



Global Knowledge®

Expert Reference Series of White Papers

Improving Employee Productivity with Cisco® Unified Mobility

Improving Employee Productivity with Cisco® Unified Mobility

Jeffrey W. Hall, Global Knowledge Unified Communications Instructor, CCSI, CCVP, CCSP, CCIP, CCDP, CCNP, MCT, MCITP, MCSE

Introduction

Have you ever stopped to think of all the electronic gadgets we have these days to stay connected? From cell phones, pagers, PDAs, netbooks, and laptops to home phones via Voice over IP (VoIP), we are doing more and more in an effort to always have the latest news and access to those things that are important to us via the Internet. In short, it is starting to take up a significant part of our day to keep up with being able to talk to everyone that we need to talk to. Beyond that, I also want to ensure that if you're talking to a client, you're using a solution that allows the client to see your Caller ID as a corporate number. If you're talking to your spouse on the same phone, he/she needs to see your personal Caller ID displayed.

Today's networking environment is nothing like it used to be. Back in the good old days (actually, many times, it wasn't so good and it wasn't so long ago), it was normal to think of going to work at 8 A.M., sitting down at a desk, taking lunch from noon to 1 P.M., then going home at 5 P.M. Additionally, when we went to work, we typically went to the same building and sat at the same desk every day.

These days, instead of a "Working Hours" mentality, it is more normal to see a "Working Moments" way of thinking. Instead of reporting to the same desk at 8 A.M. every day, we may be catching a flight to a corporate branch in another city or visiting a customer site to finalize an install in another country. With this new way of working, business requirements don't begin at 8 A.M. and end at 5 P.M.—they happen around the clock and require an entirely new way of approaching network connectivity and communications.

Modern networks demand that we have a "unified" way of working, in order to simplify our already crazy schedule. This means that while we're rushing through the airport, we can stop at a coffee shop, login to our corporate network via a VPN tunnel, and check the status of our server farm. We can also check our voicemail and send and receive faxes from within our e-mail inbox. Additionally, we can even communicate with customers from our cell phones and have our Caller ID show up as our corporate desktop phone name and phone number. The possibilities are almost endless when we apply a unified approach to communications while operating in a mobile environment.

What Is Unified Mobility?

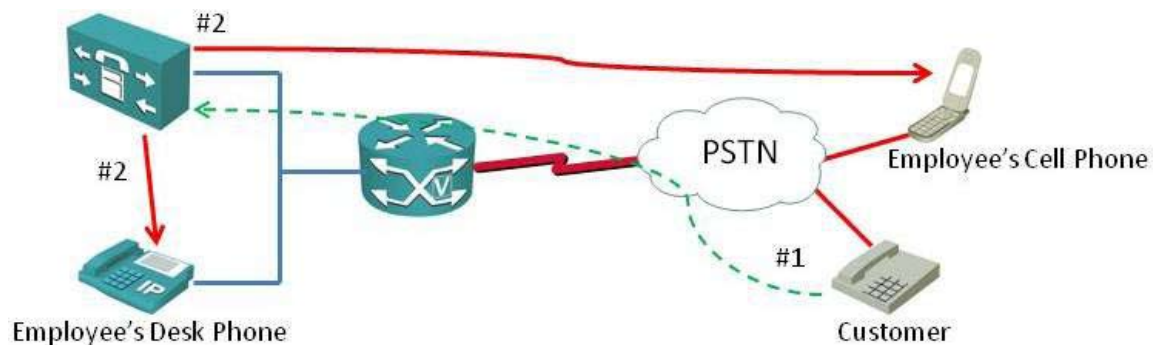
This white paper will focus on discovering and implementing Cisco's Unified Mobility solutions so that we can give our mobile employees an easier, and yet, more robust way of communicating, no matter the wired or wireless network they are currently connected to. We're also going to see how to simplify the long list of numbers that a traveling professional has to keep up with.

Instead of having to remember the phone numbers of our business desk phone, mobile IP phone, cell phone, and home phone, we're going to configure a system that allows users to be reached at a single phone number. Regardless of the physical device the employee is using, he or she can be reached with this single number. This is what it means to have "Unified Mobility."

