments



Design Best Practices Agenda

- **Building Classes of Service**

Traditional CSS Approach

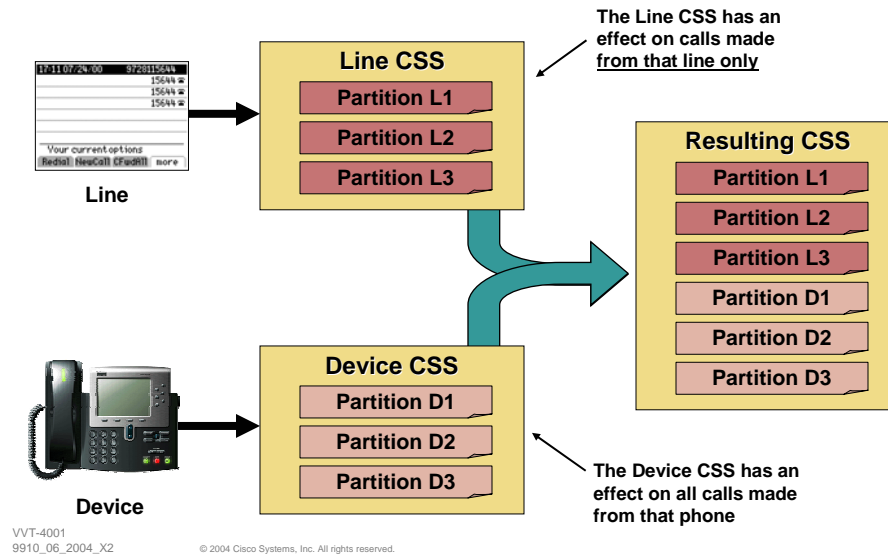
Line/Device CSS Approach

Classes of Service for SRST (COR)

- **Multi-site Deployments**
- **Extension Mobility Considerations**

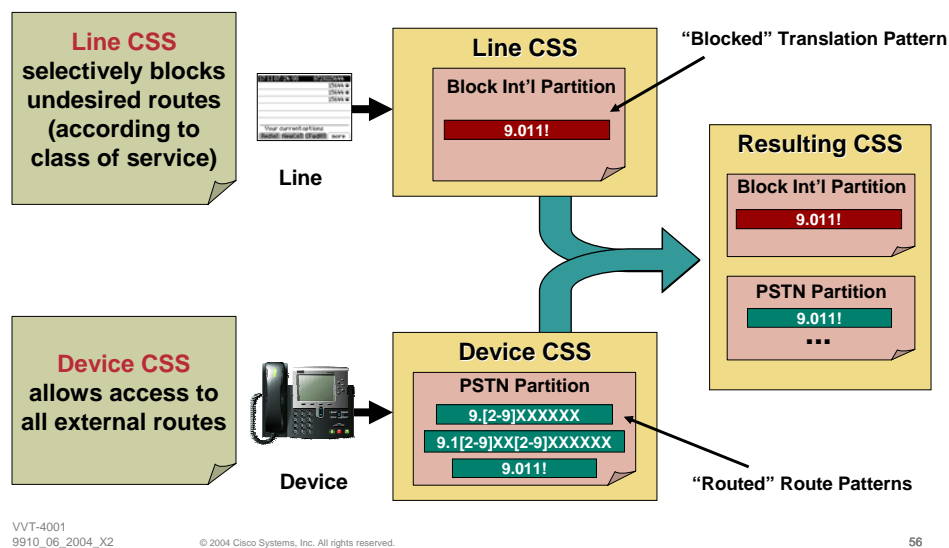
The Line/Device CSS Approach Line CSS vs. Device CSS

