



# **AT&T IP Flexible Reach Service and AT&T IP Toll-Free on AT&T VPN Service**

## **Customer Edge Router (CER) Customer Configuration Guide for Integrated CER/CUBE with AT&T Certified IP-PBX Solutions**

**September 16, 2015  
Version 1.8**

© 2015 AT&T Intellectual Property. All rights reserved.  
AT&T, the AT&T logo and all other AT&T marks contained herein are trademarks of AT&T Intellectual Property and/or AT&T affiliated companies. All other marks contained herein are the property of their respective owners.

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
Customer Configuration Guide (September 16, 2015, Version 1.8)

<b>1</b>	<b>INTRODUCTION .....</b>	<b>3</b>
<b>2</b>	<b>REFERENCES.....</b>	<b>4</b>
2.1	MICROSOFT LYNC SERVER 2010 WITH INTEGRATED ASR CER / CUBE 1.4 DOCUMENTATION .....	4
2.2	CISCO UNIFIED COMMUNICATIONS MANAGER WITH INTEGRATED ASR CER / CUBE 1.4 DOCUMENTATION .....	4
2.3	CISCO UNIFIED COMMUNICATIONS MANAGER WITH INTEGRATED ISR G2 CER / CUBE 8.8 DOCUMENTATION .....	4
2.4	CISCO UNIFIED COMMUNICATIONS MANAGER WITH INTEGRATED ISR G2 CER / CUBE 9.5.1 DOCUMENTATION .....	5
2.5	CISCO UNIFIED COMMUNICATIONS MANAGER WITH INTEGRATED ISR 4K CER / CUBE 10.5 DOCUMENTATION .....	5
<b>3</b>	<b>OVERVIEW .....</b>	<b>6</b>
<b>4</b>	<b>SPECIAL CONSIDERATIONS .....</b>	<b>6</b>
<b>5</b>	<b>CUSTOMER EDGE ROUTER CONFIGURATIONS FOR VARIOUS IP-PBX SOLUTIONS .....</b>	<b>7</b>
5.1	MICROSOFT LYNC SERVER 2010 WITH INTEGRATED CISCO ASR CER AND CUBE 1.4.....	7
5.1.1	<i>Topology.....</i>	8
5.1.2	<i>Standard Solution (binding the signaling/media to a loopback interface).....</i>	9
5.2	CISCO UNIFIED COMMUNICATIONS MANAGER WITH CISCO ISR G2 CER AND INTEGRATED CUBE 8.8/9.5.1 OR WITH CISCO ASR CER AND INTEGRATED CUBE 1.4 OR WITH CISCO ISR 4K AND INTEGRATED CUBE 10.5 .....	12
5.2.1	<i>Topology.....</i>	13
5.2.2	<i>Standard Solution (binding the signaling/media to a loopback interface).....</i>	14
<b>6</b>	<b>ACRONYMS .....</b>	<b>18</b>

## 1 Introduction

This Customer Configuration Guide (“CCG”) provides recommended guidelines for configuring the customer-managed Customer Edge Router (CER) for use with an Integrated Cisco Unified Border Element (CUBE) with AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service (“AT&T VPN”) as the Underlying Transport Service, specific to the various AT&T Certified IP-PBX Solutions listed below. CERs can be utilized for either one of those services or for both services simultaneously. This CCG is to be used in conjunction with the appropriate IP-PBX/SBC CCG and the *AT&T IP Flexible Reach Service and AT&T IP Toll-Free on AT&T VPN Service Customer Edge Router CCG* which cover the additional configurations required for use with this service including, but not limited to, configuration of the IP PBX and SBC, the various access types and interfaces, Class of Service, and Voice Quality Monitor. See the References section below for links to the appropriate documents based on the solution being used.

The following solutions are currently supported with an integrated CER/CUBE and are covered in this guide:

- Microsoft Lync Server 2010 with integrated ASR CER / CUBE 1.4
- Cisco Unified Communications Manager with integrated ASR CER / CUBE 1.4
- Cisco Unified Communications Manager with integrated ISR G2 CER / CUBE 8.8
- Cisco Unified Communications Manager with integrated ISR G2 CER / CUBE 9.5.1
- Cisco Unified Communications Manager with integrated ISR 4K CER/ CUBE 10.5

Please ensure your system set-up is consistent with the recommended specifications provided in this document. AT&T reserves the right to modify or update its guidelines at any time without notice, so please check the following link to be sure you have the latest version of this document (<http://www.corp.att.com/bvoip/avpn/implementation/> (login: att, password: attvoip)). You may also wish to consult with your AT&T technical sales representative to have them verify that you have the latest document.

## 2 References

The document links below are hosted on either a public Cisco website not requiring authentication or an AT&T website requiring the following authentication; login: att, password: attvoip. Each certified solution is listed below with the required documentation to configure the CER and IP-PBX/CUBE.

