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Oracle Enterprise Communication Broker, Enterprise Session Border Controller, Oracle Enterprise Operations Monitor and Acano Video Transcoding with Lync 2013 and Cisco CUCM

Technical Application Note

Disclaimer

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remain at the sole discretion of Oracle.

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Intended Audience

This document is intended for use by Oracle Systems Engineers, third party Systems Integrators, and end users of the Oracle Enterprise Session Border Controller (E-SBC), Communications Broker (ECB) & Operations Monitor (EOM). It assumes that the reader is familiar with basic operations of the Oracle Enterprise Session Border Controller Oracle Communications Broker & Operations monitor.

Document Overview

Oracle Communications provides session based products that help internetwork SIP based communications in multivendor environments. This document discusses the configuration and implementation of Oracle's Enterprise Communication Broker, Session Border Controller and leveraging Acano for video transcoding to provide seamless audio or video connectivity between Microsoft Lync endpoints and Cisco endpoints.

Introduction

Audience

This is a technical document intended for telecommunications engineers with the purpose of configuring the Oracle Enterprise Session Border Controller and the Oracle Communication Broker. There will be steps that require navigating the Command Line Interface (ACLI). Understanding the basic concepts of TCP/UDP, IP/Routing, and SIP/RTP are also necessary to complete the configuration and for troubleshooting, if necessary.

Requirements

- Microsoft Lync 2013
- Cisco CUCM 10.5
- Oracle Enterprise Session Border Controller ECZ730m2
- Oracle Enterprise Communication Broker PCZ200m3
- Oracle Enterprise Operations Monitor 3.3.91.2.0
- Acano 1.8.6
- Cisco Endpoint TC7.3.3.c84180a

Architecture

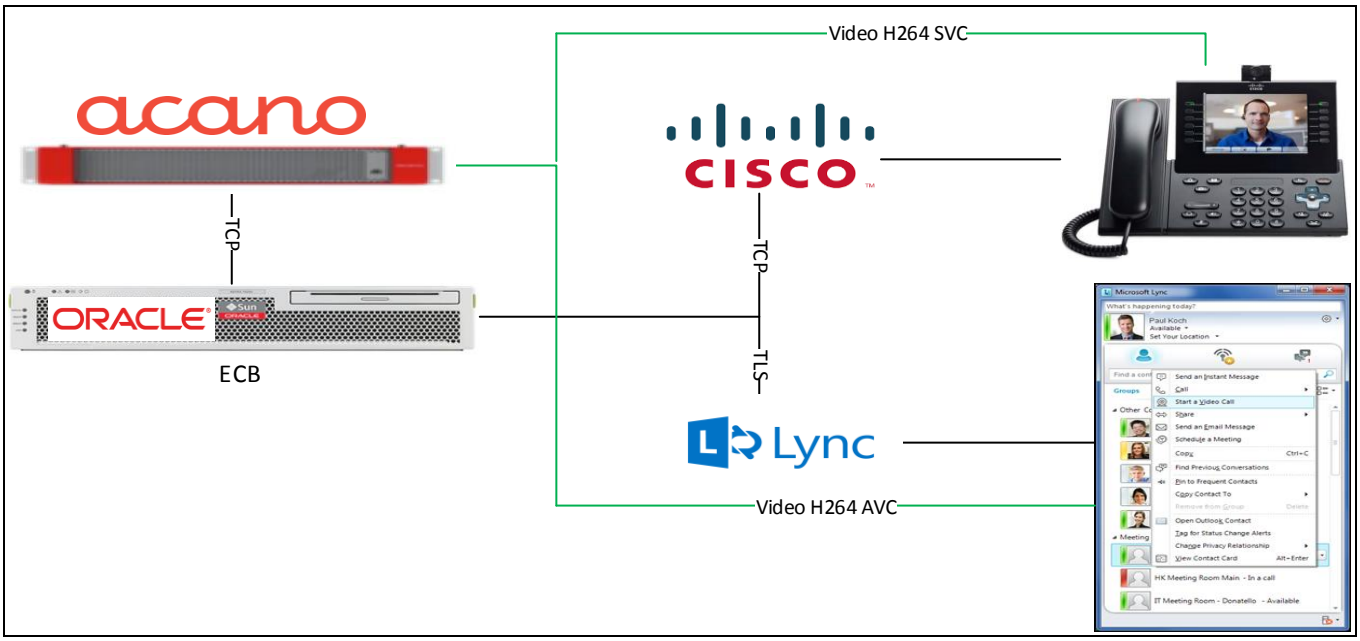
Video Transcoding

Video Calls from a Microsoft Lync environment to other external environments will likely require video transcoding. Because Oracle Communications E-SBCs only support audio transcoding, Oracle has partnered with Acano to provide video transcoding services. Video calls that originate from a Lync endpoint are sent to the Microsoft Lync frontend server. The Lync frontend server performs a lookup on the request-uri and determines that the request is external. The Lync frontend server then forwards the call to the Oracle Communications Enterprise Communication Broker over TLS. The Lync frontend server has the ECB configured as a trusted application server.

The ECB is configured to look at calls from Lync and perform a policy lookup on codecs. The codec policy evaluates the SDP in the initial invite to determine if one of the configured video codecs is present. If the policy matches one of the codecs, the ECB is configured to redirect the call to Acano for transcoding. If a video call is not present the ECB will forward the call to the E-SBC.

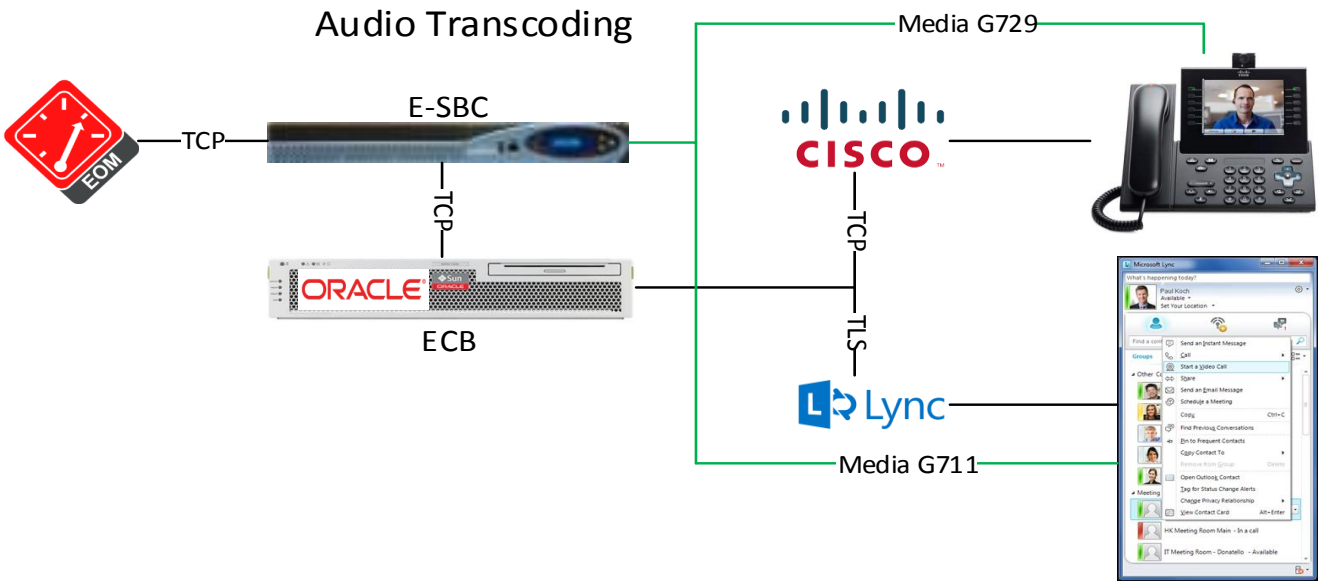
If the call is forwarded to Acano, Acano will process the signaling and will anchor media. Acano then forwards the signaling back to the ECB. The ECB does a second routing lookup based on the source from Acano and forwards the call to Cisco UCM. Routing on the ECB is determined first by the source IP in the "from" header, secondly based on the calling and called numbers, and finally based on any policy configured.

Because the ECB only performs policy lookups on the initial INVITE and does not comparing the initial offer to the 200OK, the ECB is not making a determination on transcoding. All video calls will get sent to Acano and Acano will determine if transcoding is required. Likewise, all audio calls will be forwarded to the E-SBC regardless of their transcoding requirements.

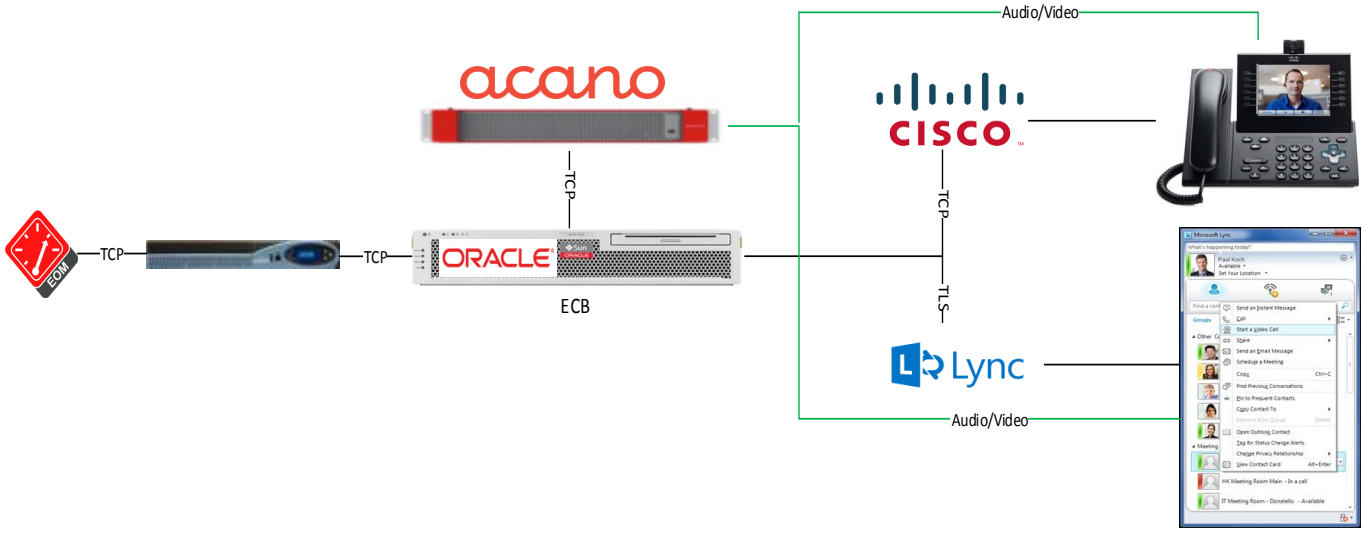


Audio Transcoding

A second ECB policy is setup on all calls from Lync that do not have video codecs. If this policy is matched the call is forwarded to the SBC as a hair pinned call. The ECB accomplishes the hairpin by including a route header requesting that the call be sent back to the EBC. The E-SBC processes the call and anchors the media by setting the SDP contact address to the IP of the SBC. The E-SBC will continue to be in the signaling path and will make a determination if audio transcoding is required. Media will be anchored to the SBC regardless of the need for transcoding.