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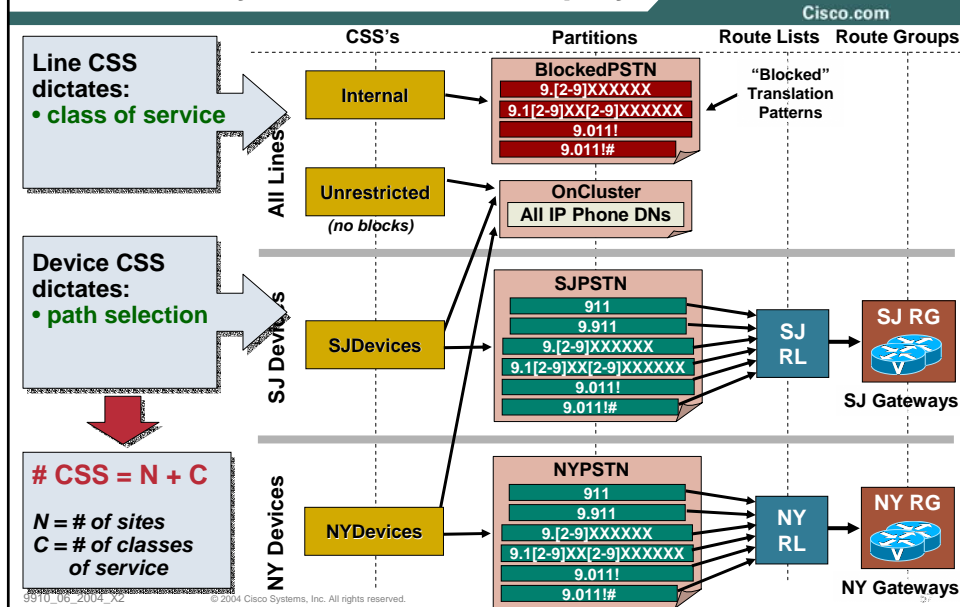


The Line/Device CSS Approach Key Idea

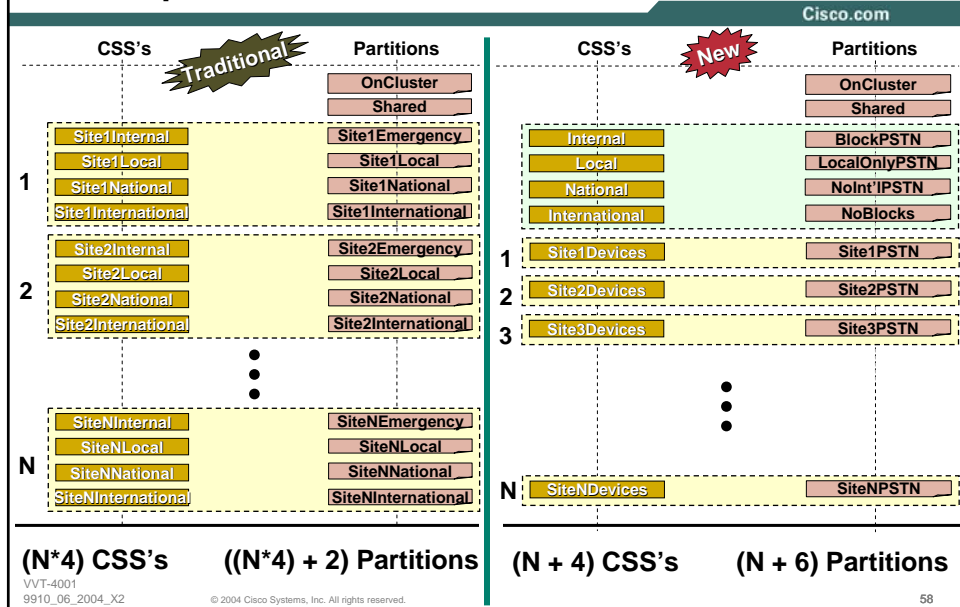
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The Line/Device CSS Approach Scalability for Centralized Deployments



The Line/Device CSS Approach Comparison of the Two Methods



The Line/Device CSS Approach CallForward Caveats

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- Forwarded calls use the *CallFwdxxx* CSS's only. These values are not concatenated with Line or Device CSS
- If forwarded calls must have unrestricted privileges, set the *CallFwdxxx* CSS's to the site-specific Device CSS
- If forwarded calls must be restricted to internal numbers only, set the *CallFwdxxx* CSS's to a single, global CSS with only internal partitions
- If forwarded calls must have some intermediate restriction (e.g., no international calls), this approach may become less efficient, as additional site-specific CSS's will be needed

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The Line/Device CSS Approach Other Caveats

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- Blocking translation patterns configured within the Line CSS must be at least as specific as the route patterns configured within the Device CSS.
(watch for the "@" wildcard, as its patterns are very specific)
- AAR uses a different CSS for rerouted calls. In most cases, this CSS can be the same as the unrestricted site-specific Device CSS.
- Priority order between line and device is reversed for CTI Route Points and CTI Ports. Therefore, the Line/Device CSS approach **cannot be *directly* applied to CTI devices**, such as Softphone (not Communicator).