What Are the Components of Unified Mobility?

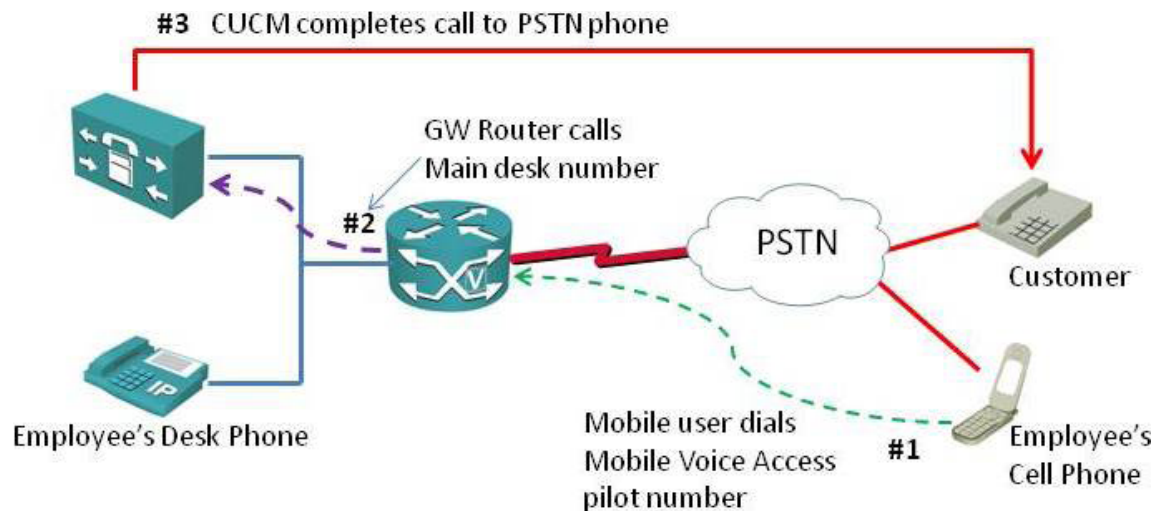
Cisco Unified Mobility consists of two components: Mobile Connect and Mobile Voice Access (MVA).

Mobile Connect allows an incoming call to an employee's corporate phone number to be offered to up to 10 additional remote devices, in addition to the desktop phone. These remote devices will typically be the user's cell phone, home phone, or spouse's phone, and must be external to the corporate network. In the following diagram, you can see that an incoming call from the PSTN is being routed to both the employee's desk phone and her cell phone at the same time. This is another reason why Cisco Unified Mobility is also referred to as "Single Number Reach."



Mobile Voice Access (MVA) is an additional technology built on top of Mobile Connect to allow employees who are located outside of the enterprise network to make calls as if they were directly connected to the corporate Cisco Unified Communications Manager (CUCM). This has multiple benefits. For example, companies that have a large number of mobile employees no longer have to reimburse each employee for the usage of his personal cell phones when making business-related calls. They can now instruct each of the mobile users to dial an MVA pilot number when calling customers. This allows the company to centralize the toll charges into a single phone bill.

The following diagram illustrates the call flow of MVA. In step one, we can see from the following diagram that the remote corporate user places a call from her personal cell phone to the Mobile Voice Access pilot number is step 1. This call arrives at the gateway router and, in step 2, the gateway router sends the call to the CUCM. The CUCM evaluates the dialed digits, matches a route pattern and forwards the call to the external PSTN phone in step 3.



What Else Does Cisco Unified Mobility Do For Me?

Mobile Connect primarily provides benefit for inbound calls into the business and MVA is used primarily for outbound calls from the network (i.e., calls externally to the PSTN). In addition to this basic behavior, we can also perform some advanced features as well.

For example, with **Mobile Connect**, if a corporate user receives a call from the PSTN while driving into the office, and the CUCM rings down his cell phone, this user can continue the call from his desk phone when he arrives at the office without dropping the call. This allows the company to provide a consistent business front to the customer by ensuring that the Caller ID presented to the external PSTN phone represents that of the business phone and not the personal cell phone.

