# Équilibrage de charge et basculement L2TP

## Contenu



# Introduction

Ce document explique les capacités d'un concentrateur d'accès L2TP (LAC) qui remplit des fonctions d'Équilibrage de charge et de Basculement aux plusieurs serveurs de réseau L2TP (LNS).

# Conditions préalables

## Conditions requises

Aucune spécification déterminée n'est requise pour ce document.

## Composants utilisés

Ce document n'est pas limité à des versions de matériel et de logiciel spécifiques.

## Conventions

Pour plus d'informations sur les conventions utilisées dans ce document, reportez-vous à

Conventions relatives aux conseils techniques Cisco.

## Équilibrage de charge LNS

En employant le RAYON pour fournir les informations de tunnel de Réseau privé virtuel à accès commuté (VPDN) à un LAC, il est possible d'expédier les utilisateurs du même Service d'identification du numéro composé réacheminé (RDNIS) ou le domaine au multiple LNS. C'est une condition requise quand les tunnels et les sessions entrants doivent être partagés à travers le multiple LNS pour faciliter des niveaux supérieurs de répartition de charge et d'offre de Redondance. Afin d'activer la caractéristique d'Équilibrage de charge, les adresses IP pour chaque LNS qui est disponible car un périphérique du tunnel doit être fourni dans les paires d'attribut/valeur de l'attribut de constructeur-particularité de Cisco (le VSA).

```
Cisco:Avpair = "vpdn:ip-addresses=10.51.6.82,10.51.6.59"
```

« , » Est utilisé comme délimiteur pour indiquer qu'il y a de plusieurs points finaux disponibles au LAC (vous pouvez également employer un espace car le délimiteur pour indiquer la priorité égale des périphériques du tunnel). Le LAC sélectionne que le point final pour l'utiliser a basé sur la sélection aléatoire de la première adresse IP inactive fournie. Si c'est occupé (le LAC ne peut pas se connecter à l'adresse IP) que la prochaine adresse IP est sélectionnée. S'il n'y a aucune adresse IP inactive disponible, la prochaine sélection est basée sur une adresse IP qui est dans « l'état du tunnel ouvert », et finalement une adresse IP qui est « état du tunnel en suspens ».

## Basculement LNS

Le logiciel de Cisco IOS® permet un maximum de six niveaux de priorité en utilisant le multiple LNS. À l'aide du « / » comme délimiteur, vous pouvez affecter les différents groupes prioritaires au LNS qui sont téléchargés au LAC. Ceci permet à certains LNS pour fonctionner en tant que le LNS primaire et d'autres comme sauvegarde. Comme avant, les périphériques du tunnel sont fournis dans les paires d'attribut/valeur VSA de Cisco.

```
Cisco:Avpair = "vpdn:ip-addresses=10.51.6.82/10.51.6.59"
```

« / » Délimiteur indique que 10.51.6.82 est dans le groupe 1 prioritaire et 10.51.6.59 est dans le groupe 2. prioritaire.

## Équilibrage de charge et Basculement LNS

Il est possible d'utiliser l'Équilibrage de charge et le Basculement dans le même profil. Ceci est réalisé à l'aide `vpdn de` paires d'attribut/valeur VSA de Cisco du `« : IP address »`, comme affiché ici :

```
Cisco:Avpair = "vpdn:ip-addresses=
1.1.1.1,2.2.2.2/3.3.3.3,4.4.4.4/5.5.5.5,6.6.6.6"
```

Ceci est interprété en tant que :

- les périphériques du tunnel 1.1.1.1 et 2.2.2.2 sont dans le groupe 1 prioritaire
- les périphériques du tunnel 3.3.3.3 et 4.4.4.4 sont dans le groupe 2 prioritaire
- les périphériques du tunnel 5.5.5.5 et 6.6.6.6 sont dans le groupe 3 prioritaire

La fonction d'Équilibrage de charge est remplie sur le groupe 1 prioritaire - inactif/non-occupé, ouvert, en suspens. Si aucun n'est disponible à ce niveau de priorité, allez au prochain niveau de priorité, et continuez la logique de sélection.

