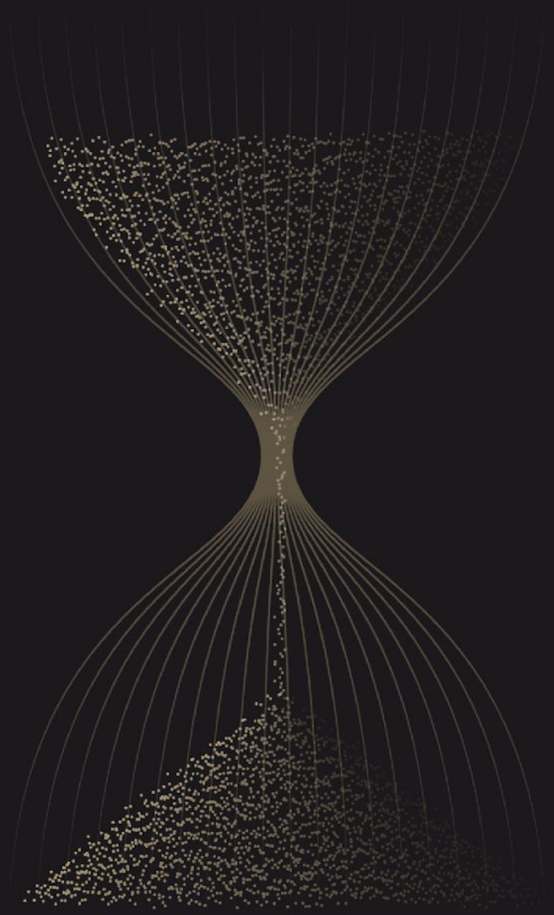

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IL TEMPO DI CAMBIARE.

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Sviluppo della rete di trasporto 100G su apparati NetEngine Huawei interamente su stack IPv6 e protocollo SRv6

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SRv6: Il Tempo di Cambiare

OpenAccess SRv6

Sviluppo rete semplificato

Performance ai massimi livelli

Traffic Engineering intelligente

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SRv6: Il Tempo di Cambiare

Perché SRv6?

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1

COS Dinamica Layer2 e Layer3

Percorsi differenziati per diverse VLAN in scenari di connessione NNI.

Percorsi differenziati per tipologia di traffico afferenti alla solita porta in base alla sorgente e/o destinazione

2

Advanced Traffic Engineering

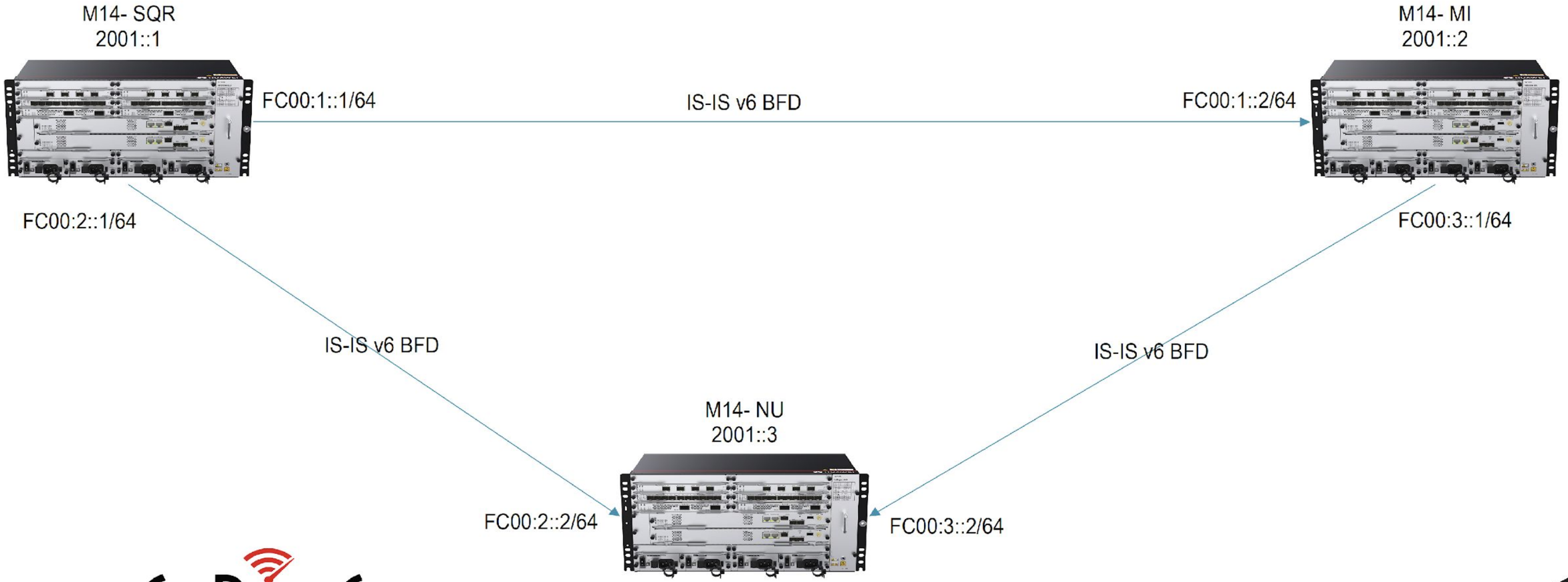
Possibilità di ruotare il traffico in tempo reale in base allo stato del link andando a interrogare tramite telemetry eventuali saturazioni dei rilegamenti o degradi e inserire in database la nuova »Colorazione» del traffico