Overall architecture



Lab Configuration

Following are the IP addresses used for the Interoperability tests. The IPs below are specific to lab setup at Telus, the IPs in production will be vastly different from one's listed below.

description	network-interface	realm	interface IP	sip-port
ECB interfaces				
management	wancom0		192.168.10.224	
signaling	M00		192.168.10.232	5060
signaling	M00		192.168.10.232	5067
Agents				
Acano	Static TCP		192.168.10.205	5060
Lync 2013	Static TLS		192.168.10.207	5061
CUCM	Static TCP		192.168.10.210	5060
E-SBC	Static TCP		192.168.10.230	5060
EOM	TCP		192.168.10.231	

description	network-interface	realm	interface IP	sip-port
SBC interfaces				
management	wancom0		10.10.10.200	
media/signalling	s1p0:0	core	192.168.10.230	5060
Session-Agents				
ECB		core	192.168.10.232	5060

Configuring the Oracle E-SBC & ECB

In this section we describe the steps for configuring an Oracle Enterprise Session Border Controller, formally known as an Acme Packet Net-Net Enterprise Session Director, for use with CM Server in a SIP trunking scenario.

In Scope

The following guide configuring the Oracle E-SBC assumes that this is a newly deployed device dedicated to a single customer. If a service provider currently has the E-SBC deployed then please see the ACLI Configuration Guide on http://docs.oracle.com/cd/E56581_01/index.htm for a better understanding of the Command Line Interface (CLI).

Note that Oracle offers several models of E-SBC. This document covers the setup for the E-SBC platform running ECZ7.3.0 or later. If instructions are needed for other Oracle E-SBC models, please contact your Oracle representative.

Out of Scope

- Configuration of Network management including SNMP and RADIUS
- setting up a hypervisor environment
- ECB Context, Dial-Plan, user registrar, or LDAP integration

E-SBC Configuration

The following section walks through configuring the Oracle E-SBC. It is outside the scope of this document to include all of the configuration elements as it will differ in every deployment. Physical-interface, Network-interface, sip-interfaces are completely standard. Microsoft Lync uses SRTP for media encryption by default. If SRTP is left as the default on Lync, SRTP IWF configuration maybe required to complete audio calls between Lync and Cisco endpoints. More information on SRTP E-SBC configuration can be found at: (http://docs.oracle.com/cd/E61547_01/doc/esbc_ecz730_configuration.pdf).

Audio Transcoding

For additional information on voice transcoding please see the enterprise SBC documentation for more information (http://docs.oracle.com/cd/E61547_01/doc/esbc_ecz730_configuration.pdf)

In this specific deployment the only purpose of the SBC is to transcode audio calls. The SBC only interfaces with ECB. Because of this only 1 network/realm/sip-interface is required. All calls that are forwarded to the SBC will have media anchored which can include non-transcoded audio calls.

The codec-policy has multiple purposes. The E-SBC media based policy will view the ingress methods SDP to ensure there are no video codecs and that PCMU and G729 are the only inbound audio codecs. When the message egresses the SBC it will add PCUM, G729, and RFC 2833 codecs if they aren't present. Finally, the policy orders the codecs so that G729 is preferred. When the 200OK is received the SBC will determine if there is a mismatch between the offer and what was received in the reply. If there is a conflict and PCMU is offered on one side and G729 is offered on the other side of the call, the SBC will transcode the audio. In this specific configuration we have forced G729 because we know that Microsoft Lync doesn't support G729 and this will force the SBC to transcode all audio call to and from Lync clients. Please note that transcoding support for G729 requires a license.

```
codec-policy
        name                                    InterRealm
        allow-codecs                            G729 PCMU video:no H264:no
H263:no telephone-event
        add-codecs-on-egress                    PCMU G729 telephone-event
        order-codecs                            G729 *
        packetization-time                      20
        force-ptime                             disabled
        dtmf-in-audio                           disabled
```

In the realm configuration 2 key attributes need to be set. First the mm-in-realm configuration attribute on the core realm that interfaces with the ECB needs to be set to “enabled”. This setting is disabled by default. Setting mm-in-realm to “enabled” will force the SBC to anchor all media. This is required because calls are hair pinned to/from the EBC on the same realm.

```
realm-config
        identifier                              core
        description                             Core realm to ECB
        addr-prefix                             0.0.0.0
        network-interfaces                      s1p0:0
        mm-in-realm                             enabled
        mm-in-network                           enabled
        mm-same-ip                              enabled
        mm-in-system                            enabled
        bw-cac-non-mm                           disabled
        msm-release                             disabled
        qos-enable                              disabled
        max-bandwidth                           0
        fallback-bandwidth                      0
…
        codec-policy                            InterRealm
        codec-manip-in-realm                    enabled
```

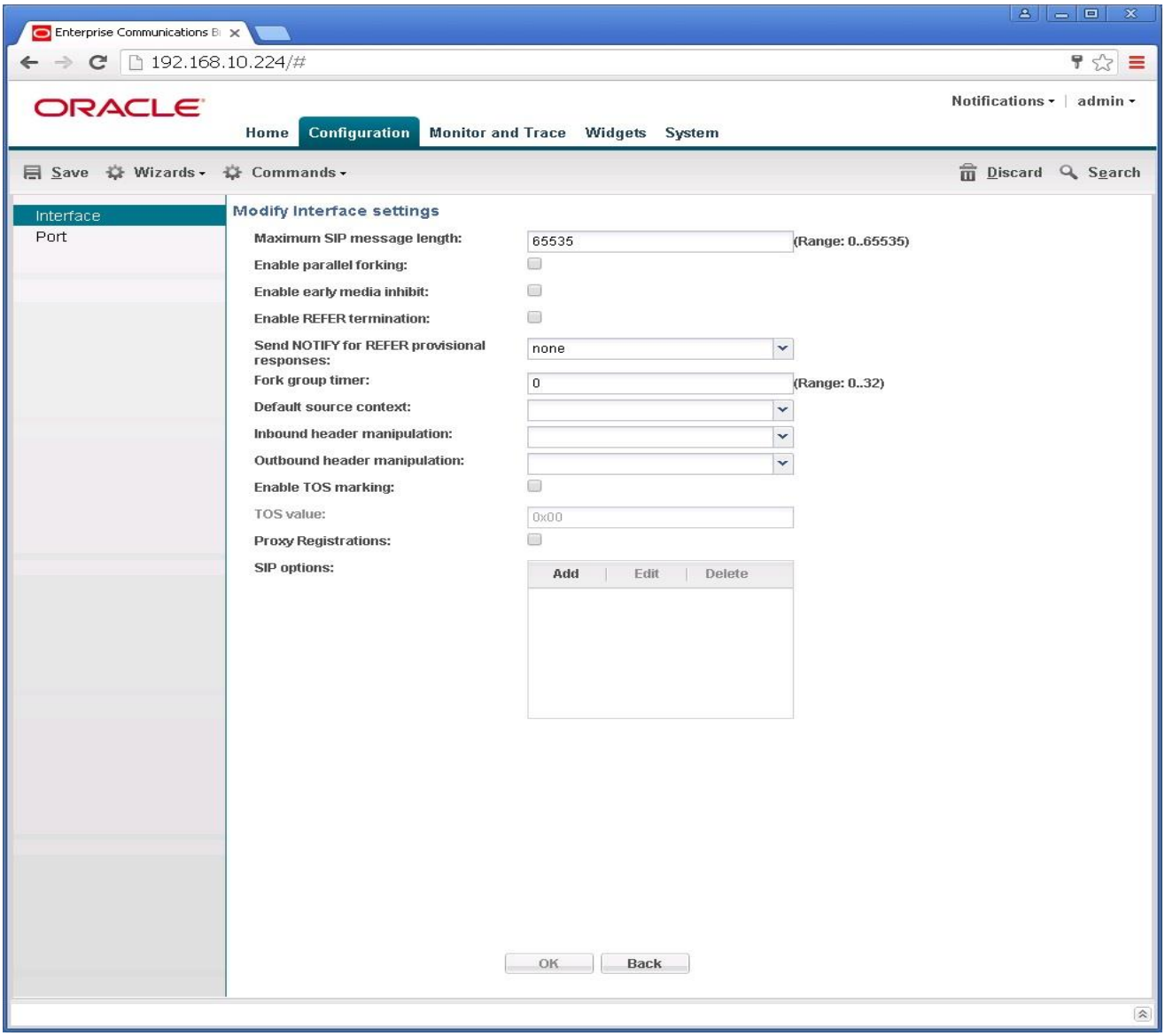
```
sip-config
        state                                   enabled
        operation-mode                          dialog
        dialog-transparency                     disabled
…
```

ECB Configuration

The following section walks through configuring the Oracle E-SBC. It is outside the scope of this document to include all of the configuration elements as it will differ in every deployment. Lync by default use TLS for signaling. 2 certificates are needed on the ECB. The first certificate is a CSR that will need to be signed by the Lync AD CA and imported back in to the ECB. The second certificate is the root certificate from the Microsoft AD CA. The certificate record will need to be created with the same CN and then import the root cert. More information on TLS configuration can be found online: (http://docs.oracle.com/cd/E55725_01/doc/ecb_pcz200_usersguide.pdf).