When using Mobile Voice Access, remote employees are able to use mid-call features using DTMF, or Dual-Tone Multi-Frequency. For example, the remote user can press *81 to place the call on hold and *83 to resume the call. The ability to access enterprise features from your cell phone as you would normally do from your desktop IP phone is a pretty nice feature.

Cisco Unified Mobility Features

True to form, Cisco Unified Mobility comes with a lot of features designed to enhance both management and performance. Let's take a closer look at each one.

1. Access Lists:

Just like normal IP routing Access Control Lists (ACLs), these allow us to restrict action based on a "permit" or "deny." In this case, however, we will not build a static list of permit and deny statements. Instead, we will implement either a **Allowed** or **Blocked Access List**.

With this type of operation, you can design your lists as either inclusive or exclusive. You may decide to allow only five specific calling numbers to be able to reach your remotely configured phone numbers via Mobile Connect. As a result, everything is denied, just like the implicit "deny any" would do in a normal IP ACL.

2. Call Logging:

I once saw a sign in a life insurance office that read: "Life insurance is like a parachute -- you have to have it in place before you need it!" Logs in the enterprise environment work exactly the same way. They must be properly configured at the appropriate level of detail BEFORE they're needed. In the Cisco IP Telephony environment, call logging is accomplished with Call Detail Records (CDRs) that are configured on both the Publisher and Subscribers of the CUCM cluster. These CDRs record who made the call, who they were calling, when the call was made, how long it lasted, etc.

With Unified Mobility, when we associate a remote device, such as a personal cell phone, with the user's corporate desktop phone, CDRs will be created regardless of which device is being used to place or receive the call. For employees who are on the road a lot, this is a critical factor, since they will probably use their cell phone or Cisco IP Communicator (CIPC) instead of their office phone. By creating CDRs, even when the remote device is being used, the company can create accurate reporting to be used for auditing, billing, and even forensics, if necessary.

3. Single Number Reach:

This is probably the single biggest feature provided by Unified Mobility. As discussed earlier, traveling professionals have a lot of communications devices they juggle during the course of their week, such as their cell phone, work phone, home phone, CIPC phone, etc. Single Number Reach allows the user to be reached with a single phone number, no matter what device he is using. This is accomplished via the Mobile Connect feature. To enable this, we will build remote profiles for each of the devices that will be alerted of an incoming phone call in addition to the main corporate phone.

The association of the main desktop phone with the additional remote devices creates a shared line appearance. This effectively broadcasts the call out to all phones when the main number is called.

4. Smart Client Support:

Cisco 7900-series phones are considered to be "smart phones" that have the ability to apply various actions before, during, and after an active call through the use of "softkeys." If a user is called and she answers on her personal cell phone, she will be able to continue the call on her main desk phone (as soon as she gets back to the office) by pushing the **Mobility** softkey. Additionally, the user can enable and disable mobility from the smart phone by pressing this softkey outside of an active phone call. This is known as using the **Telephony User Interface** (TUI) to manage the Mobility feature. The user can also enable or disable this feature from within his/her CCMUser web page via the GUI, or Graphical User Interface.

Enough Theory... How Do We Configure It??

Let's take a look at the configuration procedure for Cisco Mobile Connect so that all incoming external calls are associated with up to 10 remote devices. Here are the steps required.

