



# APP NOTE

## AT&T IP Flexible Reach Service Including MIS/PNT/AVPN Transports with Cisco UCM 7.x/9.x & Net-Net 3000-4000 Series SD

### Revision History

<i>Version</i>	<i>Author</i>	<i>Description of Changes</i>	<i>Date Revision Complete</i>
510-0019-00	Nate Denbow	First release version	02/11/2011
510-0019-01	Nate Denbow	Added Multi-PBX update to section 7	10/12/2011
	Nate Denbow	Updated to CUCM release 9.1	

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### Abstract

This application note defines a SIP configuration model suitable for the Acme Packet NN3000-4000 series Session Border Controllers (SBCs) connecting Cisco UCM 7.x/9.x from a customer premise to AT&T's IP Flexible Reach service with MIS, PNT or AVPN transport. The reference configuration presented was tested in AT&T's labs.

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<b>1</b>	<b>Introduction</b>
	This Acme Packet application note outlines the recommended configurations for the Acme Packet NN3000-4000 series Session Directors, the industry leading Session Border Controllers, for connecting AT&T's IP Flexible Reach service to Cisco UCM 7.x/9.x customers. <b>The solution contained within this document has been certified on Acme Packet's NNOS-C versions 6.1.0m3 and later.</b>
<b>2</b>	<b>Intended Audience</b>
	This document is intended for use by Acme Packet Systems Engineers, Acme Packet Enterprise Customers and Partners. It assumes that the reader is familiar with basic operations of the Session Director.
<b>3</b>	<b>Support</b>
	Questions or help concerning this Acme Packet configuration guide can be sent to: <a href="mailto:support@acmepacket.com">support@acmepacket.com</a>
	Questions regarding Cisco UCM configuration can be found under "CUCM 7.x guide" using the following link: <a href="http://www.cisco.com/en/US/solutions/ns340/ns414/ns728/networking_solutions_products_genericconten_t0900aecd805bd13d.html">http://www.cisco.com/en/US/solutions/ns340/ns414/ns728/networking_solutions_products_genericconten_t0900aecd805bd13d.html</a>
	**The AT&T website is password protected. The ID and Password are provided to each customer when they place an order for IP Flexible Reach.
<b>4</b>	<b>Design Goals</b>
	The reference configuration represents the most common Cisco UCM (Cisco Call Manager) deployment model: A Call Manager originating SIP traffic and terminating to a SIP provider via the Net-Net SD (Session Director). The configuration also supports bi-directional call-flows via Local-Policy routes.

This document will annotate each configuration with information on its general applicability. The intent is to:

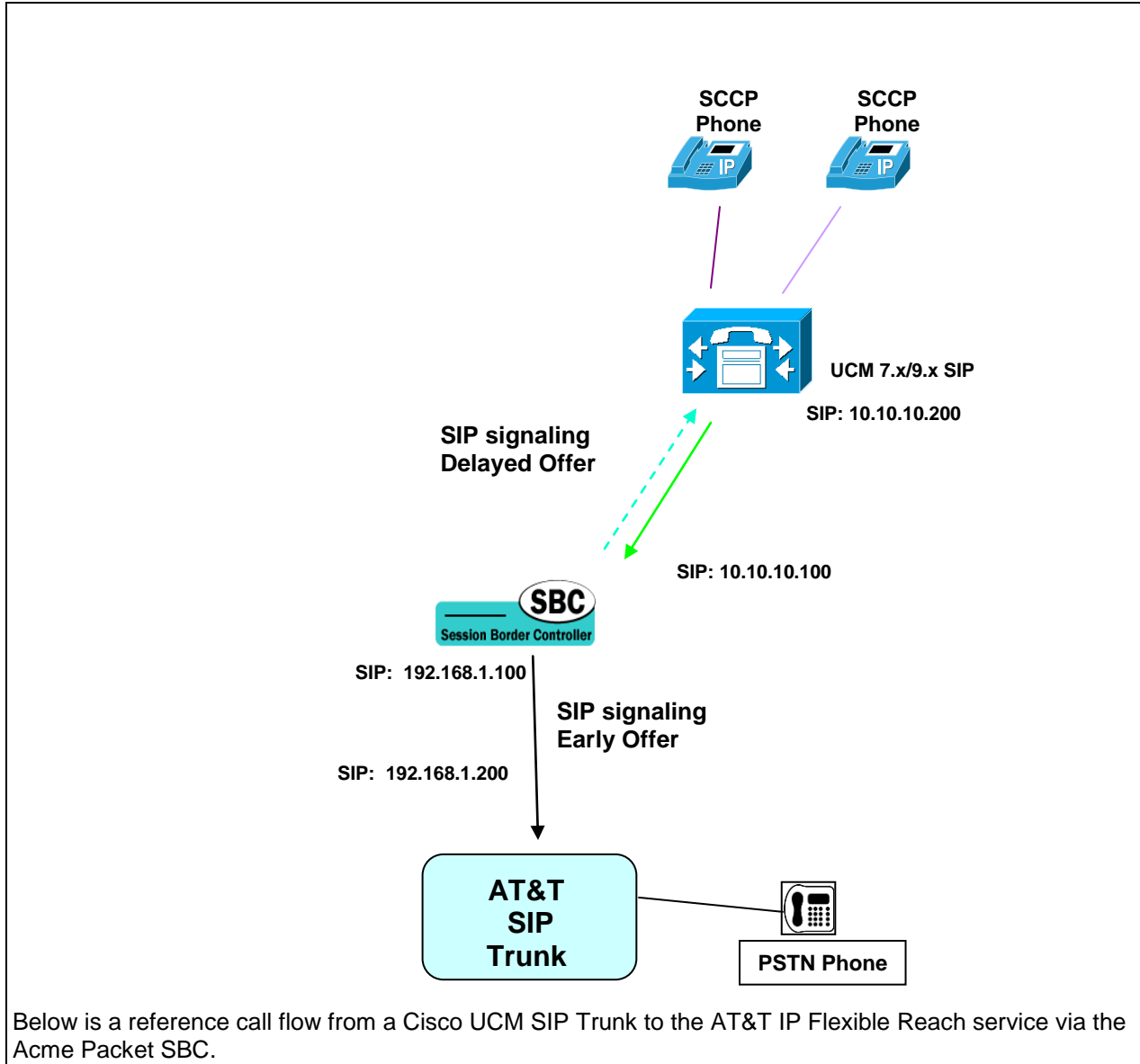
- Minimize CUCM interoperability issue's by standardizing field configurations
- Provide guidelines for new users for the Session Director
- Provide a configuration template, base-lining the SIP to SIP configuration (with accompanying Diagram)
- Flexibility: how resilient the configuration is and how adaptable the configuration is when turning up new CUCM 7.x/9.x SIP to SIP networks.
- Performance: minimize the use of unnecessary configuration objects

