BGP L3VPN Virtual PE

draft-fang-l3vpn-data-center-interconnect-01

L. Fang

R. Fernando

D. Rao

S. Boutros

IETF 88, Vancouver, Nov. 2013

Use Cases

Case 1: End-to-end BGP IP VPN cloud inter-connection
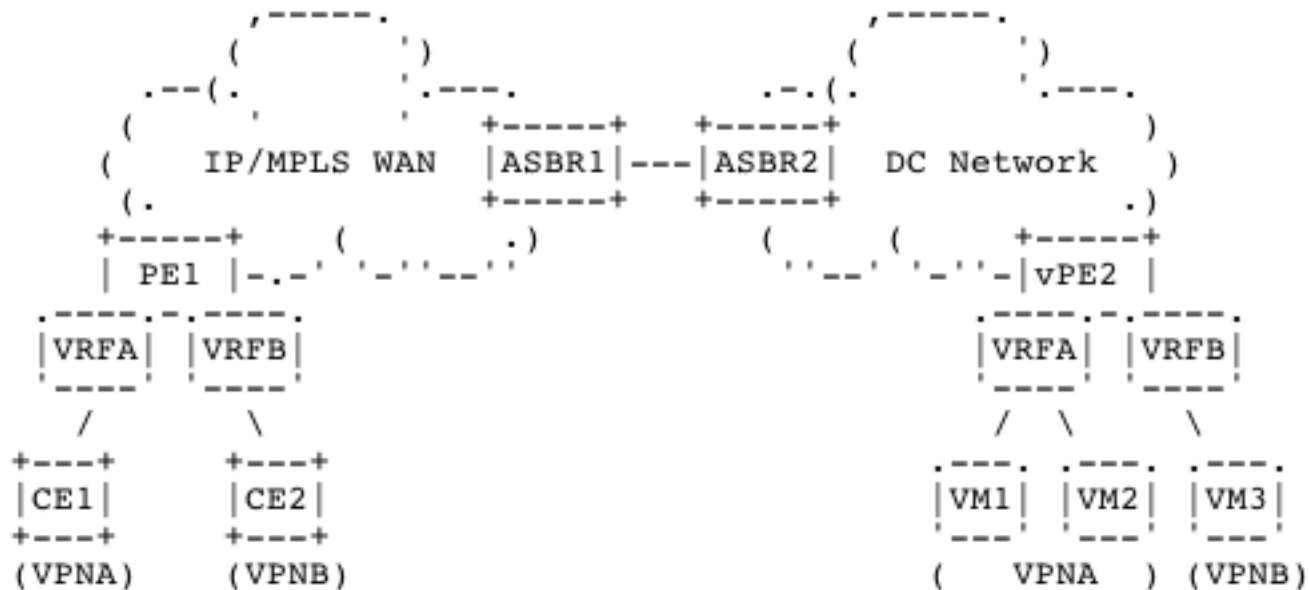
Case 2: Hybrid cloud inter-connection

Strong requirements from multiple service providers for both cases

Update

- No major text changes other than editing from 01 to 02
- Wim discussed potential mapping protocol extensions for inter-connect, Oscar, Ning interested to join the work
- Next step, update the draft with new co-author additions
- Asking for WG adoption when ready
- The rest of the slides are overview, can be quickly summarized
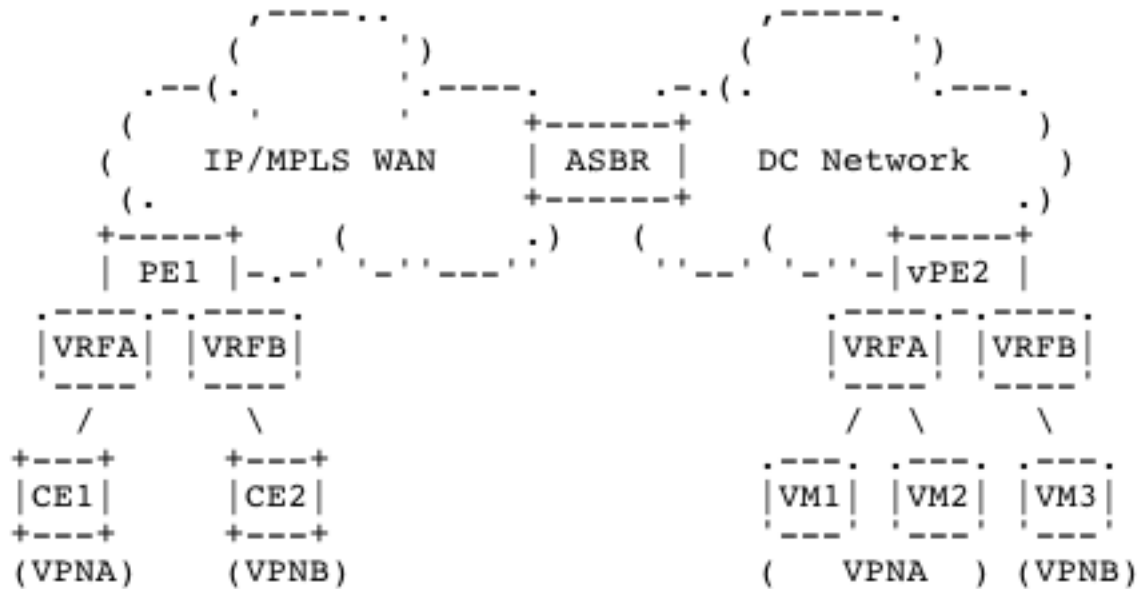
Reference model 1 (a)
End-to-end BGP IP VPN Cloud Inter-connection