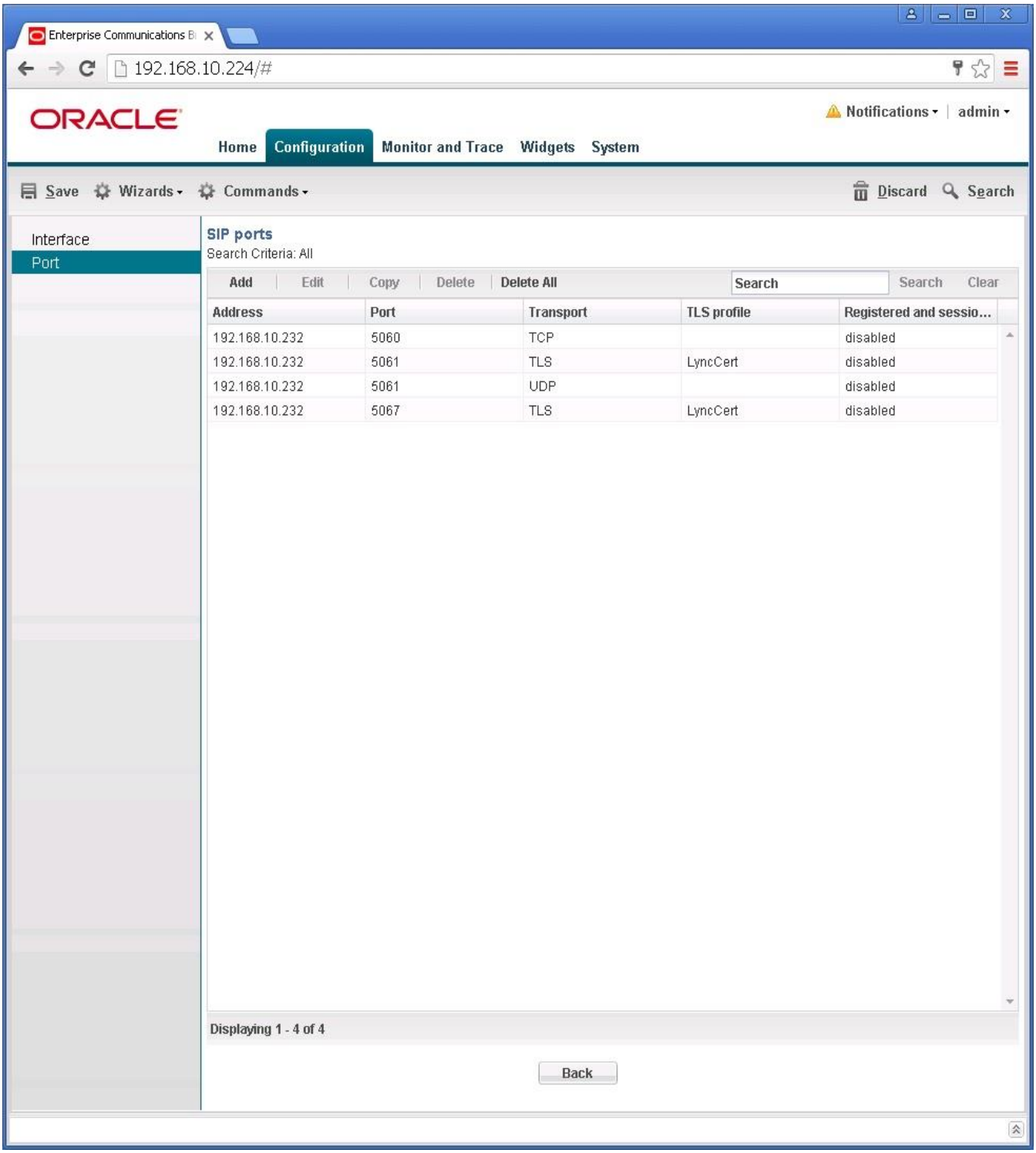
SIP Interface

The only adjustment to the sip interface configuration is the "Maximum SIP message length". The message length needs to be adjusted for video calls because the length of INVITEs and 200Oks for video exceed the default value 4095. For simplicity, the following configuration has been set to the maximum value 65535.



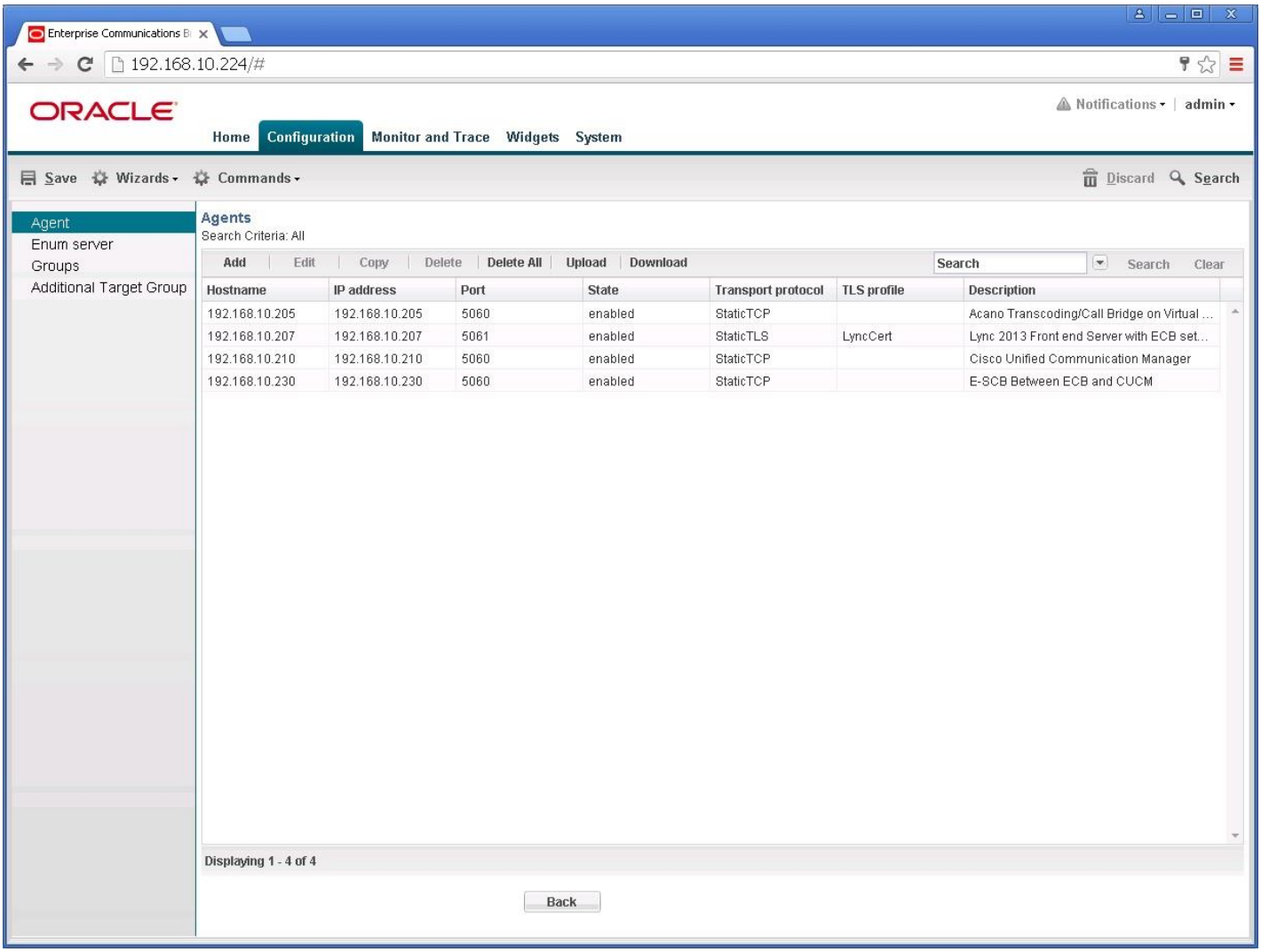
SIP Port

Multiple sip ports are required to accommodate TLS to and from Lync and TCP to and from Acano. The topology has been simplified by also using TCP to the SBC.



Agents

The Oracle Communications Enterprise Communications Broker resides in the core of the network and signals to all SIP endpoints. To simplify the agent configuration we have disabled all context and dial-plans. Agent configurations only provide a SIP connection address and provide the appropriate inbound and outbound manipulations to route the call properly. Please note that using IP addresses in place of host names is critical for successful source based routing. Each agent header manipulations will be address later in the document.

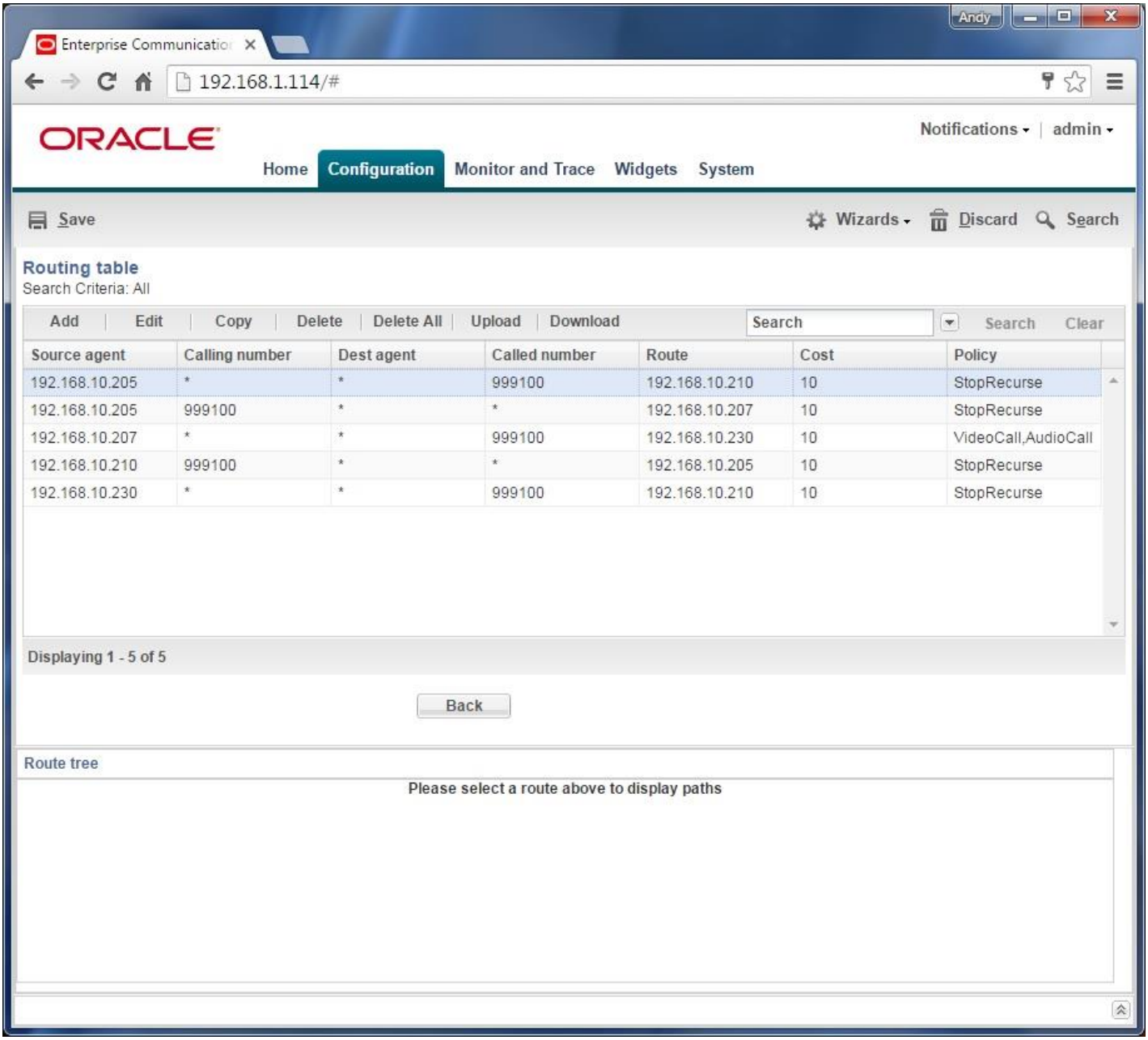


Call Routing

For the purposes of this lab, all sip users with the uri-user contact of 9991001-9991009 reside as Cisco endpoint connected to Cisco UCM or CVP. Lync endpoint users have text based uri-users for their sip contact information. Environments with number based Lync sip contacts are recommended and should provide greater granularity and control within ECB.