3

Retrocompatibilità con IPv4

Possibilità di «colorare» il traffico IPv4 e portarlo su diversi segmenti usando Source e Destination Routing

Backbone 100G Full IPv6



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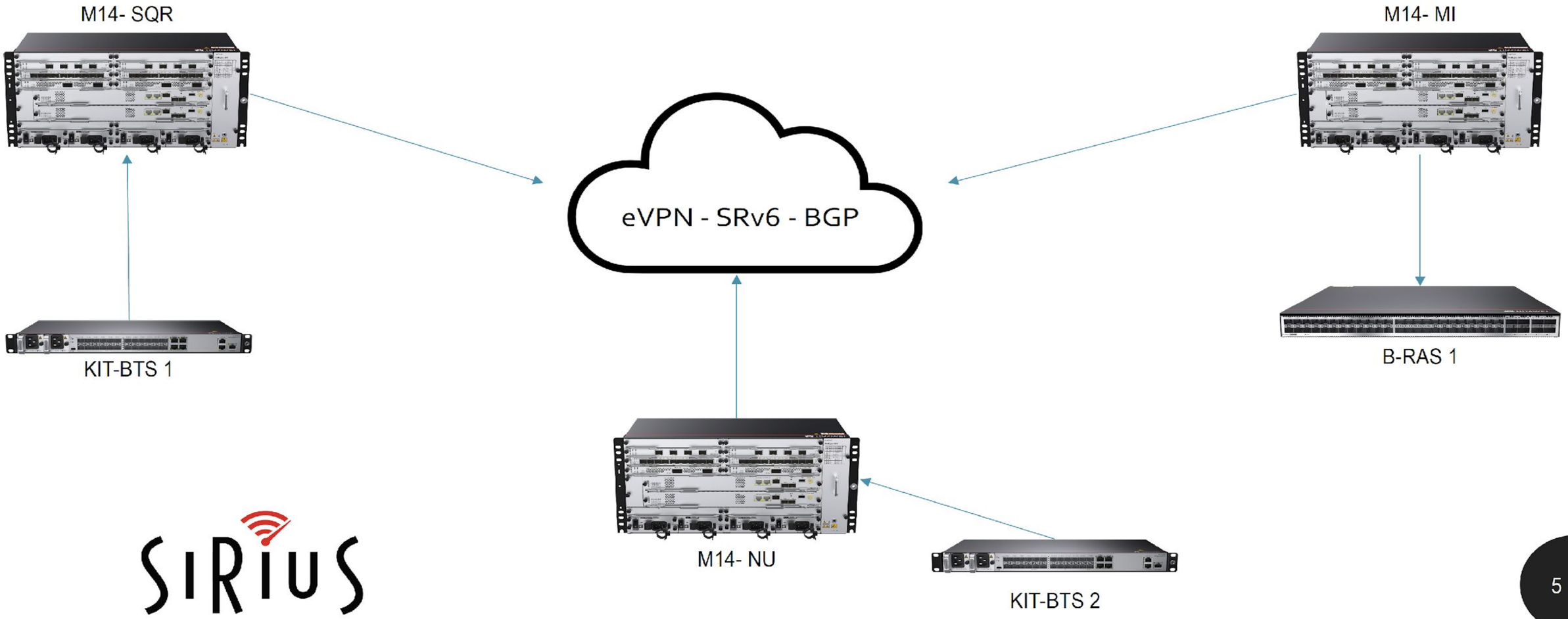
Rete in Accesso eVPN SRv6