## **5 Reference Architecture and Call-Flow**

This section includes a reference architecture diagram, where the Session Director is integrated as an Enterprise CPE Trunking Session Border Controller, performing SIP between the CUCM in the Enterprise and the AT&T IP Flexible Reach service. This reference architecture is referred to as SIP Trunking with Cisco UCM and Acme Packet "Delayed Offer to Early Offer" feature. This service no longer supports PRACK. This reference architecture must be confirmed or modified by the customer according to the specific project requirements.

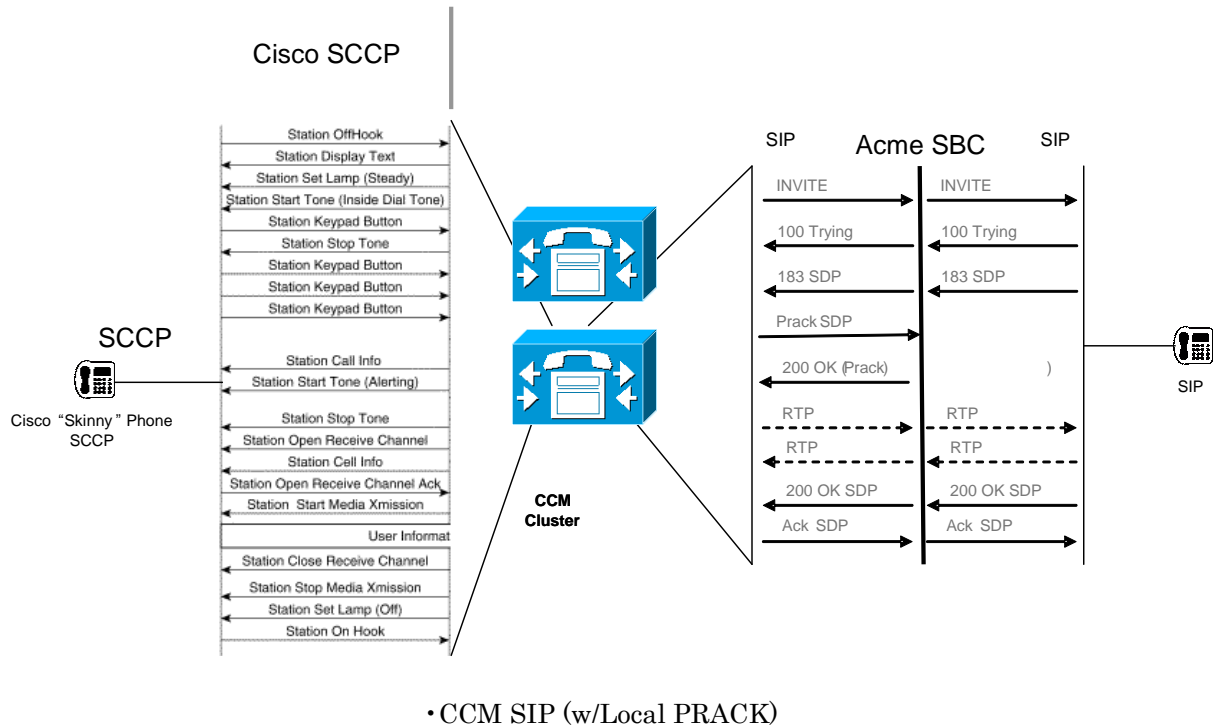
The Enterprise SIP CUCM peers with the AT&T IP Flexible Reach service via the Acme Packet SBC (as depicted below).

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Below is a reference call flow from a Cisco UCM SIP Trunk to the AT&T IP Flexible Reach service via the Acme Packet SBC.

## Cisco CCM SIP- SIP w/local PRACK Call Setup via Acme SBC



## 6 Service Requirements for Fax

Below is a description of service requirements that must be adhered to for fax calls to work as tested.

1. There is a fax incompatibility between Cisco GWs and Cisco UCM when the Cisco GW is sitting behind a Cisco UCM. This issue results in a failure of the Cisco GW to negotiate a switch to T.38 fax during an IP Flex to Cisco UCM/Cisco GW call. **This problem does not occur in IOS 12.4.22T5 so that IOS or later should be used.**

The problem is as follows:

- \* The call comes from IP Flex to the Cisco GW via the Cisco UCM.
- \* The Cisco GW detects fax and sends a T.38 fax Re-INVITE to IPFlex via the Cisco UCM.
- \* The Cisco UCM inserts 3 parameters into the Re-INVITE:
  - a=T38FaxFillBitRemoval:1
  - a=T38FaxTranscodingMMR:0
  - a=T38FaxTranscodingJBIG:0
- \* The Acme Packet SBC removes the a=T38FaxFillBitRemoval flag. However when the 200 OK is returned from IP Flex, Cisco UCM re-inserts this parameter.
- \* The Cisco GW ACKs the OK message but does not switch to T.38 and reports the following error in the debug voip ccapi all trace output:
 

**"T38FaxFillBitRemoval attribute negotiation failure... Media Negotiation failure in 200 OK".**

\* This occurs in IOS 12.4.15T13B and may occur on other 12.4 IOS releases (i.e. on the Cisco GW). **This problem does not occur in IOS 12.4.22T5 so that IOS or later should be used.**

2. Both T.38 and G.711 can be used for fax. T.38 is strongly recommended.

- In order to make T.38 fax work, the Cisco GW used for fax need only include G.729 in its codec list and the fax protocol must be set to T.38. See sample config below. This is covered in the Cisco UCM 7.x/9.x guide on the Cisco Interop Portal.

```
voice class codec 1
  codec preference 1 g729r8

voice service voip
  fax protocol t38 ls-redundancy 0
  hs-redundancy 0 fallback none
```

- In order to make G.711 fax work, the Cisco GW used for fax must include G.711 in its codec list and the fax protocol must be set to G.711 pass-through. See sample config below.

```
voice class codec 1
  codec preference 1 g729r8
  codec preference 2 g711ulaw

voice service voip
  fax protocol pass-through g711ulaw
```

## 7 Notes on Reference Configuration

In the configuration, the Cisco UCM (Cisco Call Manager) is configured for SIP Trunking and acting as a GW. The Acme Packet SD is configured to perform SIP Trunking between the Enterprise and the AT&T network (see configuration example below)

In the configuration, the realm labeled **enterprise-core**, and its corresponding SIP Interface (address 10.10.10.100), is where the SIP signaling and eventual RTP (when signaling dictates RTP can start), will enter and exit the Session Director. This address represents the SD's SIP Signaling target for the CUCM to signal to.

