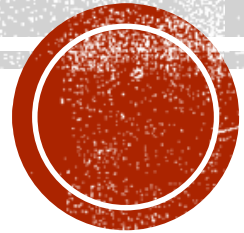
IWAN AND PFR OVERVIEW

INTELLIGENT WAN AND PERFORMANCE ROUTING CONCEPTS

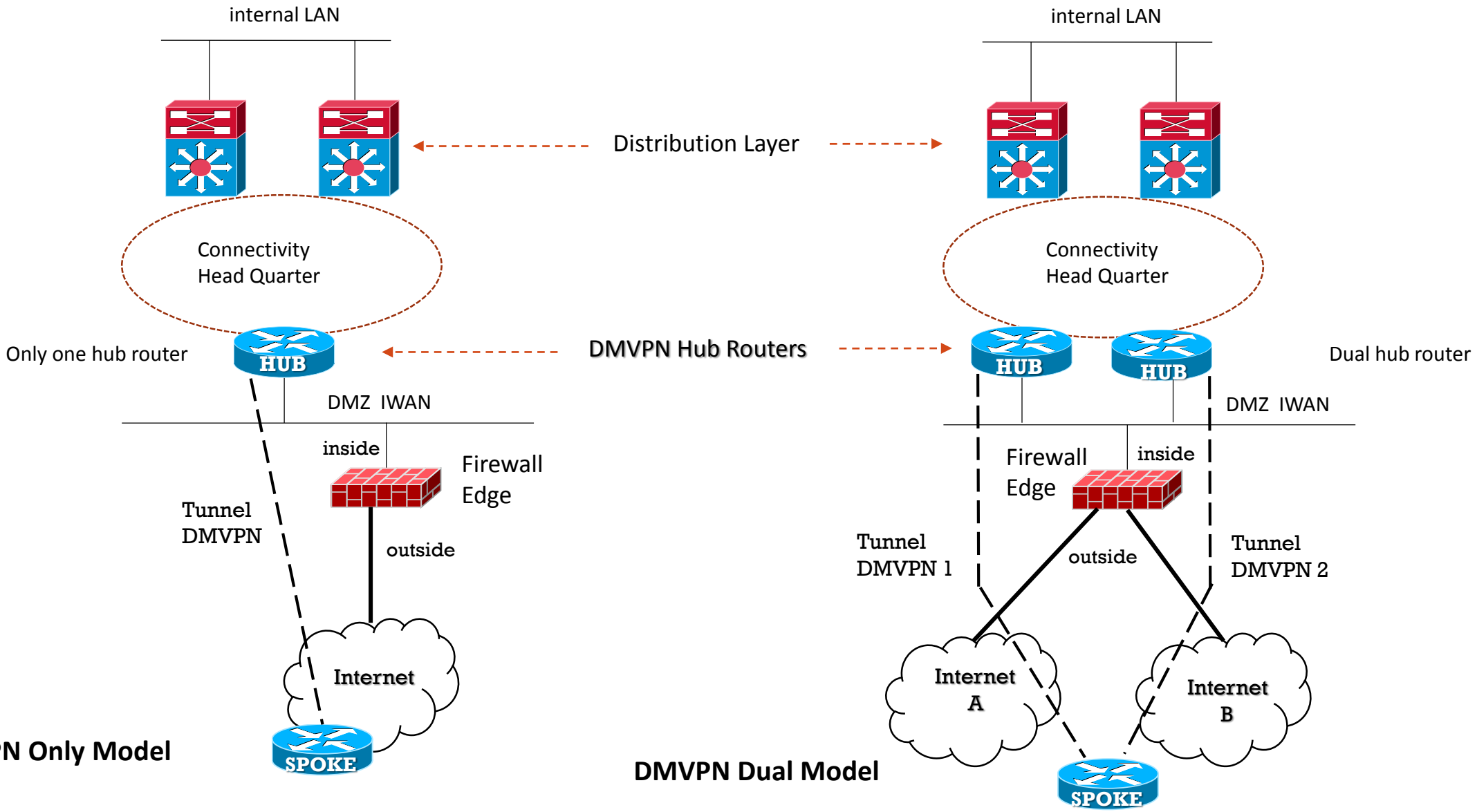
Massimiliano Sbaraglia



DEFINITION

- IWAN: INTELLIGENT WAN = introduce il concetto di NGWAN (Next-Generation WAN) e SDWAN (Software Defined WAN)
  - TID: TRANSPORT INDEPENDENT DESIGN
    - f VRF (Front Door VRF)
    - DMVPN connectivity
  - IPC: INTELLIGENT PATH CONTROL
    - PfR (Performance Routing)
    - IP SLA measurement metrics such delay, loss, jitter
  - AO: APPLICATION OPTIMIZATION
    - AVC (Application Visibility and Control)
    - WAAS (Wide Area Application Services)
    - Akamai Connect
  - SC: SECURE CONNECTIVITY
    - NAT
    - ZFW (Zone-based Policy Firewall)
    - CWS (Cisco Web Security)

