

# VoIP Toll Bypass Application for International Bank

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## Introduction

This is a case study with sample configurations from a large American based banking institution. This bank has been utilizing Cisco 2600 based VoIP technology to support their small to medium size branches in South America. This approach has saved the bank hundreds of thousands of dollars over the last two years and has been very stable since the day it was implemented.

## Prerequisites

### Requirements

There are no specific requirements for this document.

## Justification

The bank decided to roll out Cisco 2600 Routers to the small and medium size branch locations to consolidate the amount of equipment that needed to be managed and simultaneously save money with toll bypass.

## Design

The design consists Cisco 2600 Routers at the South American branches and a single Cisco 2600 at the head end. Voice switching is used to avoid one for one port assignments. Fragmentation and interleaving must be used so that large data packets do not queue before voice packets, which would cause undo delay to the voice. Link fragmentation and interleaving is achieved using Multilink Point-to-Point Protocol (MLP).

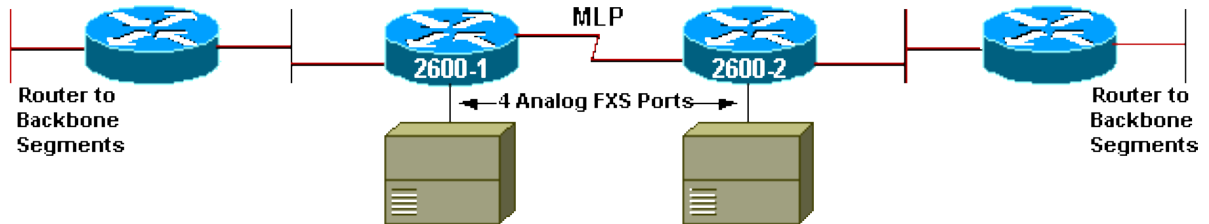
**Note:** There are four configuration samples in this document. The first two configuration samples are used for Cisco 2600 Routers that run a release earlier than Cisco IOS® Software Release 12.0(5)T. The second two configuration samples are for Cisco 2600 Routers that run Cisco IOS Software Release 12.0(5)T or later. The second two sample configurations are recommended for a network situation such as the one in the Network Diagram here. The point-to-point topology is shown in this Network Diagram.

In order to implement this configuration, you need:

- Either Cisco IOS Software Release 11.3 or Cisco IOS Software Release 12.0(5)T or later. Cisco IOS Software Release 12.0(5)T or later is recommended.
- Cisco 2600 Routers connected via MLP.

## Network Diagram

This document uses this network setup:



## Configurations

This document uses these configurations:

- Central Router with Cisco IOS Software 11.3 and Earlier
- Branch Router with Cisco IOS Software 11.3 and Earlier
- Central Router with Cisco IOS Software 12.0(7)T
- Branch Router with Cisco IOS Software 12.0(7)T

### Central Router with Cisco IOS Software 11.3 and Earlier

```

2600-1#show run
!
version 11.3
!
hostname 2600-1
!
enable password cisco
!
multilink virtual-template 1
!
dial-peer voice 10 voip
 destination-pattern 5
 ip precedence 5
 session target ipv4:10.100.101.1
!
dial-peer voice 11 voip
 destination-pattern 6
 ip precedence 5
 session target ipv4:10.100.101.1
!
dial-peer voice 12 voip
 destination-pattern 8
 ip precedence 5
 session target ipv4:10.100.101.1
!
dial-peer voice 13 voip
 destination-pattern 9
 ip precedence 5
 session target ipv4:10.100.101.1
!
dial-peer voice 1 pots
 destination-pattern 7
 port 1/0/0
!