The realm labeled **peer** and its corresponding SIP Interface (address 192.168.1.100), is where all SIP messaging enters and exits the SD, to and from the AT&T network SIP Peering side.

The Local-Policy configurations route Sessions to/from CUCM SIP to AT&T's network.

**For the Cisco UCM 9.x (N/A for 7.x) SIP Profile screen, the "Early Offer support for voice and video calls (insert MTP if needed)" option MUST BE UN-CHECKED.**

NOTE: multiple PBXs can be supported on a common Net-Net 3000/4000 SD by adding the following configuration elements for each new platform:

- Realm that faces the new PBX (i.e. INSIDE-new)
  - o The same Physical-Interface and Network-Interface may be used
- Realm that faces IP Flexible Reach (i.e. ATT-new)
  - o The same Physical-Interface and Network-Interface may be used
- SIP-interface that faces the new PBX (requires a new IP address for SIP-port)
- SIP-interface that faces IP Flexible Reach (requires a new IP address for SIP-port)
- Steering-Pool with the new "PBX facing" IP address and Realm

- Steering-Pool with the new “IP Flexible Reach facing” IP address and Realm
- Local-Policy with Source realm of new “PBX facing” realm and Next-Hop of AT&T facing IP address and Realm name
- Local-Policy with Source realm of new “AT&T facing” realm and Next-Hop of new PBX facing IP address and Realm name
- Session-Agent with new “PBX facing” IP address and Realm name

It should be noted that “platform specific” header manipulation rules and translation-rules should be configured under their respective SIP-INTERFACE rather than on a “global” level. This prevents unnecessary and potentially harmful SIP signaling modifications to the other PBX platforms that could cause certain call flows to fail

## 8 Normative References

[1] Acme Packet, “Net-Net 4000 S-C6.2.0 ACLI Configuration Guide”, 400-0061-62, Dec 2010.

[2] Archer, M., “BCP SIP Peering Configuration”, 520-0038-01, Mar 2010

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While AT&T IP Flexible Reach services support E911/911 calling capabilities under certain Calling Plans, there are circumstances when that E911/911 service may not be available, as stated in the Service Guide for AT&T IP Flexible Reach found at <http://new.serviceguide.att.com>. Such circumstances include, but are not limited to, relocation of the end user’s CPE, use of a non-native or virtual telephone number,

failure in the broadband connection, loss of electrical power, and delays that may occur in updating the Customer's location in the automatic location information database. Please review the AT&T IP Flexible Reach Service Guide in detail to understand the limitations and restrictions.

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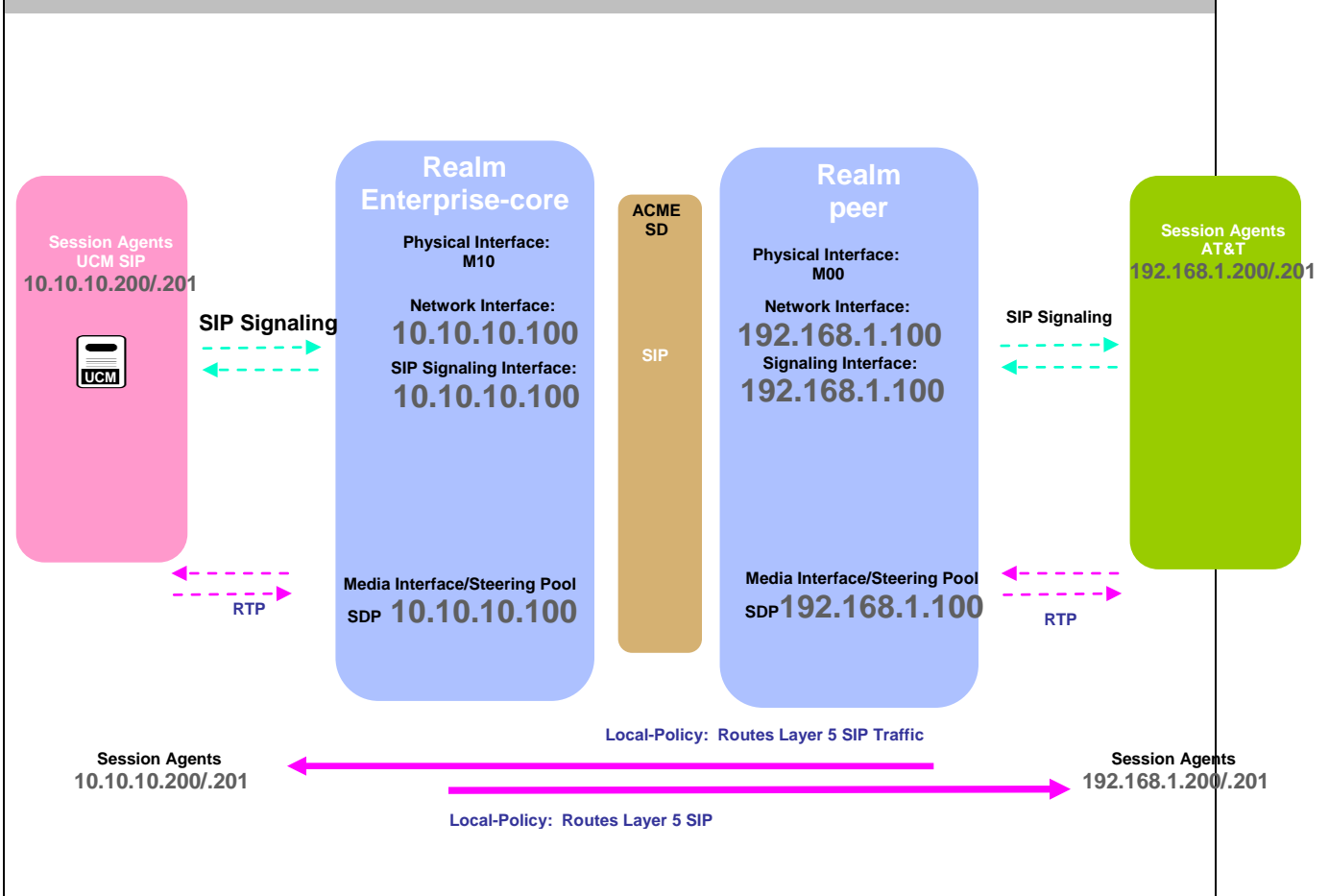
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Appendix A: Reference Diagram and Configuration



