Cisco Expo
2012

Návrh číslovacího plánu, URI dialing

T-COL2 /L2

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Program

- Developing a Global Dial Plan

- URI dialing

Developing a Global Dial Plan

- „E.164“
- Number presentation

Dial Plan: **Think Globally, Act Locally**

- More than just a cute phrase: it actually applies to Unified Communications
- **Even a local only company will make calls to, or receive calls from, international locations**
  - Mobility users tend to travel: their mobile phone thus would be best equipped with global address books
  - You may have to click-to-dial international numbers from your CUPC (or other soft phone)
- …

Dialing

- different types of dialed numbers
  - national
  - international
  - national on-net – national calls to known sites on-net
  - international on-net – intl. calls to known sites on-net
  - private numbers –private voice network (PVN)
  - intra-site – “office next door”
- who/what is dialing (is the source of the number)
  - **users using the keypad** – typically want short numbers
  - **applications, CTI** – number length irrelevant
  - **directories** – number format in the directory?

(+)E.164 DNs

+E.164 DNs

- +E.164 DNs supported since CUCM 7.0
- Configured in CUCM admin GUI as “\+”
- **Pro:**
  - Unique by definition
  - Direct + dialing with DN partition in CSS
- **Caveats:**
  - CTI applications (including UCCE/UCCX)
  - Unity Connection does not support +E.164 (as primary DN)
  - ...
- Why not use E.164 DNs instead?

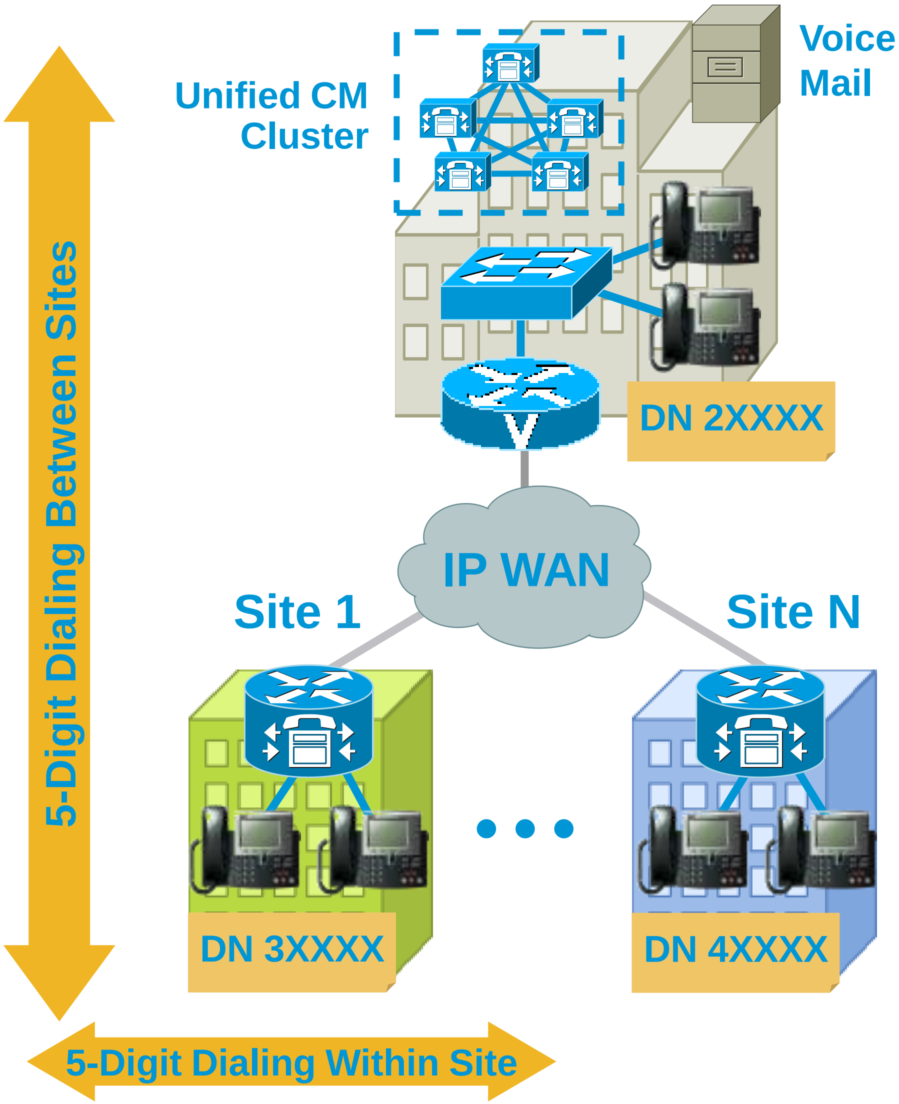
E.164 DNs

- Unique by definition
- Country code overlaps with intra-site dialing (e.g. 1xxx)
- Really?
  - E.164 dialing (w/o +) is not a supported dialing habit
  - → the DN partition must not be addressed directly
- +E.164 DNs require translations from supported dialing habit to +E.164 anyway; why not translate to E.164 instead of +E.164?
- **Calling party number globalization**
  - set external phone number mask to +E.164
  - “use external phone number mask” on translation patterns

Choosing a Dial Plan Approach

Uniform On-Net Dialing

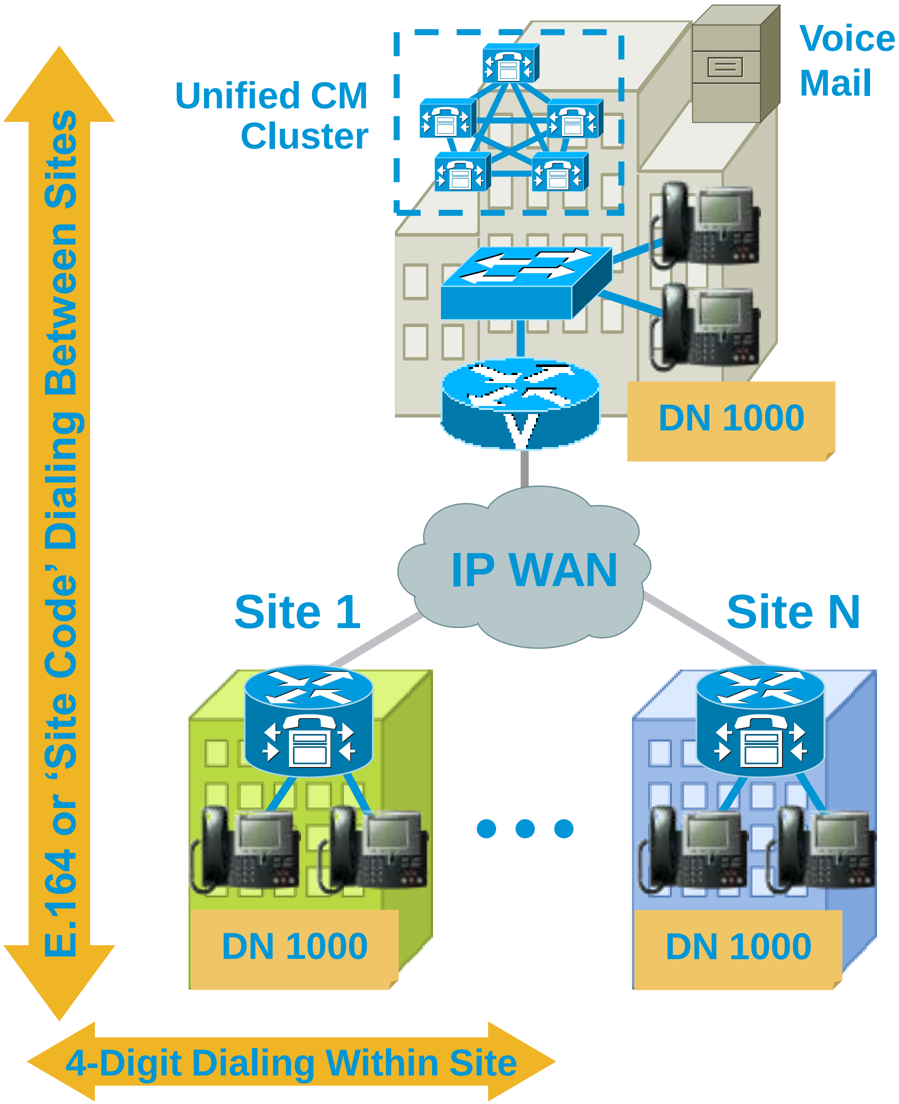
- Dialing within a site and across sites with same number of digits (e.g., five)
- Extensions are globally unique
- Easy to design and configure
- Limited scalability of the addressing method (number of sites, number of extensions)



Choosing a Dial Plan Approach

Variable-Length On-Net Dialing (VLOD)

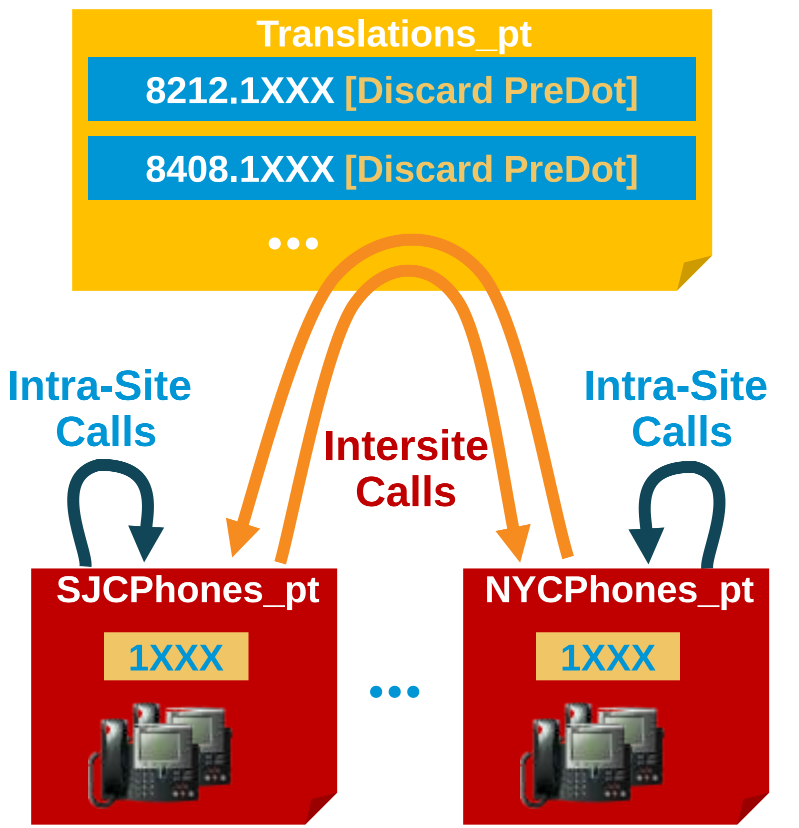
- Abbreviated dialing within a site (four or five digits)
- Identical extensions (e.g., 1000) may appear at different sites
- Intersite calls use an escape code (e.g., 9 + full E.164, or 8 + site code + extension)
- Easier scalability for large numbers of extensions and sites