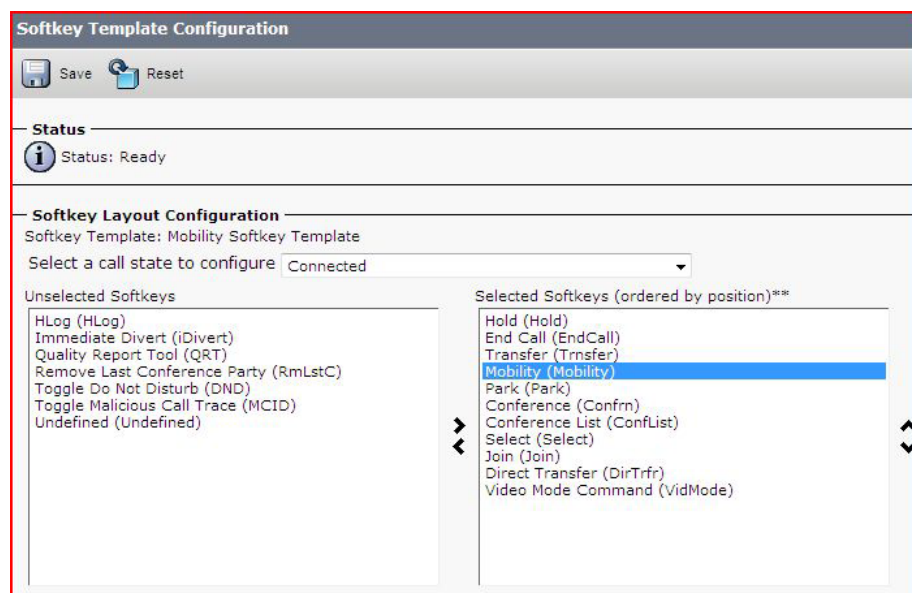
1. Configure the Softkey Template to include the "Mobility" softkey
2. Add and/or configure an end user
3. Add and/or configure an IP phone
4. Configure a remote destination profile with a shared line
5. Add the remote destination to a remote destination profile
6. Configure relevant Service Parameters
7. Configure Access Lists (Optional)
8. Configure Partitions and Calling Search Spaces (CSSs) to allow reachability within existing dial plan

Step 1: Configure the Softkey Template to include the "Mobility" softkey

By default, the Mobility softkey is not included in the active buttons of the template. Therefore, we'll have to go to the following menu to add it: **Device -> Device Settings -> Softkey Template**. Once we get there, we can do one of two things.

1. Modify an existing template
2. Create a new template

Regardless of the option we choose, it will not be possible to modify the built-in softkey template. We will have to either copy and rename a built-in template, or create a template from scratch, name it, and modify accordingly. The benefit of copying an existing template is that the softkey buttons are already configured in a default state, so all we have to do is make the minor changes to suit our needs.

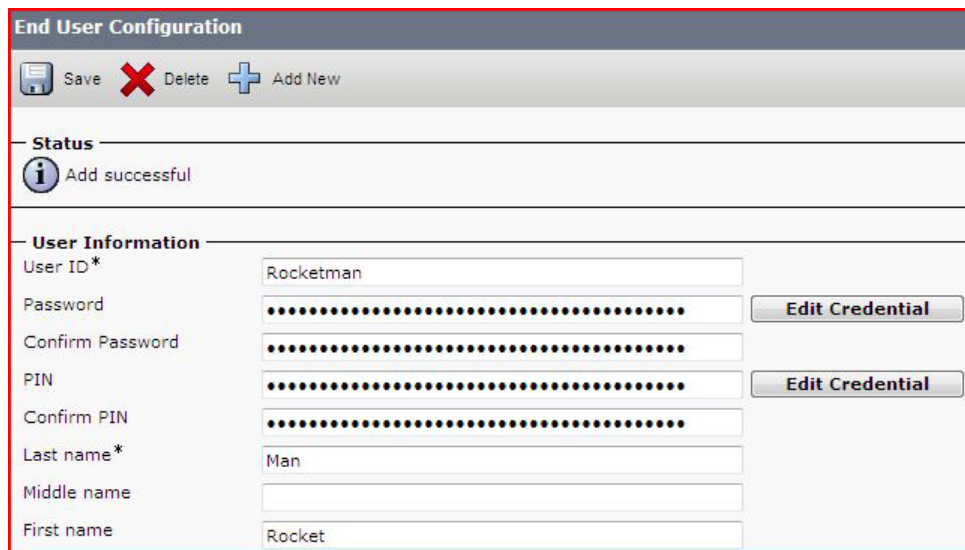


When modifying the softkey template to add the Mobility button, we'll need to modify both the **On Hook** and **Connected** call states, as follows.

Step 2: Add and/or configure an end user

Inside the user configuration, there are several entries related to Mobility.