NOTE: The configuration elements highlighted below in **bold red** differ from a “non” Delayed offer Early offer solution and must be present in order to achieve the desired results. Descriptions of these unique elements are embedded within the configuration itself in *italicized bold red*.

```

local-policy
  from-address      *
  to-address        *
  source-realm      peer
  activate-time     N/A
  deactivate-time   N/A
  state             enabled
  policy-priority   none
  policy-attribute
    next-hop        SAG:UCM
    realm            enterprise-core-ccm
    action           none
    terminate-recursion disabled
    carrier
    start-time      0000
    end-time        2400
    days-of-week    U-S
    cost            0
    app-protocol    SIP
    state           enabled
    media-profiles
local-policy

```

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```

from-address      *
to-address        *
source-realm      enterprise-core-ccm
activate-time     N/A
deactivate-time   N/A
state             enabled
policy-priority   none
policy-attribute
  next-hop        SAG:ATT
  realm           peer
  action          none
  terminate-recursion disabled
  carrier
  start-time      0000
  end-time        2400
  days-of-week    U-S
  cost            0
  app-protocol    SIP
  state           enabled
media-profiles

```

**media-profile (this sets the parameters of the G729 CODEC that will be offered in the egress SIP INVITE towards the AT&T network)**

```

name                G729
subname
media-type          audio
payload-type        18
transport           RTP/AVP
req-bandwidth       0
frames-per-packet   2
parameters         annexb=no
average-rate-limit  0
sdp-rate-limit-headroom 0
sdp-bandwidth       disabled
police-rate         0

```

media-manager

```

state             enabled
latching         disabled
flow-time-limit   86400
initial-guard-timer 43200
subsq-guard-timer 43200
tcp-flow-time-limit 86400
tcp-initial-guard-timer 300
tcp-subsq-guard-timer 300
tcp-number-of-ports-per-flow 2
hnt-rtcp         disabled
algd-log-level   NOTICE
mbcd-log-level   NOTICE
options          unique-sdp-id

```

**(note: this option as well as the anonymous-sdp setting allows for re-INVITES to be processed in hold/resume call scenarios)**

```

red-flow-port     1985
red-mgcp-port     1986
red-max-trans     10000
red-sync-start-time 5000
red-sync-comp-time 1000
media-policing    enabled
max-signaling-bandwidth 10000000
max-untrusted-signaling 100
min-untrusted-signaling 30
app-signaling-bandwidth 0
tolerance-window 30
rtcp-rate-limit  0
min-media-allocation 32000
min-trusted-allocation 1000
deny-allocation  1000
anonymous-sdp    enabled
arp-msg-bandwidth 32000
fragment-msg-bandwidth 0
rfc2833-timestamp enabled

```

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```

default-2833-duration      100
rfc2833-end-pkts-only-for-non-sig disabled
translate-non-rfc2833-event disabled
last-modified-date

network-interface
  name                      M00 (at&t/peer Facing )
  sub-port-id               0
  hostname
  ip-address                192.168.1.100 (example addresses)
  pri-utility-addr          192.168.1.101
  sec-utility-addr          192.168.1.102
  netmask                   255.255.255.0
  gateway                   192.168.1.1
  sec-gateway
  gw-heartbeat
    state                   disabled
    heartbeat               0
    retry-count             0
    retry-timeout           1
    health-score            0
  dns-ip-primary
  dns-ip-backup1
  dns-ip-backup2
  dns-domain
  dns-timeout               11
  hip-ip-list               192.168.1.100
  ftp-address
  icmp-address
  snmp-address
  telnet-address

network-interface
  name                      M10 (enterprise/core facing)
  sub-port-id               0
  hostname
  ip-address                10.10.10.100 (example addresses)
  pri-utility-addr          10.10.10.101
  sec-utility-addr          10.10.10.102
  netmask                   255.255.255.0
  gateway                   10.10.10.1
  sec-gateway
  gw-heartbeat
    state                   disabled
    heartbeat               0
    retry-count             0
    retry-timeout           1
    health-score            0
  dns-ip-primary
  dns-ip-backup1
  dns-ip-backup2
  dns-domain
  dns-timeout               11
  hip-ip-list               10.10.10.100
  ftp-address
  icmp-address              10.10.10.100
  snmp-address
  telnet-address

network-interface
  name                      wancom1 (only if H/A system)
  sub-port-id               0
  description
  hostname
  ip-address
  pri-utility-addr          11.0.0.1
  sec-utility-addr          11.0.0.2
  netmask                   255.255.255.0
  gateway
  sec-gateway

```

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```

gw-heartbeat
  state disabled
  heartbeat 0
  retry-count 0
  retry-timeout 1
  health-score 0
dns-ip-primary
dns-ip-backup1
dns-ip-backup2
dns-domain
dns-timeout 11
hip-ip-list
ftp-address
icmp-address
snmp-address
telnet-address
last-modified-by

network-interface
  name wancom2 (only if H/A system)
  sub-port-id 0
  description
  hostname
  ip-address
  pri-utility-addr 12.0.0.1
  sec-utility-addr 12.0.0.2
  netmask
  gateway
  sec-gateway
  gw-heartbeat
    state disabled
    heartbeat 0
    retry-count 0
    retry-timeout 1
    health-score 0
  dns-ip-primary
  dns-ip-backup1
  dns-ip-backup2
  dns-domain
  dns-timeout 11
  hip-ip-list
  ftp-address
  icmp-address
  snmp-address
  telnet-address
  last-modified-by

phy-interface
  name enterprise-core-ccm
  operation-type Media
  port 0
  slot 0
  virtual-mac
  admin-state enabled
  auto-negotiation enabled
  duplex-mode
  speed