### 2.1 Microsoft Lync Server 2010 with integrated ASR CER / CUBE 1.4 documentation

*CER CCG for AT&T IP Flexible Reach Service and AT&T IP Toll-Free on AT&T VPN Service (Cisco ASR 1001 and 1002)*

[http://www.corp.att.com/bvoip/docs/CER\\_CCG\\_IP\\_Flexible\\_Reach\\_and\\_IP\\_Toll\\_Free\\_AVPN\\_ASR.pdf](http://www.corp.att.com/bvoip/docs/CER_CCG_IP_Flexible_Reach_and_IP_Toll_Free_AVPN_ASR.pdf)

*Microsoft Lync 2010 (Wave 14) with an Integrated or Cascaded Cisco ASR CUBE Customer Configuration Guide*

[http://www.corp.att.com/bvoip/avpn/implementation/MS\\_Lync2010\\_Combined\\_or\\_Cascaded\\_ASR\\_CUBE\\_IPFlex\\_CCG.PDF](http://www.corp.att.com/bvoip/avpn/implementation/MS_Lync2010_Combined_or_Cascaded_ASR_CUBE_IPFlex_CCG.PDF)

### 2.2 Cisco Unified Communications Manager with integrated ASR CER / CUBE 1.4 documentation

*CER CCG for AT&T IP Flexible Reach Service and AT&T IP Toll Free on AT&T VPN Service (Cisco ASR 1001 and 1002)*

[http://www.corp.att.com/bvoip/docs/CER\\_CCG\\_IP\\_Flexible\\_Reach\\_and\\_IP\\_Toll\\_Free\\_AVPN\\_ASR.pdf](http://www.corp.att.com/bvoip/docs/CER_CCG_IP_Flexible_Reach_and_IP_Toll_Free_AVPN_ASR.pdf)

*AT&T IP Flexible Reach service on MIS, MIS with MPLS PNT and AT&T VPN Service: Connecting Cisco Unified Communications Manager 8.0(3) via the ASR 1000 (series) Cisco Unified Border Element (Enterprise Edition) 1.4 using SIP*

<http://www.cisco.com/en/US/solutions/collateral/ns340/ns414/ns728/ns833/1024986.pdf>

*AT&T IP Toll-Free and IP Transfer Connect service on MIS, MPLS PNT and AT&T VPN: Connecting Cisco Unified Customer Voice Portal 8.0(1) via the Cisco Unified Border Element (Enterprise Edition) 1.4 on ASR1000 Aggregation Services Routers using SIP*

<http://www.cisco.com/c/en/us/solutions/collateral/enterprise/unified-border-element-cube/962469.pdf>

### 2.3 Cisco Unified Communications Manager with integrated ISR G2 CER / CUBE 8.8 documentation

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
Customer Configuration Guide (September 16, 2015, Version 1.8)

**NOTE – CUBE 8.8 requires 15.2(1)T2ES IOS.**

CER CCG for AT&T IP Flexible Reach Service and AT&T IP Toll-Free on AT&T VPN Service (ISR G2)  
[http://www.corp.att.com/bvoip/docs/CER\\_CCG\\_IP\\_Flexible\\_Reach\\_and\\_IP\\_Toll\\_Free\\_AVPN\\_ISR\\_G2.pdf](http://www.corp.att.com/bvoip/docs/CER_CCG_IP_Flexible_Reach_and_IP_Toll_Free_AVPN_ISR_G2.pdf)

AT&T IP Flexible Reach - Enhanced Features Service on MIS, MPLS PNT or AT&T VPN: Connecting Cisco Unified Communications Manager 8.6 with Cisco Unified Border Element Release 8.8 using SIP  
<http://www.cisco.com/en/US/solutions/collateral/ns340/ns414/ns728/ns833/1186210.pdf>

## 2.4 Cisco Unified Communications Manager with integrated ISR G2 CER / CUBE 9.5.1 documentation

**NOTE – CUBE 9.5.1 requires 15.3(3)M1ES IOS.**

CER CCG for AT&T IP Flexible Reach Service and AT&T IP Toll-Free on AT&T VPN Service (ISR G2)  
[http://www.corp.att.com/bvoip/docs/CER\\_CCG\\_IP\\_Flexible\\_Reach\\_and\\_IP\\_Toll\\_Free\\_AVPN\\_ISR\\_G2.pdf](http://www.corp.att.com/bvoip/docs/CER_CCG_IP_Flexible_Reach_and_IP_Toll_Free_AVPN_ISR_G2.pdf)

AT&T IP Flexible Reach Service With Enhanced Features Using MIS / PNT or AT&T Virtual Private Network Transport With Cisco Unified Communications Manager 10.0.1 and Cisco Unified Border Element 9.5.1  
<http://www.cisco.com/c/dam/en/us/solutions/collateral/enterprise/interoperability-portal/application-notes-cucm-att-flexible-Reach.pdf>

## 2.5 Cisco Unified Communications Manager with integrated ISR 4K CER / CUBE 10.5 documentation

**NOTE – CUBE 10.5 requires IOS-XE Release 3.13.2S (IOS 15.4(3)S2)**

CER CCG for AT&T IP Flexible Reach Service and AT&T IP Toll-Free on AT&T VPN Service (ISR G2)  
[http://www.corp.att.com/bvoip/docs/CER\\_CCG\\_IP\\_Flexible\\_Reach\\_and\\_IP\\_Toll\\_Free\\_AVPN\\_ISR\\_4K.pdf](http://www.corp.att.com/bvoip/docs/CER_CCG_IP_Flexible_Reach_and_IP_Toll_Free_AVPN_ISR_4K.pdf)

AT&T IP Flexible Reach Service With Enhanced Features Using MIS / PNT or AT&T Virtual Private Network Transport With Cisco Unified Communications Manager v. 10.5.2 and Cisco UBE v. 10.5.0 On an ISR 4431 Router with SIP Interface  
<http://www.cisco.com/c/dam/en/us/solutions/collateral/enterprise/interoperability-portal/flexible-reach.pdf>

### 3 Overview

AT&T IP Flexible Reach Service and/or IP –Toll Free over AT&T VPN as the Underlying Transport Service is an AT&T Business Voice over IP (BVoIP) Service.