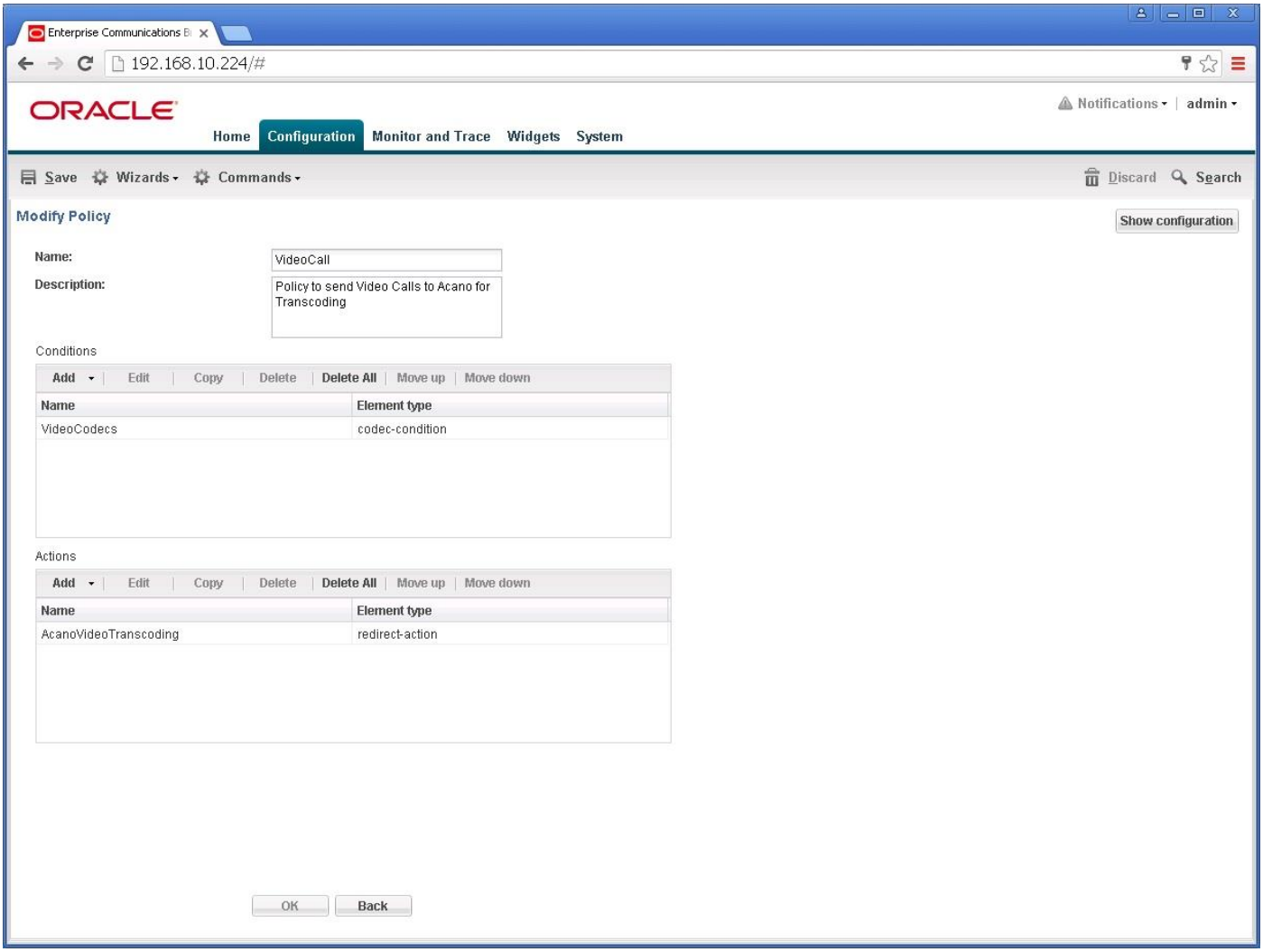
Source based routing is the primary call routing method. Source routes have been set from UCM to Acano and from Acano to Lync for both voice and video calls. The primary purpose in this is that Cisco by default uses delayed offer which prevents the ECB from being able to make a codec policy decision until later in the call setup. Further testing is needed to ensure proper outbound routing from UCM.

Call routing from Lync default to sending all traffic to the SBC unless the codec policy is met and the call is redirected to Acano. Routing should be very straight forward with a combination of calling/called numbers and source agent and a single codec policy with hairpin redirection. The stop recurse policy is used to prevent call routing loops. All new routes should be thoroughly tested to prevent routing loops.



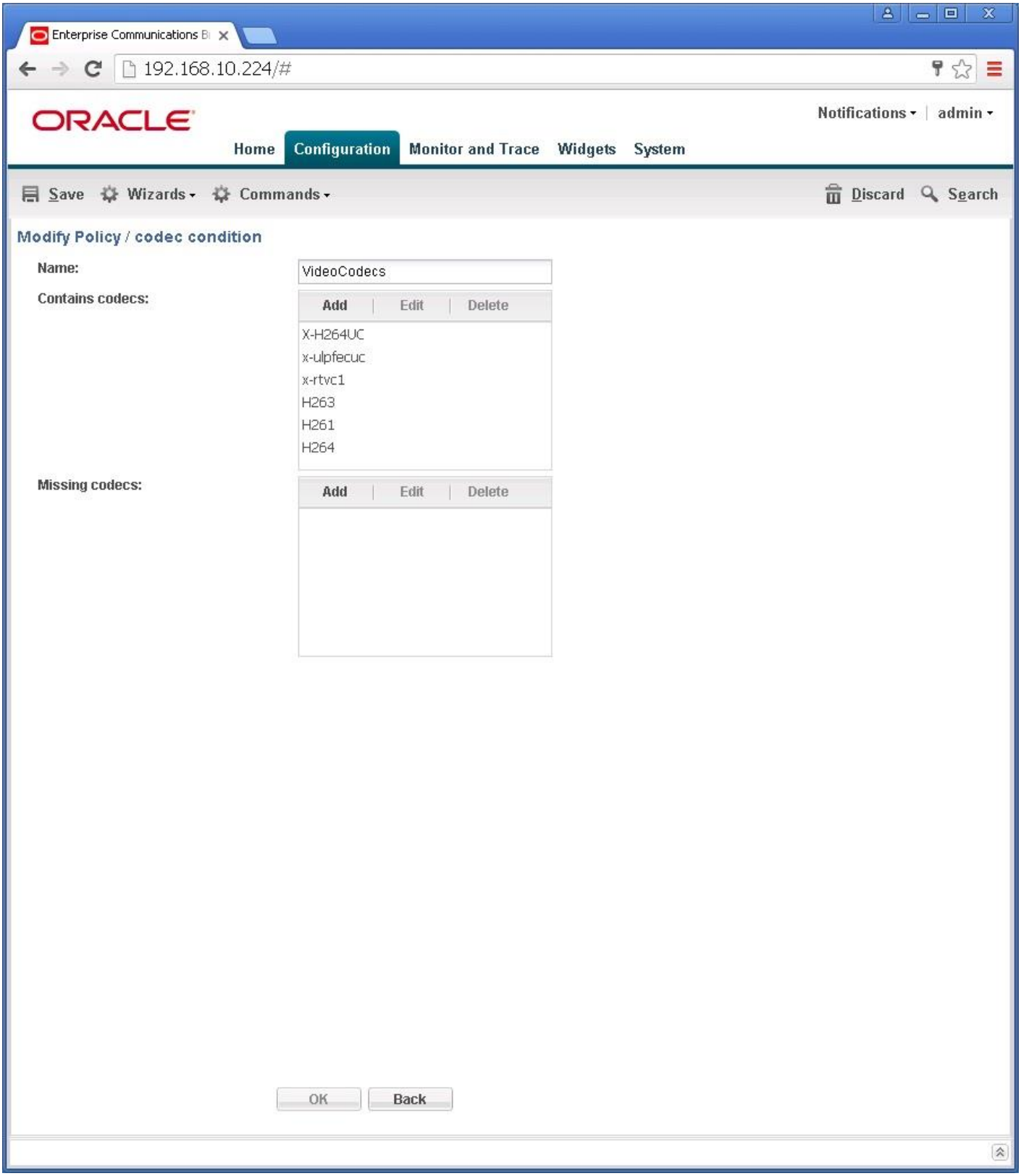
Video Codec Policy

ECB Policy features were introduced in PCZ2.0.0 MR-2. Policy configuration require version PC2.0.0m2 or later. The Policy configuration can be found in the main configuration menu under “Policy”. The video codec policy is a policy that must be configured. The policy has 4 primary parts: Name, Description, Conditions and Actions.