# Essai en laboratoire

Le test dans cette section affiche trois scénarios différents pour l'usage des caractéristiques d'Équilibrage de charge et de Basculement :

- L'Équilibrage de charge LNS utilisant l'attribut/valeur de constructeur-particularité de Cisco appareille
- Le Basculement LNS utilisant l'attribut/valeur de constructeur-particularité de Cisco appareille
- L'Équilibrage de charge et le Basculement LNS utilisant la constructeur-particularité de Cisco attribuent/paires de valeur

## L'Équilibrage de charge LNS utilisant l'attribut/valeur de Constructeur-particularité de Cisco appareille

### Profil RADIUS

Profils d'utilisateur RADIUS et de tunnel sur le serveur Merit RADIUS 3.6B :

```
2500-1 Password = "cisco"
Service-Type = Framed,
Framed-Protocol = PPP,
Framed-IP-Address = 255.255.255.255

dnis:614629 Password = "cisco"
Service-Type = Outbound,
Cisco:Avpair = "vpdn:tunnel-type=l2tp",
Cisco:Avpair = "vpdn:tunnel-id=hgw",
Cisco:Avpair = "vpdn:ip-addresses=10.51.6.82,10.51.6.59",
Cisco:Avpair = "vpdn:l2tp-tunnel-password=hello"
```

## LAC - Configuration

```
aaa new-model
!--- Enables Authentication, Authorization and Accounting functionality. aaa group server radius
NSA_LAB server 10.51.6.3 auth-port 1645 acct-port 0 non-standard ! aaa authentication login
default local aaa authentication ppp default local group NSA_LAB aaa authentication ppp DIAL
group NSA_LAB local aaa authorization network default group NSA_LAB local aaa authorization
network DIAL group NSA_LAB local !--- Authentication and Authorization will be implemented !---
in sequence by the methods configured. vpdn enable !--- Enables the VPDN feature. no vpdn
logging vpdn search-order dnis !--- Once LCP state is open, the dialed number is checked !--- to
see if the remote is a VPDN user. interface Serial0:15 no ip address encapsulation ppp no
logging event link-status dialer rotary-group 1 dialer-group 1 autodetect encapsulation ppp v120
no snmp trap link-status isdn switch-type primary-net5 isdn incoming-voice modem compress stac !
interface Dialer1 ip unnumbered Loopback0 encapsulation ppp no ip mroute-cache dialer-group 1
autodetect encapsulation ppp v120 !--- Allows the encapsulation type to be dynamically set if
the call !--- type is not identified in the ISDN Q.931 Lower Layer Compatibility. peer default
ip address pool default compress stac ppp authentication chap pap DIAL ppp authorization DIAL !-
-- The list-name DIAL is configured, that PPP Authentication and !--- Authorization will use.
ppp chap hostname 5300-1 !--- The name 5300-1 is used for all CHAP challenge and response on !--
- this interface. ppp multilink ! radius-server host 10.51.6.3 auth-port 1645 acct-port 1646
non-standard !--- 'non-standard' indicates that the RADIUS Server will use !--- non standard
RADIUS attributes.
```

## LNS - Configuration

```
aaa new-model
!--- Enables Authentication, Authorization and Accounting functionality. aaa authentication
```

login default local aaa authentication enable default group radius enable aaa authentication ppp default local aaa authentication ppp vpdn group radius none aaa authorization network default local none aaa authorization network vpdn group radius local *!--- Authentication and Authorization will be implemented !--- in sequence by the methods configured.* vpdn enable *!--- Enables the VPDN feature.* vpdn-group 1 accept-dialin protocol l2tp virtual-template 1 local name l2tp-gw l2tp tunnel password 7 1211001B1E04 *!--- The LNS will accept connections from the LAC using L2TP !--- using All Virtual-Access Interfaces that are created will be cloned from !--- Virtual-Template 1. The name 'l2tp-gw' is used to identify the password, !--- that will authenticate the tunnel, is encrypted.* interface Ethernet5/0 ip address 10.51.6.59 255.255.252.0 ! interface Virtual-Template1 ip unnumbered Ethernet5/0 no ip route-cache cef peer default ip address pool default ppp authentication chap vpdn ppp authorization vpdn ! radius-server host 10.51.6.3 auth-port 1645 acct-port 1646 non-standard *!--- 'non-standard' identifies the RADIUS Server will be !--- using nonstandard RADIUS attributes.*