1. The **Enable Mobility** checkbox must be checked. Additionally, if **Mobile Voice Access** is to be used, this checkbox must be checked as well.
2. The **Maximum Wait Time for Desk Pickup** option allows you to enter time in the number of milliseconds permitted to pass before a user must pick up the incoming call that is handed over from the remote phone to the office phone. The default value is 10,000 ms (10 seconds), while the allowed range is 0 – 30,000 ms (0 – 30 seconds).
3. The **Remote Destination Limit** allows you to specify up to 10 remote devices, with the default value being 4.



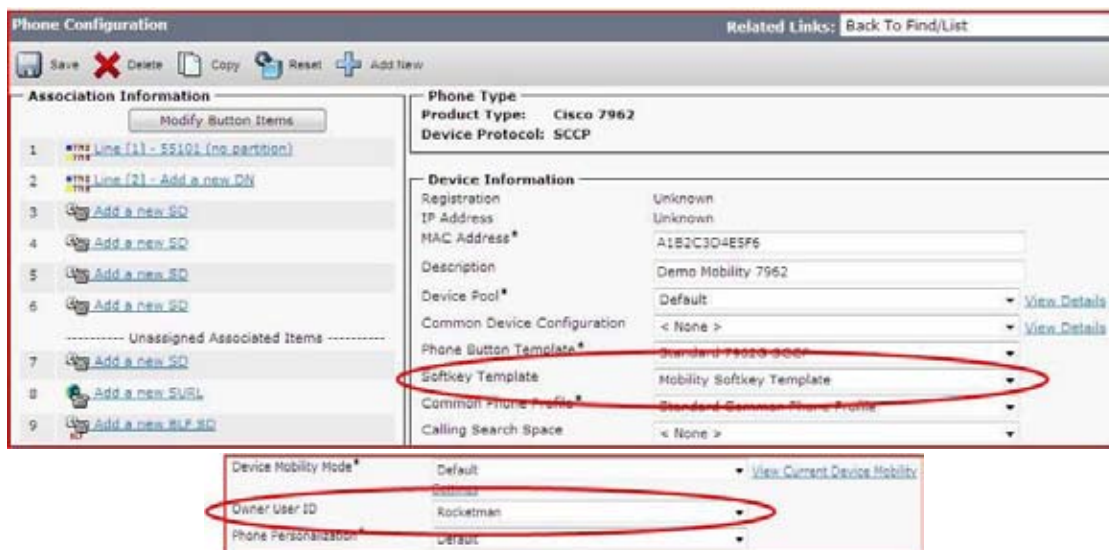
The screenshot displays the 'End User Configuration' interface. At the top, there are three buttons: 'Save' (with a floppy disk icon), 'Delete' (with a red 'X' icon), and 'Add New' (with a blue plus icon). Below this is a 'Status' section with an information icon and the text 'Add successful'. The main section is titled 'User Information' and contains several input fields and buttons:

User ID*	Rocketman	
Password	Edit Credential
Confirm Password	
PIN	Edit Credential
Confirm PIN	
Last name*	Man	
Middle name		
First name	Rocket	

Step 3: Add and/or configure an IP phone

Next, we have to add or configure an IP phone to use the new Mobility softkey template. To add an IP phone, go to the **Device -> Phone** menu and click the **Add New** button. When configuring the IP phone for Mobility, there are two main parameters to configure.

1. **Softkey Template:** It is a common mistake to build the softkey template, but then forget to apply it to the phone. Without attaching the template to a device, it will do nothing for you.
2. **Owner User ID:** This parameter associates the physical device (phone) with its user. This will enable the CUCM to locate the relevant Mobility components, such as the end user's remote destination profile.



