

# Multichassis Multilink PPP with Cisco AS5300s and an Offload Server

Document ID: 14963

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## **Introduction**

Multilink PPP (MLP) allows you to transmit packets across a logical bundle that may be formed by several physical links between two devices. Multichassis MLP extends this feature to accommodate cases where individual links for a specific bundle terminate in multiple devices. This scenario is particularly common in large dial-up Points of Presence (POPs) where a rotary of phone lines and a stack of access servers are used.

This document shows a stack of access servers that rely on an offload server to terminate all PPP connections (MLP and non-MLP). The stack group could be configured so the offload server is only left with the MLP burden (usually more CPU-intensive). The access servers could take care of non-MLP PPP connections. In this configuration, however, the offload server is in charge of all PPP (MLP and non-MLP) connections and the access servers handle all call processing (ISDN and modem).

A stack of access servers configured for Multichassis MLP relies on a bidding protocol to decide what device owns MLP bundles. Stack Group Bidding Protocol (SGBP) plays this role. Bids are a function of several variables (for example, locality, user-configurable weighted metric, CPU type, number of MLP bundles). In an offload configuration, one of the members of the stack is assigned a metric that makes the bid of that device better. In this particular case, non-MLP PPP connections are also forwarded to the offload server even though bids are not taken for this type of connection.

## **Prerequisites**

### **Requirements**

There are no specific requirements for this document.

### **Components Used**

This configuration has a stack of two Cisco 5300s to terminate analog (modem) and digital (ISDN) calls, and a Cisco 4700 to terminate the protocol connection (PPP). Each Cisco 5300 has four PRIs and 96 modems. Calls (modem or ISDN) are answered by the Cisco 5300s and tunneled to the Cisco 4700 router that is acting as the offload server using Layer 2 Forwarding (L2F).

**Note:** The two access servers and the offload server are configured for local authentication using the Authentication, Authorization, and Accounting (AAA) model. Authentication could also be configured to use Terminal Access Controller Access Control System (TACACS+) or Remote Authentication Dial-in User Service (RADIUS).

To implement this configuration, you need the following:

- Two Cisco AS5300 access servers with four Primary Rate Interfaces (PRIs) and 96 modems
- A Cisco 4700 router
- The ISDN switch type for all PRIs
- The IP addressing scheme for the access servers and the offload server
- User names, passwords, and the IP address pool for dial-up clients

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

## Conventions

For more information on document conventions, refer to Cisco Technical Tips Conventions.

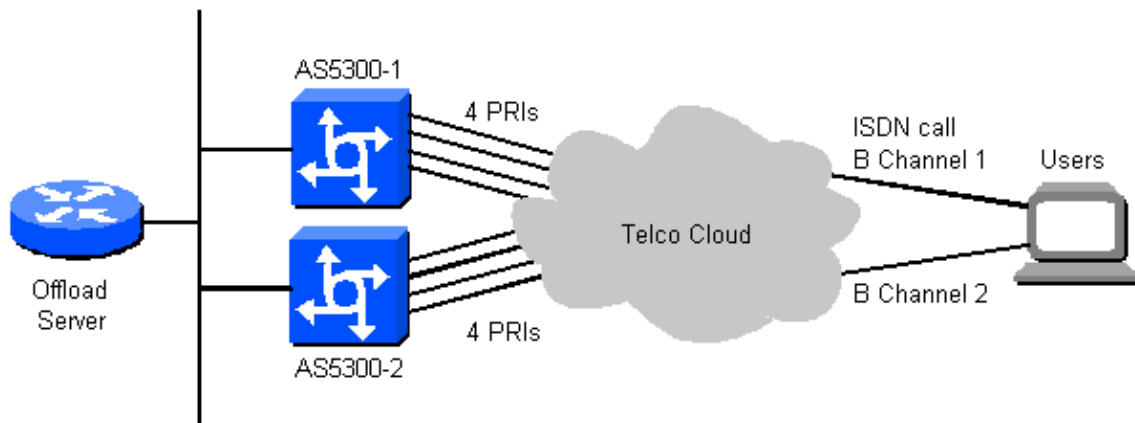
## Configure

In this section, you are presented with the information to configure the features described in this document.

**Note:** To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

## Network Diagram

This document uses this network setup:



## Configurations

This document uses three configurations. Click on each to view their respective configuration.