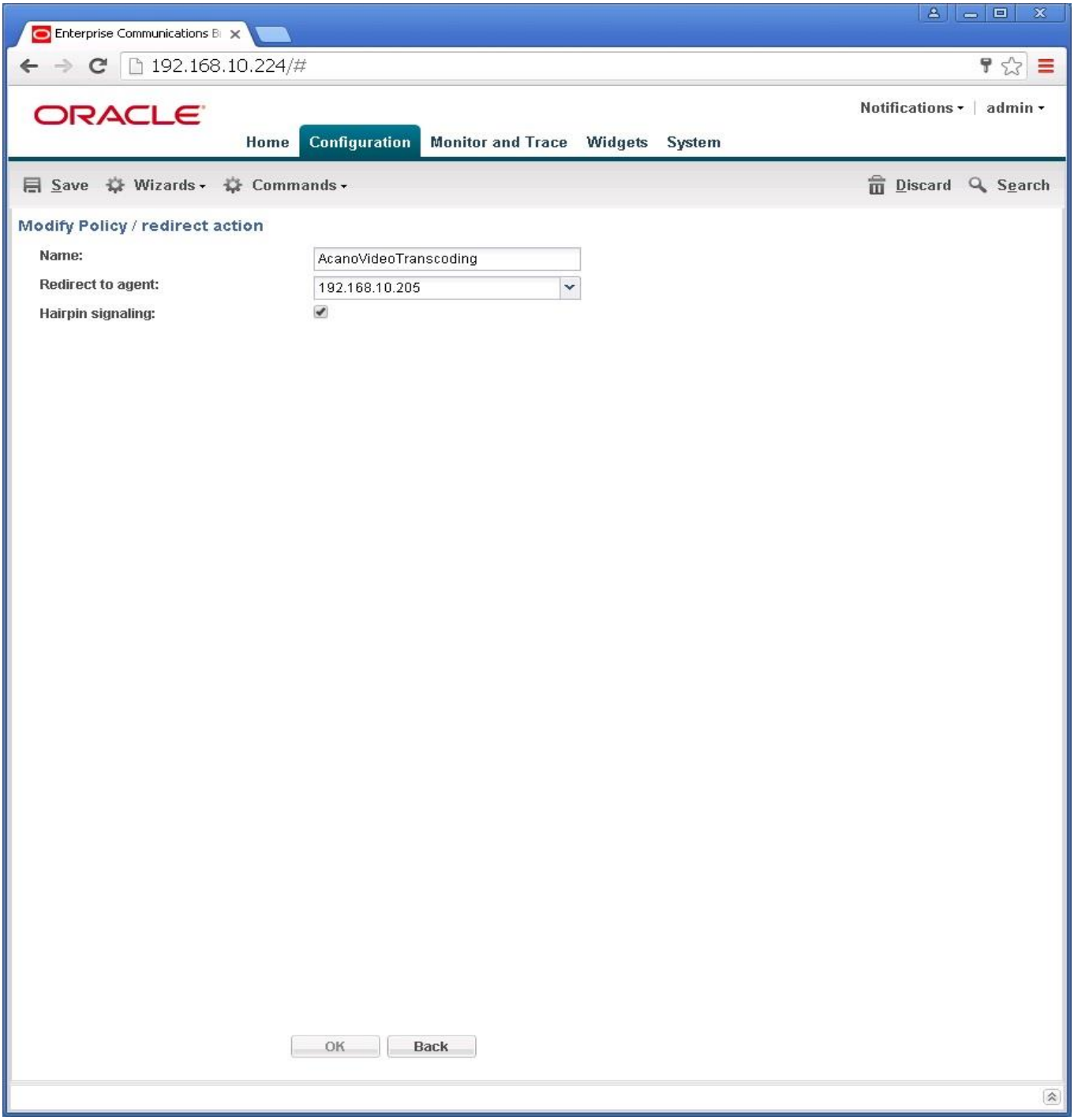
Policy Conditions

Conditions are a set of codec conditions that might invoke an “Action”. If a specific codec is not listed, the Oracle ECB will allow new codecs to be added. If any of the codecs in the “contains” list the policy will invoke the action listed in action. In this specific testing most of the common video codecs are listed.



Policy Action

Policy Action allows one or more actions to be applied when a policy condition is met. For the testing performed, the policy action is set to redirect the call to the Acano agent from the agent configuration. The hairpin signaling is set to enabled so that the ECB will insert a route header forcing the signaling get sent back to the ECB. The hairpin is required because ECB is the only external device that signals directly to UCM.



Audio Codec Policy

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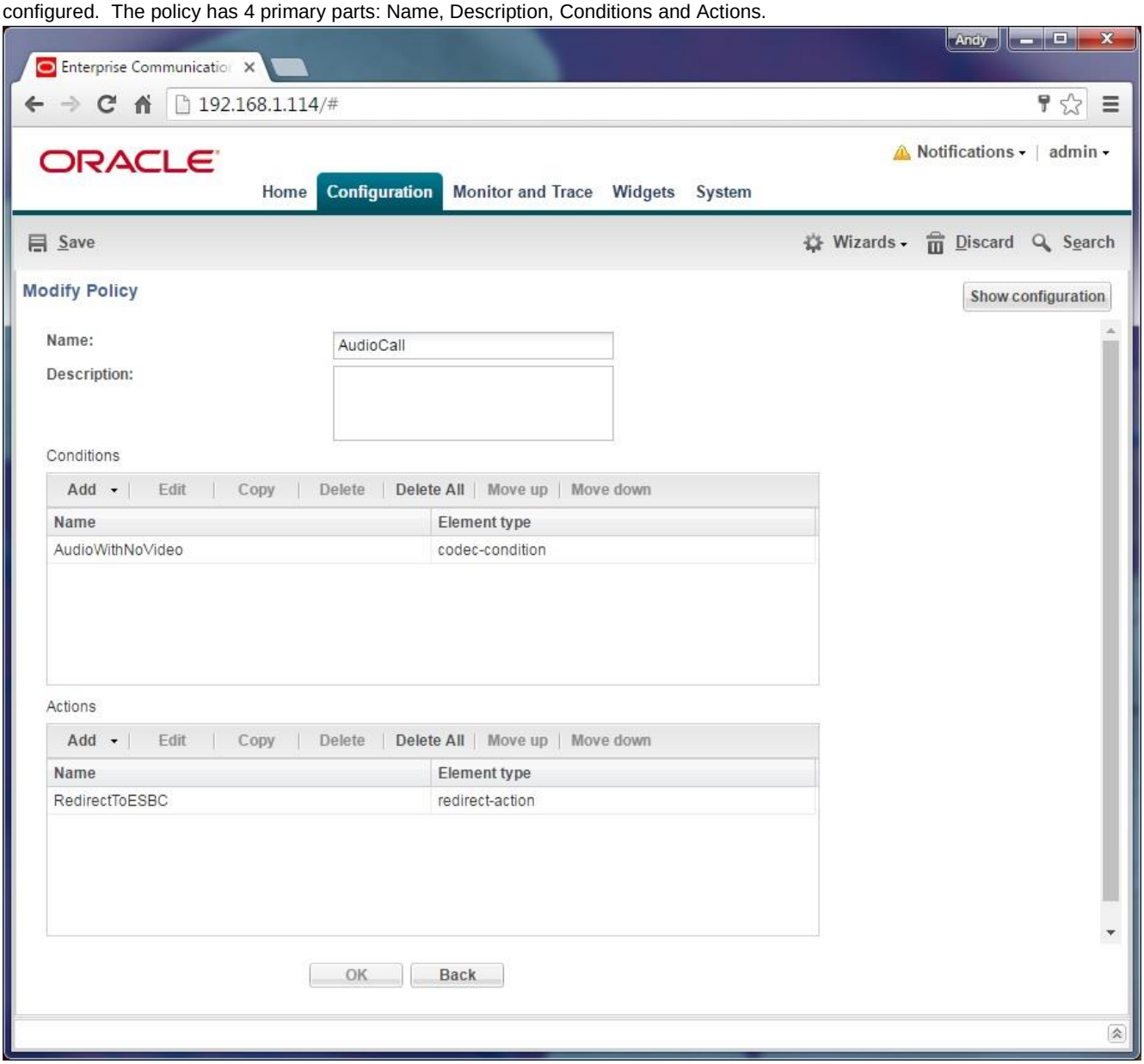
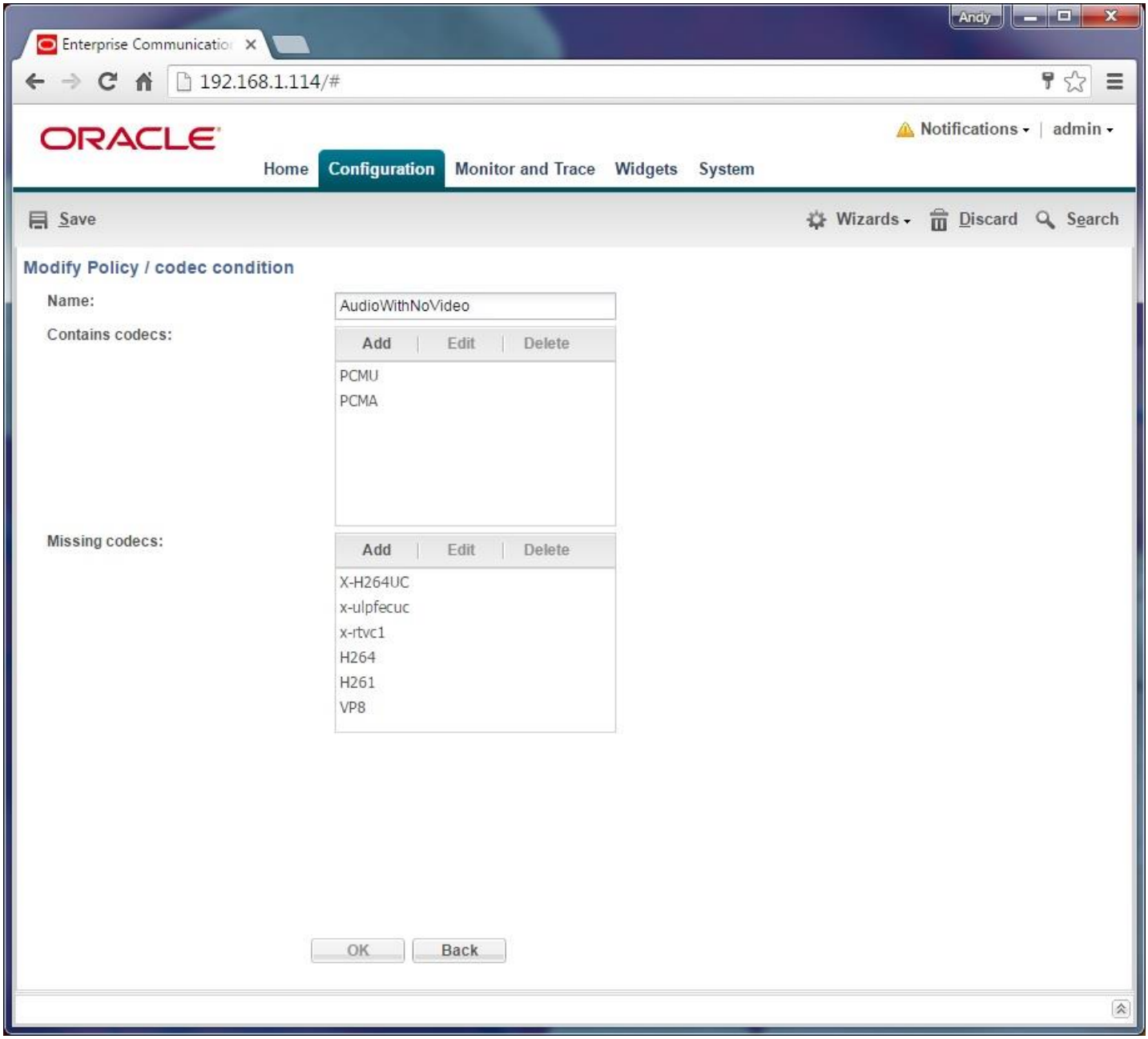
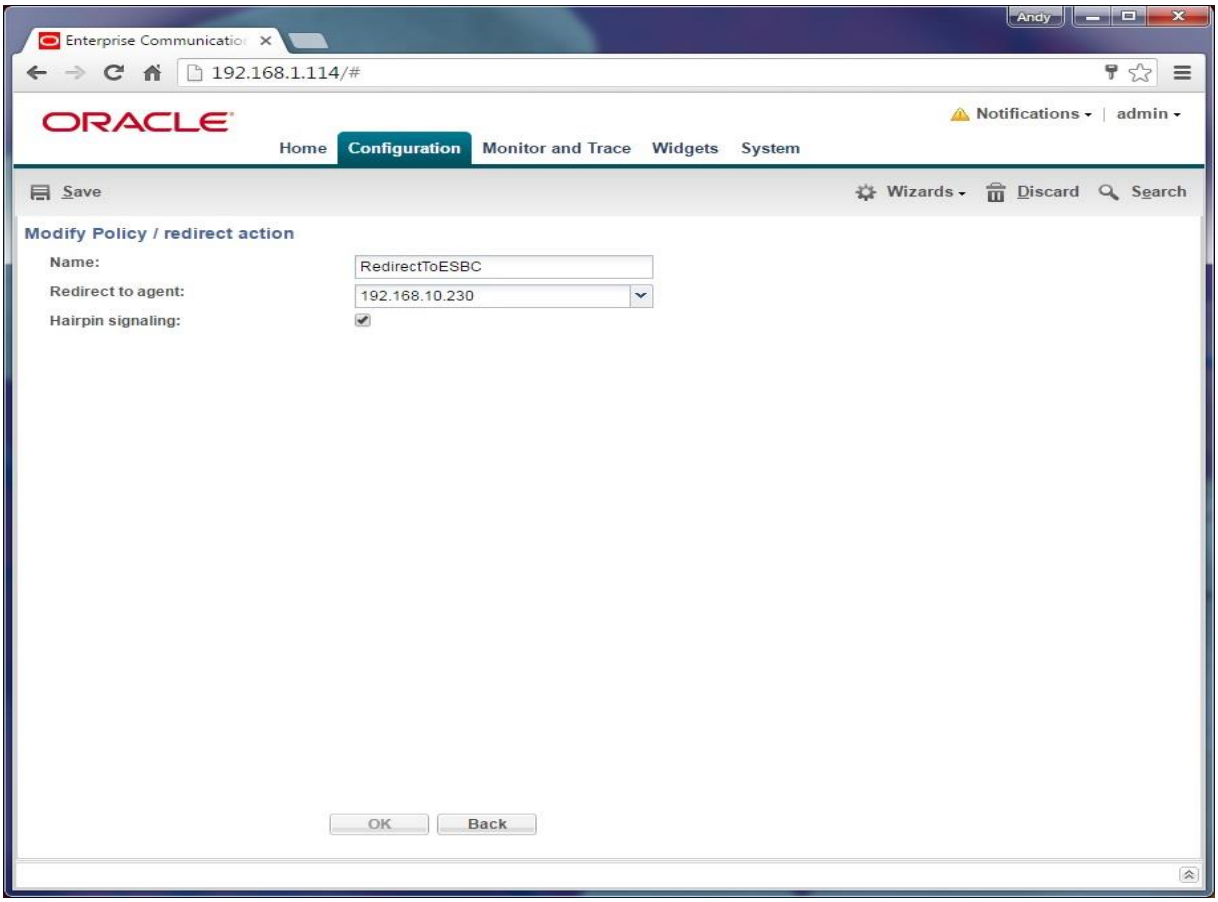