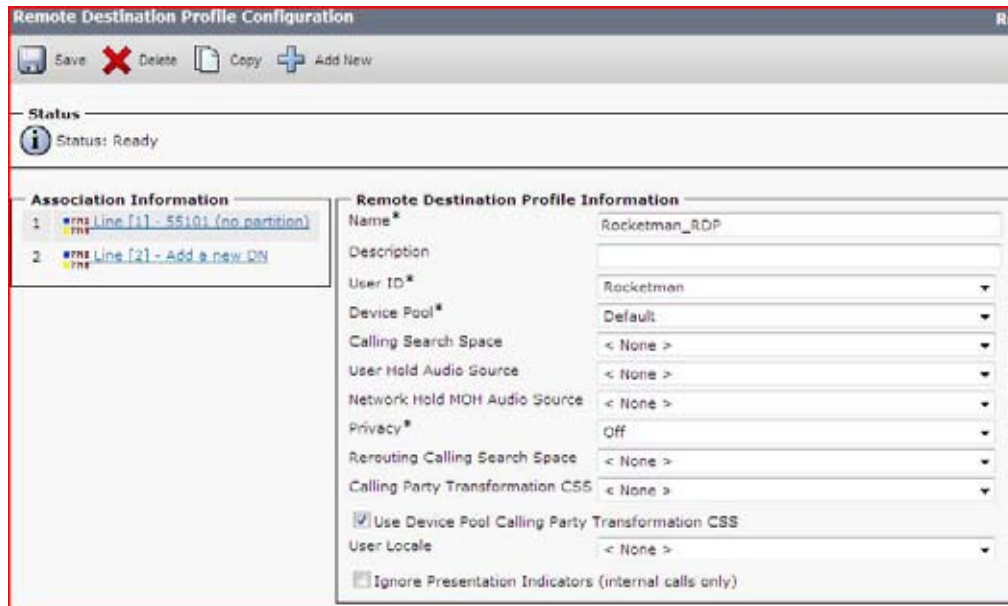
Step 4: Configure a remote destination profile with a shared line

Now, we can configure a remote destination profile that will contain all necessary parameters applying to the user's remote destinations. To configure, go to the **Device -> Device Settings -> Remote Destination Profile** menu option and click the "Add New" button.

Within the remote destination profile, the following mobility-specific parameters exist.

1. **User-ID:** This is the user that the profile is assigned to.
2. **Calling Search Space (CSS):** When MVA is accessed by a remote corporate user, this CSS is used to indicate which route patterns are accessible for calls outbound to the external PSTN phone.
3. **Privacy:** Although this setting pertains to Barging, and permits or denies a user on a shared line when joining on the same active line, Mobility will be affected if Privacy is enabled. Privacy has three possible values: **On**, **Off**, or **Default**. If set to **On**, all call information for all phones sharing the same line directory number will be removed, so it is recommended to set the value to **Off**.
4. **Rerouting CSS:** This is the CSS that will be used when sending calls placed to the enterprise number out to the remote devices.

5. **Ignore Presentation Indicators:** This is a checkbox that, when checked, will ignore any presentation restriction that is received for internal calls.



Step 5: Add the remote destination to a remote destination profile

Previously, the Remote Destination Profile defined all parameters that would be applied globally to all remote destinations, so we still must create a remote destination and apply the profile to it.

Simply stated, a remote destination is a representation of the actual device (cell phone, home phone) and defines the following key parameters.

1. **Destination Number:** This is the digit string that will be used to dial the remote device. This maximum length of this string is 20 digits.
Note: This number MUST point to a device external to the network and cannot point to another phone within the corporate telephony network that would be considered **On Net**.
2. **Remote Destination Profile:** This is the profile we created in the last step.
3. **Mobile Phone:** Check this box to allow calls to be redirected from the main corporate number to this cellular number when the user presses the Mobility softkey on the main office phone.
4. **Enable Mobile Connect:** This checkbox allows calls to be placed to this remote device in the event of an incoming call to a shared directory number of an office phone.

Remote Destination Configuration Related Links: [?](#)

Save Delete Copy Add New

Status
 Update successful

Association Information		Remote Destination Information	
Line	Line Association	Name	
Line [1] - 55101 (no partition)	<input checked="" type="checkbox"/>	Rocketman Cell Phone	
		Destination Number *	919015551234
		Answer Too Soon Timer *	1500
		Answer Too Late Timer *	19000
		Delay Before Ringing Timer *	4000
		Remote Destination Profile *	Rocketman_RDP Configure Device
		<input checked="" type="checkbox"/> Mobile Phone	
		<input checked="" type="checkbox"/> Enable Mobile Connect	

Step 6: Configure relevant Service Parameters

Now that we have a working Mobility solution, let's take a look inside the Cisco CallManager Service Parameters and tweak a couple of key values.