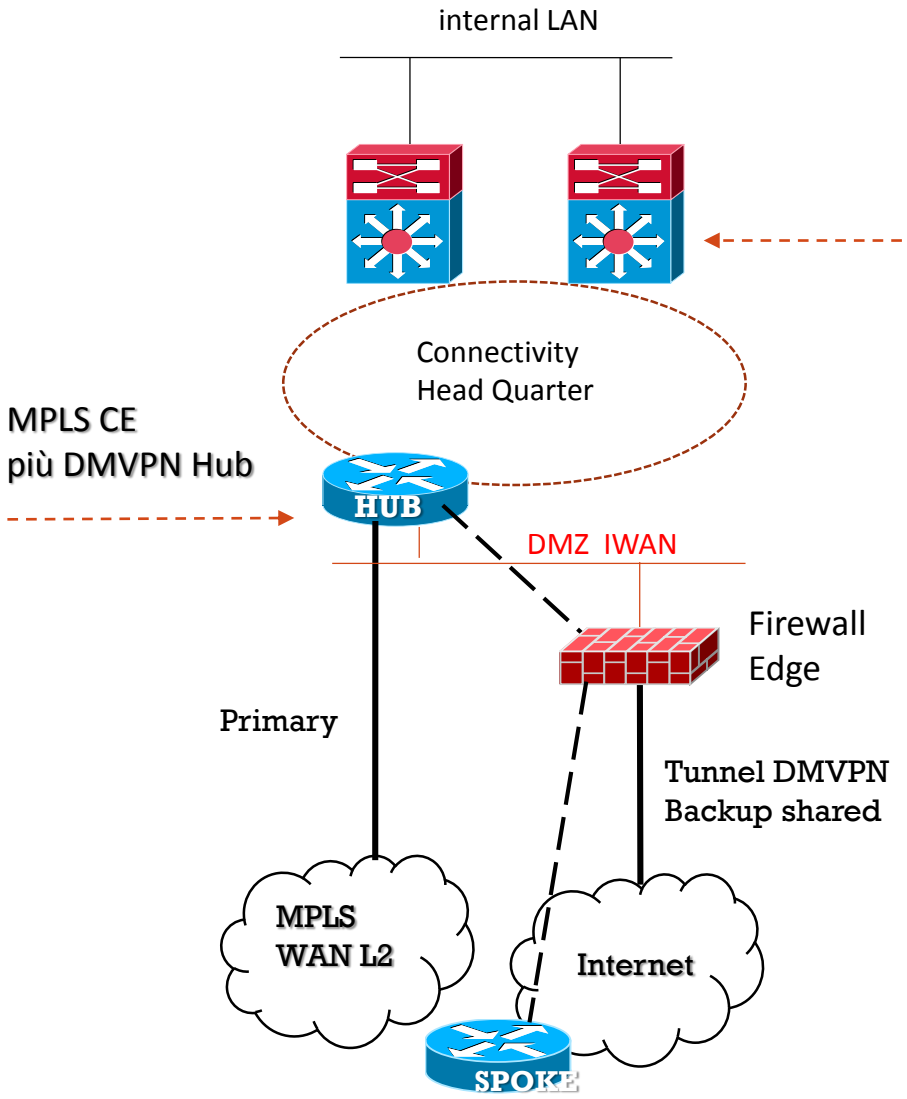
WAN DMVPN ONLY AND DUAL DESIGN



DMVPN Only Model

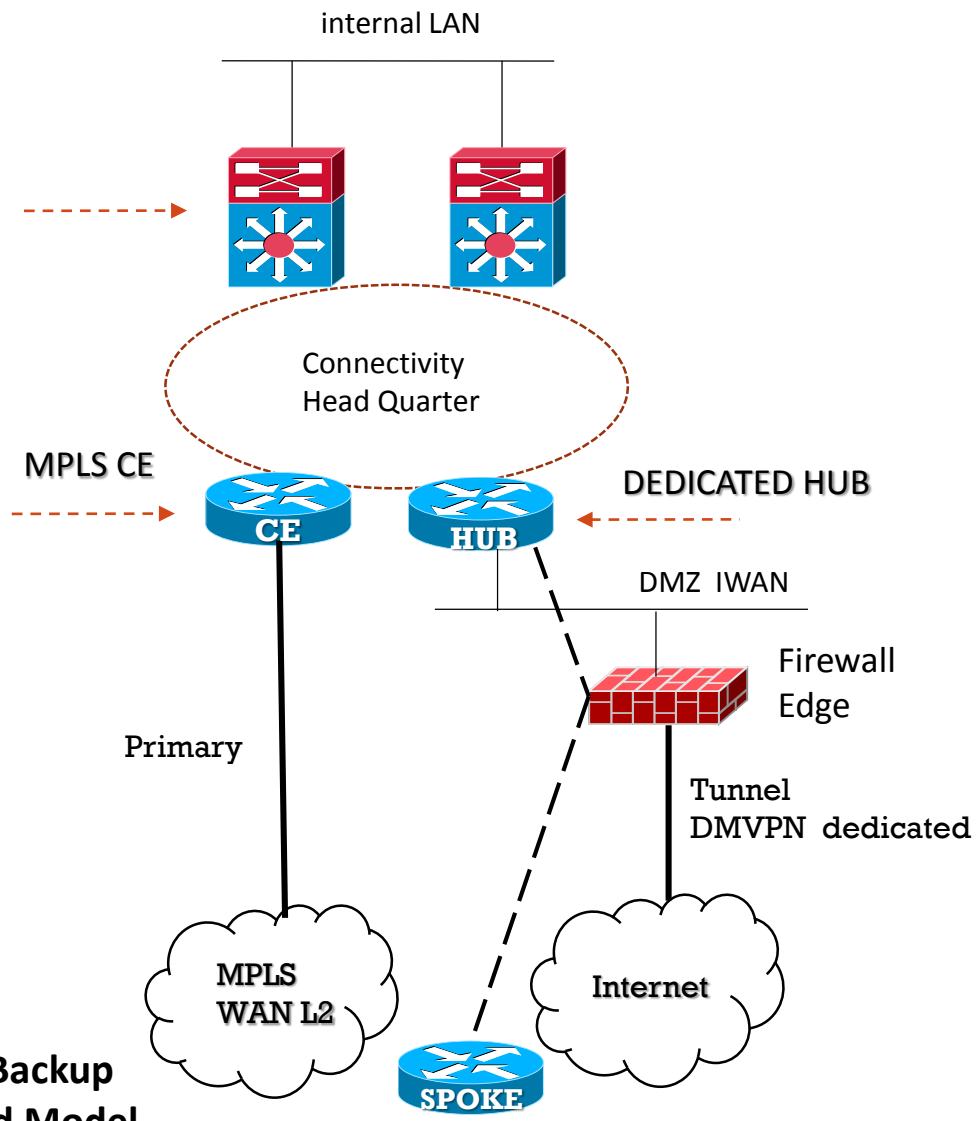
DMVPN Dual Model

WAN DMVPN BACKUP-SHARED AND BACKUP-DEDICATED DESIGN



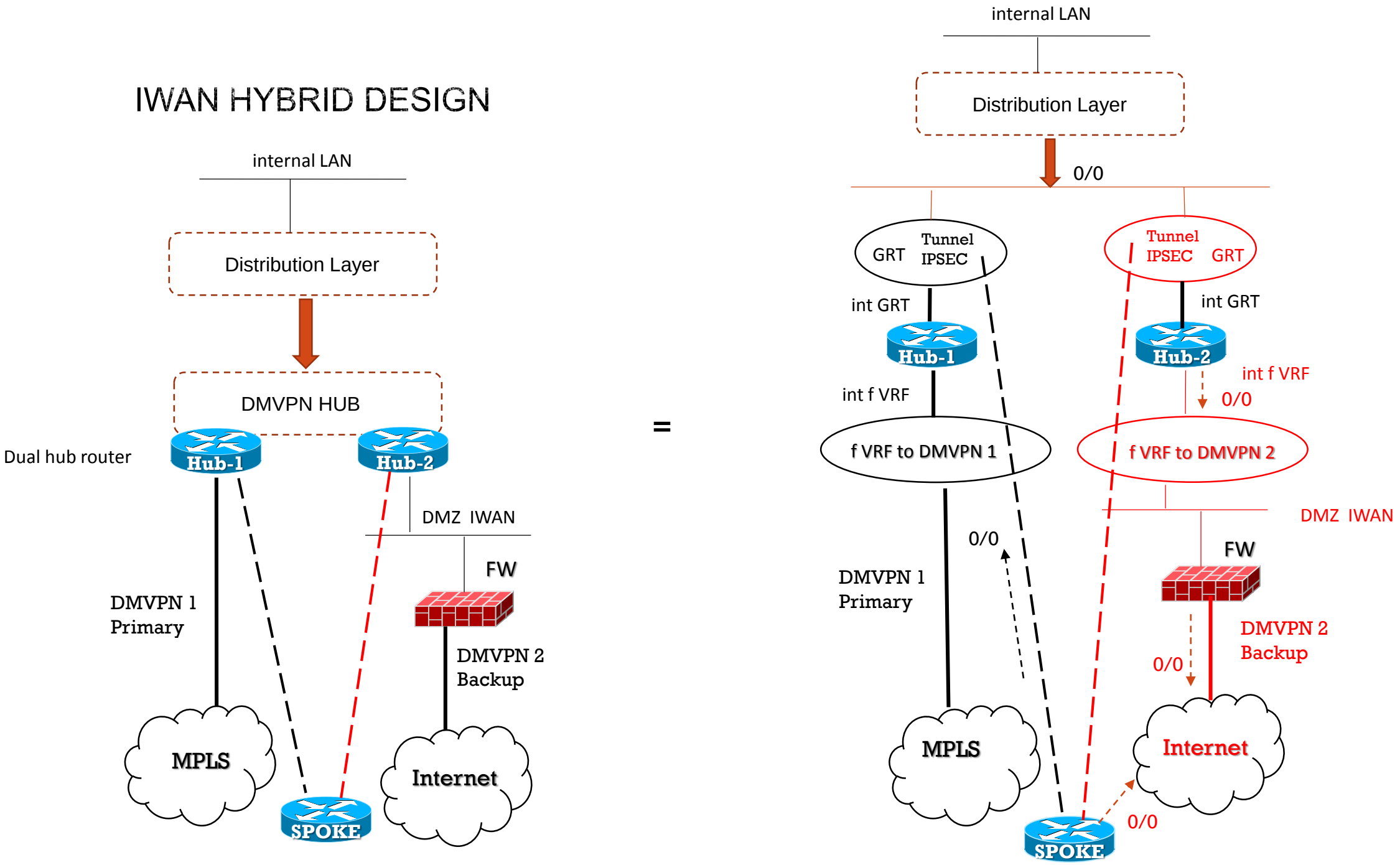
DMVPN Backup Shared

Distribution Layer



DMVPN Backup Dedicated Model

IWAN HYBRID DESIGN



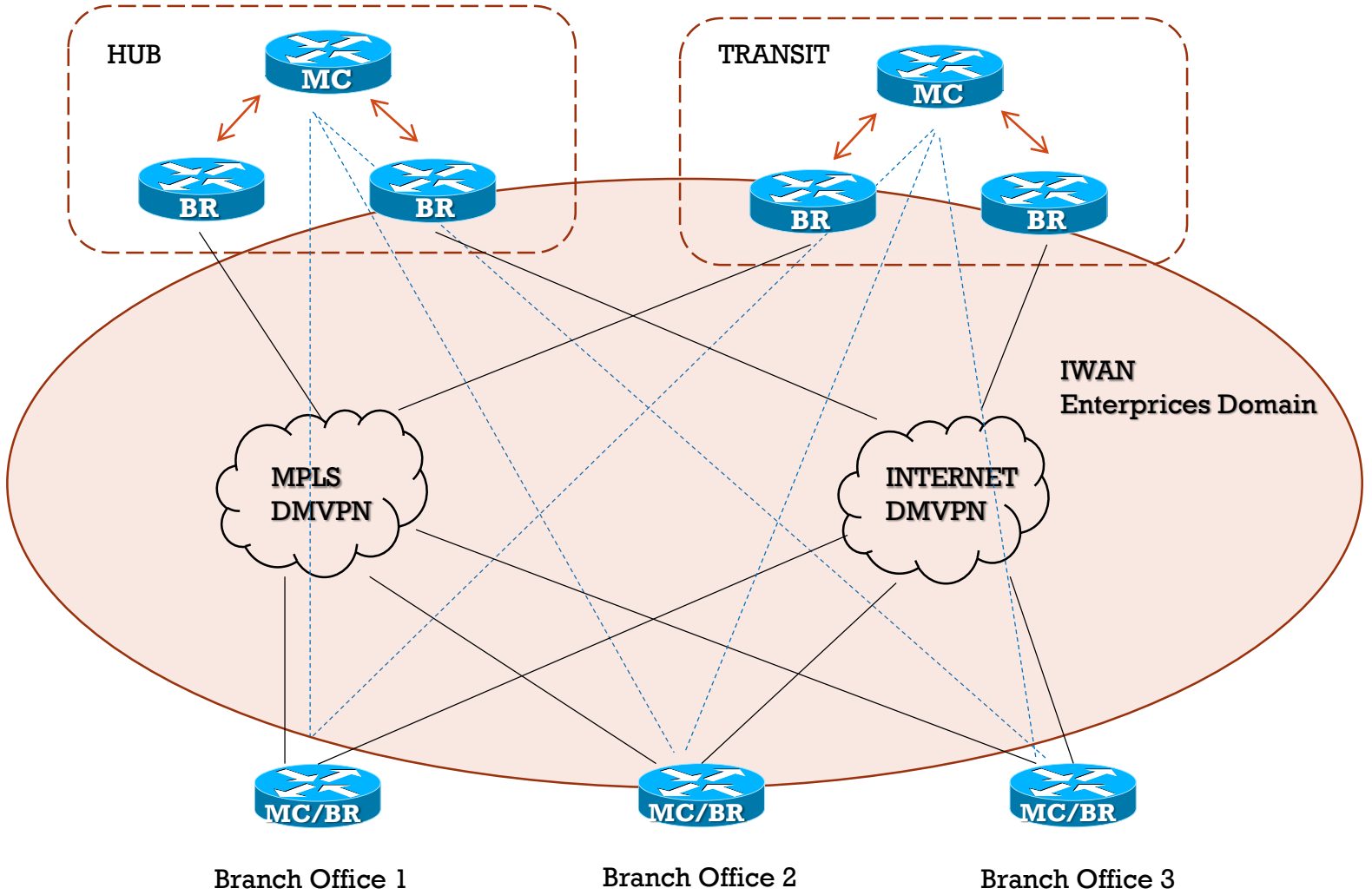
PFR PERFORMANCE ROUTING CONCEPT

- PfR Performance Routing introduce i seguenti concetti:
  - LEARN TRAFFIC CLASSES
    - Application Type and addresses traffic class
    - Detect the traffic where PfR should be applied
  - NETWORK PERFORMANCE
    - Collect performance measurements per traffic class
    - Reachability and topology derived from routing process
    - Passive Mode: NETFLOW derived throughput TCP delay, TCP loss
    - Active Mode: IP SLA derived from delay, jitter, loss, MOS