Policy Conditions



Policy Action



Header Manipulation Rules

For purposes of simplifying documentation and readability the HMRs are documented in text form. All configuration changes for ECB need to be done from the GUI. Please refer to ECB config guide for additional actual screen shots on how to configure a header manipulation rule.

Outbound HMR to Acano

The purpose of this HMR is to replace the request-uri host URI with the host URI from the To header. Acano need the to & RURI URI's to match to route requests properly.

```
 name                                    FixAcanoURI
description
split-headers
join-headers
header-rule
        name                                    StrTo
        header-name                             To
        action                                  store
        comparison-type                         case-sensitive
        msg-type                                any
        methods
        match-value
        new-value
        element-rule
                name                                    UpdtRURIHost
                parameter-name
                type                                    uri-host
                action                                  store
                match-val-type                          any
                comparison-type                         case-sensitive
                match-value
```

```
                new-value
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $StrTo.$UpdtRURIHost.$0
```

Inbound HMR from Acano

This HMR sets the request-uri host to local IP and the from host to remote IP to ensure proper source routing on the ECB

```
        name                                    InFrmAcano
        description
        split-headers
        join-headers
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $LOCAL IP
        header-rule
                name                                    UpdtFrm
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtFrom
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $REMOTE IP
```

Outbound to CUCM

UCM during this testing was setup where all the cisco users have a URI of ucm.acano.show. Because of the contact URI expectations, the request uri host and to uri host both need to be set to ucm.acano.show. Furthermore, UCM also has the expectation that all call will be from acano.show. Because the ECB is routing using source routes via IP in the headers, the from must also be set to the host acano.show.

```
        name                                    ToCUCM
        description
        split-headers
        join-headers
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               ucm.acano.show
        header-rule
                name                                    UpdtTo
                header-name                             To
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               ucm.acano.show
        header-rule
                name                                    UpdtFrom
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               acano.show
```

Inbound from CUCM & Lync

A generic HMR has been configured for inbound call from CUCM and Lync. The purpose of this HMR is to update the From URI host to the remote IP. Both CUCM and Lync use FQDNs for the host portion of the from URI. ECB uses the from URI host to determine source routes. Additionally Lync inserts a host name in record-route. This HMR also sets the record-route to the remote IP.

```
        name                                    GenericIn
        description
        split-headers
        join-headers
        header-rule
                name                                    UpdtFrm
                header-name                             From
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtRUIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $REMOTE_IP
        header-rule
                name                                    FixRecordRoute
                header-name                             Record-Route
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
                        new-value                               $REMOTE_IP
```

Outbound to Lync

Lync requires FQDN in most of the header URIs. The HMR to Lync sets the request URI and TO host URIs to acano.show. The contact header URI host is also updated to local IP. Finally, the route header inserted by ECB needs to be removed for the Lync frontend server to accept calls from a “trusted application server”. Otherwise, the Lync server tries to forward the call as a proxy.

```
        name                                    ToLync
        description
        split-headers
        join-headers
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                comparison-type                         case-sensitive
                msg-type                                any
                methods
                match-value
                new-value
                element-rule
                        name                                    UpdtRURIHost
                        parameter-name
                        type                                    uri-host
                        action                                  replace
                        match-val-type                          any
                        comparison-type                         case-sensitive
                        match-value
```

```
                new-value                                acano.show
        header-rule
                name                                     UpdtContact
                header-name                              Contact
                action                                   manipulate
                comparison-type                          case-sensitive
                msg-type                                 any
                methods
                match-value
                new-value
                element-rule
                        name                                     updtURIHost
                        parameter-name
                        type                                     uri-host
                        action                                   replace
                        match-val-type                           any
                        comparison-type                          case-sensitive
                        match-value
                        new-value                                $LOCAL_IP
        header-rule
                name                                     UpdtTo
                header-name                              To
                action                                   manipulate
                comparison-type                          case-sensitive
                msg-type                                 request
                methods                                  INVITE
                match-value
                new-value
                element-rule
                        name                                     UpdtURIHost
                        parameter-name
                        type                                     uri-host
                        action                                   replace
                        match-val-type                           any
                        comparison-type                          case-sensitive
                        match-value
                        new-value                                acano.show
        header-rule
                name                                     UpdtRoute
                header-name                              Route
                action                                   delete
                comparison-type                          case-sensitive
                msg-type                                 any
                methods
                match-value
                new-value
```

Test Plan

Testing was limited to proof of concept only. Testing was limited to very basic calls.

Video Call from Lync Client to Cisco Video Endpoint using Acano for Video transcoding	Call ringback	pass
	voice cut through on connect	pass
	video cut through on connect	pass
	2 way voice	pass
	2-way video	pass
Voice Call from Lync Client to Cisco Audio endpoint using E-SCB for transcoding	Call ringback	pass
	voice cut through on connect	pass
	2-way voice	pass
Acano initiated call to Lync endpoint through ECB	Call ringback	pass
	voice cut through on connect	pass
	video cut through on connect	pass
	2 way voice	pass
	2-way video	pass
Acano initiated call to UCM endpoint through ECB	Call ringback	pass
	voice cut through on connect	pass
	video cut through on connect	pass
	2 way voice	pass
	2-way video	pass
Video Call from UCM endpoint to Lync Video Endpoint using Acano for Video transcoding	Call ringback	pass
	voice cut through on connect	pass
	video cut through on connect	pass
	2 way voice	pass
	2-way video	pass
Audio Call from UCM endpoint to Lync Video Endpoint using Acano for Video transcoding	Call ringback	pass
	voice cut through on connect	pass
	2-way voice	pass