phy-interface
  name peer
  operation-type Media
  port 0
  slot 1
  virtual-mac
  admin-state enabled
  auto-negotiation enabled
  duplex-mode
  speed

phy-interface

```

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name	wancom1
operation-type	Control
port	1
slot	0
virtual-mac	
wancom-health-score	20
last-modified-by	
phy-interface	
name	wancom2
operation-type	Control
port	2
slot	0
virtual-mac	
wancom-health-score	20
last-modified-by	
realm-config	
identifier	peer
addr-prefix	0.0.0.0
network-interfaces	
	M00:0
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
ext-policy-svr	
max-latency	0
max-jitter	0
max-packet-loss	0
observ-window-size	0
parent-realm	
dns-realm	
media-policy	
in-translationid	
out-translationid	
in-manipulationid	
out-manipulationid	
class-profile	
average-rate-limit	0
access-control-trust-level	
invalid-signal-threshold	0
maximum-signal-threshold	0
untrusted-signal-threshold	0
deny-period	30
symmetric-latching	disabled
pai-strip	disabled
trunk-context	
early-media-allow	both
additional-prefixes	
restricted-latching	none
restriction-mask	32
accounting-enable	enabled
user-cac-mode	none
user-cac-bandwidth	0
user-cac-sessions	0
net-management-control	disabled
delay-media-update	disabled
realm-config	
identifier	enterprise-core-ccm
addr-prefix	0.0.0.0
network-interfaces	
	M10:0
mm-in-realm	enabled

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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
ext-policy-svr	
max-latency	0
max-jitter	0
max-packet-loss	0
observ-window-size	0
parent-realm	
dns-realm	
media-policy	
in-translationid	
out-translationid	
in-manipulationid	
out-manipulationid	
class-profile	
average-rate-limit	0
access-control-trust-level	
invalid-signal-threshold	0
maximum-signal-threshold	0
untrusted-signal-threshold	0
deny-period	30
symmetric-latching	disabled
pai-strip	disabled
trunk-context	
early-media-allow	both
additional-prefixes	
restricted-latching	none
restriction-mask	32
accounting-enable	enabled
user-cac-mode	none
user-cac-bandwidth	0
user-cac-sessions	0
net-management-control	disabled
delay-media-update	disabled
session-agent	
hostname	192.168.1.200
ip-address	
port	5060
state	enabled
app-protocol	SIP
app-type	
transport-method	UDP
realm-id	peer
description	at&t Session Agent Primary
carriers	
allow-next-hop-lp	enabled
constraints	enabled
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
min-seizures	5
min-asr	0
time-to-resume	0
ttr-no-response	300
in-service-period	0
burst-rate-window	0
sustain-rate-window	0
req-uri-carrier-mode	None
proxy-mode	

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redirect-action	
loose-routing	enabled
send-media-session	enabled
response-map	
ping-method	OPTIONS;hops=0
ping-interval	300
ping-in-service-response-codes	
out-service-response-codes	
media-profiles	
in-translationid	
out-translationid	
trust-me	enabled
request-uri-headers	
stop-recurse	
local-response-map	
ping-to-user-part	
ping-from-user-part	
li-trust-me	disabled
in-manipulationid	
out-manipulationid	
p-asserted-id	
trunk-group	
max-register-sustain-rate	0
early-media-allow	
invalidate-registrations	disabled
rfc2833-mode	none
rfc2833-payload	0
codec-policy	
session-agent	
hostname	192.168.1.201
ip-address	
port	5060
state	enabled
app-protocol	SIP
app-type	
transport-method	UDP
realm-id	peer
description	at&t Session Agent Secondary
carriers	
allow-next-hop-lp	enabled
constraints	enabled
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
min-seizures	5
min-asr	0
time-to-resume	0
ttr-no-response	300
in-service-period	0
burst-rate-window	0
sustain-rate-window	0
req-uri-carrier-mode	None
proxy-mode	
redirect-action	
loose-routing	enabled
send-media-session	enabled
response-map	
ping-method	OPTIONS;hops=0
ping-interval	300
ping-in-service-response-codes	
out-service-response-codes	
media-profiles	
in-translationid	

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out-translationid		
trust-me		enabled
request-uri-headers		
stop-recurse		
local-response-map		
ping-to-user-part		
ping-from-user-part		
li-trust-me		disabled
in-manipulationid		
out-manipulationid		
p-asserted-id		
trunk-group		
max-register-sustain-rate		0
early-media-allow		
invalidate-registrations		disabled
rfc2833-mode		none
rfc2833-payload		0
codec-policy		
session-agent		
hostname		10.10.10.200
ip-address		
port		5060
state		enabled
app-protocol		SIP
app-type		
transport-method		UDP
realm-id		*
description		enterprise Session Agent SIP
carriers		
allow-next-hop-lp		enabled
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
min-seizures	5	
min-asr		0
time-to-resume	0	
ttr-no-response	0	
in-service-period	0	
burst-rate-window	0	
sustain-rate-window		0
req-uri-carrier-mode		None
proxy-mode		
redirect-action		
loose-routing		enabled
send-media-session		enabled
response-map		
ping-method		
ping-interval		
ping-in-service-response-codes		
out-service-response-codes		
media-profiles		
in-translationid		
out-translationid		
trust-me		disabled
request-uri-headers		
stop-recurse		
local-response-map		
ping-to-user-part		
ping-from-user-part		
li-trust-me		disabled
in-manipulationid		



APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

out-manipulationid
p-asserted-id
trunk-group
max-register-sustain-rate          0
early-media-allow
invalidate-registrations            disabled
rfc2833-mode                       none
rfc2833-payload                    0
codec-policy

session-agent
hostname                            10.10.10.201
ip-address
port                                5060
state                               enabled
app-protocol                        SIP
app-type
transport-method                   UDP
realm-id                            *
description                         enterprise Session Agent SIP
carriers
allow-next-hop-lp                  enabled
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
min-seizures                       5
min-asr                            0
time-to-resume                     0
ttr-no-response                    0
in-service-period                  0
burst-rate-window                  0
sustain-rate-window                0
req-uri-carrier-mode               None
proxy-mode
redirect-action
loose-routing                      enabled
send-media-session                 enabled
response-map
ping-method
ping-interval
ping-in-service-response-codes
out-service-response-codes
media-profiles
in-translationid
out-translationid
trust-me                            disabled
request-uri-headers
stop-recurse
local-response-map
ping-to-user-part
ping-from-user-part
li-trust-me                         disabled
in-manipulationid
out-manipulationid
p-asserted-id
trunk-group
max-register-sustain-rate          0
early-media-allow
invalidate-registrations            disabled
rfc2833-mode                       none
rfc2833-payload                    0
codec-policy

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

session-group
  group-name          ATT
  description
  state              enabled
  app-protocol       SIP
  strategy           RoundRobin
  dest
                    192.168.1.200
                    192.168.1.201
  trunk-group
  sag-recursion      disabled
  stop-sag-recurse   401,407

session-group
  group-name          UCM
  description
  state              enabled
  app-protocol       SIP
  strategy           RoundRobin
  dest
                    10.10.10.200
                    10.10.10.201
  trunk-group
  sag-recursion      enabled
  stop-sag-recurse   401,407

sip-config
  state              enabled
  operation-mode     dialog
  dialog-transparency
  home-realm-id      peer
  egress-realm-id    enterprise-core-ccm
  nat-mode           Public
  registrar-domain
  registrar-host
  registrar-port     0
  register-service-route
  init-timer         500
  max-timer          4000
  trans-expire       32
  invite-expire      180
  inactive-dynamic-conn
  enforcement-profile
  pac-method
  pac-interval       10
  pac-strategy       PropDist
  pac-load-weight    1
  pac-session-weight
  pac-route-weight   1
  pac-callid-lifetime
  pac-user-lifetime  3600
  red-sip-port       1988
  red-max-trans      10000
  red-sync-start-time
  red-sync-comp-time
  add-reason-header  disabled
  sip-message-len    0
  enum-sag-match     disabled
  extra-method-stats
  rph-feature        disabled
  nsep-user-sessions-rate
  registration-cache-limit
  options            add-prov-to-tag=no
                    insert-arp-header
                    max-udp-length=0
                    set-inv-exp-at-100-resp

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

sip-feature (strip 100rel tag in Supported header in an inbound realm=peer packet)
  name 100rel
  realm peer
  support-mode-inbound Strip
  require-mode-inbound Pass
  proxy-require-mode-inbound Pass
  support-mode-outbound Pass
  require-mode-outbound Pass
  proxy-require-mode-outbound Pass

sip-feature(strip 100rel tag in Supported header in outbound realm=enterprise-core-ccm packet)
  name 100rel
  realm enterprise-core-ccm
  support-mode-inbound Pass
  require-mode-inbound Pass
  proxy-require-mode-inbound Pass
  support-mode-outbound Strip
  require-mode-outbound Pass
  proxy-require-mode-outbound Pass

sip-interface
  state enabled
  realm-id peer
  description
  sip-port
    address 192.168.1.100
    port 5060
    transport-protocol UDP
    tls-profile
    allow-anonymous agents-only

  carriers
  trans-expire 0
  invite-expire 0
  max-redirect-contacts 0
  proxy-mode
  redirect-action
  contact-mode none
  nat-traversal none
  nat-interval 30
  tcp-nat-interval 30
  registration-caching disabled
  min-reg-expire 300
  registration-interval 3600
  route-to-registrar disabled
  secured-network disabled
  teluri-scheme disabled
  uri-fqdn-domain
  trust-mode all
  max-nat-interval 3600
  nat-int-increment 10
  nat-test-increment 30
  sip-dynamic-hnt disabled
  stop-recurse 401,407
  port-map-start 0
  port-map-end 0
  in-manipulationid
  out-manipulationid Privacy
  sip-ims-feature disabled
  operator-identifier
  anonymous-priority none
  max-incoming-conns 0
  per-src-ip-max-incoming-conns 0
  inactive-conn-timeout 0
  untrusted-conn-timeout 0
  network-id
  ext-policy-server
  default-location-string
  charging-vector-mode none
  charging-function-address-mode none
  ccf-address
  ecf-address
```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