In this case, it is viable only if blocked patterns are more specific than the routed ones (i.e.: not relying on order of the partitions)

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Design Best Practices Agenda

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- **Building Classes of Service**

Traditional CSS Approach

Line/Device CSS Approach

Classes of Service for SRST (COR)

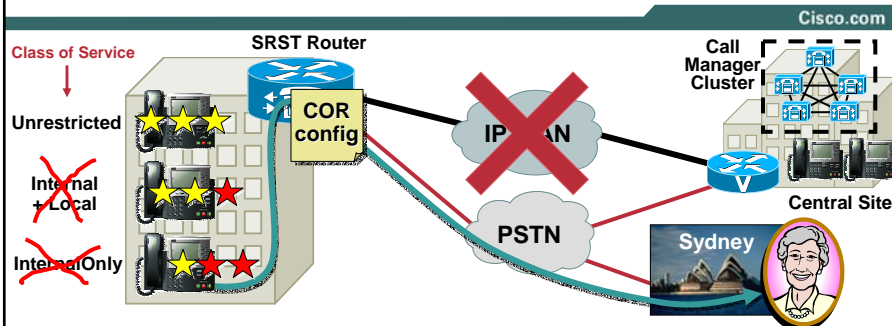
- **Multi-site Deployments**
- **Extension Mobility Considerations**

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Classes of Service for SRST (COR) Rationale



- **When WAN connection is lost, CallManager classes of service are also lost → All remote phones gain unrestricted PSTN access**
- **COR configuration on branch router allows preservation of classes of service in SRST mode**

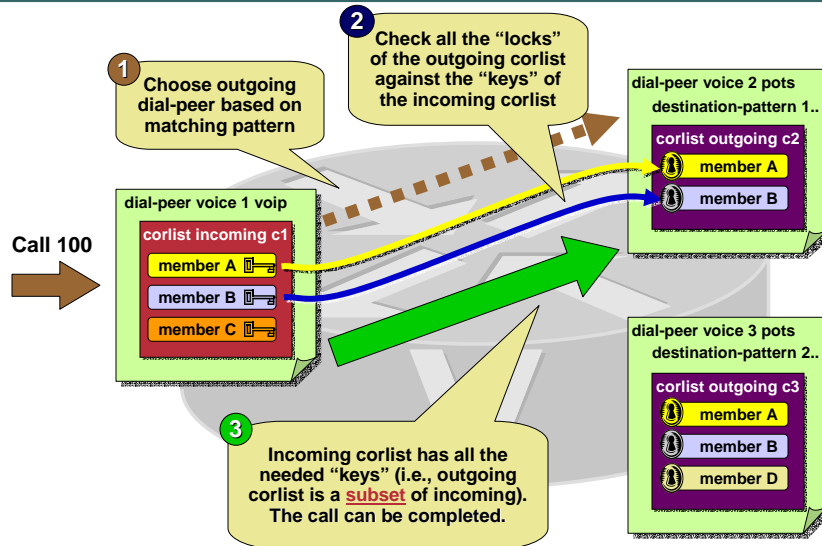
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Classes of Service for SRST (COR) COR Logic (1)