- BGP/MPLS IP VPN Inter-Connection with ASBR in each network

Reference model 1 (b)
End-to-end BGP IP VPN cloud inter-connection

```
                ,----..              ,-----.
               (        ')          (        ')
            .--(.          '.----.       .-.(.        .---.
           (      '         '   +------+      )
          (     IP/MPLS WAN    | ASBR |   DC Network     )
           (.                  +------+                .)
         +-----+    (          .)     (     (    +-----+
         | PE1 |-.-'  '-''---''       ''--'  '-''-|vPE2 |
         .----.-.----.                     .----.-.----.
         |VRFA| |VRFB|                      |VRFA|  |VRFB|
         '----' '----'                      '----'  '----'
           /        \                        /  \      \
        +---+      +---+               .---. .---. .---.
        |CE1|      |CE2|               |VM1| |VM2| |VM3|
        +---+      +---+               '---' '---' '---'
       (VPNA)     (VPNB)               (    VPNA   ) (VPNB)
```

- BGP/MPLS IP VPN Inter-Connection with shared ASBR(s)

Reference model 2
BGP/MPLS IP VPN Gateway PE connect to DC vCE Model

```
              ,-----..                    ,-----.
             (        ')                  (          ')
          .--(.       '.----.       .----.           '.----.
         (        '      '       +------|VRFA|               +----+
        (     IP/MPLS WAN        |GW/PE'----' DC Network |vCE4|
        (.                       +------|VRFB|               +----+
    +-----+      (         )'    '----'.(          )-'   |   (VPNB)
    | PE1 |-.-'  '-''-  '                '--'  '+----+      .---.
  .----.-.----.                                 |vCE3|     |VM3|
  |VRFA|  |VRFB|                      (VPNA) +----+     '---'
  '----'  '----'                              /    \
    /        \                          .---..---.
 +---+      +---+                       |VM1||VM2|
 |CE1|      |CE2|                       '---''---'
 +---+      +---+
 (VPNA)     (VPNB)
```
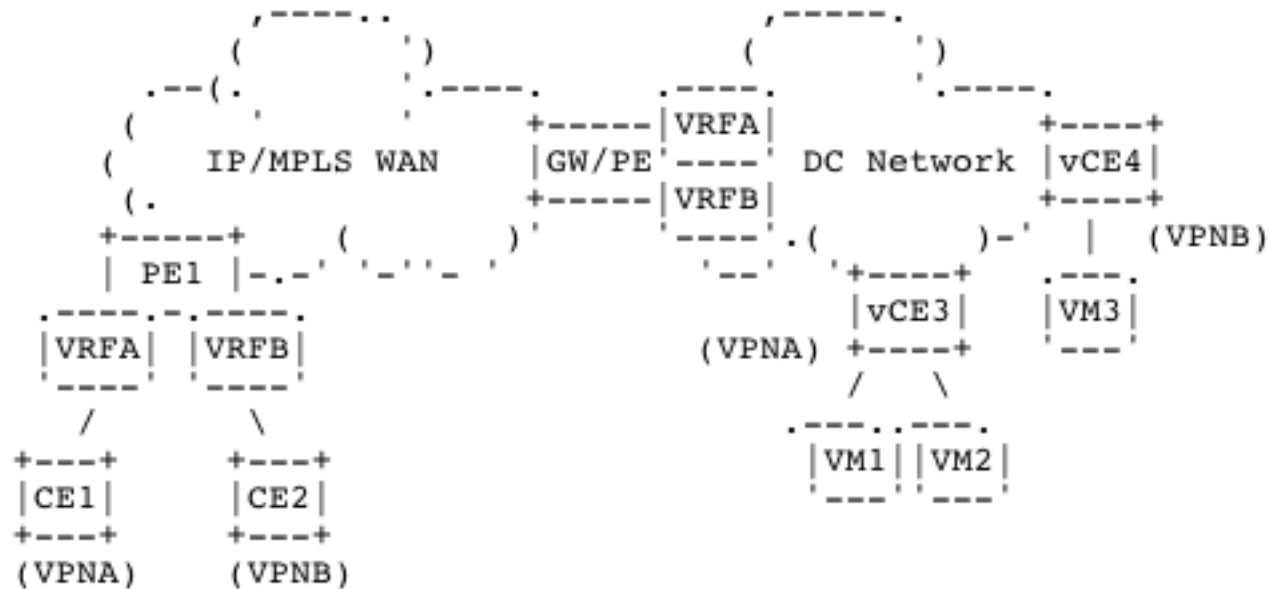
- BGP/MPLS IP VPN GW/PE connect to vCEs (no BGP/MPLS IP VPN in the DC)