  - APPLY TRAFFIC POLICY
    - Evaluate performance policies to traffic class measurements
    - Choose the appropriate policy per traffic class (example latency less than 150 ms, loss less than 1%, etc…)

PFR PERFORMANCE ROUTING CONCEPT

- PfR v3 Performance Routing introduce i seguenti concetti:
  - ENFORCE
    - Direct BRs (Direct Border Router) for each traffic class
    - BRs inject best path into FIB
    - Gather new path performance info
  - VERIFY NEW PATH
    - Verify traffic is flowing on new path
    - Revert to previous path if performance remains out-of-policy

PFR V3 PERFORMANCE ROUTING DIAGRAM



PHY connection

MC peering

MC = Master Controller

BR = Border Router

PFR V3 PERFORMANCE ROUTING KEY

- Enterprices Domain: all sites belong to an enterprice domain and connected with peering; the peering is useful for exchange, network discovery and provisioning
- Application Centric: is a simple way to provide policies based on application visibility (AVC) and classificaton throught deep packet inspection engine, NBAR v2 (Network Based Application Recognition). Applications visibility included bandwidth, performance, QoS queue and so on
- Provisioning: simple policy configuration is in a central location and is distributed to all sites via peering
- Discovery: sites are automatic discovered using peering hub-branch; prefixes are advertised along with a site ID and it is used for monitoring and optimization. Wan interface at each sites are discovered using a special probing mechanism.
- Monitoring: PfR v3 uses Unified Monitoring (called Performance Monitor) to control traffic going into WAN links and traffic coming from WAN links; it monitors performance metrics for the DSCP (Differentiate Service Code Point) rather than monitoring on a er flow or per prefix bases