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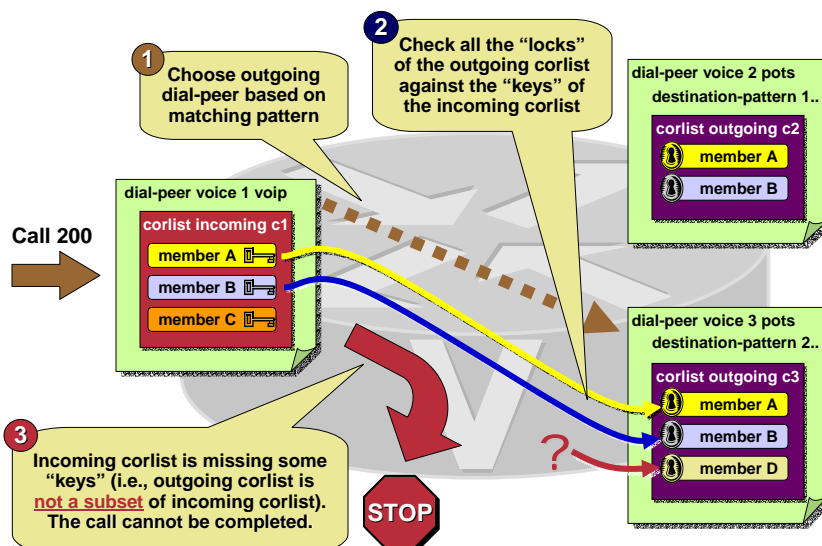
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Classes of Service for SRST (COR) COR Logic (2)

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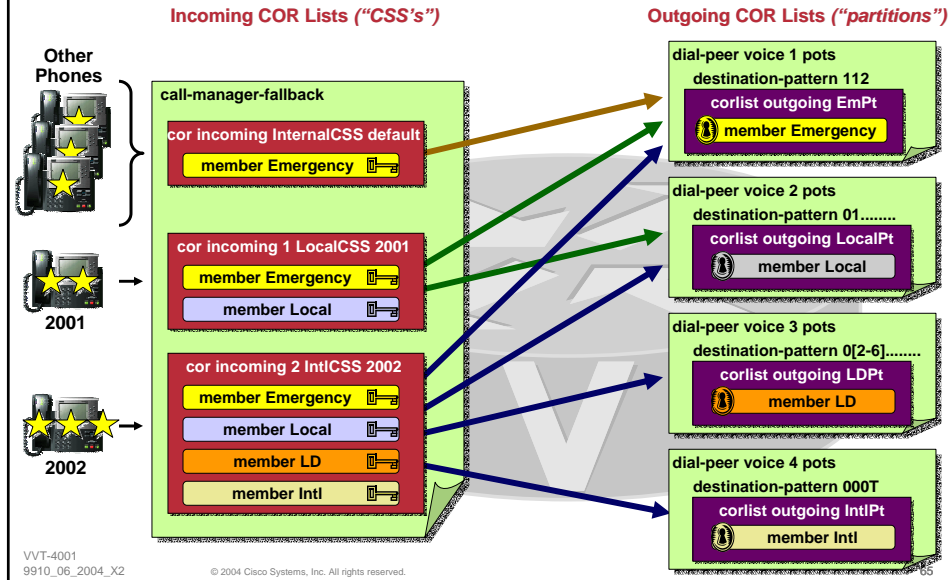
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Classes of Service for SRST (COR) How to recreate “Partitions” and “CSS’s”

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Classes of Service for SRST (COR) Step-by-step Guidelines

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- Define meaningful tags (Emergency, VMail, Local, LD, Intl)
- Define “simple” COR lists (with only one tag as a member) to be used as “partitions”
- Assign the “partitions” as **outgoing COR lists** to the appropriate POTS dial peers
- Define COR lists to be used as “CSS” (containing a subset of the tags as members)
- Assign the “CSS” as **incoming COR lists** to the different phone numbers under the SRST commands

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Classes of Service for SRST (COR)

COR: Cisco IOS Configuration Basics

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STEP 1

```
dial-peer cor custom
name A
name B
name C
name D
```

Define “tags” for
COR list members

STEP 2

```
dial-peer cor list c1
member A
member B
member C
```

```
dial-peer cor list c2
member A
member B
```

```
dial-peer cor list c3
member A
member B
member D
```

Create COR lists with
various combinations
of tags

STEP 3

```
dial-peer voice 1 voip
corlist incoming c1
session target ipv4:1.1.1.1
dtmf-relay h245-alpha
```

```
call-manager-fallback
cor incoming c2 default
cor incoming c3 1 2001
cor incoming c3 2 2004-2007
```

```
dial-peer voice 2 pots
corlist outgoing c3
destination-pattern 1..
port 1/0:23
```