Reference model 3
Hybrid inter-connection Model


```
              ,-----.                        ,-----.
            (         ')                    (         ')
         .--(.         '.---.           .-.(.         '.---.
        (       '       ' +-----+   +-----+                )
       (     IP/MPLS WAN  |ASBR |---|DC GW|  DC Network    )
       (.               +-----+   +-----+                .)
      +-----+       (         .)      (     (    +-----+
      | PE1 |-.-'  '-''--''    ''--' '-''-| NVE |
     .----.-.----.                          +-----+
     |VRFA|  |VRFB|                         /  \       \
     '----'  '----'                      .---. .---.  .---.
       /        \                        |VM1| |VM2|  |VM3|
    +---+      +---+                      .---. .---.  .---.
    |CE1|      |CE2|                     ( TenantA)  (TenantB)
    +---+      +---+
   (VPNA)     (VPNB)
```
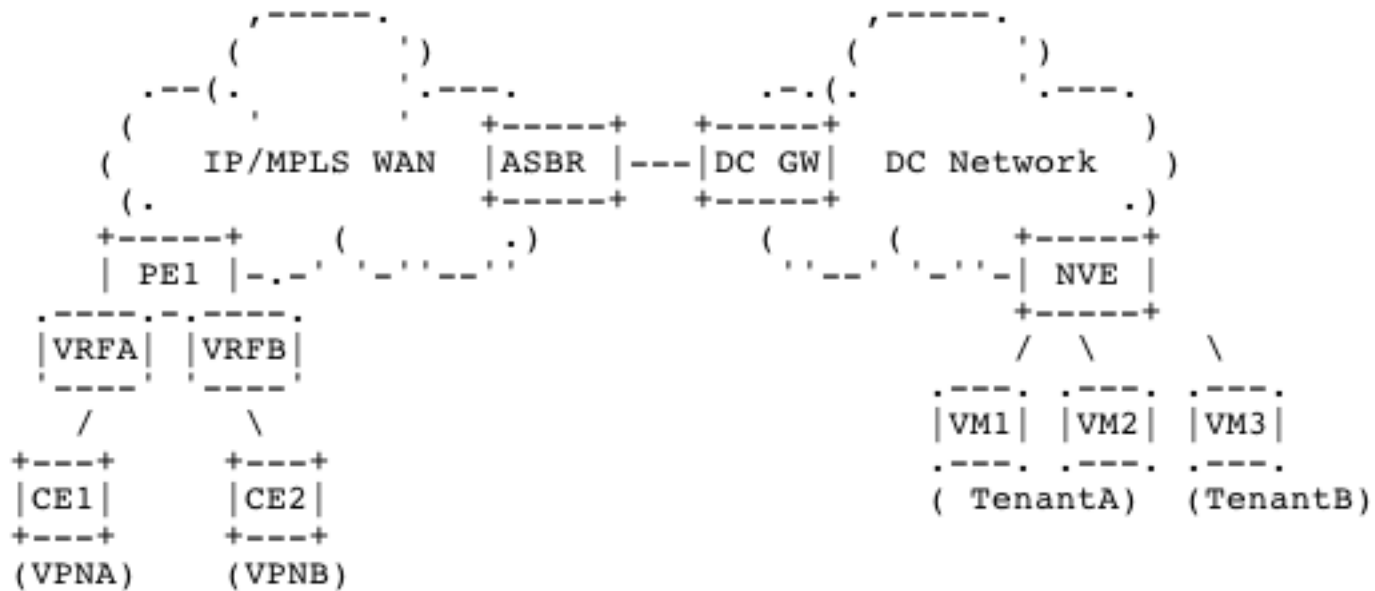
- BGP/MPLS IP VPN GW/PE to vCEs (without BGP/MPLS IP VPN in the DC)

Inter-connect IP VPN between DC and WAN

Options	Description	Scale	Security
Inter-AS Option A	back-to-back VRF	Low (vrfs, ports, rts, bgp sessions)	High (terminating)
Inter-AS Option B	BGP exchange VPN routes	Mid	Mid
Inter-AS Option C	Multihop eBGP exchange VPN-IPv4 Routes, need IGP visibility	High	Low (should not be used in inter-provider)
Single AS	One IGP domain	Low	High (only apply to single operator own DC and net)

- In addition to use RT-constrain [RFC 4648], routes summarization is needed between DC and WAN.

Inter-connect IP VPN and non-IP VPN overlay networks

- Connecting to DC with VXLAN or NVGRE
- Connection models:

  1. VRF Termination
     - The overlay based virtual network terminates into a BGP IP VPN VRF at the DC-WAN Gateway router.
     - The DC gateway performs an IP lookup and MPLS or IP encap.
     - Packet encapsulation with MPLS or IP.

  2. DC-VN and IP VPN Inter-working
     - DC Gateway router performs a direct translation between VN-IDs and IP VPN labels.
     - No IP look-up performed
     - The DC Gateway Router acts as an Inter-AS Option B ASBR peering with other ASBRs.