This document should be used solely as a general configuration guideline. The Customer is solely responsible for determining the appropriate configuration for their specific environment; AT&T provides resources to assist with that configuration. Please contact your AT&T technical support representative for assistance if needed.

Configuration examples in this guide are provided for informational purposes only. The example configurations may be mapped to a variety of vendor implementations, check with your AT&T technical support representative if you have any questions.

Note: The configuration examples provided in this document are based upon Cisco IOS features, however, the features are NOT described in their entirety; and may vary across hardware platforms and versions of IOS. Please refer to the appropriate Cisco documentation relative to your IOS features.

### 4 Special Considerations

- The following TCP/IP ports must not be blocked by firewall or access lists:
  - AT&T IP Border Element signaling and media addresses.
  - SIP signaling traffic (UDP port 5060).
  - RTP/RTCP traffic (UDP port range 16384-32767).
  - Voice Quality Monitor traffic
    - WinEyeQ Windows version: Sent to AT&T via IPsec tunnel using TCP port 1701
    - WinEyeQ Linux version: Sent to AT&T via Transport Layer Security (TLS) using TCP ports 22, 1721, 990, 57101 through & including 57111, NTP 123 and ICMP.
- The configuration information in this CCG assumes a single primary CER. Any alternate routing configurations or remote branch connectivity to other sites, within the same or other AT&T VPN, requires proper configuration of the signaling and media paths.

Routing configurations in all customer routers need to be set up to assure that the routing in the primary CER is not affected.

## 5 Customer Edge Router Configurations for various IP-PBX Solutions

This section will assist in configuring the Customer Edge Router (CER) properly to insure interoperability with AT&T Certified IP-PBX solutions for use on AT&T IP Flexible Reach Service and/or IP-Toll Free on AT&T VPN transport. Please review the section below that is applicable to your environment.

**Important Note:** The IP-PBX solutions below make reference to IP Border Element (IPBE) IP Addresses, Signaling IP Address, Media IP Address, and VQM IP Addresses which are provided to the Customer prior to the scheduled Pre-test date in a letter AT&T will send titled Customer Configuration and Voice Quality Monitor (VQM) device Shipping/Confirmation with Customer-managed router. The Signaling IP Address and the Media IP Address can be Customer supplied or AT&T provided.

Throughout this document, AT&T provided IP Address is synonymous with IP Flexible Reach IP Address.

### 5.1 Microsoft Lync Server 2010 with integrated Cisco ASR CER and CUBE 1.4

This Microsoft Lync solution works in conjunction with a CUBE that is combined with a Cisco CER (referred to as an “integrated CER/CUBE”). This section covers the CER specific commands. Please see the appropriate CCG for Lync and CUBE specific configurations.

A loopback interface must be configured on the integrated CER/CUBE for the public Signaling Address (media will also be sourced from the same loopback interface). Therefore, all voice and signaling traffic will be sourced from the loopback interface of the integrated CER/CUBE.

Note:

- Support for IP Flexible Reach Service only.
- The integrated CER/CUBE only supports Customer Managed Central Sites running IOS **15.1(1)S1 on the ASR 1001 or ASR 1002**.
- This solution only supports G.711 for RTP. Only access speeds of full T1 and greater will be supported with this solution. Fax is not supported.

- Network Address Translation (NAT) of the Signaling Address is not an option for the integrated CER/CUBE solution.

### 5.1.1 Topology

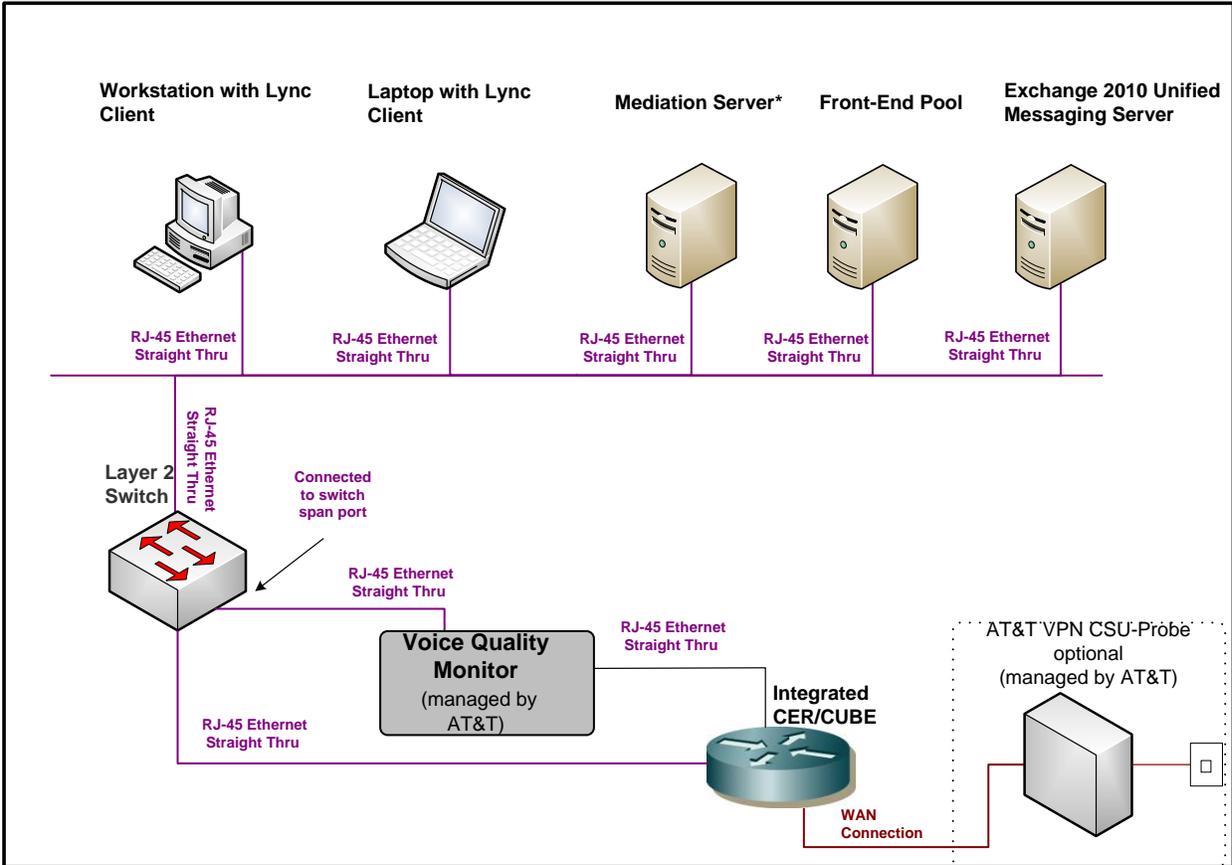
Following is a sample diagram of a network topology for a site with Microsoft Lync Server 2010 and an integrated ASR CER/CUBE. The AT&T VPN CSU-Probe and Voice Quality Monitor (VQM) are both AT&T managed devices.