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Implementazione del protocollo su segmenti L2 per veicolare gli accessi su un singolo B-RAS

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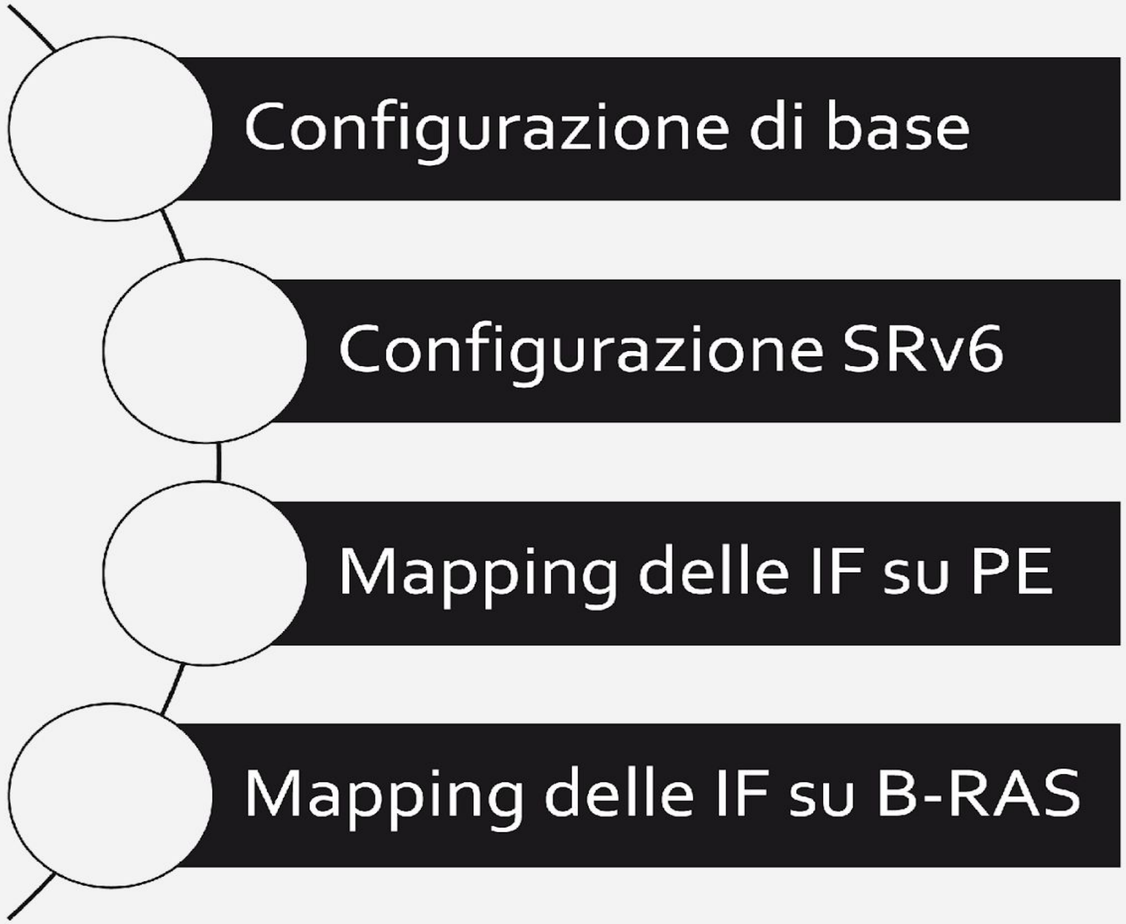

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Configurazione di Base

P2P e Management

SIRIUS

```
interface 100GE0/7/0
        description TO 7/0 HW-M14-MI
        undo shutdown
        Ipv6 enable
        ipv6 address FC00:1::1/64
        ipv6 mtu 9600
        isis ipv6 enable 100
        isis circuit-type p2p
        isis circuit-level level-2
        isis ipv6 cost 100
        undo dcn
#
interface 100GE0/7/0.200
        vlan-type dot1q 200
        description * MNG TO HW-M14-MI *
        ip binding vpn-instance Management
        ip address 172.16.0.1 255.255.255.252
        isis enable 200
#
        undo shutdown
        undo dcn
#
```

