# Comprendere la risoluzione dei problemi BGP di base

## Sommario



## Introduzione

Questo documento descrive la procedura per eseguire la risoluzione dei problemi di Border Gateway Protocol (BGP) e la comprensione degli output di base su un Nexus.

## Prerequisiti

### Requisiti

Cisco raccomanda la conoscenza dei seguenti argomenti:

- Switch Nexus
- BGP

### Componenti usati

Le informazioni discusse in questo documento fanno riferimento a dispositivi usati in uno specifico ambiente di emulazione. Su tutti i dispositivi menzionati nel documento la configurazione è stata ripristinata ai valori predefiniti. Se la rete è operativa, valutare attentamente eventuali conseguenze derivanti dall'uso dei comandi.

## Premesse

BGP è un protocollo gateway esterno utilizzato nelle reti su larga scala per consentire lo scambio di informazioni di routing e raggiungibilità tra sistemi autonomi (ASes). È il protocollo di routing principale che attiva il sistema di routing globale Internet.

## Individuazione configurazione implementata per i peer BGP

Verificare che la funzionalità BGP sia abilitata su Nexus 9300.

Identificare e comprendere la configurazione del processo BGP.

```
switch# show running-config bgp

!Command: show running-config bgp
!Running configuration last done at: Tue Jul 18 19:45:05 2023
!Time: Tue Jul 18 19:45:44 2023

version 10.2(4) Bios:version 05.47
feature bgp

router bgp 64512                                -> The AS number of the local BGP speaker.
  router-id 172.17.255.255                      -> BGP speaker identifier.
  address-family ipv4 unicast                   -> Global address family configuration.
    network 10.100.1.0/24                       -> Specifies a network as local to this autonomous system
    redistribute direct route-map permit_all    -> Routes redistribution from other routing protocols (OS
    neighbor 10.1.1.1                           -> IP address of the remote BGP peer.
    remote-as 64512                             -> The AS number of the remote BGP peer.*
    address-family ipv4 unicast                 -> Local address family configuration.
      prefix-list allow_in in                   -> Prefix-list applied at the inbound of the BGP peer. **
      prefix-list allow_out out                 -> Prefix-list applied at the outbound of the BGP peer. *
      soft-reconfiguration inbound always       -> Store the inbound BGP route updates.
  neighbor 172.18.255.255
    remote-as 65535
    update-source loopback10                    -> Interface used to source BGP updates.
    ebgp-multihop 3                             -> Maximum hops to reach peer IP address, it modifies the
    address-family ipv4 unicast
      route-map block_route in                  -> Route-map applied at the inbound of the BGP peer. **
      route-map no_local out                    -> Route-map applied at the outbound of the BGP peer. **
      soft-reconfiguration inbound always
```

Nota: lo stesso ASN configurato in locale e in remoto identifica una sessione iBGP, mentre un ASN diverso configurato identifica una sessione eBGP.

La mappa route ha un valore di gerarchia superiore rispetto a un elenco di prefissi applicato allo stesso peer.

# Come comprendere gli output di base del protocollo BGP

Stato peer BGP

```
switch# show ip bgp summary
BGP summary information for VRF default, address family IPv4 Unicast
BGP router identifier 172.17.255.255, local AS number 64512                              -> Local BGP ID
BGP table version is 67, IPv4 Unicast config peers 2, capable peers 2
20 network entries and 19 paths using 5424 bytes of memory
```

```
BGP attribute entries [6/2112], BGP AS path entries [2/20]
BGP community entries [0/0], BGP clusterlist entries [0/0]
13 received paths for inbound soft reconfiguration
12 identical, 0 modified, 1 filtered received paths using 96 bytes

Neighbor        V    AS    MsgRcvd    MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
10.1.1.1        4 64512        346        334       67    0    0 05:25:12 8            -> BGP peer IP a
172.18.255.255  4 65535        334        327       67    0    0 05:18:00 8
```

Nota: nella sezione Su/Giù viene visualizzato il tempo di attività o inattività della sessione peer BGP.

La sezione State/PfxRcd visualizza lo stato BGP su cui si trova la sessione. Mostra il numero di prefissi appresi dal peer quando lo stato viene stabilito.

| STATI BGP | |
|---|---|
| Inattivo | Questo è il primo stato in cui BGP attende un "evento di avvio". L'evento di avvio si verifica quando un utente configura un nuovo router BGP adiacente o quando viene reimpostato un peering BGP stabilito. |
| Connetti | BGP: attesa del completamento dell'handshake TCP a tre vie. Quando ha esito positivo, continua allo stato OpenSent. In caso di errore, si continua a impostare lo stato Attivo. |
| Active | BGP tenta un altro handshake TCP a tre vie per stabilire una connessione con il router BGP adiacente remoto. Se ha esito positivo, passa allo stato OpenSent. Se il timer ConnectRetry scade, viene ripristinato lo stato Connect. |
| ApriInviato | In questo stato, BGP attende un messaggio Open dal vicino BGP remoto. |
| ApriConferma | BGP attende un messaggio keepalive dal vicino BGP remoto. |
| Stabilito | L'adiacenza del router BGP è completa e i router BGP inviano pacchetti di aggiornamento per scambiare informazioni di routing. |