## Debugs pris du LAC

Jan 1 00:32:54.847: %LINK-3-UPDOWN: Interface Serial0:0, changed state to up
Jan 1 00:32:55.027: Se0:0 PPP: Treating connection as a callin
Jan 1 00:32:55.027: Se0:0 PPP: Phase is ESTABLISHING, Passive Open
Jan 1 00:32:55.027: Se0:0 CHAP: Using alternate hostname 5300-1
Jan 1 00:32:55.027: Se0:0 LCP: State is Listen
Jan 1 00:32:55.027: Se0:0 LCP: I CONFREQ [Listen] id 112 len 10
- snip -
**Jan 1 00:32:55.063: Se0:0 LCP: State is Open** Jan 1 00:32:55.063: Se0:0 PPP: Phase is AUTHENTICATING, by this end Jan 1 00:32:55.063: Se0:0 CHAP: Using alternate hostname 5300-1 Jan 1 00:32:55.063: Se0:0 CHAP: O CHALLENGE id 14 len 27 from "5300-1" Jan 1 00:32:55.083: Se0:0 CHAP: I RESPONSE id 14 len 27 from "2500-1" Jan 1 00:32:55.083: Se0:0 PPP: Phase is FORWARDING **Jan 1 00:32:55.083: Se0:0 VPDN: Got DNIS string 614629 Jan 1 00:32:55.083: Se0:0 VPDN: Looking for tunnel -- dnis:614629 --** Jan 1 00:32:55.083: Serial0:0 AAA/AUTHOR/VPDN (480033158): Port='Serial0:0' list='default' service=NET Jan 1 00:32:55.083: AAA/AUTHOR/VPDN: Serial0:0 (480033158) user='dnis:614629' Jan 1 00:32:55.087: Serial0:0 AAA/AUTHOR/VPDN (480033158): send AV service=ppp Jan 1 00:32:55.087: Serial0:0 AAA/AUTHOR/VPDN (480033158): send AV protocol=vpdn Jan 1 00:32:55.087: Serial0:0 AAA/AUTHOR/VPDN (480033158): found list "default" Jan 1 00:32:55.087: Serial0:0 AAA/AUTHOR/VPDN (480033158): Method=NSA_LAB (radius) Jan 1 00:32:55.087: RADIUS: Initial Transmit Serial0:0 id 50 10.51.6.3:1645, Access-Request, len 100 Jan 1 00:32:55.087: Attribute 4 6 0A330644 Jan 1 00:32:55.087: Attribute 5 6 00000000 Jan 1 00:32:55.087: Attribute 26 17 00000009020B5365 Jan 1 00:32:55.087: Attribute 61 6 00000002 Jan 1 00:32:55.087: Attribute 1 13 646E6973 Jan 1 00:32:55.087: Attribute 30 8 36313436 Jan 1 00:32:55.087: Attribute 2 18 F0AF3BC4 Jan 1 00:32:55.087: Attribute 6 6 00000005 Jan 1 00:32:55.091: RADIUS: Received from id 50 10.51.6.3:1645, Access-Accept, len 167 Jan 1 00:32:55.091: Attribute 6 6 00000005 Jan 1 00:32:55.091: Attribute 26 29 0000000901177670 Jan 1 00:32:55.091: Attribute 26 26 0000000901147670 Jan 1 00:32:55.091: Attribute 26 47 0000000901297670 Jan 1 00:32:55.091: Attribute 26 39 0000000901217670 *!--- LAC receives a call, negotiates PPP, LCP is declared Open, !--- the dialed number is queried to ascertain if this is a VPDN customer. !--- VPDN attempts to find an existing tunnel for the user, queries RADIUS for !--- the tunnel information.* Jan 1 00:32:55.091: RADIUS: saved authorization data for user 61F40024 at 61F9813C Jan 1 00:32:55.091: RADIUS: cisco AVPair "vpdn:tunnel-type=l2tp" Jan 1 00:32:55.091: RADIUS: cisco AVPair "vpdn:tunnel-id=hgw" Jan 1 00:32:55.091: RADIUS: cisco AVPair "vpdn:ip-addresses=10.51.6.82,10.51.6.59" Jan 1 00:32:55.095: RADIUS: cisco AVPair "vpdn:l2tp-tunnel-password=hello" Jan 1 00:32:55.095: AAA/AUTHOR (480033158): Post authorization status = PASS_ADD Jan 1 00:32:55.095: AAA/AUTHOR/VPDN: Processing AV service=ppp Jan 1 00:32:55.095: AAA/AUTHOR/VPDN: Processing AV protocol=vpdn Jan 1 00:32:55.095: AAA/AUTHOR/VPDN: Processing AV tunnel-type=l2tp Jan 1 00:32:55.095: AAA/AUTHOR/VPDN: Processing AV tunnel-id=hgw **Jan 1 00:32:55.095: AAA/AUTHOR/VPDN: Processing AV ip-addresses= 10.51.6.82,10.51.6.59** Jan 1 00:32:55.095: AAA/AUTHOR/VPDN: Processing AV l2tp-tunnel-password=hello Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: Got tunnel info for dnis:614629 Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: LAC hgw Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: l2tp-busy-disconnect yes Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: l2tp-tunnel-password xxxxxx Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: 2 IP addresses Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: IP 10.51.6.82 Priority 1 Jan 1 00:32:55.095: Se0:0 VPDN/RPMS/: IP 10.51.6.59 Priority 1 **Jan 1 00:32:55.095: Se0:0 VPDN/: curlvl 1 Address 0: 10.51.6.82, priority 1 Jan 1 00:32:55.095: Se0:0 VPDN/: Select non-active address 10.51.6.82, priority 1** *!--- The tunnel information is downloaded, using Cisco VSA. Two LNS IP !--- Addresses are used with a ',' as the delimiter, indicating that both !--- have equal priority. In this case 10.51.6.82 is selected as the tunnel !--- endpoint.* Jan 1 00:32:55.095: Se0:0 VPDN: Find LNS process