Appendix A

E-SBC Configuration

```
sho running-config short
codec-policy
        name                                    InterRealm
        allow-codecs                            G729 PCMU video:no H264:no H263:no
telephone-event
        add-codecs-on-egress                    PCMU G729 telephone-event
        order-codecs                            G729 *
media-manager
network-interface
        name                                    s1p0
        description                             Core
        hostname                                ESBC-Core
        ip-address                              192.168.10.230
        netmask                                 255.255.255.0
        gateway                                 192.168.10.1
        icmp-address                            192.168.10.230
ntp-config
        server                                  172.16.0.101
phy-interface
        name                                    s1p0
        operation-type                          Media
        slot                                    1
realm-config
        identifier                              core
        description                             core
        network-interfaces                      s1p0:0
        mm-in-realm                             enabled
        codec-policy                            InterRealm
        codec-manip-in-realm                    enabled
redundancy-config
        state                                   disabled
session-agent
        hostname                                192.168.10.232
        ip-address                              192.168.10.232
        transport-method                        StaticTCP
        realm-id                                core
sip-config
        dialog-transparency                     disabled
        home-realm-id                           core
        options                                 max-udp-length=0
        sip-message-len                         65535
sip-interface
        realm-id                                core
        description                             core sip interface
        sip-port
                address                                 192.168.10.230
                transport-protocol                      TCP
        redirect-action                         Recurse
sip-monitoring
spl-config
steering-pool
        ip-address                              192.168.10.230
```

```
        start-port                              32768
        end-port                                65535
        realm-id                                core
system-config
        hostname                                esbc
        description                             Acano Lab ESBC
        location                                Acano Lab
        process-log-level                       DEBUG
        comm-monitor
                state                                   enabled
                monitor-collector
                        address                                 192.168.10.227
        default-gateway
web-server-config
task done
ESBC#
```

Appendix B

Full ECB Configuration

```
sho running-config short
certificate-record
        name                                    AcanoDC
        common-name                             acano-SHOWAD-CA
        key-size                                2048
certificate-record
        name                                    ECB-Cert2
        common-name                             ecb.acano.show
        key-size                                2048
policy
        name                                    AudioCall
        description                             Audio calls should get anchored to the
Oracle SBC.
        codec-condition
                name                                    AudioCodecCondition
                contains-codecs                         PCMU
                                                        PCMA
                missing-codecs                          X-H264UC
        redirect-action
                name                                    RouteTOSBC
                redirect-to-agent                       192.168.10.230
policy
        name                                    Deny
        description                             Built-in policy to deny the incoming
session
        routing-action
                name                                    DenyAction
                routing-mode                            deny
policy
        name                                    Emergency
        description                             Built-in policy to ignore constraints for
emergency or priority calls
        constraints-action
                name                                    IgnoreConstraints
                ignore-constraints                      enabled
policy
        name                                    FixRURIToAcano
policy
        name                                    StopRecurse
        description                             Built-in policy to prevent further backup
route attempts
```

```
        routing-action
                name                                    StopRecurseAction
policy
        name                                    VideoCall
        description                             Policy to send Video Calls to Acano for
Transcoding
        codec-condition
                name                                    VideoCodecs
                contains-codecs                         X-H264UC
                                                        x-ulpfecuc
                                                        x-rtvc1
                                                        H263
                                                        H261
                                                        H264
        redirect-action
                name                                    AcanoVideoTranscoding
                redirect-to-agent                       192.168.10.205
profile
        profile-name                            acctProfile
        template-name                           ESM-5-Acct
        generate-start                          OK
        state                                   disabled
        file-path                               /opt/logs
        file-output                             disabled
        file-rotate-time                        0
        max-file-size                           10000000
        ftp-push                                disabled
        ftp-port                                21
profile
        profile-name                            acctsrvProfile
        template-name                           ESM-6-Acct-Srv
        port                                    1813
profile
        profile-name                            agentGroupProfile
        template-name                           ESM-D-Agent-Group
        strategy                                Hunt
        recurse                                 disabled
        agents
profile
        profile-name                            agentProfile
        template-name                           ESM-4-Agent
        port                                    5060
        transport                               UDP
        agent-state                             enabled
        translate-mode                          E164
        number-digits                           4
        constraints                             disabled
        max-sessions                            0
        max-inbound-sessions                    0
        max-outbound-sessions                   0
        max-burst-rate                          0
        max-inbound-burst-rate                  0
        max-outbound-burst-rate                 0
        max-sustain-rate                        0
        max-inbound-sustain-rate                0
        max-outbound-sustain-rate               0
        burst-rate-window                       0
        sustain-rate-window                     0
        optionsPing                             disabled
        ping-interval                           0
profile
        profile-name                            enumProfile
        template-name                           ESM-9-Enum
        servers
        translate-mode                          E164
        number-digits                           0
        query-method                            hunt
```

```
        timeout                                 11
        lookup-length                           0
        max-response-size                       512
        health-query-interval                   0
profile
        profile-name                            intfProfile
        template-name                           ESM-25-Interface
        sipMessageLen                           4095
        parallelForking                         disabled
        earlyMediaInhibit                       disabled
        terminateRefer                          disabled
        forkGroupTimeout                        0
        referNotifyProvisional                  none
        default-context                         E164
        min-reg-expire                          (unresolvable) (target not set)
        enable-tos-marking                      disabled
        tos-value-signaling                     0x00
        proxyRegistration                       disabled
profile
        profile-name                            networkProfile
        template-name                           ESM-2-Network
        VLAN                                    0
        gateway                                 0.0.0.0
        enable-icmp                             disabled
        virtual-mac                             00:08:25:dd:dd:dd
        high-availability                       (unresolvable) (target not set)
        gwHeartbeat                             enabled
        hostname                                (unresolvable) (target not set)
        terminateRefer                          (unresolvable) (target not set)
        referNotifyProvisional                  (unresolvable) (target not set)
profile
        profile-name                            portProfile
        template-name                           ESM-3-Port
        port                                    5060
        transport                               UDP
        registered-and-session-agents           disabled
profile
        profile-name                            regProfile
        template-name                           ESM-A-Registrar
        reg-state                               disabled
        domains
        min-reg-expire                          300
        credential-retrieval-method             None
        fork-group                              1
profile
        profile-name                            snmpProfile
        template-name                           ESM-7-SNMP
        snmp-community                          public
        snmp-addresses
profile
        profile-name                            syncAgentProfile
        template-name                           ESM-C-Sync-Agent
profile
        profile-name                            syncConfigProfile
        template-name                           ESM-B-Sync-Config
        state                                   disabled
        configuration                           enabled
        registration                            disabled
profile
        profile-name                            systemProfile
        template-name                           ESM-1-System
        hostname                                ECB
        process-log-level                       NOTICE
        restart                                 enabled
        telnet-tmo                              0
        console-tmo                             0
        syslog-server-address                   0.0.0.0
```

```
        syslog-server-port                  514
        syslog-server-facility              4
        high-availability                   disabled
        primary-addr                        169.254.1.1
        secondary-addr                      169.254.1.2
        enableMiscSnmpTraps                 disabled
        enableCommMonitor                   disabled
        commMonitorCollectorAddress         0.0.0.0
        commMonitorCollectorNetIf           wancom0:0
        commMonitorCollectorPort            4739
        maxUntrustedPacketRate              50000
        maxArpPacketRate                    1000
        enableSipMonAndTrc                  disabled
        ntpServers
profile
        profile-name                        trapProfile
        template-name                       ESM-8-Trap
        snmp-community                      public
        trap-port                           162
routing-entry
        source-agent                        192.168.10.205
        called-number                       999100
        route                               192.168.10.210
        description
routing-entry
        source-agent                        192.168.10.205
        calling-number                      999100
        route                               192.168.10.207
        cost                                10
        policy                              StopRecurse
routing-entry
        source-agent                        192.168.10.207
        route                               192.168.10.210
        cost                                10
        policy                              VideoCall,AudioCall,StopRecurse
routing-entry
        source-agent                        192.168.10.210
        calling-number                      999100
        route                               192.168.10.205
routing-entry
        source-agent                        192.168.10.230
        calling-number                      999100
        route                               192.168.10.210
        cost                                10
        policy                              StopRecurse
service
        service-name                        acct1
        profile-name                        acctProfile
        generate-start                      OK
        generate-interim                    Reinvite-Response
        state                               disabled
        file-path                           /opt/logs
        file-output                         disabled
        file-rotate-time                    0
        max-file-size                       10000000
        ftp-push                            disabled
        ftp-port                            21
service
        service-name                        intf1
        profile-name                        intfProfile
        sipMessageLen                       65535
        parallelForking                     disabled
        earlyMediaInhibit                   disabled
        terminateRefer                      disabled
        forkGroupTimeout                    0
        referNotifyProvisional              none
        min-reg-expire                      300
```

```
        enable-tos-marking                      disabled
        tos-value-signaling                     0x00
        proxyRegistration                       disabled
        esm-registrar                           reg1
service
        service-name                            network1
        profile-name                            networkProfile
        VLAN                                    0
        ip-address                              192.168.10.224
        netmask                                 255.255.255.0
        gateway                                 192.168.10.1
        enable-icmp                             enabled
        virtual-mac                             02:0c:29:7b:90:e9
        high-availability                       disabled
        gwHeartbeat                             enabled
        hostname                                ECB
        terminateRefer                          disabled
        referNotifyProvisional                  none
        esm-system                              system1
        esm-sip-int                             intf1
service
        service-name                            port_192.168.10.232_5060_TCP
        profile-name                            portProfile
        address                                 192.168.10.232
        port                                    5060
        transport                               TCP
        registered-and-session-agents           disabled
service
        service-name                            port_192.168.10.232_5061_TLS
        profile-name                            portProfile
        address                                 192.168.10.232
        port                                    5061
        transport                               TLS
        tls-profile                             LyncCert
        registered-and-session-agents           disabled
service
        service-name                            port_192.168.10.232_5061_UDP
        profile-name                            portProfile
        address                                 192.168.10.232
        port                                    5061
        transport                               UDP
        registered-and-session-agents           disabled
service
        service-name                            port_192.168.10.232_5067_TLS
        profile-name                            portProfile
        address                                 192.168.10.232
        port                                    5067
        transport                               TLS
        tls-profile                             LyncCert
        registered-and-session-agents           disabled
service
        service-name                            reg1
        profile-name                            regProfile
        reg-state                               enabled
        domains
snr.acano.com,hong.acano.com,oracle.acano.com
        min-reg-expire                          300
        credential-retrieval-method             None
        fork-group                              1
service
        service-name                            sync1
        profile-name                            syncConfigProfile
        state                                   disabled
        configuration                           enabled
        registration                            disabled
service
        service-name                            system1
```

```
        profile-name                            systemProfile
        hostname                                ECB
        location                                PV
        default-gateway                         192.168.10.1
        process-log-level                       DEBUG
        restart                                 enabled
        telnet-tmo                              0
        console-tmo                             0
        syslog-server-address                   0.0.0.0
        syslog-server-port                      514
        syslog-server-facility                  4
        high-availability                       disabled
        primary-peer                            ECB
        primary-addr                            169.254.1.1
        secondary-peer                          ecb02
        secondary-addr                          169.254.1.2
        enableMiscSnmpTraps                     disabled
        enableCommMonitor                       enabled
        commMonitorSbcGrpId                     0
        commMonitorCollectorAddress             192.168.10.227
        commMonitorCollectorNetIf               wancom0:0
        commMonitorCollectorPort                4739
        maxUntrustedPacketRate                  50000
        maxArpPacketRate                        1000
        enableSipMonAndTrc                      enabled
        ntpServers
session-agent
        hostname                                192.168.10.205
        IP-address                              192.168.10.205
        transport-protocol                      StaticTCP
        description                             Acano Transcoding/Call Bridge on Virtual
Machine
        egress-number-translation-mode          pattern-only
        inbound-header-manipulation             InFrmAcano
        outbound-header-manipulation            FixAcanoURI
        enable-OPTIONS-ping                     enabled
        OPTIONS-ping-interval                   90
session-agent
        hostname                                192.168.10.207
        IP-address                              192.168.10.207
        port                                    5061
        transport-protocol                      StaticTLS
        TLS-profile                             LyncCert
        description                             Lync 2013 Front end Server with ECB setup
as a Trusted AS
        egress-number-translation-mode          pattern-only
        inbound-header-manipulation             GenericIn
        outbound-header-manipulation            ToLync
        OPTIONS-ping-interval                   20
session-agent
        hostname                                192.168.10.210
        IP-address                              192.168.10.210
        transport-protocol                      StaticTCP
        description                             Cisco Unified Communication Manager
        egress-number-translation-mode          pattern-only
        inbound-header-manipulation             GenericIn
        outbound-header-manipulation            ToCUCM
        OPTIONS-ping-interval                   30
session-agent
        hostname                                192.168.10.230
        IP-address                              192.168.10.230
        transport-protocol                      StaticTCP
        description                             E-SCB Between ECB and CUCM
        egress-number-translation-mode          pattern-only
sip-manipulation
        name                                    FixAcanoURI
        header-rule
```

```
                name                                    StrTo
                header-name                             To
                action                                  store
                element-rule
                        name                                    UpdtRURIHost
                        type                                    uri-host
                        action                                  store
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               $StrTo.$UpdtRURIHost.$0
sip-manipulation
        name                                    GenericIn
        header-rule
                name                                    UpdtFrm
                header-name                             From
                action                                  manipulate
                element-rule
                        name                                    UpdtRUIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               $REMOTE_IP
        header-rule
                name                                    FixRecordRoute
                header-name                             Record-Route
                action                                  manipulate
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               $REMOTE_IP
sip-manipulation
        name                                    InFrmAcano
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               $LOCAL_IP
        header-rule
                name                                    UpdtFrm
                header-name                             From
                action                                  manipulate
                element-rule
                        name                                    UpdtFrom
                        type                                    uri-host
                        action                                  replace
                        new-value                               $REMOTE_IP
sip-manipulation
        name                                    ToCUCM
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               ucm.acano.show
```

```
        header-rule
                name                                    UpdtTo
                header-name                             To
                action                                  manipulate
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               ucm.acano.show
        header-rule
                name                                    UpdtFrom
                header-name                             From
                action                                  manipulate
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               acano.show
sip-manipulation
        name                                    ToLync
        header-rule
                name                                    UpdtRURI
                header-name                             request-uri
                action                                  manipulate
                element-rule
                        name                                    UpdtRURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               acano.show
        header-rule
                name                                    UpdtContact
                header-name                             Contact
                action                                  manipulate
                element-rule
                        name                                    updtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               $LOCAL_IP
        header-rule
                name                                    UpdtTo
                header-name                             To
                action                                  manipulate
                msg-type                                request
                methods                                 INVITE
                element-rule
                        name                                    UpdtURIHost
                        type                                    uri-host
                        action                                  replace
                        new-value                               acano.show
        header-rule
                name                                    UpdtRoute
                header-name                             Route
                action                                  delete
tls-profile
        name                                    LyncCert
        end-entity-certificate                  ECB-Cert2
        trusted-ca-certificates                 AcanoDC
        mutual-authenticate                     enabled
tls-profile
        name                                    LyncCert2
        end-entity-certificate                  ECB-Cert3
        trusted-ca-certificates                 AcanoDC
web-server-config
        inactivity-timeout                      10
        https-state                             enabled
        tls-profile                             LyncCert
task done
```