Configurazione di Base

Loopback

SIRIUS

```
interface LoopBack0
        description Loopback
        ipv6 enable
        ipv6 address 2001::1/128
        isis ipv6 enable 100
#
interface LoopBack200
        description Loopback Management
        ip binding vpn-instance Management
        ip address 172.16.248.1 255.255.255.255
        isis enable 200
```

Configurazione di Base

IS-IS Parte1

SIRIUS

```
isis 100
        is-level level-2
        cost-style wide
        timer lsp-generation 1 50 50 level-2
        network-entity 01.0100.2001.0001.00
        is-name HW-M14-SQR
        timer spf 1 50 50
        set-overload on-startup
        send-sa-bit 120
        allow external
        #
        ipv6 enable topology ipv6
        ipv6 bfd all-interfaces enable
        ipv6 bfd all-interfaces min-tx-interval 10 min-rx-interval 10 frr-binding
        ipv6 frr
                loop-free-alternate level-2
                ti-lfa level-2
```

Configurazione di Base

IS-IS Parte2

SIRIUS

```
isis 200 vpn-instance Management
        is-level level-2
        network-entity 01.0200.0248.0001.00
        is-name HW-M14-SQR
```

Configurazione di Base

BGP

SIRIUS

```
bgp 65100
        router-id 200.1.0.1
        private-4-byte-as enable
        peer 2001::2 as-number 65100
        peer 2001::2 connect-interface LoopBack0
        peer 2001::3 as-number 65100
        peer 2001::3 connect-interface LoopBack0
        peer 2001::6 as-number 65100
        peer 2001::6 connect-interface LoopBack0
        peer 2001::9 as-number 65100
        peer 2001::9 connect-interface LoopBack0
        peer 2001::12 as-number 65100
        peer 2001::12 connect-interface LoopBack0
        peer 2001::13 as-number 65100
        peer 2001::13 connect-interface LoopBack0
        peer 2001::14 as-number 65100
        peer 2001::14 connect-interface LoopBack0
        peer 2001::15 as-number 65100
        peer 2001::15 connect-interface LoopBack0
#
ipv4-family
        unicast undo synchronization
#
```

Configurazione SRv6

Parte 1


```
segment-routing ipv6
        encapsulation source-address 2001::1
        locator srv6be ipv6-prefix 2002:1:: 84 static 12 args 16
        opcode ::2 end-op
#
Isis 100
        segment-routing ipv6 locator srv6be
        ipv6 avoid-microloop segment-routing
        ipv6 avoid-microloop segment-routing rib-update-delay 10000
```


Configurazione SRv6

Parte 1

SIRIUS

```
bgp 65100
    l2vpn-family evpn
    reflector cluster-id 200.1.0.1
    undo policy vpn-target
    peer 2001::2 enable
    peer 2001::2 advertise encap-type srv6
    peer 2001::3 enable
    peer 2001::3 advertise encap-type srv6
    peer 2001::6 enable
    peer 2001::6 reflect-client
    peer 2001::6 advertise encap-type srv6
    peer 2001::9 enable
    peer 2001::9 reflect-client
    peer 2001::9 advertise encap-type srv6
    peer 2001::12 enable
    peer 2001::12 reflect-client
    peer 2001::12 advertise encap-type srv6
    peer 2001::13 enable
    peer 2001::13 reflect-client
    peer 2001::13 advertise encap-type srv6
    peer 2001::14 enable
    peer 2001::14 reflect-client
    peer 2001::14 advertise encap-type srv6
    peer 2001::15 enable
    peer 2001::15 reflect-client
    peer 2001::15 advertise encap-type srv6
```


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SRv6: Il Tempo di Cambiare

Mapping Interfacce su PE

SIRIUS

```
evpn vpn-instance SRS/CAP-1003 bd-mode
          route-distinguisher 1003:65100
          segment-routing ipv6 best-effort
          segment-routing ipv6 locator srv6be
          vpn-target 65100:65100 export-extcommunity
          vpn-target 65100:65100 import-extcommunity
#
ip vpn-instance Management
          ipv4-family
#
ip vpn-instance Public
          ipv4-family
          ipv6-family
#
ip vpn-instance __LOCAL_OAM_VPN__
          ipv4-family
          ipv6-family
#
bridge-domain 1003
          description SRS/CAP-1003
          evpn binding vpn-instance SRS/CAP-1003
#
interface GigabitEthernet0/2/2
 portswitch
 description TO-KIT-BTS_PI
 undo shutdown
 port link-type trunk
 undo dcn
#
interface GigabitEthernet0/2/2.1003 mode l2
 encapsulation qinq vid 602 ce-vid 2
 bridge-domain 1003
#
```