Associate incoming and
outgoing COR lists with
voip/ pots dial-peers and
call-manager-fallback

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Classes of Service for SRST (COR)

SRST COR Limitations

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- Maximum number of “cor incoming” statements under call-manager-fallback is **5 (plus default)** in SRST **2.1 (IOS 12.2(13)T)**
- Maximum number of “cor incoming” statements under call-manager-fallback is **20 (plus default)** in SRST **3.0 (IOS 12.2(15)ZJ)**
- If “manager” phone DN’s are not consecutive and the SRST site is relatively large, this may become an obstacle to establishing appropriate classes of service

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Design Best Practices Agenda

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- Building Classes of Service
- **Multi-site Deployments**
 - Choosing a Dial Plan Approach
 - Uniform On-net Dialing
 - Variable-length On-net Dialing with Partitioned Addressing
 - Variable-length On-net Dialing with Flat Addressing
- Extension Mobility Considerations

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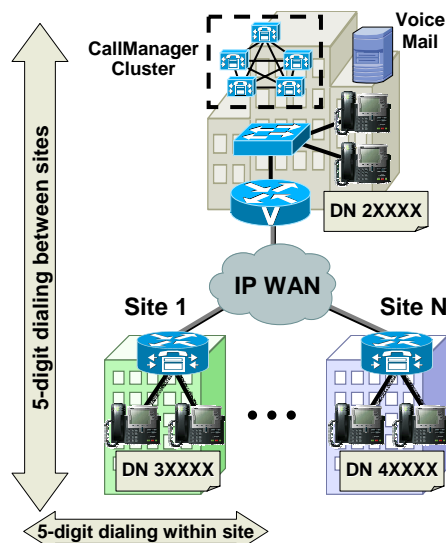
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Choosing a Dial Plan Approach

Uniform On-net Dialing

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- Dialing within a site and across sites with same number of digits (e.g., 5)
- Extensions are globally unique
- Easy to design and configure
- Limited scalability of the addressing method (*number of sites, number of extensions*)

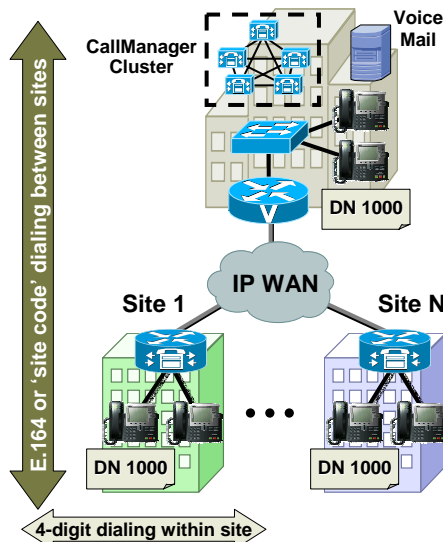
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Choosing a Dial Plan Approach Variable-length On-net Dialing (VLOD)

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- Abbreviated dialing within a site (4 or 5 digits)
- Identical extensions (e.g., 1000) may appear at different sites
- Inter-site calls use an "escape code" (e.g., "9 + full E.164", or "8 + site code + extension")
- Easier scalability for large numbers of extensions and sites

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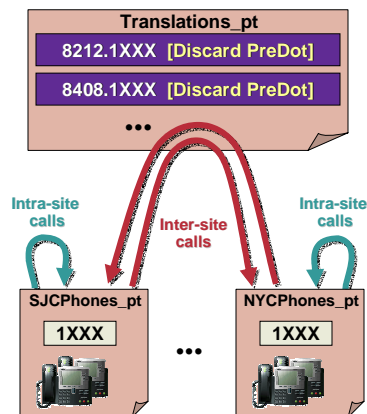
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Choosing a Dial Plan Approach Addressing methods for VLOD