Choosing a Dial Plan Approach

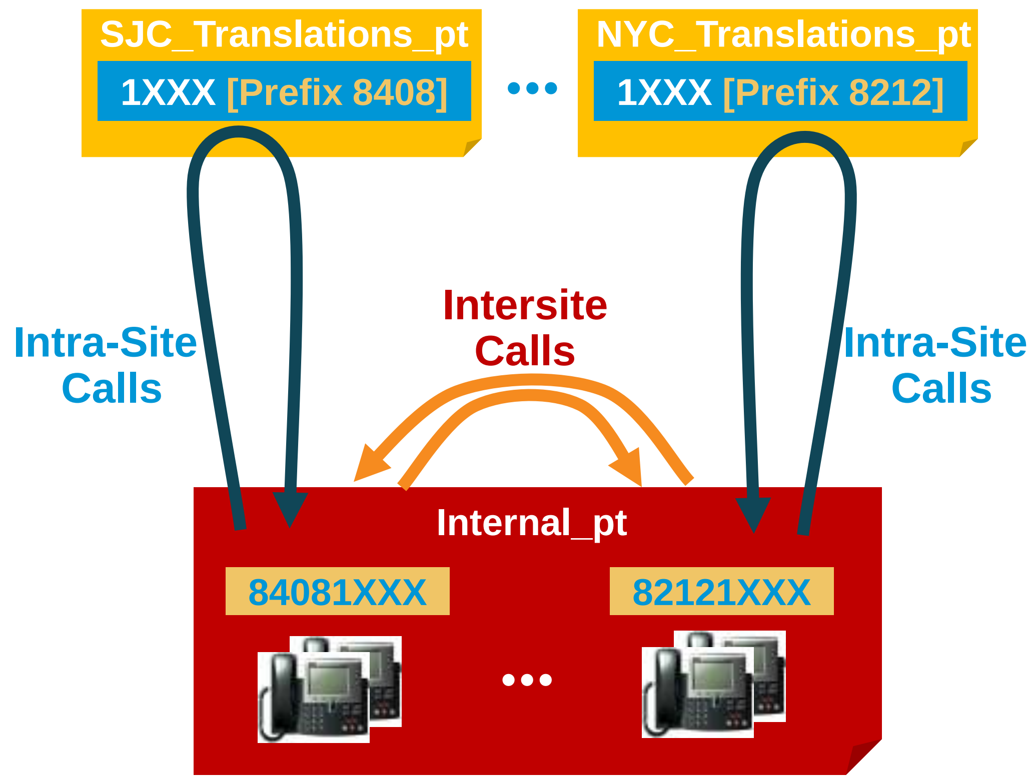
Addressing Methods for VLOD

Partitioned Addressing



- Phone DNs in different partitions
- Global Xlations for intersite calls

Flat Addressing



- Phone DNs in same global partition
- Per-site translations for intrasite calls

Types of Callable Patterns

- Directory Number

  Extend call to registered device (phone, voicemail port etc.)

- Route Pattern

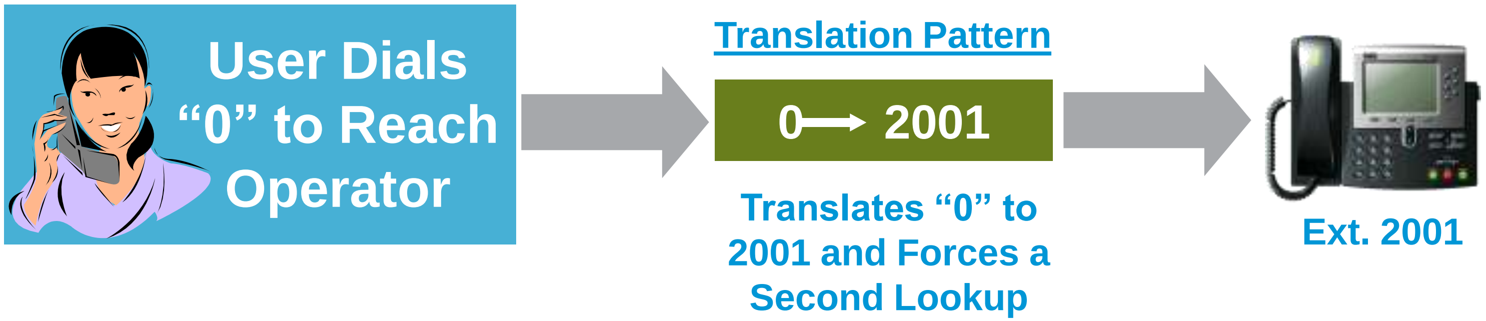
  Modify calling and called party and start routing to an external route

- Translation Pattern

  Modify calling and called party and continue to route using a different calling search space

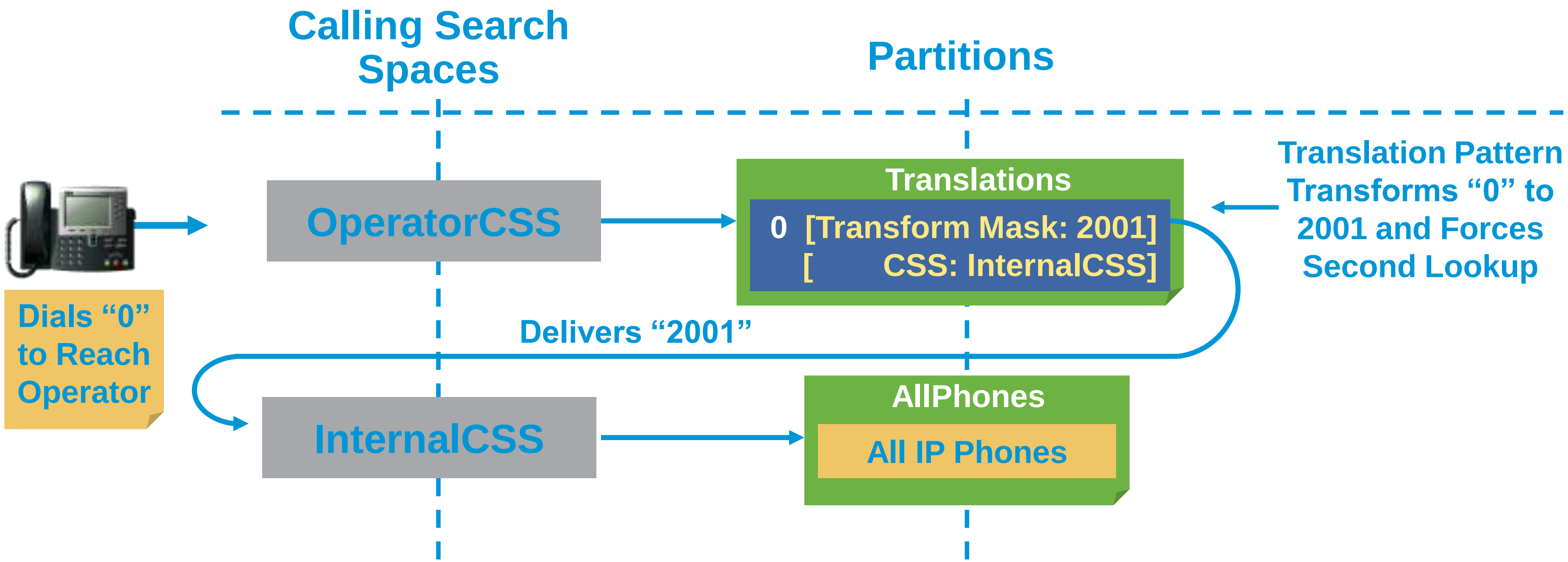
Translation Patterns
The Basics

- Match on dialed digits
- Perform calling and/or called party digit manipulation
- Force second lookup in Cisco Unified CM, using a (possibly different) calling search space



Translation Patterns

Call Flow



- Allows digit manipulation of called and calling party number
- Forces second lookup in Cisco Unified CM, using a (possibly different) calling search space

Number Transformations

- Two Concepts:
  - Implicit – **As part of routing process**
    - Translation Pattern
    - Route Pattern
    - Route Lists
  - Explicit – Transformation **after routing decision**
    - Incoming Calling/Called Party Settings on gateways, trunks (or device pools)
    - Calling/Called Party Transformation CSS on gateways, trunks (or device pools)
    - Calling Party Transformation CSS on phones (or device pools)

Number Transformations

Gateways: Calling and Called-Party Transforms

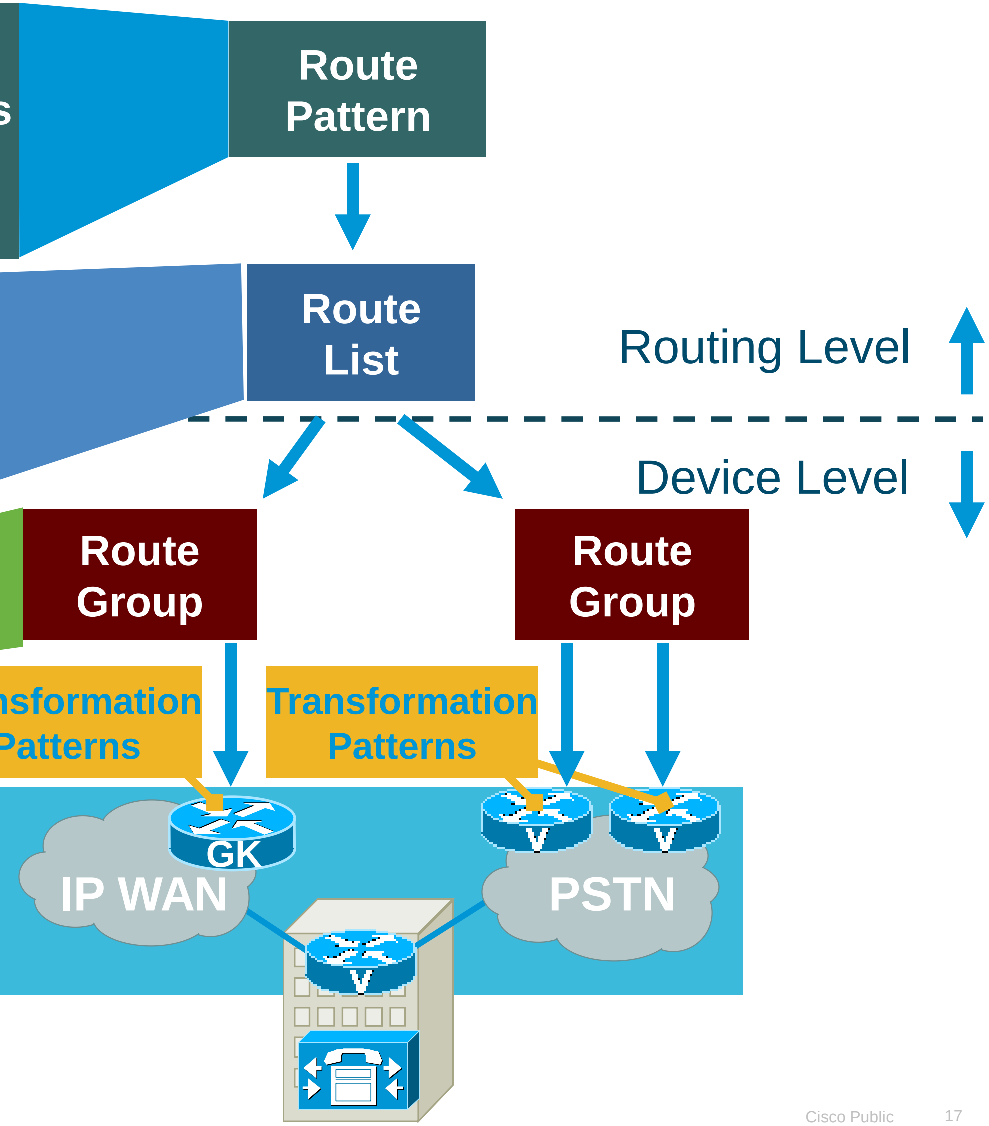
Route Pattern
- Matches dialed number for external calls
- Performs digit manipulation (optional)
- Points to a route list for routing