Appendix C

Setting up ECB as Trusted Application Server in Lync Frontend Server

For purposes of simplifying documentation and readability the HMRs are documented in text form. All configuration changes for ECB need to be done from the GUI.

1) You will need to upload a certificate signed by the trusted CA to the ECB.
Note, when you create the CSR the certificate's CN will need to match the FQDN of the ECB.

2) Setup DNS records

SRV : _sipinternaltls._tcp.fe.lync.acano.show
A : fe.lync.acano.show

3) Set up a trust pool

New-CsTrustedApplicationPool -Identity acano-trust -ComputerFqdn ecb.acano.show -Registrar fe.lync15.acano.com -site 1 -RequiresReplication $false -ThrottleAsServer $true -TreatAsAuthenticated $true
New-CsTrustedApplication -ApplicationId ecb-application -TrustedApplicationPoolFqdn ecb-trust -Port 5061
$x=New-CsStaticRoute -TLSRoute -Destination "server.acano.com" -MatchUri "ecb.acano.show" -Port 5061 -UseDefaultCertificate $true
Set-CsStaticRoutingConfiguration -Identity global -Route @{Add=$x}
Enable-CsTopology

4) Set up a static route towards the ECB
$RouteSfserver01=New-CsStaticRoute -TLSRoute -Destination "ecb.acano.show" -MatchUri "ecb.acano.show" -Port 5061 -UseDefaultCertificate $true
Set-CsStaticRoutingConfiguration -Identity global -Route @{Add=$RouteSfserver01}
To show the routes "Get-CsStaticRoutingConfiguration"

Appendix D

Acano Configuration

Network Configuration on IPv4

In the Acano solution virtual deployment, there is only one network interface initially but up to 4 are supported (see the next section). The initial interface is "a", equivalent to interface A in the Acano Server deployment. (The MMP runs on this interface in the virtual deployment.)

Configuration

1. Configure the Network Interface speed using the following MMP commands.

To set network interface speed, duplex and auto-negotiation parameters use the iface command e.g. to display the current configuration on the Admin interface, in the MMP type:

iface a

To set the interface to 1GE, full duplex type:

iface a 1000 full

and to switch auto negotiation on or off, type:

iface a autoneg <on|off>

We recommend that the network interface is set to auto negotiation unless you have a specific reason not to.

The “a” interface is initially configured to use DHCP. To view or reconfigure the IP settings: a. Go on to step b if you are using static IP addresses.

To find out the dhcp configured settings, type:

ipv4 a

2. Acano solution: Virtualized Deployment R1.8 Installation Guide 76-1025-07-D Page 9

Go on to step 3. b. Configure to use static IP addresses (skip this step if you are using DHCP)

Use the ipv4 add command to add a static IP address to the interface with a specified subnet mask and default gateway. For example, to add address 10.1.2.4 with prefix length 16 (netmask 255.255.0.0) with gateway 10.1.1.1 to the interface, type:

ipv4 a add 10.1.2.4/16 10.1.1.1

To remove the IPv4 address, type:

ipv4 a del

3. Set DNS Configuration

To output the dns configuration, type: *dns*

To set the application DNS server type: *dns add forwardzone <domain name> <server IP>*

Note: A forward zone is a pair consisting of a domain name and a server address: if a name is below the given domain name in the DNS hierarchy, then the DNS resolver can query the given server. Multiple servers can be given for any particular domain name to provide load balancing and fail over. A common usage will be to specify "." as the domain name i.e. the root of the DNS hierarchy which matches every domain name, i.e. is the server is on IP 10.1.1.1 *dns add forwardzone . 10.1.1.33*

If you need to delete a DNS entry use: *dns del forwardzone <domain name> <server IP>*

for example: *dns del forwardzone . 10.1.1.33*

Configuring the Call Bridge

The Call Bridge needs a key and certificate pair that is used to establish TLS connections with SIP Call Control devices and with the Lync Front End (FE) server. If you are using Lync, this certificate will need to be trusted by the Lync FE server. 8.

The command **callbridge listen <interface>** allows you to configure a listening interface (chosen from A, B, C or D). By default the Call Bridge listens on no interfaces.

1. Create and upload the certificate as described in the Certificateguidelines document (available at www.acano.com).

2. Sign into the MMP and configure the CallBridge to listen on interface A.

callbridge listen a

Note: Call Bridge must be listening on a network interface that is not NAT’d to another IP address, because Call Bridge is required to convey the same IP that is configured on the interface in SIP messages when talking to a remote site.

ConfiguretheCallBridgetousethecertificatesbyusingthefollowingcommand so that a TLS connection can be established between the Lync FE server and the Call Bridge, for example: **callbridge certs callbridge.key callbridge.crt** The full

command and using a certificate bundle as provided by your CA, is described in the Certificate guidelines document.

Restart the CallBridge interface to apply the changes. **callbridge restart**

Connecting Link/Skype for Business:

Lync Front End Server configuration

To route calls originating from Lync clients to the Acano server: 1. Add a Lync static route pointing to the Acano server matching domain acano.example.com.

Adding a dial plan rule on the Acano server

1. Sign into the WebAdmin Interface and go to Configuration>OutboundCalls

2. Set up a dial plan rule with:

Domain=**example.com**

SIP Proxy = the IP address or FQDN of your Lync FE pool or server

Local contact domain = **callbridge.acano.example.com**

Note: The local contact domain field should contain the Fully Qualified Domain Name (FQDN) for the Acano server. It should only be set if setting up a trunk to Lync.

TrunkType=Lync

LocalFromDomain=**acano.example.com**

SIP Proxy to Use = the IP addressor FQDN of your Lync FE pool or server bank, or leave this field blank.

Lync clients can now dial into a call 88001 hosted on the Acano server by dialing 88001@example.com.

Acano Routing Rules:

The following Acano Dial plan rules were added to configuration to allow for the correct flow of the call media.

Acano Configuration

Forwarding rule

Domain matching pattern: *

Priority: 0

Forward: forward

Caller ID: pass through

Rewrite domain: no

Forwarding domain: -

Outbound rule

Domain: Acano.show (lync domain)

SIP Proxy to use: ecb.acano.show

Local contact domain: -

Local from domain: -

Trunk type: Lync

Behaviour: Stop

Priority: 0

Encryption: Unencrypted

Tenant: no

Acano Documentation

The following information was based on:

Acano-server-single-combined-1.8-Deployment-Guide.pdf (Available at Acano.com)

Acano-solution-Virtual-Deployment-R1.8-Installation-Guide.pdf (Available at Acano.com)

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