Note:

- The VQM is plugged into a dedicated Ethernet port on the integrated CER/CUBE and into a mirrored switch port (i.e. Switched Port Analyzer (SPAN) feature on a Cisco switch) on a customer managed switch. Configuration details for the SPAN port are provided in a configuration guide located on the AT&T website:  
<http://www.corp.att.com/bvoip/avpn/implementation>
- The AT&T VPN CSU-Probe is optional.
- All other equipment is managed by the customer.

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
 AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
 Customer Configuration Guide (September 16, 2015, Version 1.8)

**AT&T BVoIP on AT&T VPN site  
 with AT&T VPN CSU-Probe, Voice Quality Monitor, Integrated CER/CUBE, Lync 2010  
 (CPE site design – physical view)**



**5.1.2 Standard Solution (binding the signaling/media to a loopback interface)**

**Step 1: Configure the loopback interface**

Configure the loopback IP Address with the provided IP Flexible Reach Signaling IP Address.

```
interface Loopback0
  ip address <IP Flex Signaling Address> <subnet mask>
```

**Step 2: Configure LAN interface facing customer switch**

Configure a LAN interface on the integrated CER/CUBE on the same network as the customer voice network.

```
interface FastEthernet0/0
```

```
description LAN interface facing customer switch
ip address <IP address in customer voice network> <appropriate subnet>
duplex full
speed 100
```

### **Step 3: Configure static routes (optional)**

The integrated CER/CUBE can be configured with static routes for the LAN where the customer voice network resides. This is only required if the integrated CER/CUBE and customer voice network reside on different networks.

Route to the customer voice network:

**Syntax:** *ip route <customer voice network> <appropriate subnet> <IP Address of next hop>*

### **Step 4: Configure network statements for BGP**

The integrated CER/CUBE loopback IP address (Signaling IP Address) and LAN network address of the customer voice network must be advertised via BGP.

```
router bgp <your AS number>
no synchronization
bgp log-neighbor-changes
network <Signaling IP Address> mask 255.255.255.255
network <LAN address customer voice network> mask <use appropriate mask>
neighbor <PER IP address> remote-as <remote AS>
neighbor <PER IP address> allowas-in
no auto-summary
```

### **Step 5: VQM Configuration**

Please remember to include the proper routing statements in the CER required for the Voice Quality Monitor. See section 4.5.3 in the AT&T Business Voice over IP on AT&T VPN CER CCG for more information.

In addition, this solution requires configuration of a SPAN port on a switch. Configuration details for the SPAN port are provided in a configuration guide located on the AT&T website:

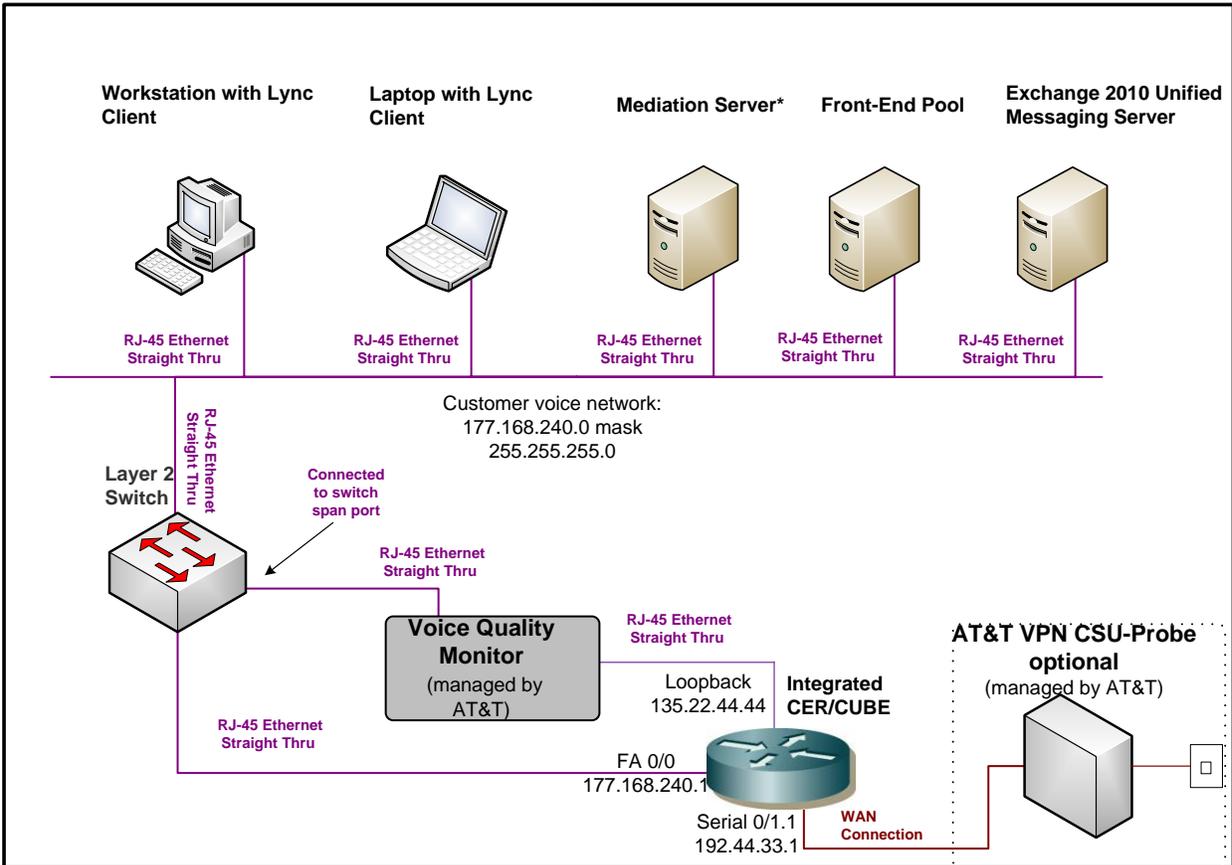
<http://www.corp.att.com/bvoip/avpn/implementation>

Example: In this example, 177.168.240.0 is the customer voice network. The IP address 177.168.240.1 is the LAN interface on the integrated CER/CUBE facing the customer managed

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
 AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
 Customer Configuration Guide (September 16, 2015, Version 1.8)

switch. The IP address 135.22.44.44 is the loopback address on the integrated CER/CUBE used for the Signaling IP Address.

**AT&T BVoIP on AT&T VPN site  
 with AT&T VPN CSU-Probe, Voice Quality Monitor, Integrated CER/CUBE, Lync 2010  
 (CPE site design – physical view)**



Router configuration output:

```
interface Loopback0
  ip address 135.22.44.44 255.255.255.255
  !
interface FastEthernet0/0
  description LAN interface facing customer switch
  ip address 177.168.240.1 255.255.255.0
  duplex full
  speed 100
  !
router bgp 65000
```

```
no synchronization
bgp log-neighbor-changes
network 135.22.44.44 mask 255.255.255.255
network 177.168.240.0 mask 255.255.255.0
neighbor 192.44.33.2 remote-as 37383
neighbor 192.44.33.2 allowas-in
no auto-summary
```

**NOTE: Please remember to include the proper routing statements in the CER required for the Voice Quality Monitor. See section 4.5.3 in the AT&T Business Voice over IP on AT&T VPN CER CCG for more information.**

## 5.2 Cisco Unified Communications Manager with Cisco ISR G2 CER and integrated CUBE 8.8/9.5.1 or with Cisco ASR CER and integrated CUBE 1.4 or with Cisco ISR 4K and integrated CUBE 10.5

This Cisco Unified Communications Manager (CUCM) solution works in conjunction with a CUBE that is combined with a Cisco CER (referred to as an “integrated CER/CUBE”). This section covers the CER specific commands. Please see the appropriate CCG for CUCM and CUBE specific configurations.

A loopback interface must be configured on the integrated CER/CUBE for the public Signaling Address (media will also be sourced from the same loopback interface). Therefore, all voice and signaling traffic will be sourced from the loopback interface of the integrated CER/CUBE.

Note:

- The integrated CER/CUBE only supports Customer Managed Sites running IOS **15.2(1)T2ES (CUBE 8.8)** or **15.3(3)M1ES (CUBE 9.5.1)** on the **ISR G2** or IOS **15.1(1)S1 (CUBE 1.4)** on the **ASR 1001** or **ASR 1002** or **IOS-XE Release 3.13.2S, IOS 15.4(3)S2 (CUBE 10.5)**
- Remote sites with an integrated CUBE are supported (aka: Direct Media). The remote site IP phones register across the WAN to a central site where the CUCM resides.
- Network Address Translation (NAT) of the Signaling Address is not an option for the integrated CER/CUBE solution.