Hunt/Route List
- Chooses path for call routing
- Per-route group digit manipulation
- Points to prioritised route groups

Route Group
- Distributes calls to GWs/trunks

Transformation Pattern
- Modifies calling (Cg) party
- Modifies called (Cd) party

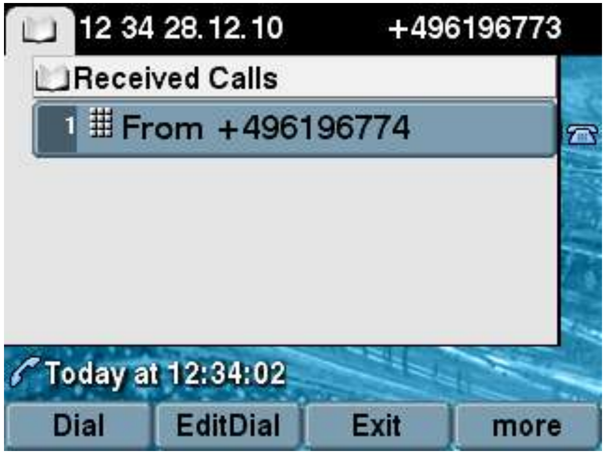
Devices
- Gateways (H.323, MGCP, SIP)
- Trunk (H.225, ICT, SIP)



Calling Party Numbers

Where do they show up?

- Alerting plane
- calling party number in outgoing calls
- missed/received calls directory



General Concept for CnPNs

- globalize on ingress:
  - incoming calling party transformation CSSes on GWs
  - globalization of DNs has to use calling party transformations of a translation pattern in the path (e.g. use external phone number mask)
- localize on egress
  - outgoing calling party transformation CSS on GWs
  - calling party transformation CSS on phone

URI Dialing

What is a URI in CUCM 9.0?

- URI is a “uniform resource identifier”. Example: johndoe@cisco.com
- URIs are aliases for device numbers.
- A call to the URI behaves as if the call was made directly to the device number.

Why dial Alpha URIs?

- Always a VOIP call. (Calls to a number can be routed over the PSTN, but this isn't desirable because PSTN calls don't support Video.)
- Provides for better integration with URI centric call control systems like Tandberg's VCS and Microsoft Office Communicator Server (OCS).
- URIs can be used for a more reliable directory integration.

URIs and routing

- **Intra-cluster**: Calls to URIs on the local cluster are routed using partitions and search spaces. Look at the SRND for guidance.
- **Inter-cluster** routing problem:
  - URI calls between clusters can't be routed with prefix like phones can.
  - URIs on multiple clusters can have the same domain suffix so you can't route calls to the correct cluster using the domain suffix.
- Inter-cluster routing solution:
  - URIs are replicated between clusters using the Inter-cluster Lookup Service (ILS). When a call is made a lookup is done in ILS to figure out what SIP trunk to route the call out of.

URIs in caller ID

- A call from a device number includes a URI in the caller ID if one exists
- A call from a device number always includes the device number in the caller ID so it can be presented to a device that doesn’t support URIs and those devices can return the call.

Alpha URI Dialing phone support

- Only a subset of the phones support dialing a URI. Currently supported phones:
  - Round Table (exceptions: transferring, conferencing, and forwarding today.)
  - E-20, E-90 (coming soon?)
  - Cisco Jabber for Windows (coming soon?)
- All phones support receiving an alpha URI call.

Features supported

- Transfer
- Forward
- Conference
- Callback (Callback to a URI call will be numeric.)
- Speed Dial
- Abbreviated Dial
- Redirecting (SIP 302)
- CDR
- CTI/JTAPI/TAPI (SIP/SCCP)
- UDS (URI lookup and query)
- SIP trunks (Inter-cluster, SME, CUBE, IME and CoRes)

Feature limitations

- Round table phones:
  - Don’t let you enter a URI will transferring, conferencing or configuring forward all.
- H323. MGCP trunks/gateways and most phones:
  - Don’t let you dial URIs.
  - Present the number as the caller.
- Q.SIG trunks:
  - The caller ID may be numeric in some situations.
- SRST:
  - Doesn’t support URI dialing.

URI Intra-cluster routing

Basics of intra-cluster routing when dialing a URI

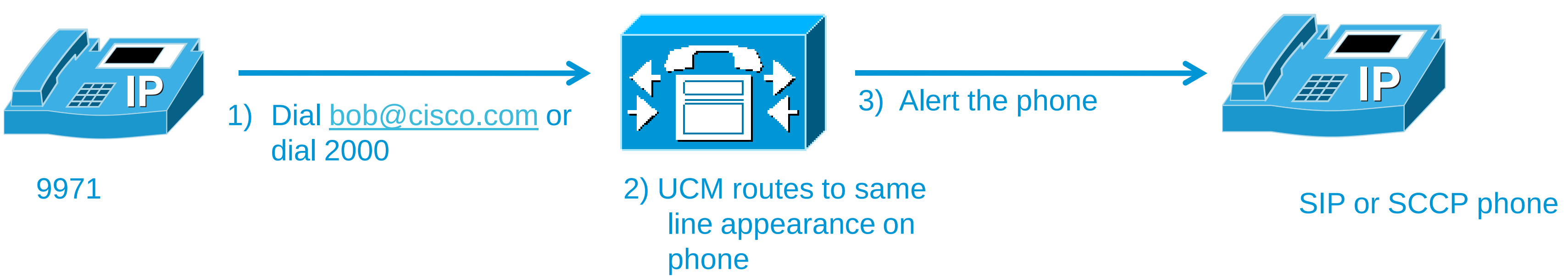
Overview – URI dialing

- A URI is an alias of a DN. You can dial either and reach same destination.

- URIs can be associated with a DN on any line device, SIP or SCCP.

- DN or Blended (URI and DN) identity can be delivered in the signaling for display/call history population.

- Phones have no notion of their associated URI. They still register with DN.



Supported URI formats

- Supported according to SIP RFC 3261, section 25.1

  alice@cisco.com

  alice@10.10.10.1

- user portion is case-sensitive, host portion is case-insensitive

  e.g. Alice@cisco.com and alice@cisco.com are not the same

- explicit IPv6 host not supported

  e.g. alice@[2001:420:8ff:6:250:56ff:fe8e:103c]

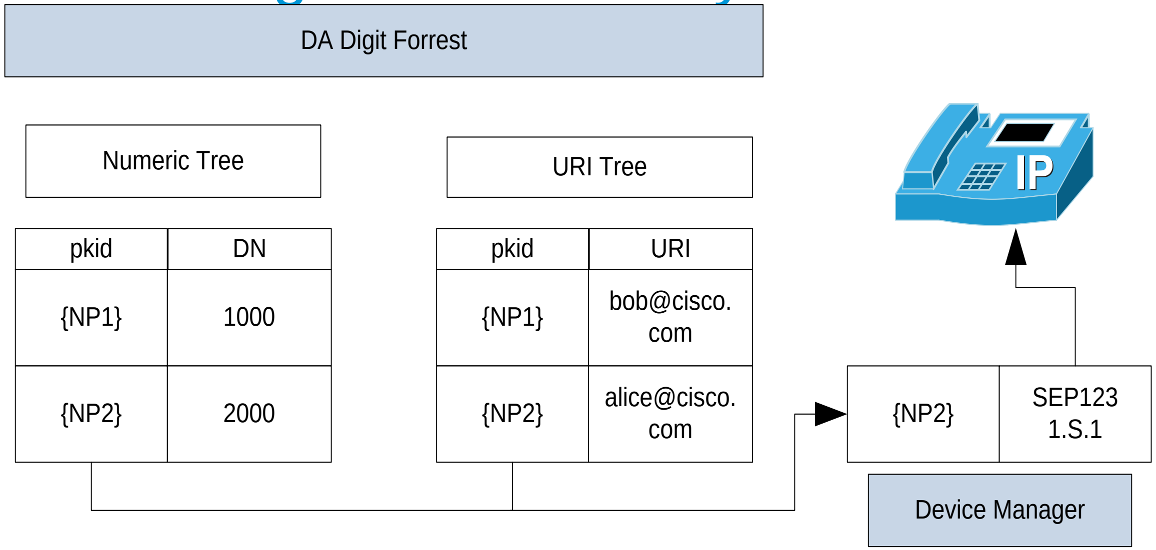
- URIs without a user name are not supported

  e.g. sip:cisco.com

- 7-bit ASCII only

Storing URIs in Digit Analysis

- URIs are stored in separate tree in DA.
- URI is an alias of a DN. Both URI and DN point to same line appearance on the device.
- Components calling DA must indicate if a dial string is a DN or URI before sending to DA for analysis



Dial String Interpretation – Problem Statement

•Characters 0-9, A-D,*,+ span both the numeric and alpha-numeric sets, there needs to be a way to disambiguate when an incoming dial string is arbitrary.