- Probing: PfR v3 uses a lightweight probing that generate traffic when there isn't traffic as well as with data traffic: the router generates RTP traffic, which enable you to measure jitter and packet loss via monitors.
- **Scaling:** PfR v3 uses the platform hardware wherever possible to generate the probes on the border router; cisco PfR v3 uses the existing traffic for probing; when there isn't traffic, PfR v3 uses its own probes to measure important metrics such as delay and jitter

PFR V3 PERFORMANCE ROUTING KEY

- VRF support: PfR v3 offer segmentation (VRF) into different logical networks using separate DMVPN tunnels
- Hub Master Controller (MC): all policies are configured on the hub Master Controller; it acts as master controller for the site and makes optimization decision
- Hub Border Router (BR): are the routers with WAN interfaces and PfR is enabled on there interfaces; an hub BR can support only one transport and will generate discovery probes to help branch sites discover their external interfaces
- Transit Master Controller (TMC): like the Hub MC but in the transit site
- Transit Border Router (TBR): like the Hub BR but in the transit site
- Branch Master Controller (BMC): router Master Controller in the branch site; no policy configuration on this device; it is receive policies from the Hub MC; this device acts as master controller for that site for making optimization decision
- Branch Border Router (BBR): Border Router at the branch site; this device is only configured for enable PfR; the WAN interfaces are detected automatically.