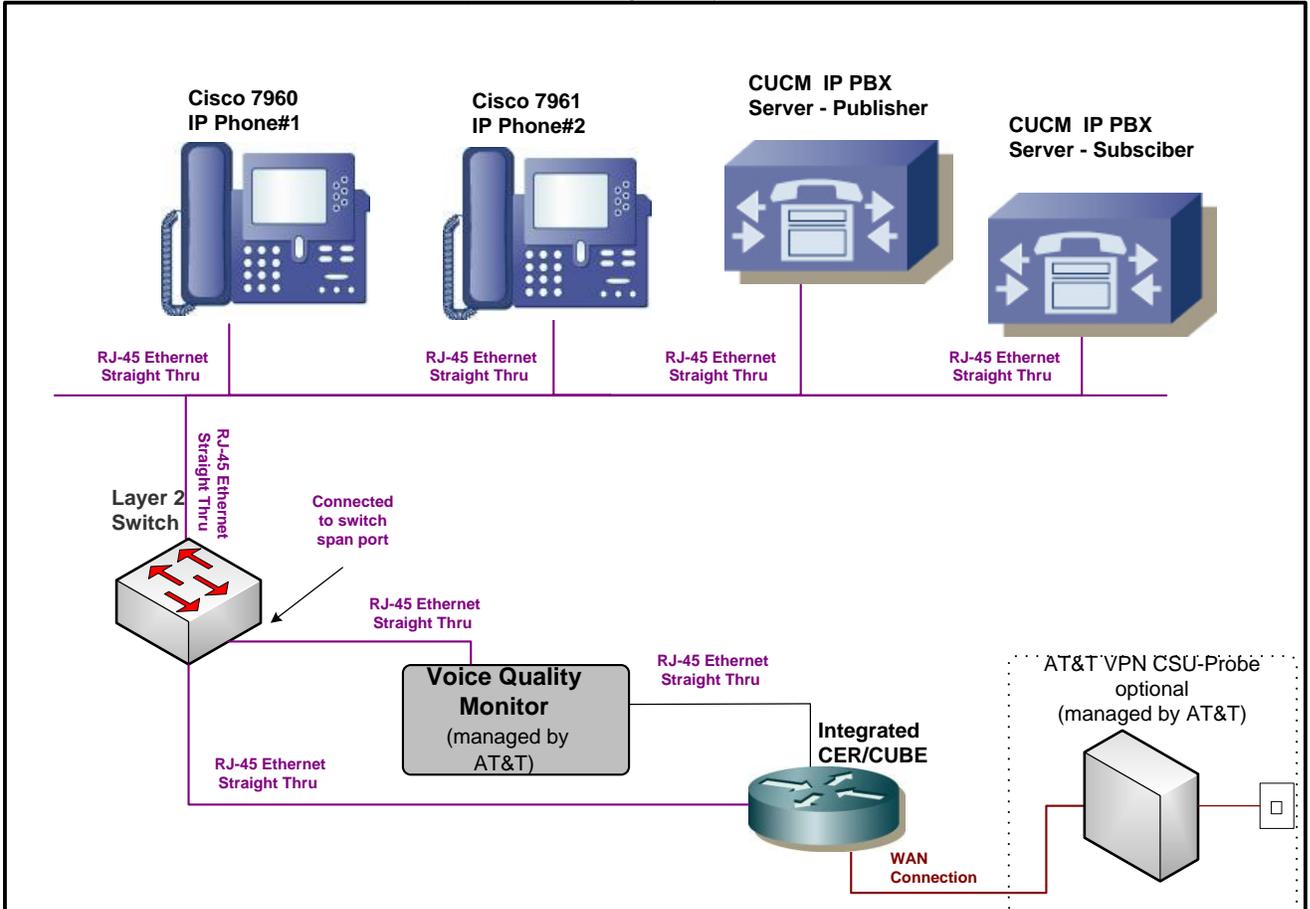
### 5.2.1 Topology

Following is a sample diagram of a network topology for a site with CUCM and an integrated CER/CUBE. The AT&T VPN CSU-Probe and Voice Quality Monitor (VQM) are both AT&T managed devices.

Note:

- The VQM is plugged into a dedicated Ethernet port on the integrated CER/CUBE and into a mirrored switch port (i.e. Switched Port Analyzer (SPAN) feature on a Cisco switch) on a customer managed switch. Configuration details for the SPAN port are provided in a configuration guide located on the AT&T website: <http://www.corp.att.com/bvoip/avpn/implementation>
- The AT&T VPN CSU-Probe is optional.
- All other equipment is managed by the customer.

**AT&T BVoIP on AT&T VPN site  
 with VPN CSU-Probe, Voice Quality Monitor, integrated CER/CUBE, CUCM  
 (CPE site design – physical view)**



**5.2.2 Standard Solution (binding the signaling/media to a loopback interface)**

**Step 1: Configure the loopback interface**

Configure the loopback IP Address with the provided IP Flexible Reach Signaling IP Address.

```
interface Loopback0
  ip address <IP Flex Signaling Address> <subnet mask>
```

**Step 2: Configure LAN interface facing customer switch**

Configure a LAN interface on the integrated CER/CUBE on the same network as the customer voice network.

```
interface FastEthernet0/0
description LAN interface facing customer switch
ip address <IP address in customer voice network> <appropriate subnet>
duplex full
speed 100
```

### **Step 3: Configure static routes (optional)**

The integrated CER/CUBE can be configured with static routes for the LAN where the CUCM and/or IP phones reside. This is only required if the integrated CER/CUBE and CUCM and/or IP phones reside on different networks.

Route to the CUCM and/or IP phones LAN:

**Syntax:** *ip route <CUCM LAN network> <appropriate subnet> <IP Address of next hop>*

### **Step 4: Configure network statements for BGP**

The integrated CER/CUBE loopback IP address (Signaling IP Address) and LAN network address of the CUCM and/or IP phones must be advertised via BGP.

```
router bgp <your AS number>
no synchronization
bgp log-neighbor-changes
network <Signaling IP Address> mask 255.255.255.255
network <LAN address of CUCM and/or IP phones> mask <use appropriate mask>
neighbor <PER IP address> remote-as <remote AS>
neighbor <PER IP address> allowas-in
no auto-summary
```

### **Step 5: VQM Configuration**

Please remember to include the proper routing statements in the CER required for the Voice Quality Monitor. See section 4.5.3 in the AT&T Business Voice over IP on AT&T VPN CER CCG for more information.