Mapping Interfacce su BRAS

Parte 1

SIRIUS

```
evpn vpn-instance SRS/CAP-1003 bd-mode
        route-distinguisher 1003:65100
        segment-routing ipv6 best-effort
        segment-routing ipv6 locator srv6be
        vpn-target 65100:65100 export-extcommunity
        vpn-target 65100:65100 import-extcommunity
#
ip vpn-instance Management
        ipv4-family
#
ip vpn-instance Public
        ipv4-family
        ipv6-family
#
ip vpn-instance __LOCAL_OAM_VPN__
        ipv4-family
        ipv6-family
#
```

Mapping Interfacce su BRAS

Parte 2

SIRIUS

```
interface Virtual-Template1
        ip binding vpn-instance Management
        ip address unnumbered
        interface LoopBack200
        ppp authentication-mode auto
        ppp keepalive interval 10 retransmit 3
        pppoe-server ac-name HW-F1A-SQR
#
interface Virtual-Ethernet0/1/2
        ve-group 2 l2-terminate
#
interface Virtual-Ethernet0/1/2.1003 mode l2
        description * SRS/CAP-1003 *
        encapsulation qinq vid 602 ce-vid 2 to 3
        bridge-domain 1003
#
interface Virtual-Ethernet0/1/3
        ve-group 2 l3-access
#
interface Virtual-Ethernet0/1/3.1003
        statistic enable
        user-vlan 2 3 qinq 602
        pppoe-server bind Virtual-Template 1
        bas
        #
                access-type layer2-subscriber
                default-domain authentication siriustec
        #
#
```

Ulteriori Opportunità di Traffic Engineering

- Bilanciare il traffico in scenari dual homing e singola CE mediante trunk e possibilità di differenti instradamenti identificati da mac-source o mac-destination oppure source e/o destination IPv4/IPv6
- Bilanciare il traffico in scenari dual homing dual CE mediante doppia trunk bilanciando in round robin o con mac-source o mac-destination oppure source e/o destination IPv4/IPv6
- Traffico in vie diversificate per ogni VLAN in base al COS o in base alla saturazione/degrado
- Traffico L3 IPv4/V6 in vie diversificate per ogni sorgente/destinazione in base al COS o in base alla saturazione/degrado

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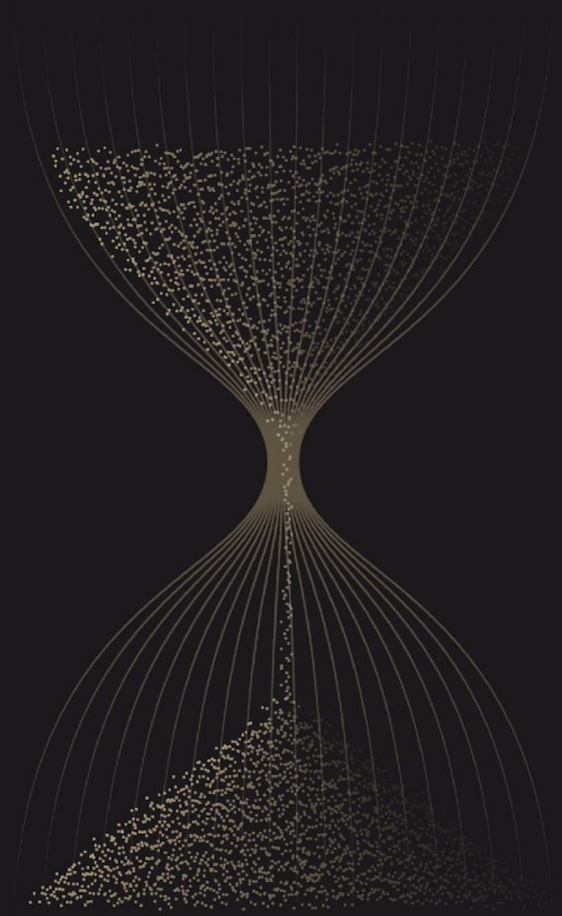

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IL TEMPO DI CAMBIARE.

Grazie dell'attenzione e un ringraziamento a tutti i miei colleghi che hanno contribuito al progetto, Emiljan, Giuseppe, Andrea, Federico, Juri, Fabio e ovviamente Simone.

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