Comprendere le informazioni peer BGP.

```
switch# show ip bgp neighbors 10.1.1.1
BGP neighbor is 10.1.1.1, remote AS 64512, ibgp link, Peer index 3            -> Peer IP address, remo
  BGP version 4, remote router ID 172.16.255.255                              -> BGP version, Peer Rou
  Neighbor previous state = OpenConfirm                                       -> Previous BGP state
  BGP state = Established, up for 00:05:29                                    -> Current BGP state and
  Neighbor vrf: default                                                       -> VRF used for the peer
  Peer is directly attached, interface Ethernet1/49                           -> Interface used to sou
  Last read 00:00:28, hold time = 180, keepalive interval is 60 seconds       -> Amount of time from l
  Last written 00:00:28, keepalive timer expiry due 00:00:31                  -> Amount of time from l
  Received 363 messages, 0 notifications, 0 bytes in queue
  Sent 354 messages, 1 notifications, 0(0) bytes in queue
  Enhanced error processing: On
    0 discarded attributes
```

```
Connections established 2, dropped 1                                    -> Counters informing th
Last update recd 00:05:28, Last update sent  = 00:05:28                 -> Timer of the last maj
 Last reset by us 00:06:21, due to holdtimer expired error              -> Last reset timer and
Last error length sent: 0
Reset error value sent: 0
Reset error sent major: 4 minor: 0
Notification data sent:
Last reset by peer never, due to No error
Last error length received: 0
Reset error value received 0
Reset error received major: 0 minor: 0
Notification data received:

Neighbor capabilities:
Dynamic capability: advertised (mp, refresh, gr) received (mp, refresh, gr)
Dynamic capability (old): advertised received
Route refresh capability (new): advertised received
Route refresh capability (old): advertised received
4-Byte AS capability: advertised received
Address family IPv4 Unicast: advertised received
Graceful Restart capability: advertised received

Graceful Restart Parameters:
Address families advertised to peer:
  IPv4 Unicast
Address families received from peer:
  IPv4 Unicast
Forwarding state preserved by peer for:
Restart time advertised to peer: 120 seconds
Stale time for routes advertised by peer: 300 seconds
Restart time advertised by peer: 120 seconds
Extended Next Hop Encoding Capability: advertised received
Receive IPv6 next hop encoding Capability for AF:
  IPv4 Unicast  VPNv4 Unicast

Message statistics:
                         Sent               Rcvd
Opens:                      2                  2
Notifications:              1                  0
Updates:                   22                 20
Keepalives:               340                339
Route Refresh:              1                  0
Capability:                 2                  2
Total:                    354                363
Total bytes:             7949               7524
Bytes in queue:             0                  0

For address family: IPv4 Unicast
BGP table version 88, neighbor version 88
8 accepted prefixes (8 paths), consuming 2176 bytes of memory
0 received prefixes treated as withdrawn
11 sent prefixes (11 paths)                                             -> Amount of prefixes ad
Inbound soft reconfiguration allowed(always)
Third-party Nexthop will not be computed.
Inbound ip prefix-list configured is allow_in, handle obtained
Outbound ip prefix-list configured is allow_out, handle obtained
Last End-of-RIB received 00:00:01 after session start
Last End-of-RIB sent 00:00:01 after session start
First convergence 00:00:01 after session start with 11 routes sent

Local host: 10.1.1.2, Local port: 28262
Foreign host: 10.1.1.1, Foreign port: 179
```

```
  fd = 73
```

Informazioni sulla tabella BGP

Questo output visualizza lo stato, l'hop successivo, la metrica, la preferenza locale, il peso e il percorso AS di tutti i prefissi appresi nella tabella BGP.

```
switch# show ip bgp
BGP routing table information for VRF default, address family IPv4 Unicast
BGP table version is 88, Local Router ID is 172.17.255.255
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

   Network            Next Hop            Metric     LocPrf     Weight Path
*>r10.1.1.0/30        0.0.0.0                  0        100      32768 ?
*>i10.100.1.0/24      10.1.1.1                           100          0 i
*>i10.100.2.0/24      10.1.1.1                           100          0 i
*>i10.100.3.0/24      10.1.1.1                           150          0 i
*>i10.100.4.0/24      10.1.1.1                 0         100          0 ?
*>i10.100.5.0/24      10.1.1.1                 0         100          0 ?
*>i10.100.6.0/24      10.1.1.1                 0         100          0 ?
*>i10.100.7.0/24      10.1.1.1                 0         100          0 ?
*>i10.100.8.0/24      10.1.1.1                 0         100          0 ?
*>r172.17.255.255/32  0.0.0.0                  0         100      32768 ?
*>e172.30.1.0/24      172.18.255.255           0                      0 65535 ?
*>e172.30.2.0/24      172.18.255.255           0                      0 65535 ?
*>e172.30.3.0/24      172.18.255.255           0                      0 65535 ?
*>e172.30.4.0/24      172.18.255.255           0                      0 65535 ?
*>e172.30.5.0/24      172.18.255.255           0                      0 65535 65534 65533 ?
*>e172.30.6.0/24      172.18.255.255           0                      0 65535 65534 65533 ?
*>e172.30.7.0/24      172.18.255.255           0                      0 65535 65534 65533 ?
*>e172.30.8.0/24      172.18.255.255           0                      0 65535 65534 65533 ?
*>r192.168.1.0/30     0.0.0.0                  0         100      32768 ?
```