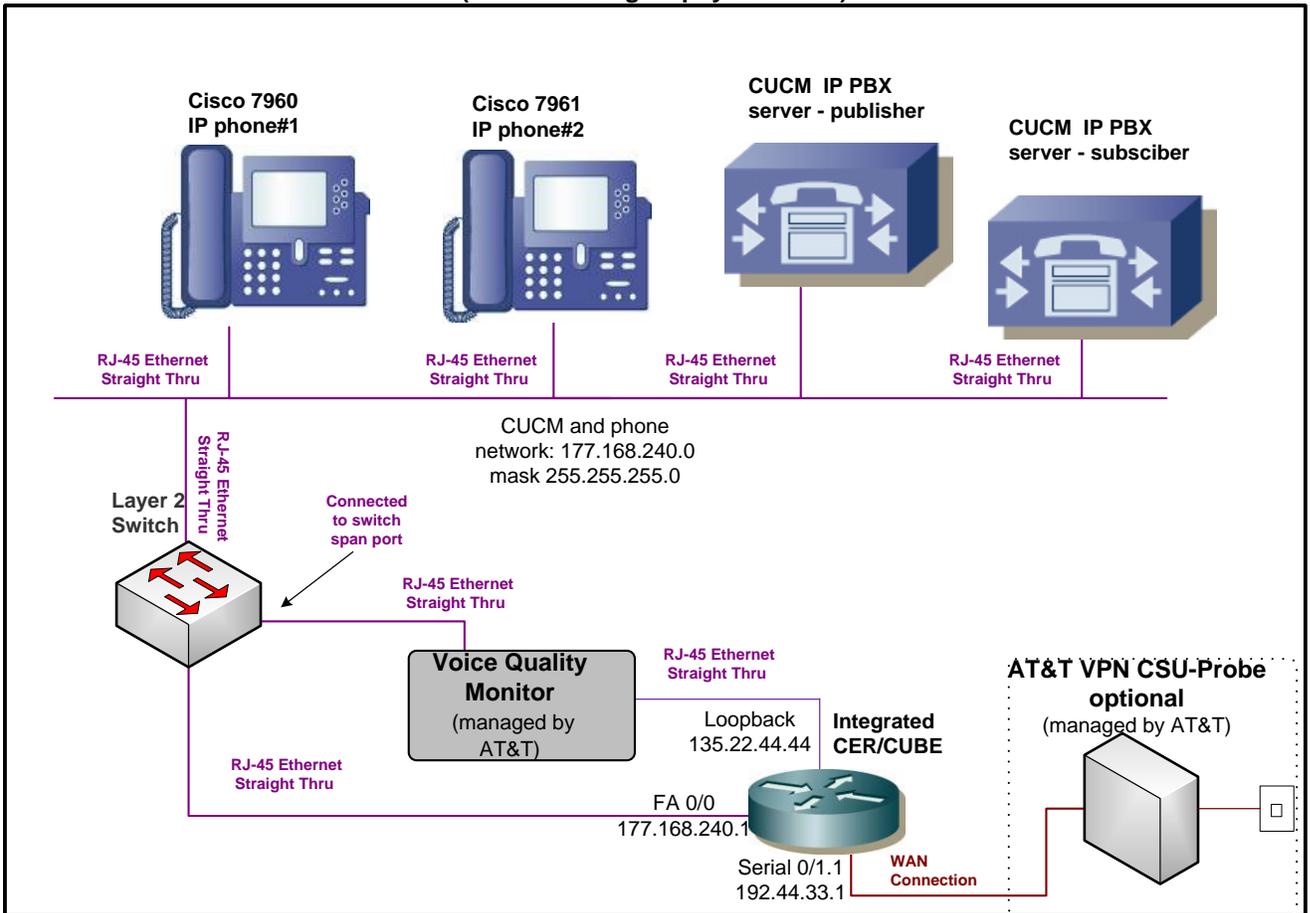
In addition, this solution requires configuration of a SPAN port on a switch. Configuration details for the SPAN port are provided in a configuration guide located on the AT&T website:

<http://www.corp.att.com/bvoip/avpn/implementation>

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
 AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
 Customer Configuration Guide (September 16, 2015, Version 1.8)

Example: In this example, 177.168.240.0 is the customer LAN where the CUCM and IP phones reside. The IP address 177.168.240.1 is the LAN interface on the integrated CER/CUBE facing the customer managed switch. The IP address 135.22.44.44 is the loopback address on the integrated CER/CUBE used for the Signaling IP Address.

**AT&T BVoIP on AT&T VPN Site  
 with AT&T VPN CSU-Probe, Voice Quality Monitor, CUBE, CUCM  
 (CPE site design – physical view)**



Router configuration output:

```
interface Loopback0
  ip address 135.22.44.44 255.255.255.255
!
interface FastEthernet0/0
  description LAN interface facing customer switch
```

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
Customer Configuration Guide (September 16, 2015, Version 1.8)

```
ip address 177.168.240.1 255.255.255.0
duplex full
speed 100
!
router bgp 65000
no synchronization
bgp log-neighbor-changes
network 135.22.44.44 mask 255.255.255.255
network 177.168.240.0 mask 255.255.255.0
neighbor 192.44.33.2 remote-as 37383
neighbor 192.44.33.2 allowas-in
no auto-summary
```