created Jan 1 00:32:55.095: Tnl 49467 L2TP: SM State idle Jan 1 00:32:55.095: Tnl 49467 L2TP: O SCCRQ Jan 1 00:32:55.099: Tnl 49467 L2TP: Tunnel state change from idle to wait-ctl-reply Jan 1 00:32:55.099: Tnl 49467 L2TP: SM State wait-ctl-reply **Jan 1 00:32:55.099: Se0:0 VPDN: Forward to address 10.51.6.82** Jan 1 00:32:55.099: Se0:0 VPDN: Pending Jan 1 00:32:55.099: Se0:0 VPDN: Process created Jan 1 00:32:55.191: Tnl 49467 L2TP: I SCCRP from l2tp-gw Jan 1 00:32:55.191: Tnl 49467 L2TP: Got a challenge from remote peer, l2tp-gw Jan 1 00:32:55.191: Tnl 49467 L2TP: Got a response from remote peer, l2tp-gw Jan 1 00:32:55.191: Tnl 49467 L2TP: Tunnel Authentication success **Jan 1 00:32:55.191: Tnl 49467 L2TP: Tunnel state change from wait-ctl-reply to established** Jan 1 00:32:55.191: Tnl 49467 L2TP: O SCCCN to l2tp-gw tnlid 62193 Jan 1 00:32:55.195: Tnl 49467 L2TP: SM State established Jan 1 00:32:55.195: Tnl/Cl 49467/16 L2TP: Session FS enabled Jan 1 00:32:55.195: Tnl/Cl 49467/16 L2TP: Session state change from idle to wait-for-tunnel Jan 1 00:32:55.195: Se0:0 Tnl/Cl 49467/16 L2TP: Create session Jan 1 00:32:55.195: Tnl 49467 L2TP: SM State established Jan 1 00:32:55.195: Se0:0 Tnl/Cl 49467/16 L2TP: O ICRQ to l2tp-gw 62193/0 Jan 1 00:32:55.195: Se0:0 Tnl/Cl 49467/16 L2TP: Session state change from wait-for-tunnel to wait-reply Jan 1 00:32:55.195: Se0:0 VPDN: 2500-1 is forwarded Jan 1 00:32:55.327: Se0:0 Tnl/Cl 49467/16 L2TP: O ICCN to l2tp-gw 62193/17 **Jan 1 00:32:55.327: Se0:0 Tnl/Cl 49467/16 L2TP: Session state change from wait-reply to established** Jan 1 00:32:56.195: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0:0, changed state to up Jan 1 00:33:00.851: %ISDN-6-CONNECT:Interface Serial0:0 is now connected to 2500-1 Jan 1 00:33:06.111: %ISDN-6-CONNECT: Interface Serial0:1 is now connected to N/A N/A *!--- Second call is received by the LAC, !--- the dialed number is a VPDN customer.* Jan 1 00:33:35.027: As1 LCP: I CONFREQ [Closed] id 1 len 23 - snip - **Jan 1 00:33:39.275: As1 LCP: State is Open** Jan 1 00:33:39.275: As1 PPP: Phase is AUTHENTICATING, by this end Jan 1 00:33:39.275: As1 CHAP: Using alternate hostname 5300-1 Jan 1 00:33:39.275: As1 CHAP: O CHALLENGE id 2 len 27 from "5300-1" Jan 1 00:33:39.383: As1 CHAP: I RESPONSE id 2 len 25 from "paul" Jan 1 00:33:39.383: As1 PPP: Phase is FORWARDING **Jan 1 00:33:39.383: As1 VPDN: Got DNIS string 614629 Jan 1 00:33:39.383: As1 VPDN: Looking for tunnel -- dnis:614629 --** Jan 1 00:33:39.387: Async1 AAA/AUTHOR/VPDN (3019717950): Port='Async1' list='default' service=NET Jan 1 00:33:39.387: AAA/AUTHOR/VPDN: Async1 (3019717950) user='dnis:614629' Jan 1 00:33:39.387: Async1 AAA/AUTHOR/VPDN (3019717950): send AV service=ppp Jan 1 00:33:39.387: Async1 AAA/AUTHOR/VPDN (3019717950): send AV protocol=vpdn Jan 1 00:33:39.387: Async1 AAA/AUTHOR/VPDN (3019717950): found list "default" Jan 1 00:33:39.387: Async1 AAA/AUTHOR/VPDN (3019717950): Method=NSA_LAB (radius) Jan 1 00:33:39.387: RADIUS: Initial Transmit Async1 id 52 10.51.6.3:1645, Access-Request, len 97 Jan 1 00:33:39.387: Attribute 4 6 0A330644 Jan 1 00:33:39.387: Attribute 5 6 00000001 Jan 1 00:33:39.387: Attribute 26 14 0000000902084173 Jan 1 00:33:39.387: Attribute 61 6 00000000 Jan 1 00:33:39.387: Attribute 1 13 646E6973 Jan 1 00:33:39.387: Attribute 30 8 36313436 Jan 1 00:33:39.387: Attribute 2 18 E9164E4C Jan 1 00:33:39.387: Attribute 6 6 00000005 Jan 1 00:33:39.391: RADIUS: Received from id 52 10.51.6.3:1645, Access-Accept, len 167 Jan 1 00:33:39.391: Attribute 6 6 00000005 Jan 1 00:33:39.391: Attribute 26 29 0000000901177670 Jan 1 00:33:39.391: Attribute 26 26 0000000901147670 Jan 1 00:33:39.391: Attribute 26 47 0000000901297670 Jan 1 00:33:39.391: Attribute 26 39 0000000901217670 Jan 1 00:33:39.391: RADIUS: saved authorization data for user 621904CC at 61FAB9EC Jan 1 00:33:39.391: RADIUS: cisco AVPair "vpdn:tunnel-type=l2tp" Jan 1 00:33:39.391: RADIUS: cisco AVPair "vpdn:tunnel-id=hgw" Jan 1 00:33:39.391: RADIUS: cisco AVPair "vpdn:ip-addresses=10.51.6.82,10.51.6.59" Jan 1 00:33:39.391: RADIUS: cisco AVPair "vpdn:l2tp-tunnel-password=hello" Jan 1 00:33:39.395: AAA/AUTHOR (3019717950): Post authorization status = PASS_ADD Jan 1 00:33:39.395: AAA/AUTHOR/VPDN: Processing AV service=ppp Jan 1 00:33:39.395: AAA/AUTHOR/VPDN: Processing AV protocol=vpdn Jan 1 00:33:39.395: AAA/AUTHOR/VPDN: Processing AV tunnel-type=l2tp Jan 1 00:33:39.395: AAA/AUTHOR/VPDN: Processing AV tunnel-id=hgw Jan 1 00:33:39.395: AAA/AUTHOR/VPDN: Processing AV ip-addresses=10.51.6.82,10.51.6.59 Jan 1 00:33:39.395: AAA/AUTHOR/VPDN: Processing AV l2tp-tunnel-password=hello Jan 1 00:33:39.395: As1 VPDN/RPMS/: Got tunnel info for dnis:614629 Jan 1 00:33:39.395: As1 VPDN/RPMS/: LAC hgw Jan 1 00:33:39.395: As1 VPDN/RPMS/: l2tp-busy-disconnect yes Jan 1 00:33:39.395: As1 VPDN/RPMS/: l2tp-tunnel-password xxxxxx Jan 1 00:33:39.395: As1 VPDN/RPMS/: 2 IP addresses Jan 1 00:33:39.395: As1 VPDN/RPMS/: IP 10.51.6.82 Priority 1 Jan 1 00:33:39.395: As1 VPDN/RPMS/: IP 10.51.6.59 Priority 1 Jan 1 00:33:39.395: As1 VPDN/: curlvl 1 Address 1: 10.51.6.59, priority 1 **Jan 1 00:33:39.395: As1 VPDN/: Select non-active address 10.51.6.59, priority 1** *!--- The second non-active endpoint is selected 10.51.6.59 !--- and the control connection is established.* Jan 1 00:33:39.395: As1 VPDN: Find LNS process created Jan 1 00:33:39.395: Tnl 20770 L2TP: SM State idle Jan 1 00:33:39.395: Tnl 20770 L2TP: O SCCRQ Jan 1 00:33:39.399: Tnl 20770 L2TP: Tunnel state change from idle to wait-ctl-reply Jan 1 00:33:39.399: Tnl 20770 L2TP: SM State wait-ctl-reply **Jan 1 00:33:39.399: As1 VPDN: Forward to address 10.51.6.59** Jan 1 00:33:39.399: As1 VPDN: Pending Jan 1 00:33:39.399: As1 VPDN: Process created Jan 1 00:33:39.399: Tnl 20770 L2TP: I SCCRP from l2tp-gw Jan 1 00:33:39.399: Tnl 20770 L2TP: Got a challenge from remote peer, l2tp-gw Jan 1 00:33:39.399: Tnl 20770 L2TP: Got a response from remote peer, l2tp-gw Jan 1 00:33:39.399:

Tnl 20770 L2TP: Tunnel Authentication success Jan 1 00:33:39.399: Tnl 20770 L2TP: Tunnel state change from wait-ctl-reply to established Jan 1 00:33:39.403: Tnl 20770 L2TP: O SCCCN to l2tp-gw tnlid 42921 Jan 1 00:33:39.403: Tnl 20770 L2TP: SM State established Jan 1 00:33:39.403: As1 VPDN: Forwarding... Jan 1 00:33:39.403: Tnl/Cl 20770/17 L2TP: Session FS enabled Jan 1 00:33:39.403: Tnl/Cl 20770/17 L2TP: Session state change from idle to wait-for-tunnel Jan 1 00:33:39.403: As1 Tnl/Cl 20770/17 L2TP: Create session Jan 1 00:33:39.403: Tnl 20770 L2TP: SM State established Jan 1 00:33:39.403: As1 Tnl/Cl 20770/17 L2TP: O ICRQ to l2tp-gw 42921/0 Jan 1 00:33:39.403: As1 Tnl/Cl 20770/17 L2TP: Session state change from wait-for-tunnel to wait-reply Jan 1 00:33:39.403: As1 VPDN: paul is forwarded Jan 1 00:33:39.407: As1 Tnl/Cl 20770/17 L2TP: O ICCN to l2tp-gw 42921/16 **Jan 1 00:33:39.407: As1 Tnl/Cl 20770/17 L2TP: Session state change from wait-reply to established**