```

```
dial-peer voice 2 pots
 destination-pattern 7
 port 1/0/1
!
dial-peer voice 3 pots
 destination-pattern 7
 port 1/1/0
!
dial-peer voice 4 pots
 destination-pattern 7
 port 1/1/1
!
!
voice-port 1/0/0
 vad
 connection plar 5
!
voice-port 1/0/1
 vad
 connection plar 6
!
voice-port 1/1/0
 vad
 connection plar 8
!
voice-port 1/1/1
 vad
 connection plar 9
clock timezone EST -5
clock summer-time DST recurring
!
interface Loopback1
 ip address 10.100.253.1 255.255.255.0
!
interface Ethernet0/0
 ip address 10.175.238.29 255.255.255.0
!
interface Serial0/0
 no ip address
 shutdown
!
interface Serial0/1
 no ip address
 shutdown
!
interface Serial0/2
 encapsulation ppp
 bandwidth 64
 load-interval 30
 no fair-queue
 ppp multilink
!
interface Virtual-Template1
 ip unnumbered Loopback1
 ip rtp header-compression
 ip rtp reserve 16384 50
 bandwidth 64
 fair-queue 64 256 10
 ppp multilink
 ppp multilink fragment-delay 20
 ppp multilink interleave
!
router ospf 99
 network 10.100.253.1 0.0.0.0 area 21
 network 10.175.0.0 0.0.255.255 area 0
!
```

```
ip classless
!
line con 0
  exec-timeout 15 0
line aux 0
  exec-timeout 25 0
transport input all
line vty 0 4
  exec-timeout 15 0
!
end
```

### Branch Router with Cisco IOS Software 11.3 and Earlier

```
2600-2#show run
!
version 11.3
!
hostname 2600-2
!
enable password cisco
!
multilink virtual-template 1
!
dial-peer voice 1 pots
  destination-pattern 5
  port 1/0/0
!
dial-peer voice 2 pots
  destination-pattern 6
  port 1/0/1
!
dial-peer voice 3 pots
  destination-pattern 8
  port 1/1/0
!
dial-peer voice 4 pots
  destination-pattern 9
  port 1/1/1
!
dial-peer voice 10 voip
  destination-pattern 7
  ip precedence 5
  session target ipv4:10.175.238.29
!
!
voice-port 1/0/0
  vad
  connection plar 7
!
voice-port 1/0/1
  vad
  connection plar 7
!
voice-port 1/1/0
  vad
  connection plar 7
!
voice-port 1/1/1
  vad
  connection plar 7
clock timezone est -5
clock summer-time dst recurring
!
!
```

```

!
interface Loopback1
 ip address 10.100.253.2 255.255.255.0
!
interface Ethernet0/0
 ip address 10.100.101.1 255.255.255.0
!
interface Serial0/0
 no ip address
!
interface Serial0/1
 no ip address
!
interface Serial0/2
 no ip address
 encapsulation ppp
 bandwidth 64
 load-interval 30
 no fair-queue
 ppp multilink
!
interface Virtual-Template1
 ip unnumbered Loopback1
 ip rtp header-compression
 ip rtp reserve 16384 50 64
 bandwidth 64
 fair-queue 64 256 10
 ppp multilink
 ppp multilink fragment-delay 20
 ppp multilink interleave
!
router ospf 99
 network 10.100.101.0 0.0.0.255 area 21
 network 10.100.253.2 0.0.0.0 area 21
!
ip classless
!
line con 0
 exec-timeout 15 0
 line 1
 transport input all
line 2
 transport input all
line aux 0
 exec-timeout 25 0
 transport input all
line vty 0 4
 exec-timeout 15 0
 login
!
end

```

### Central Router with Cisco IOS Software 12.0(7)T

```

2600-1#show run
!
version 12.0
!
hostname 2600-1
!
enable password cisco
!
dial-peer voice 10 voip
 destination-pattern 5
 ip precedence 5