- Cisco AS5300-1
- Cisco AS5300-2
- Offload Server

## Cisco AS5300-1

```
!  
version 12.0  
service timestamps debug datetime msec  
service timestamps log datetime msec  
!  
hostname as5300-1  
!  
aaa new-model  
aaa authentication login default local  
aaa authentication login CONSOLE none  
aaa authentication ppp default if-needed local  
enable password somethingSecret  
!  
username MMLP_stack password 0 knock-knock  
username admin password 0 open4me  
!  
ip subnet-zero  
no ip domain-lookup  
!  
sgbp group MMLP_stack  
sgbp member as5300-2 10.100.0.2  
sgbp member offload-rtr 10.100.0.250  
sgbp ppp-forward  
isdn switch-type primary-5ess  
!  
controller T1 0  
framing esf  
clock source line primary  
linecode b8zs  
pri-group timeslots 1-24  
!  
controller T1 1  
framing esf  
clock source line secondary 1  
linecode b8zs  
pri-group timeslots 1-24  
!  
controller T1 2  
framing esf  
linecode b8zs  
pri-group timeslots 1-24  
!  
controller T1 3  
framing esf  
linecode b8zs  
pri-group timeslots 1-24  
!  
interface Ethernet0  
ip address 10.100.0.1 255.255.255.0  
no ip directed-broadcast  
!  
interface Serial0:23  
no ip address  
no ip directed-broadcast  
encapsulation ppp  
dialer rotary-group 1  
isdn switch-type primary-5ess  
isdn incoming-voice modem  
!  
interface Serial1:23  
no ip address  
no ip directed-broadcast  
encapsulation ppp  
dialer rotary-group 1
```

```
isdn switch-type primary-5ess

isdn incoming-voice modem
!
interface Serial2:23
no ip address
no ip directed-broadcast
encapsulation ppp
dialer rotary-group 1
isdn switch-type primary-5ess
isdn incoming-voice modem
!
interface Serial3:23
no ip address
no ip directed-broadcast
encapsulation ppp
dialer rotary-group 1
isdn switch-type primary-5ess
isdn incoming-voice modem
!
interface FastEthernet0
no ip address
no ip directed-broadcast
shutdown
!
interface Group-Async1
no ip address
no ip directed-broadcast
encapsulation ppp
async mode interactive
ppp authentication chap
ppp multilink
group-range 1 96
!
interface Dialer1
no ip address
no ip directed-broadcast
encapsulation ppp
ppp authentication chap
ppp multilink
!
ip classless
no ip http server
!
line con 0
login authentication CONSOLE
transport input none
line 1 96
autoselect during-login
autoselect ppp
modem Dialin
line aux 0
line vty 0 4
!
end
```

### Cisco AS5300-2

```
!
version 12.0
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname as5300-2
!
```

```
aaa new-model
aaa authentication login default local
aaa authentication login CONSOLE none
aaa authentication ppp default if-needed local
enable password somethingSecret
!
username MMLP_stack password 0 knock-knock
username admin password 0 open4me
!
ip subnet-zero
no ip domain-lookup
!
sgbp group MMLP_stack
sgbp member offload-rtr 10.100.0.250
sgbp member as5300-1 10.100.0.1
sgbp ppp-forward
isdn switch-type primary-5ess
!
controller T1 0
framing esf
clock source line primary
linecode b8zs
pri-group timeslots 1-24
!
controller T1 1
framing esf
clock source line secondary 1
linecode b8zs
pri-group timeslots 1-24
!
controller T1 2
framing esf
linecode b8zs
pri-group timeslots 1-24
!
controller T1 3
framing esf
linecode b8zs
pri-group timeslots 1-24
!
interface Ethernet0
ip address 10.100.0.2 255.255.255.0
no ip directed-broadcast
!
interface Serial0:23
no ip address
no ip directed-broadcast
encapsulation ppp
dialer rotary-group 1
isdn switch-type primary-5ess
isdn incoming-voice modem
!
interface Serial1:23
no ip address
no ip directed-broadcast
encapsulation ppp
dialer rotary-group 1
isdn switch-type primary-5ess
isdn incoming-voice modem
!
interface Serial2:23
no ip address
no ip directed-broadcast
encapsulation ppp
dialer rotary-group 1
isdn switch-type primary-5ess
```

```

 isdn incoming-voice modem
 !
interface Serial3:23
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 dialer rotary-group 1
 isdn switch-type primary-5ess
 isdn incoming-voice modem
 !
interface FastEthernet0
 no ip address
 no ip directed-broadcast
 shutdown
 !
interface Group-Async1
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 async mode interactive
 ppp authentication chap
 ppp multilink
 group-range 1 96
 !
interface Dialer1
 no ip address
 no ip directed-broadcast
 encapsulation ppp
 ppp authentication chap
 ppp multilink
 !
ip classless
no ip http server
 !
line con 0
 login authentication CONSOLE
 transport input none
line 1 96
 autoselect during-login
 autoselect ppp
 modem Dialin
line aux 0
line vty 0 4
 !
end