term-tgrp-mode           none
implicit-service-route   disabled
rfc2833-payload          101
rfc2833-mode             preferred
constraint-name
response-map
local-response-map
enforcement-profile
refer-call-transfer      disabled
route-unauthorized-calls
tcp-keepalive           none
add-sdp-invite          invite
    (note: add-sdp-invite feature inserts CODEC list specified in "add-sdp-profiles"
to egress INVITE towards AT&T's network)
add-sdp-profiles      G729 PCMU telephone-event

sip-interface
state                   enabled
realm-id                enterprise-core-ccm
description
sip-port
    address              10.10.10.100
    port                 5060
    transport-protocol   UDP
    tls-profile
    allow-anonymous      all
carriers
trans-expire            0
invite-expire           0
max-redirect-contacts   0
proxy-mode
redirect-action
contact-mode            none
nat-traversal           none
nat-interval            30
tcp-nat-interval        90
registration-caching     disabled
min-reg-expire           300
registration-interval    3600
route-to-registrar      disabled
secured-network          disabled
teluri-scheme            disabled
uri-fqdn-domain
options                100rel-interworking
    (note: this option enables the "local-PRACK" interworking feature to keep PRACK
from being sent up to the AT&T network)
trust-mode              all
max-nat-interval        3600
nat-int-increment        10
nat-test-increment      30
sip-dynamic-hnt         disabled
stop-recurse            401,407
port-map-start           0
port-map-end             0
in-manipulationid      req100rel
out-manipulationid      NAT_IP_rel
sip-ims-feature          disabled
operator-identifier
anonymous-priority      none
max-incoming-conns      0
per-src-ip-max-incoming-conns 0
inactive-conn-timeout    0
untrusted-conn-timeout  0
network-id
ext-policy-server
default-location-string
charging-vector-mode     pass
charging-function-address-mode pass
ccf-address
ecf-address
term-tgrp-mode

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

implicit-service-route      disabled
rfc2833-payload            101
rfc2833-mode               transparent
constraint-name
response-map
local-response-map
enforcement-profile
refer-call-transfer        disabled
route-unauthorized-calls
tcp-keepalive              none
add-sdp-invite             disabled
add-sdp-profiles

```

**sip-manipulation**

**name** **Privacy**  
**description** (performs basic NAT of From/To headers as well as fixing up the SDP from a hold/resume scenario requiring a LOCAL IP to be inserted into the Connection info line)