```

```
session target ipv4:10.100.101.1
!
dial-peer voice 11 voip
destination-pattern 6
ip precedence 5
session target ipv4:10.100.101.1
!
dial-peer voice 12 voip
destination-pattern 8
ip precedence 5
session target ipv4:10.100.101.1
!
dial-peer voice 13 voip
destination-pattern 9
ip precedence 5
session target ipv4:10.100.101.1
!
dial-peer voice 1 pots
destination-pattern 7
port 1/0/0
!
dial-peer voice 2 pots
destination-pattern 7
port 1/0/1
!
dial-peer voice 3 pots
destination-pattern 7
port 1/1/0
!
dial-peer voice 4 pots
destination-pattern 7
port 1/1/1
!
!
voice-port 1/0/0
vad
connection plar 5
!
voice-port 1/0/1
vad
connection plar 6
!
voice-port 1/1/0
vad
connection plar 8
!
voice-port 1/1/1
vad
connection plar 9
clock timezone EST -5
clock summer-time DST recurring
!
interface Multilink1
ip address 10.100.253.1 255.255.255.0
no ip directed-broadcast
no ip route-cache
ip tcp header-compression iphc-format
no ip mroute-cache
fair-queue 64 256 1000
no cdp enable
ppp multilink
ppp multilink fragment-delay 20
ppp multilink interleave
multilink-group 1
ip rtp header-compression iphc-format
ip rtp priority 16384 50 64
```

```

!
interface Ethernet0/0
 ip address 10.175.238.29 255.255.255.0
!
interface Serial0/0
 no ip address
 no fair-queue
!
interface Serial0/1
 no ip address
 shutdown
!
interface Serial0/2
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 no ip route-cache
 no ip mroute-cache
 bandwidth 64
 load-interval 30
 no fair-queue
 ppp multilink
 multilink-group 1
!
router ospf 99
 network 10.100.253.1 0.0.0.0 area 21
 network 10.175.0.0 0.0.255.255 area 0
!
ip classless
!
line con 0
 exec-timeout 15 0
line aux 0
 exec-timeout 25 0
transport input all
line vty 0 4
 exec-timeout 15 0
!
end

```

### Branch Router with Cisco IOS Software 12.0(7)T

```

2600-2#show run
!
version 12.0
!
hostname 2600-2
!
enable password cisco
!
dial-peer voice 1 pots
 destination-pattern 5
 port 1/0/0
!
dial-peer voice 2 pots
 destination-pattern 6
 port 1/0/1
!
dial-peer voice 3 pots
 destination-pattern 8
 port 1/1/0
!
dial-peer voice 4 pots
 destination-pattern 9
 port 1/1/1

```

```
!  
dial-peer voice 10 voip  
  destination-pattern 7  
  ip precedence 5  
  session target ipv4:10.175.238.29  
!  
!  
voice-port 1/0/0  
  vad  
  connection plar 7  
!  
voice-port 1/0/1  
  vad  
  connection plar 7  
!  
voice-port 1/1/0  
  vad  
  connection plar 7  
!  
voice-port 1/1/1  
  vad  
  connection plar 7  
clock timezone est -5  
clock summer-time dst recurring  
!  
!  
interface Multilink1  
  ip address 10.100.253.2 255.255.255.0  
no ip directed-broadcast  
no ip route-cache  
ip tcp header-compression iphc-format  
no ip mroute-cache  
load-interval 30  
fair-queue 64 256 1000  
no cdp enable  
ppp multilink  
ppp multilink fragment-delay 20  
ppp multilink interleave  
multilink-group 1  
ip rtp header-compression iphc-format  
ip rtp priority 16384 50 64  
!  
interface Ethernet0/0  
  ip address 10.100.101.1 255.255.255.0  
!  
interface Serial0/0  
  physical-layer async  
  no ip address  
!  
interface Serial0/1  
  physical-layer async  
  no ip address  
!  
interface Serial0/2  
  no ip address  
  no ip directed-broadcast  
  encapsulation ppp  
  no ip route-cache  
  bandwidth 64  
  load-interval 30  
  no fair-queue  
  ppp multilink  
  multilink-group 1  
!  
router ospf 99  
network 10.100.101.0 0.0.0.255 area 21
```

```
network 10.100.253.2 0.0.0.0 area 21
!
ip classless
!
line con 0
  exec-timeout 15 0
  line 1
  no exec-banner
  transport input all
  line 2
  transport input all
line aux 0
transport input all
line vty 0 4
  exec-timeout 15 0
  login
!
end
```

## Verify

There is currently no verification procedure available for this configuration.

## Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

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## Related Information

- [Voice Technology Support](#)
  - [Voice and Unified Communications Product Support](#)
  - [Recommended Reading: Troubleshooting Cisco IP Telephony](#)
  - [Technical Support & Documentation – Cisco Systems](#)
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