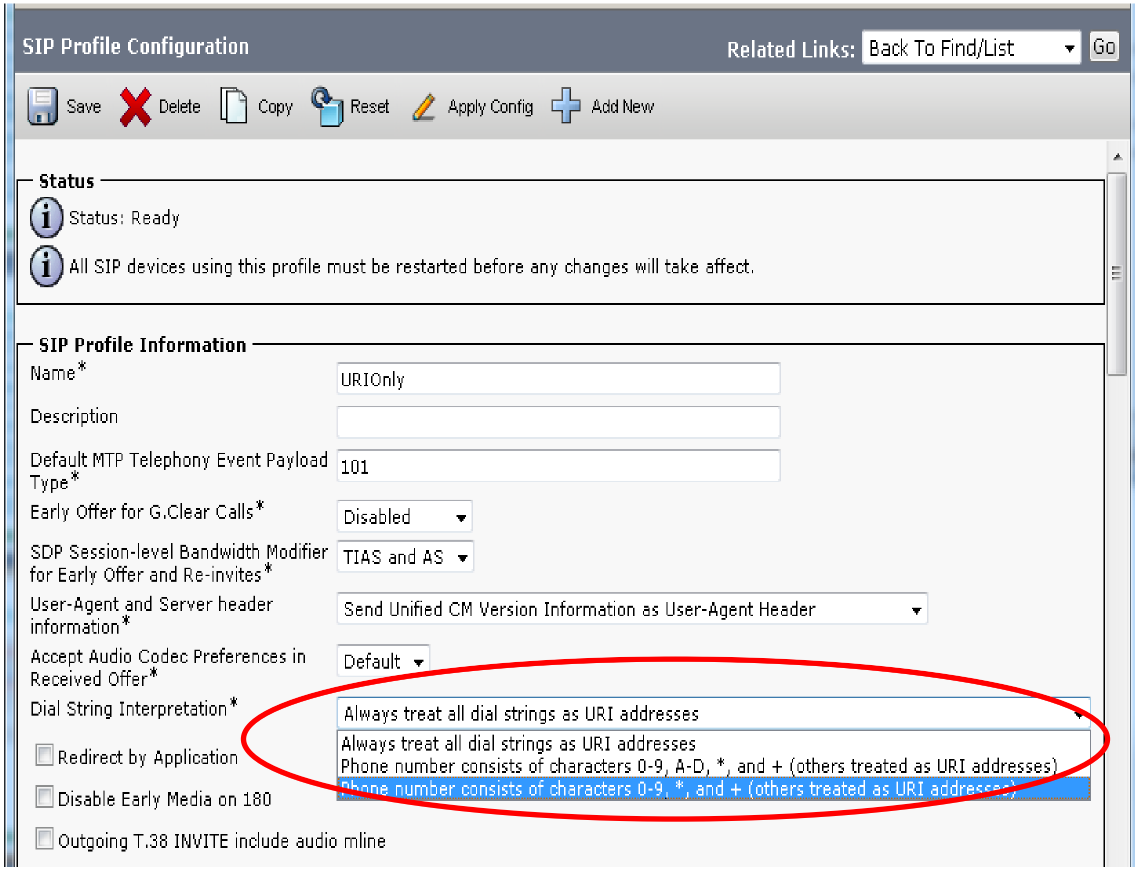
e.g., is the user portion of sip:1234@10.10.10.1 a DN or URI dial string?

•Two tiered solution

1) Phone includes "user=phone" tag on Request-URI when in keypad mode. This indicates the dial string is a number.

2) "user=phone" not present, UCM applies a configurable interpretation policy on the Request-URI.

SIP Profile setting, Dial String Interpretation



- •Dial String Interpretation setting on SIP Profile page.
- •Default is “0-9,*, and +” dial string is number.
- •Best practice, provision non-ambiguous URIs

Delivering blended identity

- Blended identity is delivered to phones that indicate support for new x-cisco-number tag

  e.g. Remote-Party-ID:<sip:alice@cisco.com;x-cisco-number=1000>

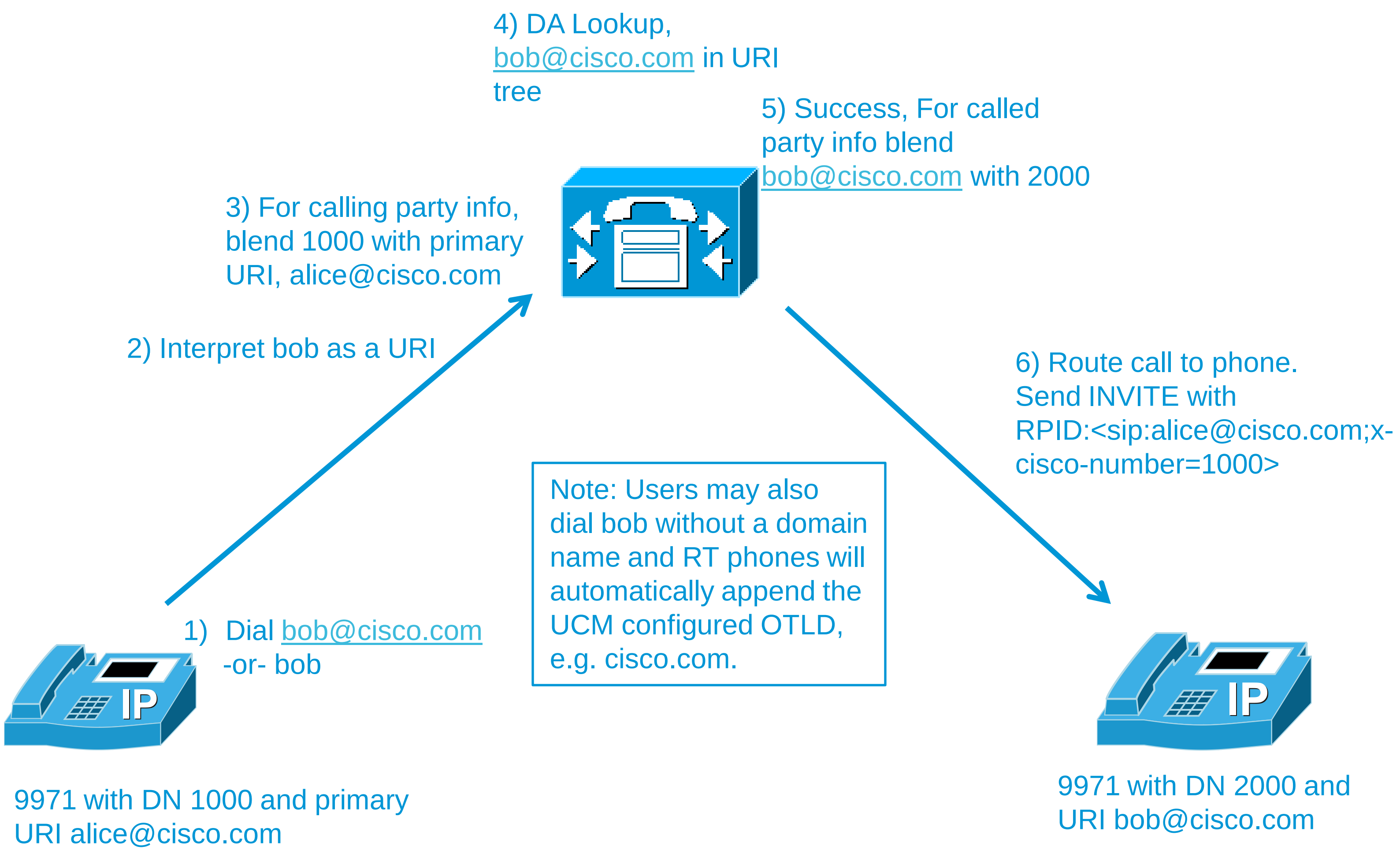
- Phones indicate support via new REGISTER/optionsind key

  e.g. <x-cisco-number></x-cisco-number>

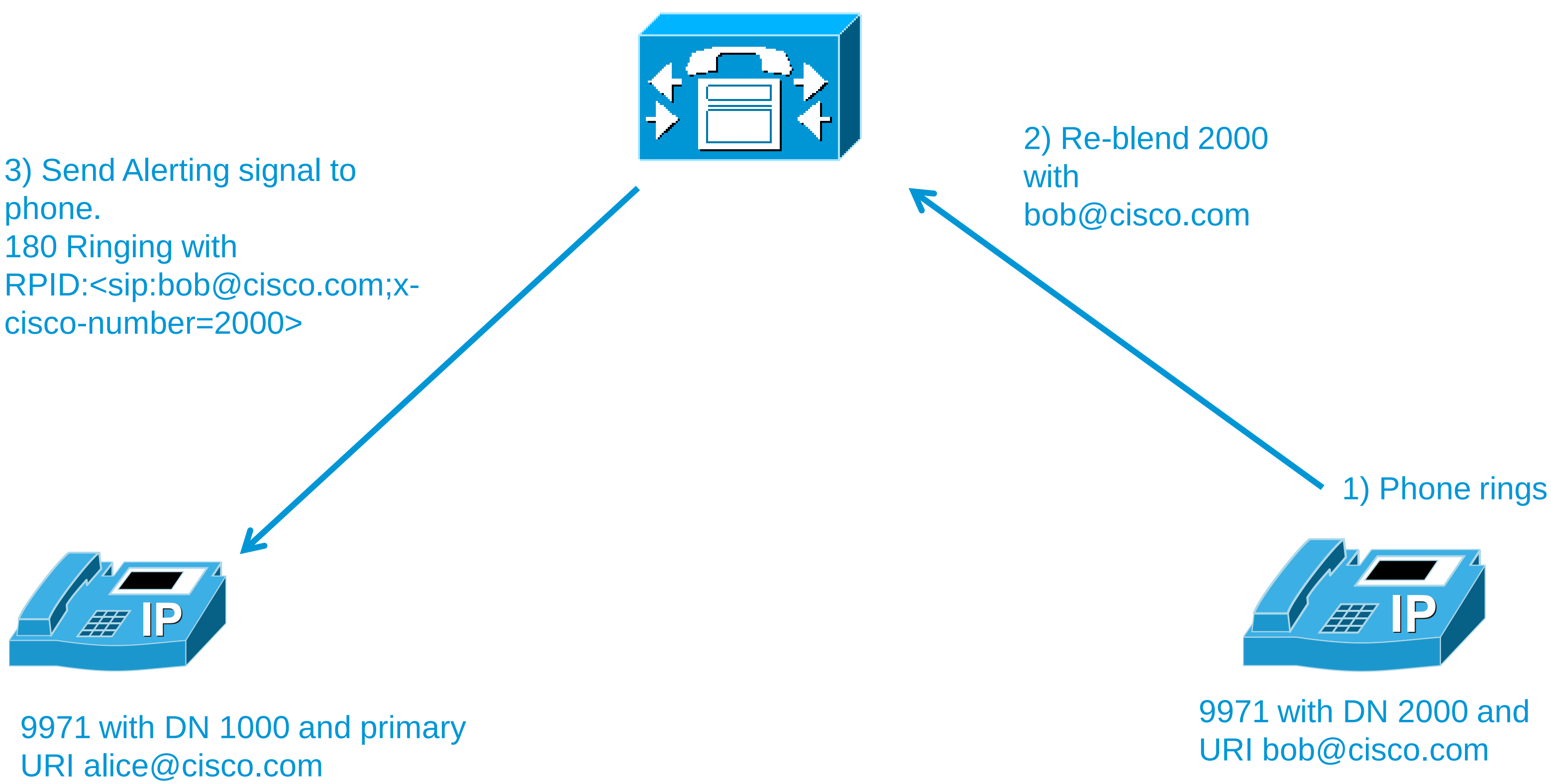
- -or- Configure phone model with new QED flag
- SIP Trunk, configure for blended delivery on trunk page (more on that later)
- Headers affected,

  Remote-Party-ID, Diversion, P-Asserted-ID(trunk only), P-Preferred-Identity(trunk only), NOTIFY content for shared line.