```

### Offload Server

```

 !
version 12.0
service timestamps debug uptime
service timestamps log uptime
 !
hostname offload-rtr
 !
aaa new-model
aaa authentication login default local
aaa authentication login CONSOLE none
aaa authentication ppp default local
enable password somethingSecret
 !
username MMLP_stack password 0 knock-knock
username santiago password 0 letmein
username admin password 0 open4me
 !

```

```

ip subnet-zero
no ip domain-lookup
!
multilink virtual-template 1
!
sgbp group MMLP_stack
sgbp seed-bid offload
sgbp member as5300-2 10.100.0.2
sgbp member as5300-1 10.100.0.1
!
interface Ethernet0
 ip address 10.100.0.250 255.255.255.0
 no ip directed-broadcast
 media-type 10BaseT
!
interface Ethernet1
 ip address 10.100.1.1 255.255.255.0
 no ip directed-broadcast
 media-type 10BaseT
!
interface Virtual-Template1
 ip unnumbered Ethernet0
 no ip directed-broadcast
 peer default ip address pool IPpool
 ppp authentication chap
 ppp multilink
!
ip local pool IPpool 10.10.10.1 10.10.10.254
ip classless
ip route 0.0.0.0 0.0.0.0 10.100.1.2
no ip http server
!
line con 0
 login authentication CONSOLE
 transport input none
line aux 0
line vty 0 4
!
end

```

## Debug and Verification Tips

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool ( registered customers only ) , which allows you to view an analysis of **show** command output.

- **debug isdn q931** To check ISDN connections as users dial in to see what is happening with the ISDN call (for example, if the connection is being dropped).
- **debug ppp negotiation** To see if a client is passing PPP negotiation; this is when you check for address negotiation.
- **debug ppp authentication** To see if a client is passing authentication. If you are using a version prior to Cisco IOS Software Release 11.2, use the `debug ppp chap` command instead.
- **debug ppp error** To display protocol errors and error statistics associated with PPP connection negotiation and operation.
- **debug vtemplate** To display the cloning of the Virtual-Template interface.
- **show isdn status** The status should be:

◆ Layer 1 = active

◆ Layer 2 = MULTIPLE\_FRAMES\_ESTABLISHED

If Layer 1 is not active, then the wiring adapter or port may be bad or not plugged in. If Layer 2 is in a state of TEI\_Assign, then the router is not talking to the switch.

- **show isdn service** To check the status of the B channels. This command is only used for access servers that support PRI/T1 controllers.
- **show sgbp** To see that all members of the stack group are active.
- **show ppp multilink** To see information on MLP bundles that are active.
- **show user** To display async/sync users currently connected. You will see an entry for the MLP bundle and one for each link in the bundle for those users that have successfully negotiated MLP.
- **debug sgbp hellos** To monitor periodic hello activity between stack group members.
- **debug sgbp events** To track the addition or removal of devices to and from the stack group.
- **debug vpdn l2x-events** To display L2F tunnel and session creation.

## For Modem Troubleshooting

- **debug modem** To see if the router is receiving the right signals from the modem.
- **debug modem csm** To enable the modem management Call Switching Module (CSM) debug mode.

**Note:** Before issuing **debug** commands, refer to Important Information on Debug Commands.

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## Related Information

- **Dial Technology Support Pages**
  - **Tools and Utilities – Cisco Systems**
  - **Technical Support – Cisco Systems**
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Updated: Jan 15, 2008

Document ID: 14963

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