```

header-rule
  name                From_Header
  header-name         From
  action              manipulate
  comparison-type     case-sensitive
  match-value
  msg-type            request
  new-value
  methods
  element-rule
    name              From_header
    parameter-name
    type              uri-host
    action            replace
    match-val-type   any
    comparison-type  case-sensitive
    match-value
    new-value         $LOCAL_IP

```

```

header-rule
  name                To_Header
  header-name         To
  action              manipulate
  comparison-type     case-sensitive
  match-value
  msg-type            request
  new-value
  methods
  element-rule
    name              To_header
    parameter-name
    type              uri-host
    action            replace
    match-val-type   any
    comparison-type  case-sensitive
    match-value
    new-value         $REMOTE_IP

```

**header-rule** (fixes connection info address of 0.0.0.0 during hold/resume)

```

name                checkHoldSdp
header-name         Content-Type
action              store
comparison-type     pattern-rule
match-value
msg-type            request
new-value
methods             INVITE
element-rule
  name                checkIP
  parameter-name     application/sdp
  type                mime
  action              store
  match-val-type     any
  comparison-type    pattern-rule
  match-value       \Rc=IN IP4 0\.0\.0\.0\b
  new-value

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

header-rule
  name                fixSdpRequest
  header-name         Content-Type
  action              manipulate
  comparison-type     boolean
  match-value         $checkHoldSdp.$checkIP
  msg-type            request
  new-value           request
  methods             INVITE
  element-rule
    name              replaceIP
    parameter-name    application/sdp
    type              mime
    action            find-replace-all
    match-val-type   any
    comparison-type  pattern-rule
    match-value      \Rc=IN IP4 (0\.0\.0\.0)\b[[:1:]]
    new-value        $LOCAL_IP

header-rule (deletes undesirable T38FaxFillBitRemoval attribute from SDP)
  name                fixT38
  header-name         content-type
  action              manipulate
  comparison-type     pattern-rule
  match-value         pattern-rule
  msg-type            request
  new-value           request
  methods             INVITE
  element-rule
    name              delT38
    parameter-name    application/sdp
    type              mime
    action            find-replace-all
    match-val-type   any
    comparison-type  pattern-rule
    match-value      \Ra=T38FaxFillBitRemoval:[0-9]{1,2}
    new-value        pattern-rule

header-rule (adds ptime:30 if not already present)
  name                addPtime
  header-name         Content-Type
  action              store
  comparison-type     case-sensitive
  msg-type            request
  new-value           request
  methods             INVITE
  element-rule
    name              checkSdp
    parameter-name    application/sdp
    type              mime
    action            store
    match-val-type   any
    comparison-type  pattern-rule
    match-value      a=ptime:[0-9]{1,2}(\n|\r\n)
    new-value        pattern-rule

header-rule
  name                ModSDP
  header-name         Content-Type
  action              manipulate
  comparison-type     boolean
  msg-type            request
  new-value           request
  methods             INVITE
  element-rule
    name              modSdp1
    parameter-name    application/sdp
    type              mime
    action            find-replace-all
    match-val-type   any

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

comparison-type
match-value
new-value
pattern-rule
\Rm=audio.*\R() [[:1:]]
a=ptime:30+$CRLF

header-rule
  name PAI_Header
  header-name P-Asserted-Identity
  action manipulate
  comparison-type case-sensitive
  msg-type any
  methods
  match-value
  new-value
  element-rule
    name PAI_Local_IP
    parameter-name
    type uri-host
    action replace
    match-val-type any
    comparison-type case-sensitive
    match-value
    new-value $LOCAL_IP

header-rule
  name PPI_Header
  header-name P-Preferred-Identity
  action manipulate
  comparison-type case-sensitive
  msg-type any
  methods
  match-value
  new-value
  element-rule
    name PPI_Local_IP
    parameter-name
    type uri-host
    action replace
    match-val-type any
    comparison-type case-sensitive
    match-value
    new-value $LOCAL_IP

header-rule
  name RPI_Header
  header-name Remote-Party-ID
  action manipulate
  comparison-type case-sensitive
  msg-type any
  methods
  match-value
  new-value
  element-rule
    name RPI_header
    parameter-name
    type uri-host
    action replace
    match-val-type any
    comparison-type case-sensitive
    match-value
    new-value $LOCAL_IP

header-rule (modifies uri-user of Diversion header to specific customer site)
name moduserTN
header-name Diversion
action manipulate
comparison-type case-sensitive
msg-type request
methods
match-value
new-value
element-rule
  name modUser
  parameter-name
  type uri-user
  action replace

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

        match-val-type      any
        comparison-type     case-sensitive
        match-value
        new-value           7322162758 (this number provided as an
example only with actual TN provided by customer)

sip-manipulation (adds a Requires header to trigger the "local-PRACK" feature)
  name                    req100rel
  description
  header-rule
    name                  sup100rel
    header-name           Supported[0]
    action                store
    comparison-type       pattern-rule
    match-value           100rel
    msg-type              request
    new-value
    methods               INVITE
  header-rule
    name                  addRequire
    header-name           Require
    action                add
    comparison-type       boolean
    match-value           $sup100rel
    msg-type              request
    new-value             "100rel"
    methods               INVITE