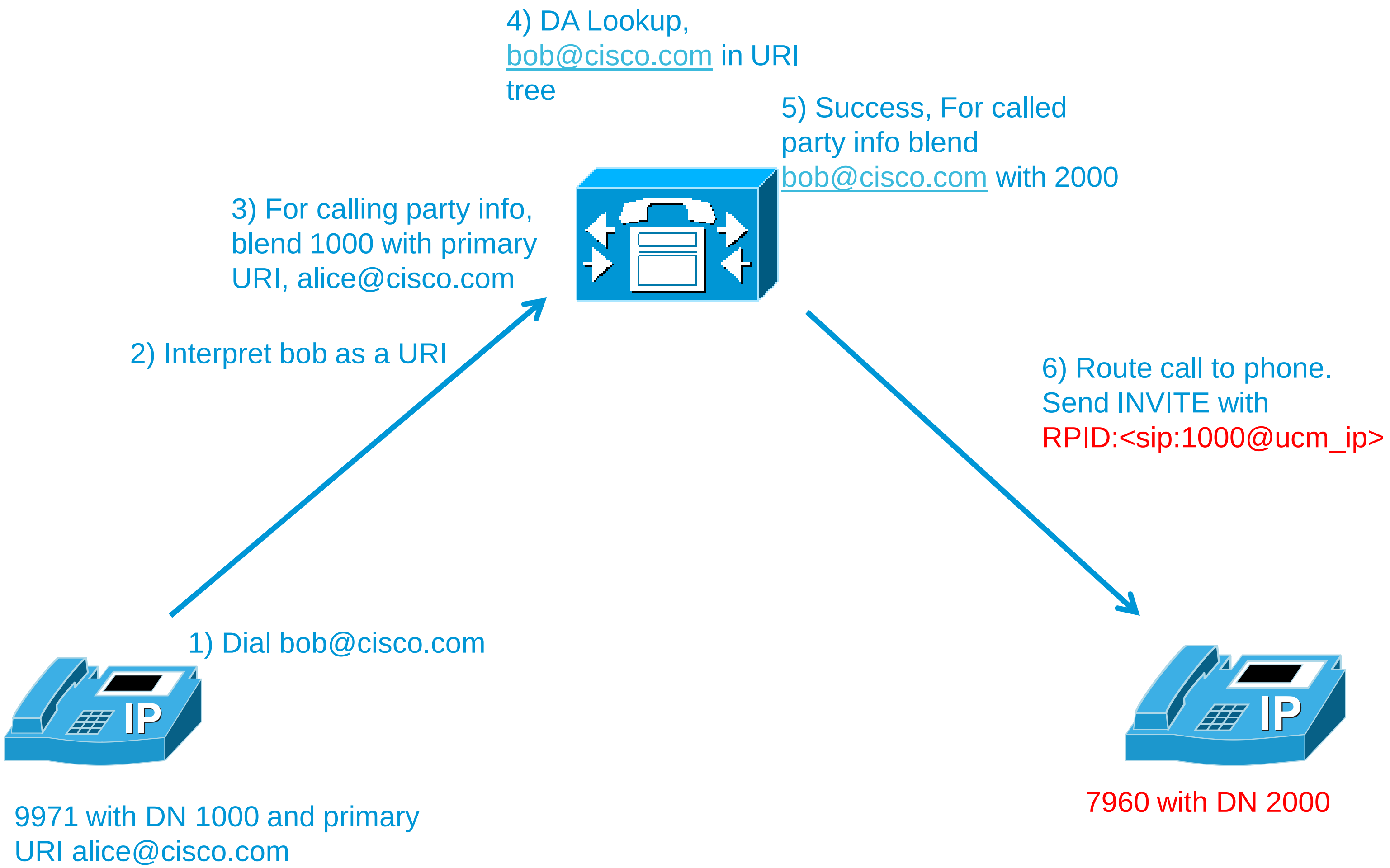
Call Flow Example – Outgoing call flow



Call Flow Example – Alerting Flow



Call Flow Example – Outgoing call flow, calling legacy phone



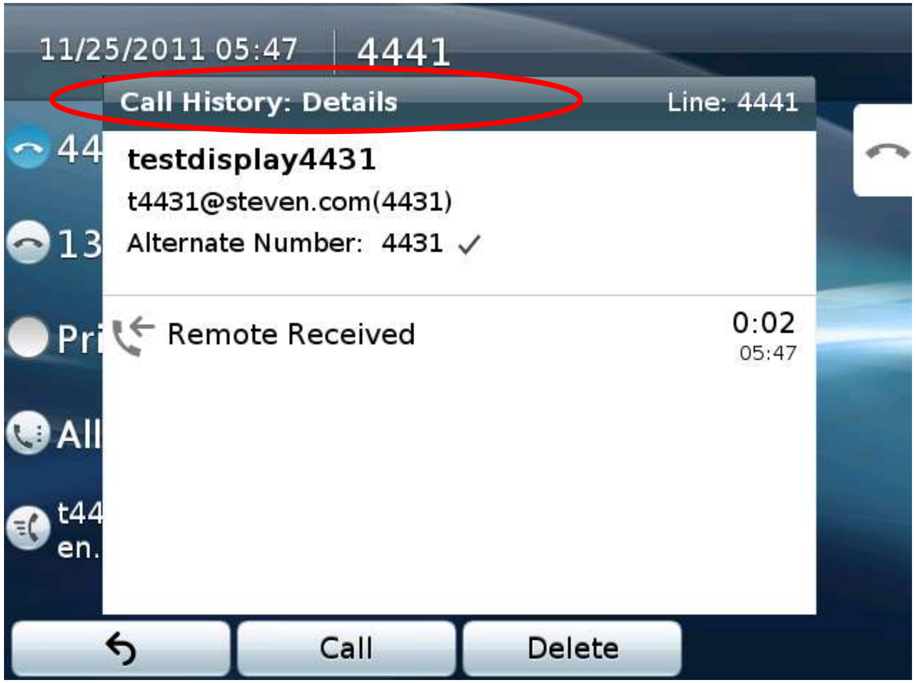
Displaying blended identity on Phone

Phones that support blended identity consumption may use it for display and/or call history population.

•RT phones will give URI priority when both URI and DN are available.

•For display, RT phones will only display Alerting/Display Name and URI. (no DN)

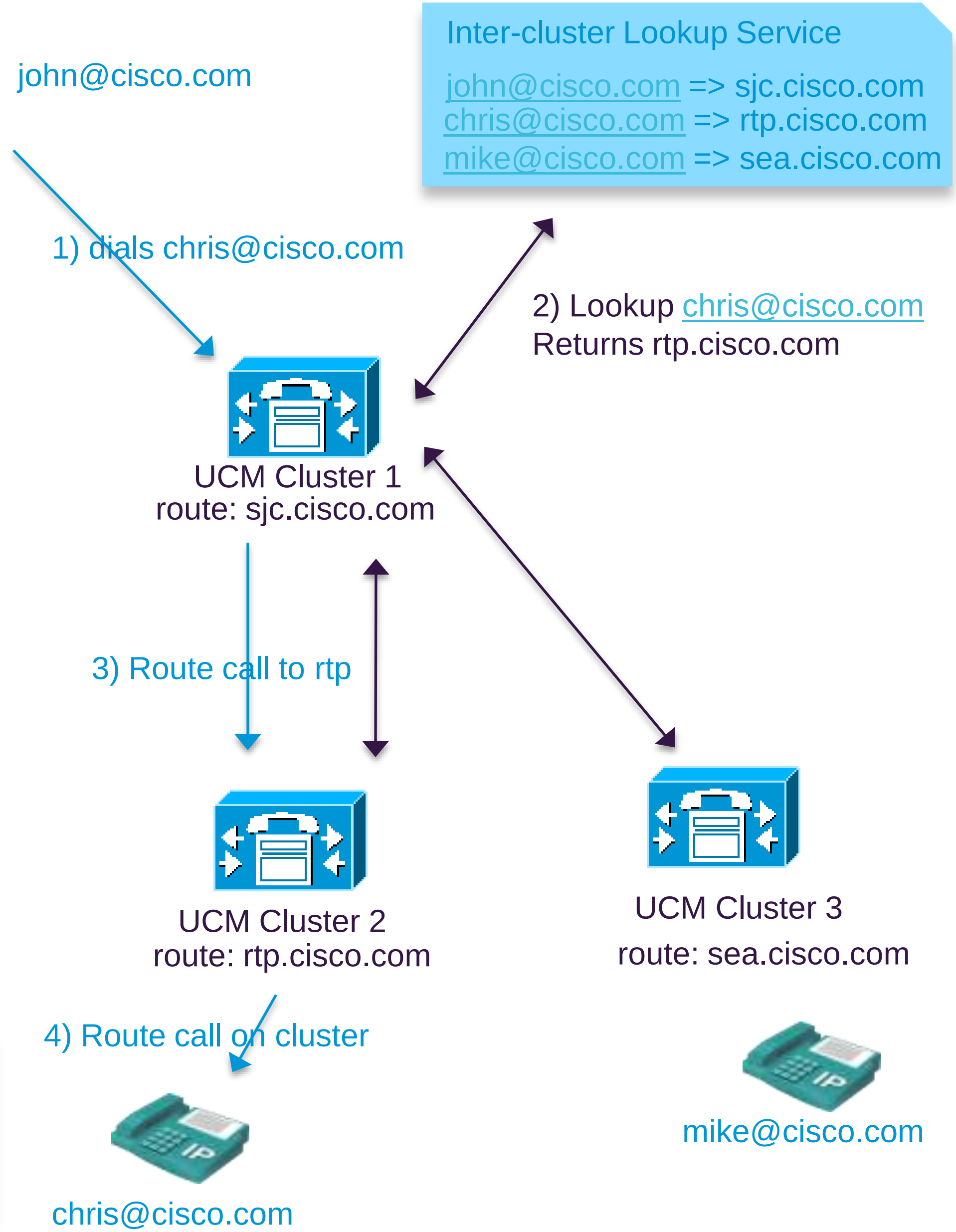
•For call history population, RT phones will log both. URI will be preferred, DN is available in the details window.