I prefissi vengono annunciati a un router BGP adiacente specifico.

```
switch# show ip bgp neighbors 172.18.255.255 advertised-routes

Peer 172.18.255.255 routes for address family IPv4 Unicast:
BGP table version is 88, Local Router ID is 172.17.255.255
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

   Network            Next Hop            Metric     LocPrf     Weight Path
*>i10.100.1.0/24      10.1.1.1                           100          0 i
*>i10.100.2.0/24      10.1.1.1                           100          0 i
*>i10.100.3.0/24      10.1.1.1                           150          0 i
*>i10.100.4.0/24      10.1.1.1                 0         100          0 ?
```

```
*>i10.100.5.0/24      10.1.1.1                 0        100          0 ?
*>i10.100.6.0/24      10.1.1.1                 0        100          0 ?
*>i10.100.7.0/24      10.1.1.1                 0        100          0 ?
*>i10.100.8.0/24      10.1.1.1                 0        100          0 ?
```

Prefissi ricevuti da un peer BGP prima di qualsiasi filtro (elenco di prefissi e/o mappa delle route)*

```
switch# show ip bgp neighbors 172.18.255.255 received-routes

Peer 172.18.255.255 routes for address family IPv4 Unicast:
BGP table version is 88, Local Router ID is 172.17.255.255
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

   Network            Next Hop            Metric     LocPrf     Weight Path
* e172.18.255.255/32  172.18.255.255           0                     0 65535 ?
*>e172.30.1.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.2.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.3.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.4.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.5.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
*>e172.30.6.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
*>e172.30.7.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
*>e172.30.8.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
```

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Nota È necessario configurare la riconfigurazione soft in ingresso nel sistema adiacente

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Prefissi ricevuti da un peer BGP dopo i filtri (elenco di prefissi e/o mappa di route)

```
switch# show ip bgp neighbors 172.18.255.255 routes

Peer 172.18.255.255 routes for address family IPv4 Unicast:
BGP table version is 88, Local Router ID is 172.17.255.255
Status: s-suppressed, x-deleted, S-stale, d-dampened, h-history, *-valid, >-best
Path type: i-internal, e-external, c-confed, l-local, a-aggregate, r-redist, I-injected
Origin codes: i - IGP, e - EGP, ? - incomplete, | - multipath, & - backup, 2 - best2

   Network            Next Hop            Metric     LocPrf     Weight Path
*>e172.30.1.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.2.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.3.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.4.0/24      172.18.255.255           0                     0 65535 ?
*>e172.30.5.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
*>e172.30.6.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
*>e172.30.7.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
*>e172.30.8.0/24      172.18.255.255           0                     0 65535 65534 65533 ?
```

Informazioni dettagliate sul percorso per un prefisso specifico

```
switch# show ip bgp 172.30.6.0
BGP routing table information for VRF default, address family IPv4 Unicast
BGP routing table entry for 172.30.6.0/24, version 28                                  -> Prefi
Paths: (3 available, best #3)                                                          -> Numbe
Flags: (0x8000001a) (high32 00000000) on xmit-list, is in urib, is best urib route, is in HW

  Path type: external, path is valid, not best reason: Router Id, no labeled nexthop
  AS-Path: 65535 65534 65533 , path sourced external to AS                             -> As Pa
    172.20.255.255 (metric 0) from 172.20.255.255 (172.20.255.255)                     -> Next
      Origin incomplete, MED 0, localpref 100, weight 0

  Path type: external, path is valid, not best reason: newer EBGP path, no labeled nexthop
  AS-Path: 65535 65534 65533 , path sourced external to AS
    172.19.255.255 (metric 0) from 172.19.255.255 (172.19.255.255)
      Origin incomplete, MED 0, localpref 100, weight 0

  Advertised path-id 1
  Path type: external, path is valid, is best path, no labeled nexthop, in rib         -> Path
  AS-Path: 65535 65534 65533 , path sourced external to AS
    172.18.255.255 (metric 0) from 172.18.255.255 (172.18.255.255)
      Origin incomplete, MED 0, localpref 100, weight 0

  Path-id 1 advertised to peers:                                                       -> BGP p
    10.1.1.2
```

---

Nota: *AS-Path rappresenta l'ASN attraversato per raggiungere la posizione in cui ha avuto origine il prefisso.

**Il percorso AS viene letto da destra a sinistra.

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Per esaminare il processo di selezione del miglior percorso in BGP, vedere Selezione del miglior percorso BGP

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