sip-manipulation
  name                    NAT_IP_rel
  description
  header-rule
    name                  chk183
    header-name           @status-line
    action                store
    comparison-type       case-sensitive
    msg-type              reply
    methods
    match-value
    new-value
  element-rule
    name                  bool183
    parameter-name
    type                  status-code
    action                store
    match-val-type       any
    comparison-type       case-sensitive
    match-value           183
    new-value
  element-rule
    name                  bool180
    parameter-name
    type                  status-code
    action                store
    match-val-type       any
    comparison-type       case-sensitive
    match-value           180
    new-value
  header-rule
    name                  addRSeq
    header-name           RSeq
    action                add
    comparison-type       boolean
    msg-type              reply
    methods               invite
    match-value           ($chk183.$bool183 | $chk183.$bool180)
    new-value
  element-rule
    name                  addRSeqem
    parameter-name

```



APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

        type                header-value
        action               add
        match-val-type      any
        comparison-type     boolean
        match-value         $chk183.$bool183
        new-value           1
    element-rule
        name                 addRSeqem180
        parameter-name
        type                 header-value
        action               add
        match-val-type      any
        comparison-type     boolean
        match-value         $chk183.$bool180
        new-value           1
header-rule
    name                    delSupported
    header-name              Supported
    action                   delete
    comparison-type          case-sensitive
    match-value
    msg-type                 reply
    new-value
    methods                  invite
header-rule
    name                    del100rel
    header-name              Supported
    action                   manipulate
    comparison-type          case-sensitive
    match-value
    msg-type                 request
    new-value
    methods                  INVITE
    element-rule
        name                 strip100rel
        parameter-name
        type                 header-value
        action               find-replace-all
        match-val-type      any
        comparison-type     case-sensitive
        match-value         ,$100rel
        new-value
header-rule
    name                    allowaddHr
    header-name              Allow
    action                   store
    comparison-type          pattern-rule
    match-value
    msg-type                 any
    new-value
    methods
header-rule (fixes up Allow header to include INVITE, BYE, ACK, CANCEL, PRACK, and INFO
as specified in the new-value field)
    name                    addallowaddHr
    header-name              Allow
    action                   add
    comparison-type          boolean
    match-value              !$allowaddHr
    msg-type                 any
    new-value                "INVITE, BYE, ACK, CANCEL, PRACK, INFO"
    methods
header-rule (deletes G711 when G729 is offered)
    name                    checkG729Sdp
    header-name              Content-Type
    action                   store
    comparison-type          pattern-rule
    match-value
    msg-type                 request
    new-value
    methods                  INVITE
    element-rule

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

        name checksdp
        parameter-name application/sdp
        type mime
        action store
        match-val-type any
        comparison-type pattern-rule
        match-value (\Rm=audio [0-9]{1,5} RTP/AVP ([0-9]{1,4}
)*) ([0-9 ]*)\b
        new-value
    element-rule
        name checkcodec
        parameter-name application/sdp
        type mime
        action store
        match-val-type any
        comparison-type pattern-rule
        match-value a=rtpmap:18.*\R
        new-value
    header-rule
        name fixSdpRequest
        header-name Content-Type
        action manipulate
        comparison-type boolean
        match-value $checkG729Sdp.$checkcodec
        msg-type request
        new-value
        methods INVITE
    element-rule
        name removeG711
        parameter-name application/sdp
        type mime
        action find-replace-all
        match-val-type any
        comparison-type pattern-rule
        match-value a=rtpmap:0.*\R
        new-value
    element-rule
        name mod100mLine
        parameter-name application/sdp
        type mime
        action find-replace-all
        match-val-type any
        comparison-type pattern-rule
        match-value (m=audio.*RTP/AVP).*( 18).*( 100)\R
        new-value $1+$2+$3+$CRLF
    element-rule
        name mod101mLine
        parameter-name application/sdp
        type mime
        action find-replace-all
        match-val-type any
        comparison-type pattern-rule
        match-value (m=audio.*RTP/AVP).*( 18).*( 101)\R
        new-value $1+$2+$3+$CRLF
    header-rule (inserts CONTACT header in 18x messages back to Call manager if one doesn't already
    exist; otherwise CUCM responds with CANCEL)
        name chking183
        header-name @status-line
        action store
        comparison-type case-sensitive
        msg-type reply
        methods
        match-value
        new-value
    element-rule
        name bol183
        parameter-name
        type status-code
        action store
        match-val-type any

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```

        comparison-type      case-sensitive
        match-value          183
        new-value
    element-rule
        name                 boll180
        parameter-name
        type                 status-code
        action               store
        match-val-type       any
        comparison-type      case-sensitive
        match-value          180
        new-value

header-rule
    name                    contactaddHr
    header-name             contact
    action                  store
    comparison-type         pattern-rule
    msg-type                reply
    methods                 INVITE
    match-value
    new-value

header-rule
    name                    addcontact183Hr
    header-name             contact
    action                  add
    comparison-type         boolean
    msg-type                reply
    methods
    match-value             $chking183.$bol183&!$contactaddHr
    new-value               "<sip:+"$LOCAL_IP+>"

header-rule
    name                    addcontact180Hr
    header-name             contact
    action                  add
    comparison-type         boolean
    msg-type                reply
    methods
    match-value             $chking183.$bol180&!$contactaddHr
    new-value               "<sip:+"$LOCAL_IP+>"

steering-pool
    ip-address              192.168.1.100
    start-port              16384
    end-port                32767
    realm-id                peer
    network-interface

steering-pool
    ip-address              10.10.10.100
    start-port              16384
    end-port                32767
    realm-id                enterprise-core-ccm
    network-interface

system-config
    hostname                enterprise
    description             enterpriseSBC
    location
    mib-system-contact
    mib-system-name
    mib-system-location
    snmp-enabled            enabled
    enable-snmp-auth-traps  disabled
    enable-snmp-syslog-notify enabled
    enable-snmp-monitor-traps enabled
    enable-env-monitor-traps disabled
    snmp-syslog-his-table-length 1
    snmp-syslog-level       WARNING
    system-log-level        WARNING
    process-log-level       NOTICE

```

APP NOTE AT&T IP Flexible Reach Service including MIS/PNT/AVPN Transports  
with Cisco UCM 7.x through 9.x and Net-Net 3000-4000 Series SD

```
process-log-ip-address    0.0.0.0
process-log-port         0
call-trace               disabled
internal-trace           disabled
log-filter               all
default-gateway          192.168.1.1 (example address)
restart                  enabled
exceptions
telnet-timeout           0
console-timeout          0
remote-control           enabled
link-redundancy-state    disabled
```

## Appendix B: IP Endpoint Support

**Supported IP endpoints:** The following specific Cisco IP endpoints are supported with IP Flexible Reach service. These endpoints must support SCCP and NTE.

VG224

7902, 7905, 7911, 7912, 7931, 7937, 7940, 7941, 7942, 7945,  
7960, 7961, 7962, 7965, 7970, 7971, 7975

Future new phone models

**Non-Supported IP endpoints:** The following specific IP endpoints are **NOT supported** with IP Flexible Reach service because they do not support NTE:

7910, 7920, 7935, 7936

VG248

DPA-7610, DPA-7630

Please go to the following Cisco link for further information.

[http://www.cisco.com/en/US/docs/voice\\_ip\\_comm/cucm/srnd/6x/media.html#wp1055031](http://www.cisco.com/en/US/docs/voice_ip_comm/cucm/srnd/6x/media.html#wp1055031)