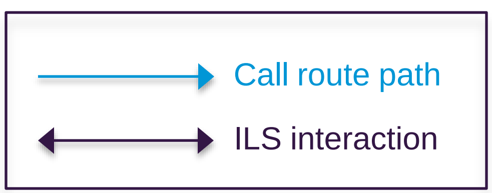


URI Inter-cluster routing

Multiple Cluster
Inter-cluster lookup service

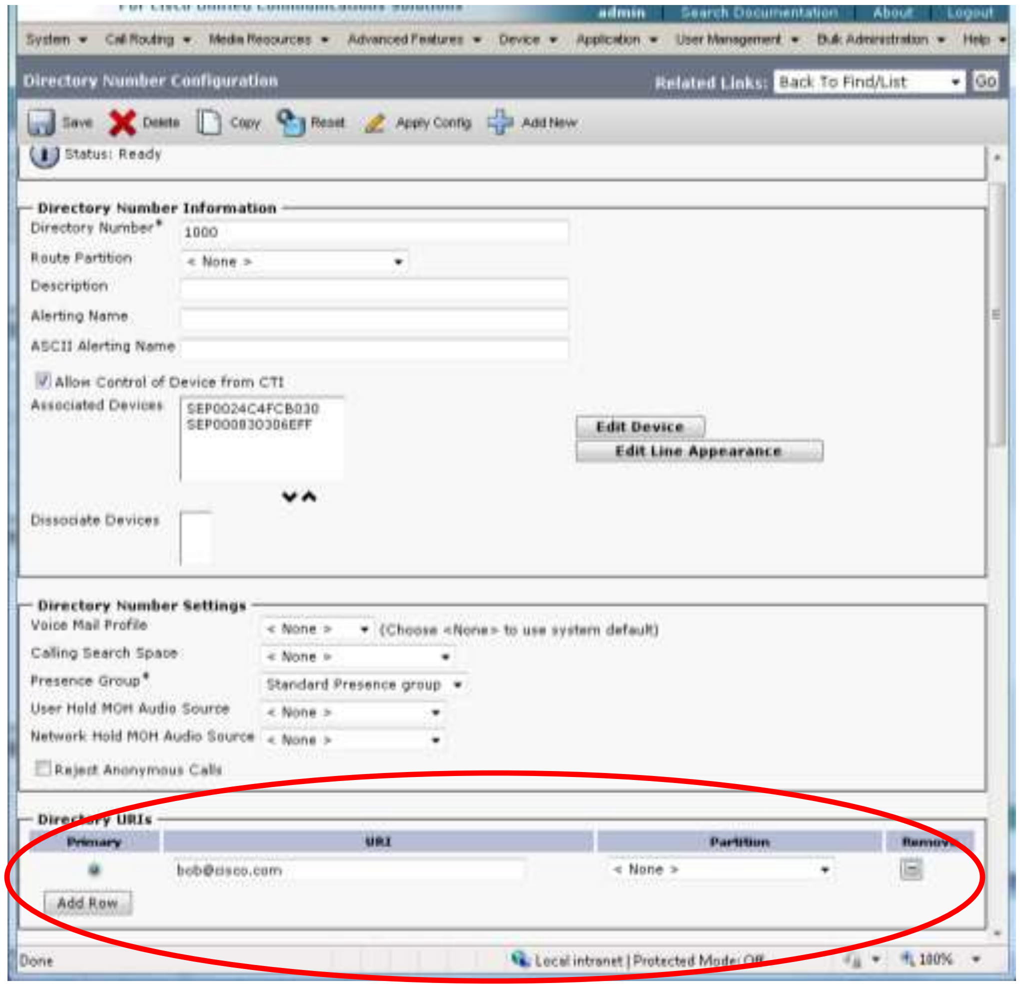
- Replication Overview:
  - A URI is owned by one cluster
  - Each cluster replicates its URIs and route string to its neighbors.
  - HUB and spoke replication topology ensures a fully connected network.
- Routing Overview:
  - Route string is retrieved for the URI
  - Route string is routed through the SIP routes to a SIP trunk
  - If necessary, process repeats from cluster to cluster until it gets to home cluster





Basic Provisioning

Add URI via Directory Number page



- •Any DN can have a URI associated/be dialed by it.
- •Phones have no explicit knowledge of associated URI.
- •Can add up to 5 separate URIs, only one is primary.
- •The primary URI is the well known URI for a user. It’s the URI that gets asserted when blending calling party identity and blended with the called party DN when a DN is dialed.
- •Each URI can be in a separate partition and need not be in the same partition as the associated DN.

Manually Add URI via End User page – Work Flow

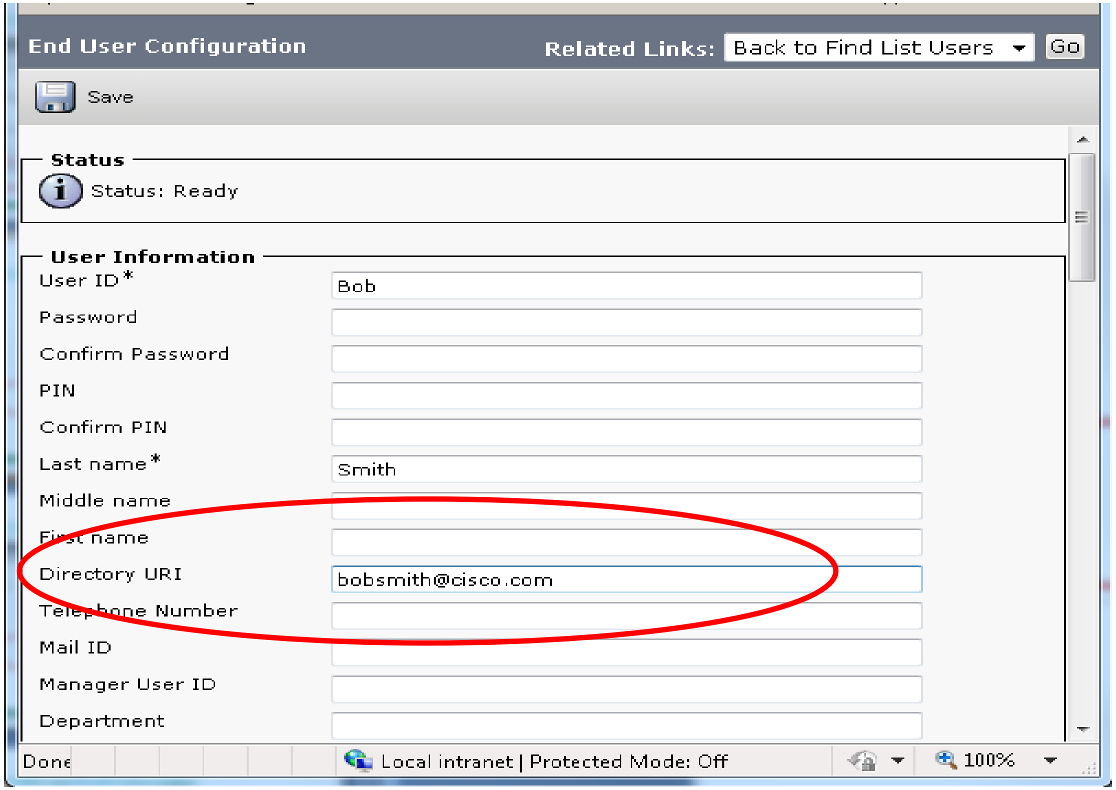
- Create End User with directory URI

- Associate End User with phone

- Associate primary DN with End User

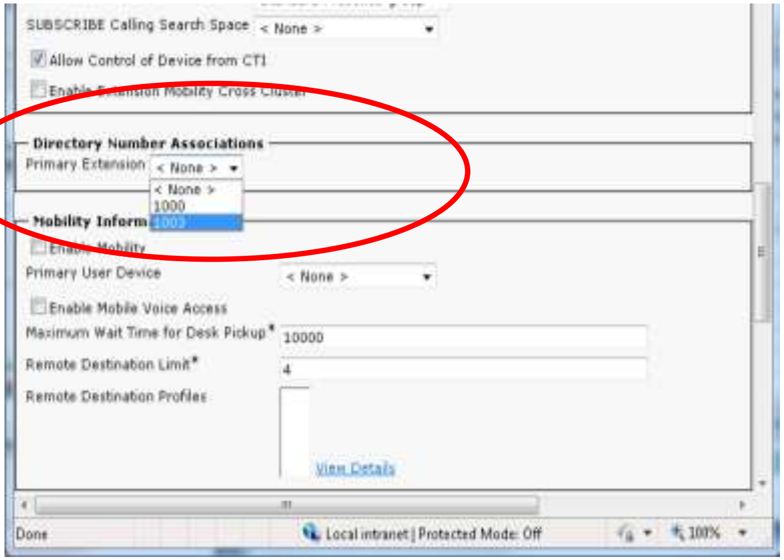
- URI shows up in DN page as primary, non-deletable URI

Add URI via End User Configuration page

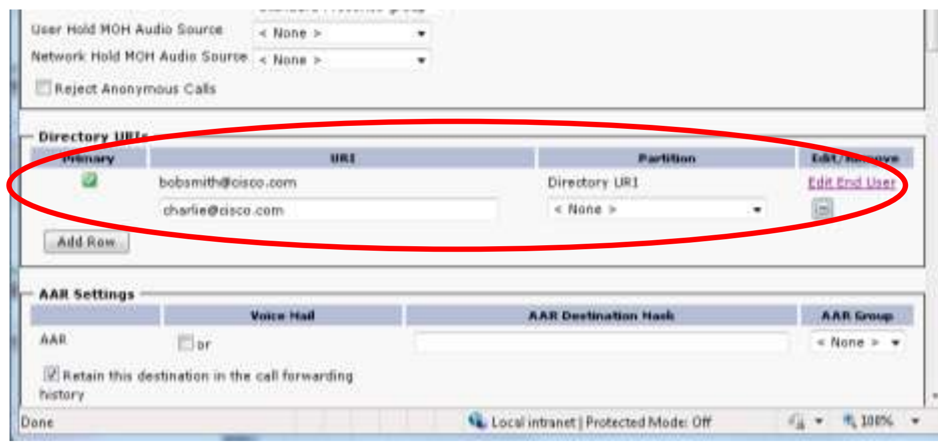


- Create an end user and add a directory URI
- Associate End User with phone

Associate End User with Phone/Primary DN



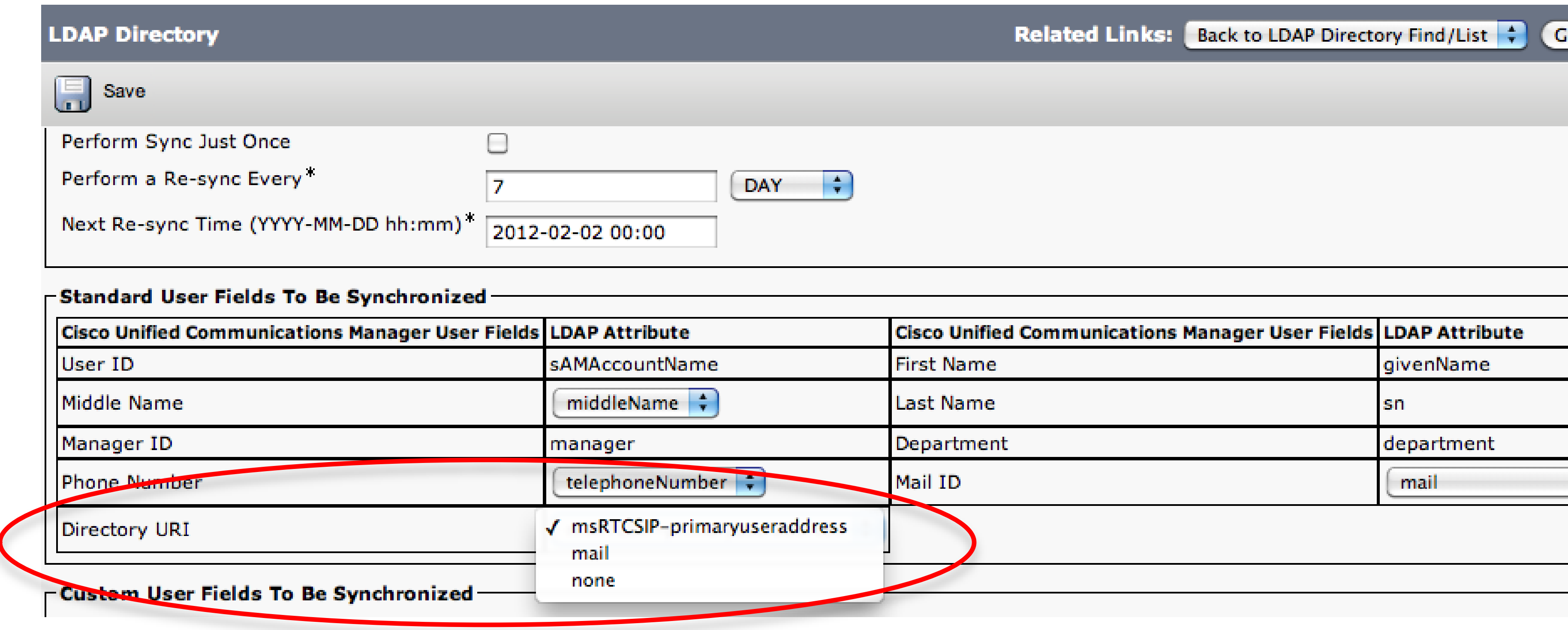
- •End User page, associate primary extension with end user.
- •URI shows up in DN page.
- •End User URI is always primary.
- •End User URI gets put into non-deletable “Directory URI” partition.