**NOTE: Please remember to include the proper routing statements in the CER required for the Voice Quality Monitor. See section 4.5.3 in the AT&T Business Voice over IP on AT&T VPN CER CCG for more information.**

## 6 Acronyms

<b>Acronym</b>	<b>Translation</b>
ADSL	Asymmetric Digital Subscriber Line
AIM	Advanced Integration Module A
AS	Autonomous System
ATM	Asynchronous Transfer Mode
AT&T VPN	AT&T Virtual Private Network
BC	Committed Burst
BE	Excess Burst or Best Effort
BGP	Border Gateway Protocol
BH	Bursty High
BL	Bursty Low
BOE	Branch Office Extension
CAS	Channel Associated Signaling
CBWFQ	Class Based Weighted Fair Queuing
CCG	Customer Configuration Guide
CCS	Common Channel Signaling
CDR	Committed Data Rate
CEF	Cisco Express Forwarding
CER	Customer Edge Router
CHAP	Challenge Handshake Authentication Protocol
CIR	Committed Information Rate
CLI	Command Line Interface
CM	Communications Manager
COS	Class of Service
CPE	Customer Premise Equipment
CPU	Central Processing Unit
CRC	Cyclic Redundancy Check
CRTP	Compress Real Time Protocol
CSU/DSU	Channel Service Unit / Data Service Unit
CUBE	Cisco Unified Border Element
CUCM	Cisco Unified Communications Manager
DID	Direct Inward Dial
DS	Down Stream

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
 AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
 Customer Configuration Guide (September 16, 2015, Version 1.8)

<b>Acronym</b>	<b>Translation</b>
DSCP	Differentiated Service Code Point
DSL	Digital Subscriber Line
DSP	Digital Signal Processors
DTMF	Dual Tone Multi Frequency
E&M	Ear & Mouth
EF	Expedient Forwarding
ePVC	Enhanced Permanent Virtual Circuit
FR	Frame Relay
FXO	Foreign Exchange Office
FXS	Foreign Exchange Station
GSM FR	Global System for Mobile communications Full Rate
HDV	High Density Voice
HWIC	High-speed WAN Interface Card
IAR	Inbound Alternate Routing
IETF	Internet Engineering Task Force
IMA	Inverse Multiplexing over ATM
IOS	Internetwork Operation System
IP	Internet Protocol
IPBE	Internet Protocol Border Element
IPSEC	Internet Protocol Security
ISR	Integrated Services Router
ITU-T	International Telecommunication Union - Telecommunications
GW	Gateway
LAN	Local Area Network
LFI	Link Fragmentation and Interleaving
LLQ	Low Latency Queuing
LD	Long Distance
MLPPP	Multi-Link Point-to-Point Protocol
MM	Multi Media
MOW	Most Of World
MTU	Maximum Transmission Unit
NAT	Network Address Translation
NET	Network Equipment Technologies
NM	Network Module
NPE	Network Processing Engine
OAM	Operation Administration & Maintenance

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
 AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
 Customer Configuration Guide (September 16, 2015, Version 1.8)

<b>Acronym</b>	<b>Translation</b>
OCS	Office Communication Server
PA	Port Adapter
PAT	Port Address Translation
PBX	Private Branch Exchange
PC	Personal Computer
PCR	Peak Cell Rate
PER	Provider Edge Router
POS	Packet over SONET
POTS	Plain Old Telephone Service
PPP	Point-to-Point Protocol
PQ	Priority Queue
PRI	Primary Rate Interface
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
PVC	Permanent Virtual Circuit
PVDM	Packet Voice DSP Module
QOS	Quality of Service
QSIG	Q Signaling
RC	Receive
RFC	Request for Comment
RT	Real Time
RTCP	Real Time Control Protocol
RTP	Real Time Protocol
SBC	Session Border Controller
SCCP	Skinny Call Control Protocol
SCR	Sustainable Cell Rate
SHDSL	Single-Pair High-Speed Digital Subscriber Line
SIP	Session Initiation Protocol
SM	Session Manager
SPE	Synchronous Payload Envelope
TAC	Technical Assistance Center
TC	Time Interval
TDM	Time Division Multiplexing
TN	Telephone Number
TX	Transmit
UDP	User Datagram Protocol

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
Customer Configuration Guide (September 16, 2015, Version 1.8)

<b>Acronym</b>	<b>Translation</b>
US	Up Stream or United States
VAD	Voice Activity Detection
VCI	Virtual Circuit Identifier
VLAN	Virtual Local Area Network
VNI	Voice Network Infrastructure
VoIP	Voice over Internet Protocol
VPI	Virtual Path Identifier
VPN	Virtual Private Network
VT	Virtual Template
WAN	Wide Area Network
WFQ	Weighted Fair Queuing
WIC	WAN Interface Card

AT&T Certified IP-PBX Solutions for Integrated Customer Edge Route/Cisco Unified Border Element  
AT&T IP Flexible Reach Service and/or IP Toll-Free on AT&T VPN Service  
Customer Configuration Guide (September 16, 2015, Version 1.8)

This Customer Configuration Guide ("CCG") is offered as a convenience to AT&T's customers. The specifications and information regarding the product in this CCG are subject to change without notice. All statements, information, and recommendations in this CCG are believed to be accurate but are presented without warranty of any kind, express or implied, and are provided "AS IS". Users must take full responsibility for the application of the specifications and information in this CCG.

In no event shall AT&T or its suppliers be liable for any indirect, special, consequential, or incidental damages, including, without limitation, lost profits or loss or damage arising out of the use or inability to use this CCG, even if AT&T or its suppliers have been advised of the possibility of such damage.