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Partitioned Addressing

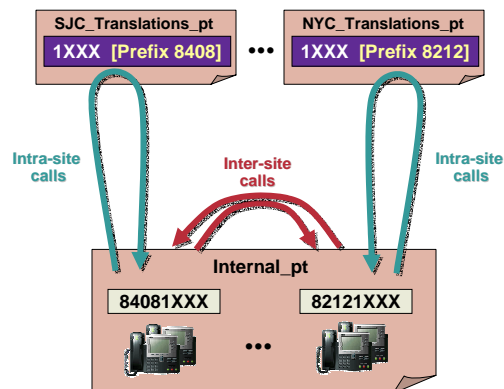


- Phone DN's in different partitions
- Global Xlations for inter-site calls

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Flat Addressing



- Phone DN's in same global partition
- Per-site translations for intra-site calls

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Choosing a Dial Plan Approach

Preliminary Design Questions

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- How many sites are going to be part of the system?
- What are the calling patterns between sites?
- What do users dial within a site and to reach another site?
- What transport network is going to be used for inter-site calls (PSTN or IP WAN)?
- What (if any) CTI applications are being used?
- Is there a desire for a standardized on-net dialing structure (e.g., using site codes)?

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Design Best Practices Agenda

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- Building Classes of Service
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 - Choosing a Dial Plan Approach
 - Uniform On-net Dialing**
 - Variable-length On-net Dialing with Partitioned Addressing
- Extension Mobility Considerations

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Uniform On-net Dialing Use this Model if...

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- DID ranges do not overlap (based on chosen quantity of digits for internal calls)
- Number of sites is relatively small
- Number of sites is not expected to grow significantly in the future

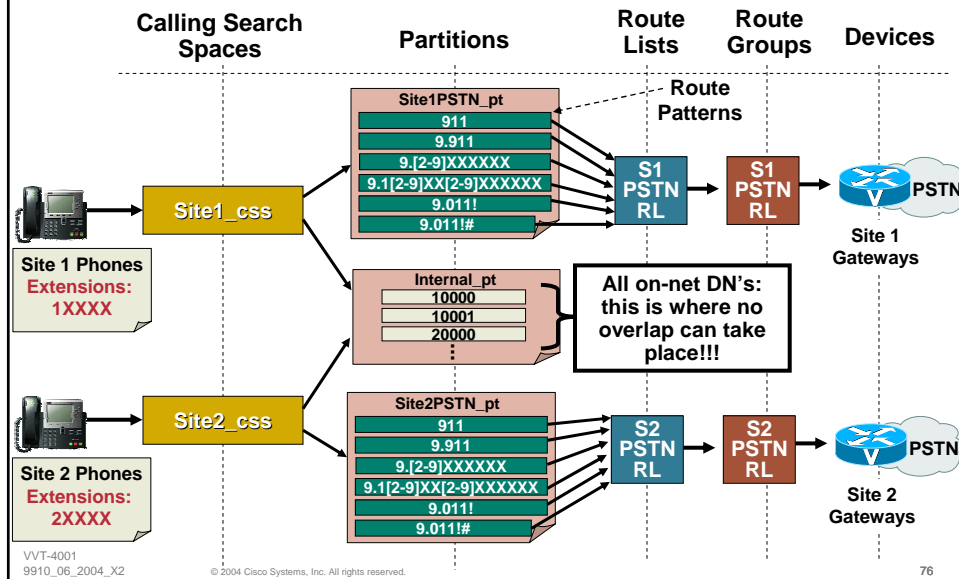
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Uniform On-net Dialing Composite View

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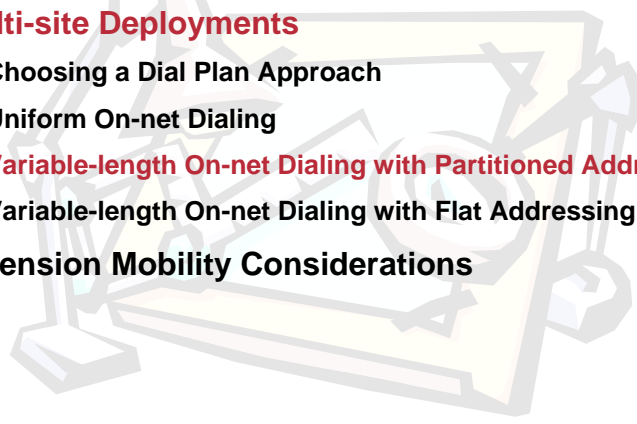
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