LDAP Directory URI Synchronization

- Works the same as all other LDAP fields, LDAP values that have a corresponding CUCM value are synchronized
- LDAP Directory URI field synchronizes with Directory URI on the End User Configuration page
- Synchronized directory URIs are added to the default Directory URI partition
- Any user that has a primary extension and an LDAP directory URI will have that URI added to the list of routable URIs in the system

LDAP Directory Configuration



New Numeric Transformations

Inbound Calls, New Calling Party CSS

Problem Statement

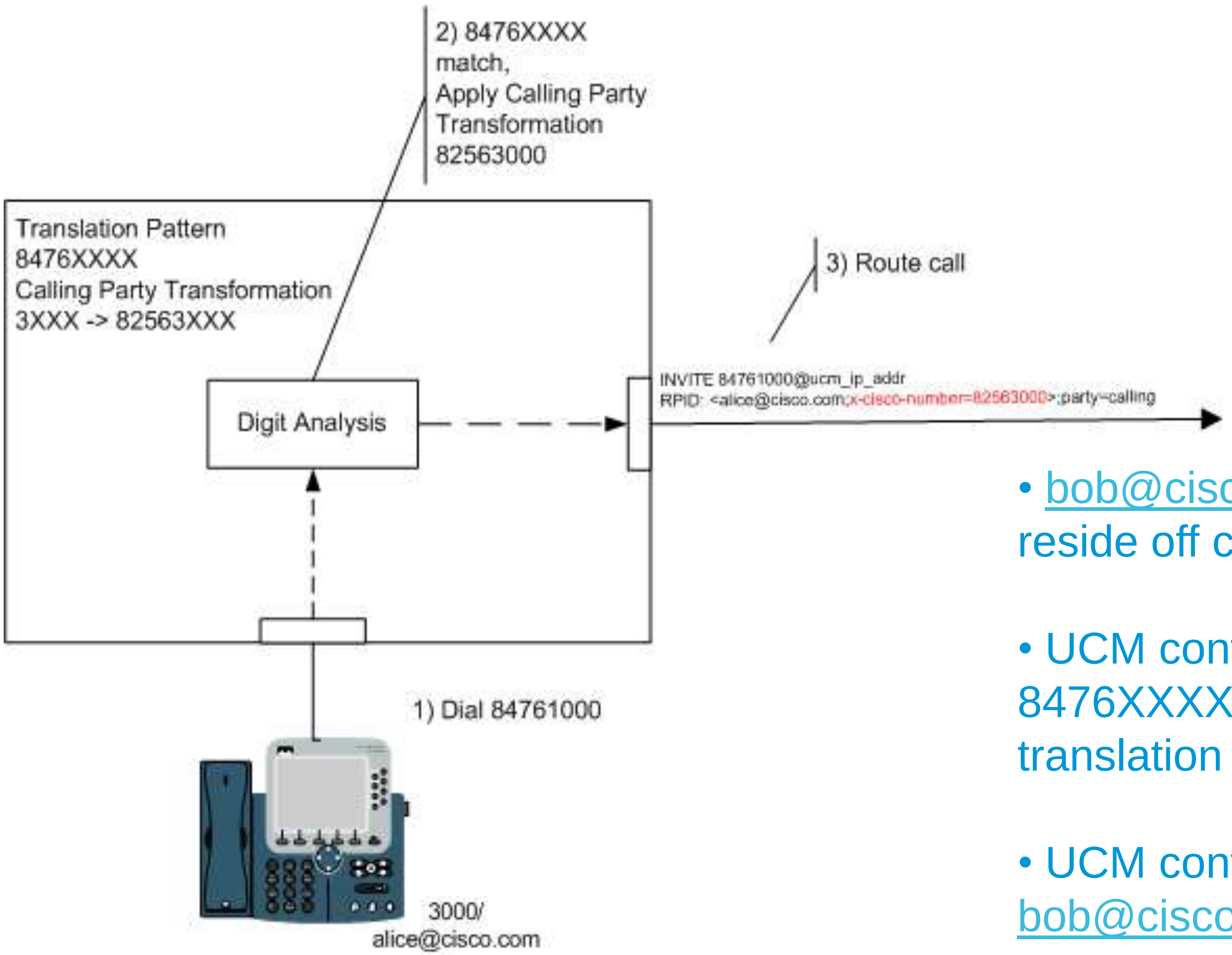
- URI is an alias of a DN. Expectation that you can dial either and reach same destination.

- URI routing can take a different route path through the system such that required digit transformations are not applied.

- Specifically, numeric translation patterns, which are a routing-level entity, can modify the calling and called party numbers.

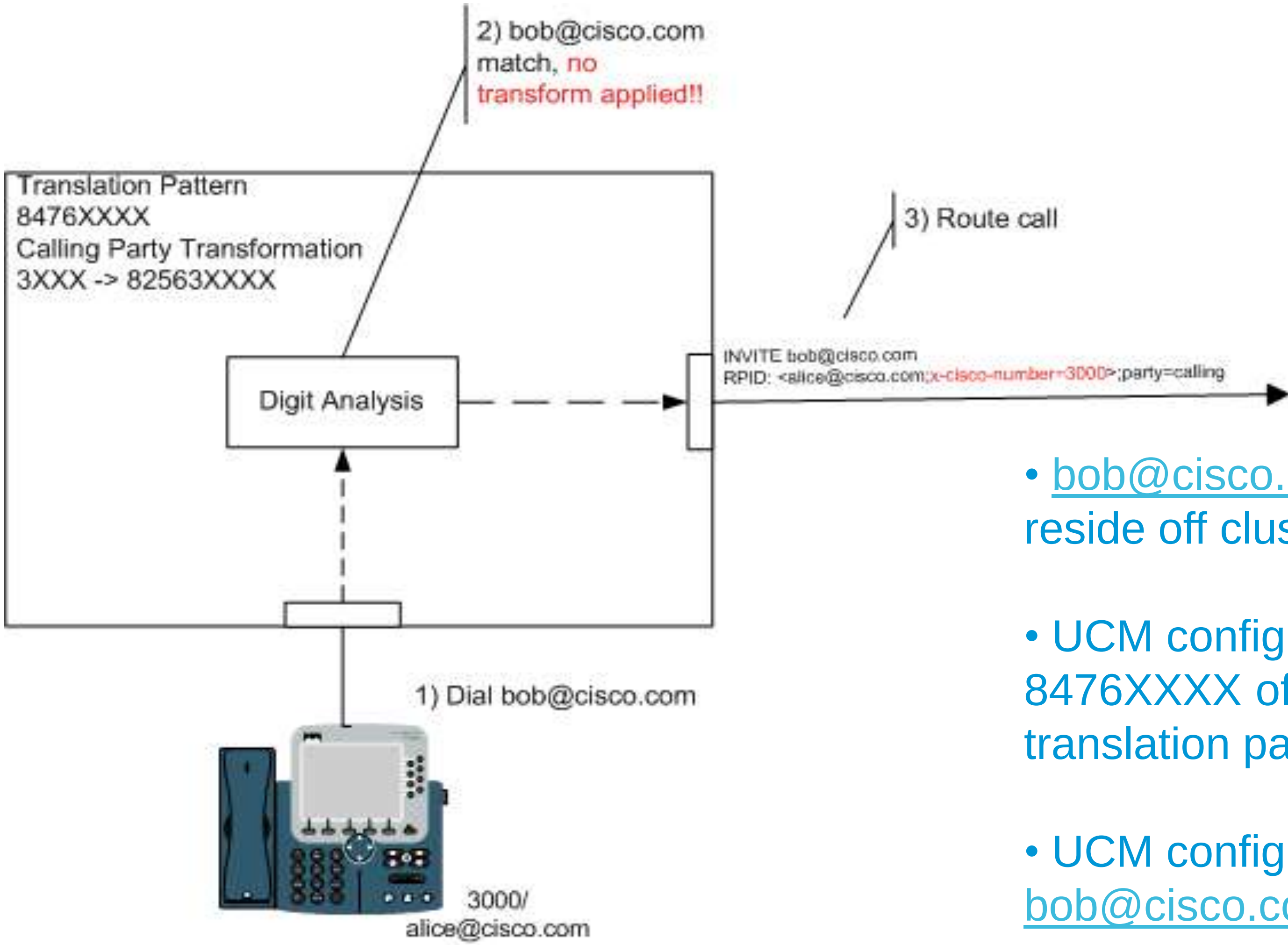
- Deployments that use translation patterns to modify calling party numbers will want to add this CSS when using URI dialing feature.