1. Matching Caller ID with Remote Destination
2. Number of Digits for Caller ID Partial Match

You may ask why would I want to match only a partial Caller ID string? That's a very good question! The CUCM will send the call to a remote device according to the calling number presentation (Caller ID). However, what if the Caller ID doesn't exactly match the destination number configured for the remote device? In other words, if you've configured the number of the remote device to start with "91," but the Caller ID does not contain these numbers, then calls to internal devices will not show the Caller ID of the office phone.

By default, the Matching Caller ID with Remote Destination parameter is set to **Complete Match**, which means that all digits must match. However, based on our previous discussion, we can set this parameter to **Partial Match** to account for when the "91" is not present. It will still match the rest of the number.

The "Number of Digits for Caller ID Partial Match" defines how many digits will be matched if the first parameter is set to **Partial Match**. By default, this parameter is set to 10.

Service Parameter Configuration Related Link

Save Set to Default Advanced

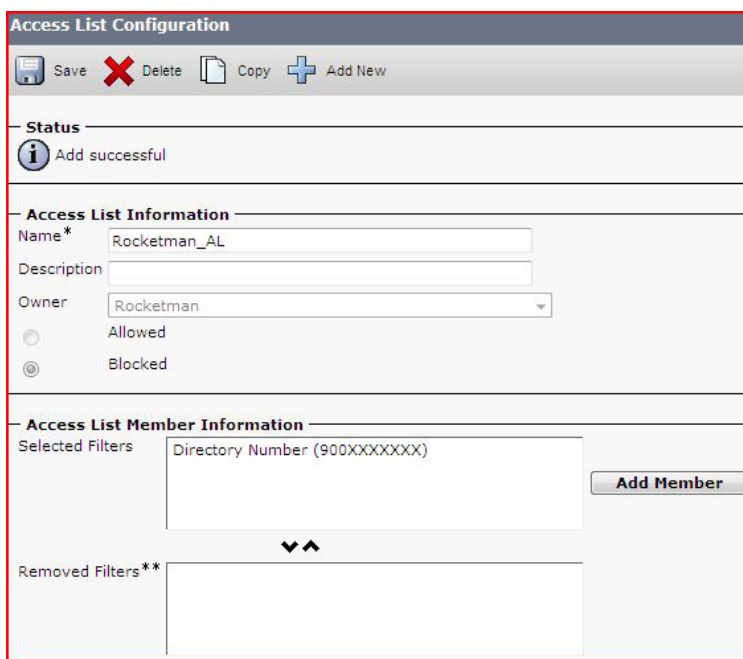
Inbound Calling Search Space for Remote Destination *	Trunk or Gateway Inbound Calling Search Space	Trunk or Gateway
Enable Enterprise Feature Access *	False	False
Enable Mobile Voice Access *	False	False
Mobile Voice Access Number		
Matching Caller ID with Remote Destination *	Partial Match	Complete Match
Number of Digits for Caller ID Partial Match *	10	10

Step 7: Configure Access Lists (Optional)

As an optional configuration, we can control which callers are allowed to ring down our remote destination numbers. This is accomplished by configuring either an **Allowed** or **Blocked Access List**. Within CUCMv7.0, go to **Call Routing -> Class of Control -> Access List** and defining the following parameters.

1. Name
2. Description (Optional)
3. Owner: This will be the end user associated with the remote destination device
4. Select either the **Allowed** or **Blocked** radio button

If the **Allowed** radio button is selected, then any numbers that are listed will be allowed, and everything else will be blocked. Vice versa is true: if the **Blocked** radio button is selected, then any listed numbers will be blocked, and everything else will be allowed.