Dial DN Example



- bob@cisco.com/4761000 reside off cluster.
- UCM configured to route 8476XXXX off cluster via translation pattern.
- UCM configured to route bob@cisco.com via ILS

Dial URI Example



- bob@cisco.com/4761000 reside off cluster.
- UCM configured to route 8476XXXX off cluster via translation pattern.
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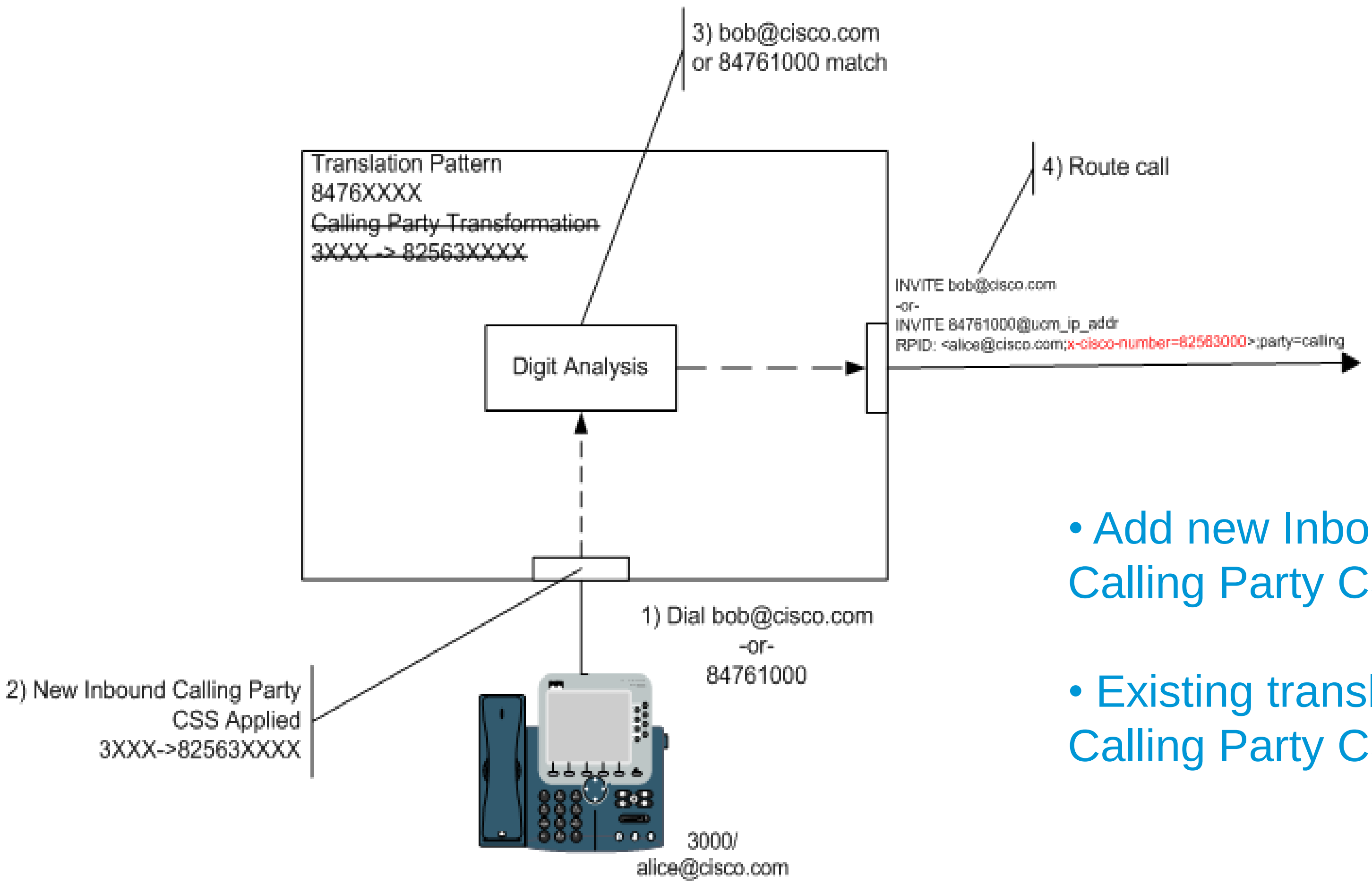
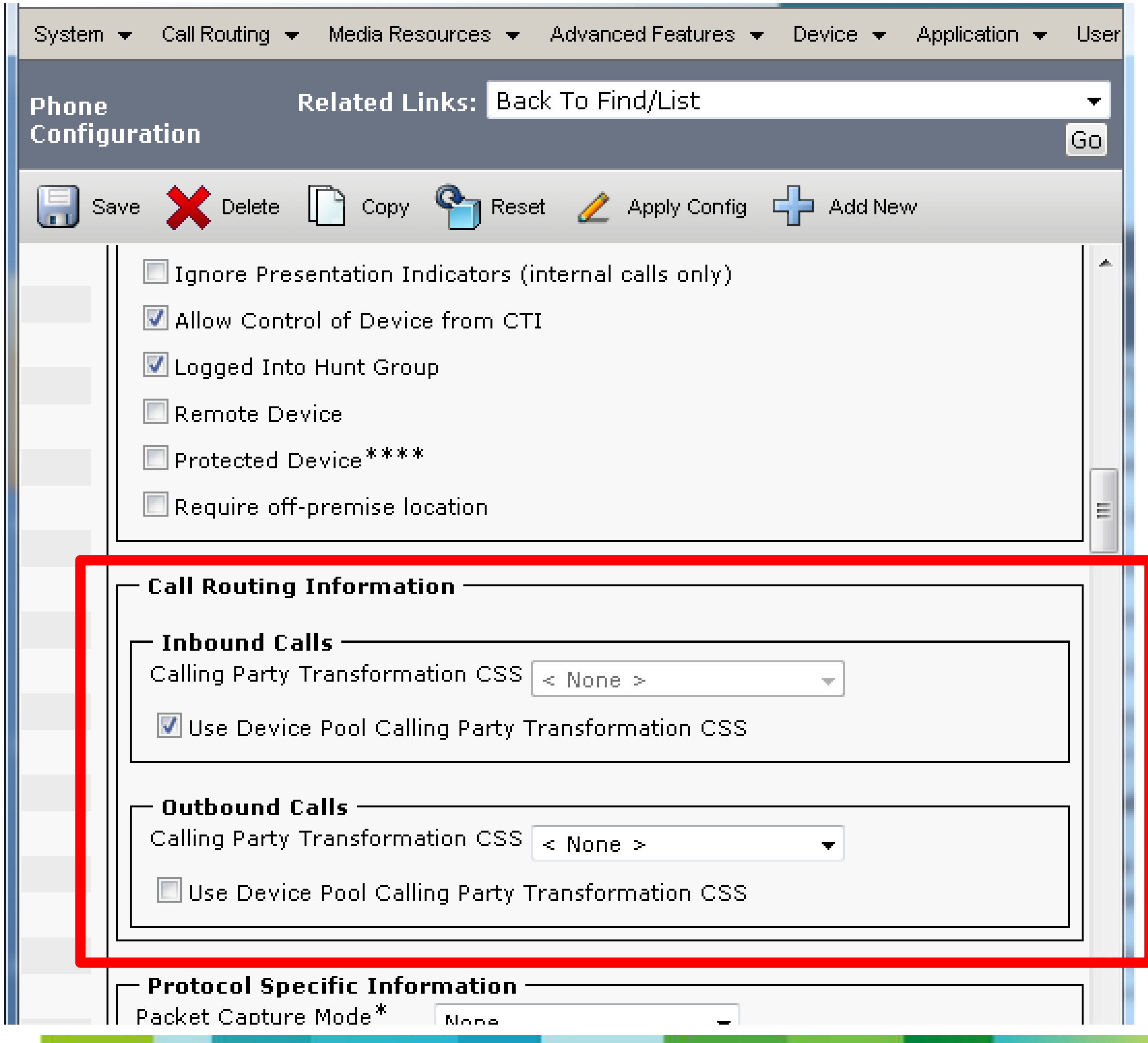
Dial URI or DN, new Inbound Calls, Calling CSS example



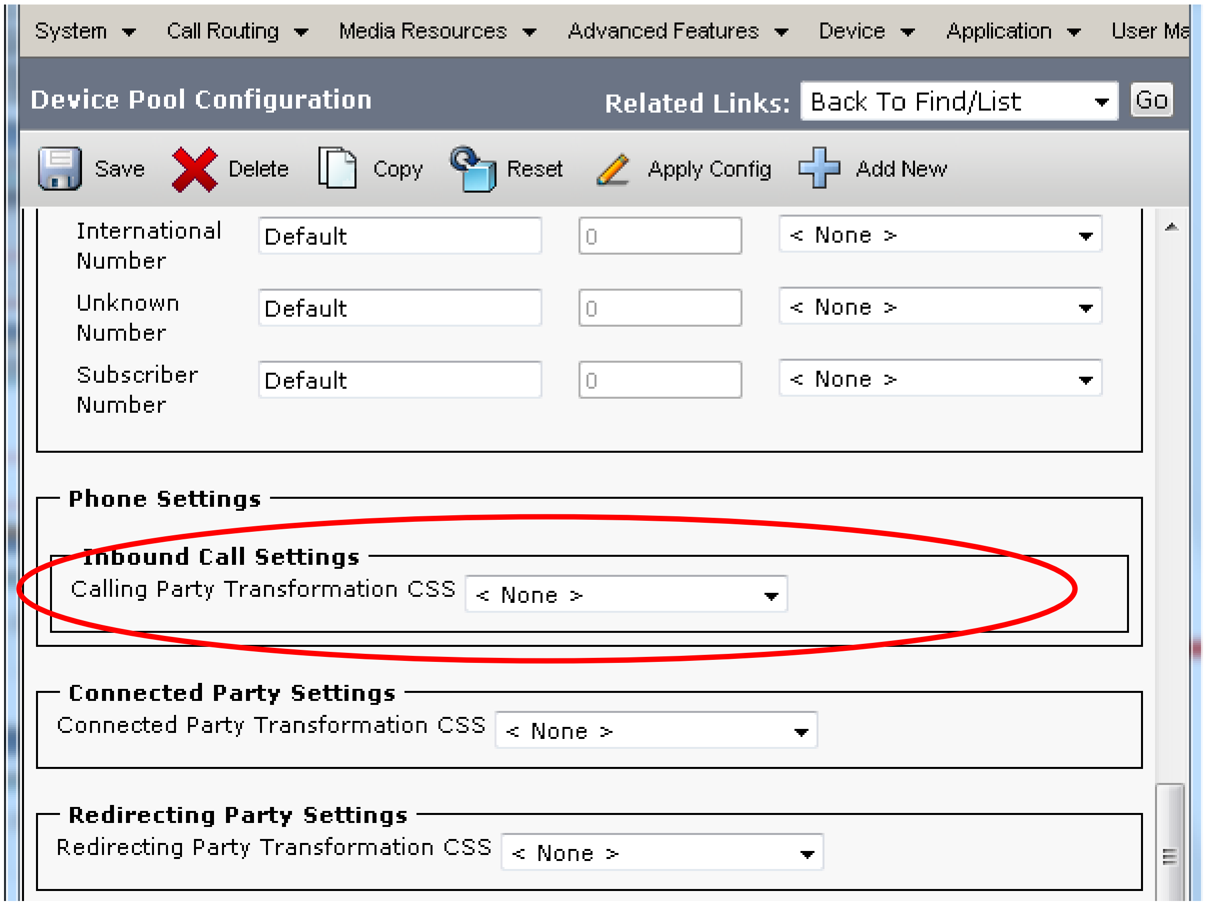
- Add new Inbound Calls, Calling Party CSS
- Existing translation pattern Calling Party CSS not applied

Phone Configuration Page, Calling Party Transformation CSS



- Added new “Inbound Calls, Calling Party Transformation CSS” dropdown with Device Pool override
- Moved existing “Calling Party Transformation CSS” to new “Outbound Calls” section
- Grouped both into a “Call Routing Information” section

Device Pool Page, Calling Party Transformation CSS



- Added new “Inbound Call Setting, Calling Party Transformation CSS” dropdown
- Overrides phone page setting, if checkbox checked

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- Zveme Vás na **Ptali jste se…** v sále **LEO**
  1.den 17:45 – 18:30
  2.den 16:30 – 17:00

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