Access List Configuration

Save Delete Copy Add New

Status
Add successful

Access List Information

Name* Rocketman_AL
Description
Owner Rocketman
 Allowed
 Blocked

Access List Member Information

Selected Filters Directory Number (900XXXXXXX) Add Member
Removed Filters**

After creating the Access List, it must be applied to the Remote Destination, as follows.



When receiving a call during the above ring schedule:

Always ring this destination
 Ring this destination only if caller is in -- Not Selected -- View Details
 Do not ring this destination if caller is in Rocketman_AL View Details

Note that if you created an **Allowed** Access List, the entry will only appear in the “Ring this destination...” parameter. If you created a **Blocked** Access List, it will only appear in the “Do not ring this destination...” parameter.

Step 8: Configure Partitions and Calling Search Spaces (CSSs) to allow reachability within existing dial plan

Of course, all the Mobility configurations in the world will not help if we are not allowed to call the remote device. Therefore, as a final step, when the shared line for the remote device is created, it must be assigned a partition that will be accessible by the main office IP phone. The CSS can be applied either on the line of the office phone (Line CSS) or directly onto the device level (Device CSS).

Additionally, for Mobile Connect calls that are forwarded outbound to a remote device, a **Rerouting CSS** can be configured in the remote destination profile.

Summary

In this discussion, we’ve taken a high-level look at Cisco Unified Mobility. We discussed what mobility is and saw that Unified Mobility is made up of both the “Mobile Connect” and “Mobile Voice Access” features.

We examined the call flow of both Mobile Connect and Mobile Voice Access and saw that Mobile Connect is primarily of benefit for incoming calls that can allow up to 10 remote devices to be rung down while also ringing down the primary office phone. We also saw that Mobile Voice Access is primarily of benefit for outgoing calls from a remote corporate user and allows the company to centralize long-distance and international billing, instead of having to reimburse countless mobile engineers for the use of their personal devices.

We also looked at the rich feature set provided by Unified Mobility and walked through the process of configuring the Mobile Connect feature on our CUCM.

Learn More

Learn more about how you can improve productivity, enhance efficiency, and sharpen your competitive edge. Check out the following Global Knowledge courses:

[CIPT1 v6.0 – Cisco IP Telephony Part 1](#)

[CIPT2 v6.0 – Cisco IP Telephony Part 2](#)

[ACCMU v6.1 – Administering Cisco Unified Communications Manager v6.1](#)

[ACUCM+ – Administering Cisco Unified Communications Manager v7.0](#)

For more information or to register, visit www.globalknowledge.com or call **1-800-COURSES** to speak with a sales representative.

Our courses and enhanced, hands-on labs offer practical skills and tips that you can immediately put to use. Our expert instructors draw upon their experiences to help you understand key concepts and how to apply them to your specific work situation. Choose from our more than 700 courses, delivered through Classrooms, e-Learning, and On-site sessions, to meet your IT and management training needs.

About the Author

Jeffrey Hall is a senior Unified Communications engineer and Instructor with Global Knowledge. Jeffrey has more than 14 years of experience designing and administering data and telephony networks for such organizations as the U.S. Army, SBC, AT&T, and Genesis Networks. Additionally, Jeffrey holds the following certifications: CCSI; CCVP; CCSP; CCIP; CCNP; CCDP; MCT; MCSE; and MCITP. Jeffrey currently lives in the Memphis, Tennessee area with his wife Tammy, and daughters Shaina and Alex.

References

CUCM 7.x Solution Reference Network Design (SRND) Guide: (www.cisco.com/go/srnd)

Implementing Cisco Unified Communications Manager, Part 2 (CIPT2): (<http://www.ciscopress.com/bookstore/product.asp?isbn=1587055619>)

Mobile Connect and Mobile Voice Access: (http://www.cisco.com/en/US/docs/voice_ip_comm/cucmbe/admin/6_0_1/ccmfeat/fsmobmgr.pdf)

Mobility Solutions Extend Cisco Unified Communications: (http://www.cisco.com/en/US/prod/collateral/voicesw/ps6789/ps7290/ps7271/prod_white_paper0900aecd805e696f.pdf)