



**Zerotier - Using an Open Source solution to integrate VPNs and start SD-WAN operations**



**Lucenildo Lins de Aquino Júnior**



- SD-WAN
- Zerotier
- LXC - Linux Container
- G8 Solution
- Next Steps
- References



The software-defined wide-area network (SD-WAN or SDWAN) is a specific application of software-defined networking (SDN) technology applied to WAN connections

- Removing potentially expensive routing hardware by provisioning connectivity and services via the cloud
- Emerging SD-WAN technology can also be more flexible.



- Capabilities
  - VPNs, SDN and SD-WAN in single System
  - Abstractions for manage all your connected resources across both local and wide area networks as same LAN
- Encrypted end-to-end
- Takes the most direct path available for minimum latency and maximum performance
- Replaces physical LAN/WAN boundary with a virtual one

## Zerotier - Tech Characteristics



- 100% Compatible with IPv6
- Virtual delegation in IPv4 and IPv6
- Connect all time and over all hurdling
  - Peer-to-Peer connection
  - Relay connections over MOON
  - Relay connections over Root
    - These are San Francisco, New York, Amsterdam, Johannesburg, Sao Paulo, Singapore, Dallas, Toronto, Frankfurt (Germany), Paris, Sydney, and Tokyo
- Clients for all platforms ∴ Desktops, Mobiles, Servers and CPEs

```
lucenildo@lucenildo-G8:~$ sudo zerotier-cli listpeers
```

```
200 listpeers <ztaddr> <path> <latency> <version> <role>
200 listpeers 07b3096bc5 - -1 1.2.12 LEAF
200 listpeers 09c551723b 2804:039c:8c00:0002:f432:ffff:fed3:aa1e/9993;3765;3765 -1 1.2.8 LEAF
200 listpeers 0ade135ddc - -1 1.2.12 LEAF
200 listpeers 10a264ee4a 18.231.171.53/49096;2657;7616 38 1.2.12 LEAF
200 listpeers 234b13db57 191.33.232.110/2052;2657;16692 77 1.2.4 LEAF
200 listpeers 287fc6b648 45.32.165.98/51209;2657;12387 494 1.2.4 LEAF
200 listpeers 2d3b1abd3d 177.235.18.11/9993;619;619 296 1.2.8 LEAF
200 listpeers 30477c0689 177.107.62.19/41474;2657;1323 66 1.2.4 LEAF
200 listpeers 375bb89bc8 189.50.123.214/35161;2657;14666 93 1.2.4 LEAF
200 listpeers 3889192349 - -1 1.2.12 LEAF
200 listpeers 39551bd8cb - -1 1.2.4 LEAF
200 listpeers 3cab07527e 189.50.123.214/37308;3237;3237 65 1.2.12 LEAF
200 listpeers 3e6a849e08 52.67.243.222/9993;2657;7617 38 1.2.8 LEAF
200 listpeers 48b6ff05b7 186.226.82.2/28456;3509;3447 128 1.2.12 LEAF
200 listpeers 4e6b320053 45.32.165.98/55572;2094;2094 661 1.2.4 LEAF
200 listpeers 4f4c43064e - -1 1.2.8 LEAF
200 listpeers 5537af82ba - -1 1.2.4 LEAF
200 listpeers 584324d13a 179.191.96.194/15471;2657;17627 39 1.2.4 LEAF
200 listpeers 7204405e58 189.50.123.214/1404;3424;1382 77 1.2.4 LEAF
200 listpeers 8841408a2e 45.32.198.130/9993;2657;2468 189 1.1.5 PLANET
200 listpeers 88a61a7167 - -1 1.2.12 LEAF
200 listpeers 8a73525762 189.50.123.214/45163;3525;3366 196 1.2.4 LEAF
200 listpeers 8baada7731 189.50.123.214/55082;2550;2550 62 1.2.4 LEAF
200 listpeers 92fe324be1 187.113.35.208/9993;3525;3422 118 1.2.12 LEAF
200 listpeers 937f7b9875 177.189.69.27/1146;3525;3242 846 1.2.12 LEAF
200 listpeers 9d219039f3 107.170.197.14/9993;7660;17471 228 1.1.5 PLANET
200 listpeers 9dd4489dd1 186.226.82.2/42547;3435;1676 130 1.2.12 LEAF
200 listpeers a09acff0233 87.98.218.130/46780;2657;4104 751 1.2.5 LEAF
200 listpeers a0e6e27aae 2804:039c:7003:0000:b867:73ff:fe1a:dc6/9993;2657;2581 43 1.2.4 LEAF
200 listpeers a3f87961d4 2804:039c:3003:0001:ec35:67ff:fed9:646d/9993;2657;12612 51 1.2.4 LEAF
200 listpeers a6a84fb3d5 189.50.123.214/15417;2657;14675 64 1.2.4 LEAF
200 listpeers ac594def8b - -1 1.2.4 LEAF
200 listpeers ac9fccf988 189.50.123.214/1365;3035;2959 65 1.2.4 LEAF
200 listpeers b46d17c585 - -1 1.2.12 LEAF
200 listpeers b9515cc78b - -1 1.2.12 LEAF
200 listpeers ba93306b7f 179.96.63.6/9993;2658;119480 53 1.2.12 LEAF
200 listpeers bbd1e30952 45.65.221.26/11653;3510;3426 82 1.2.12 LEAF
200 listpeers c67e6d1bf2 177.105.237.22/26295;2658;5541 840 1.2.4 LEAF
200 listpeers cc0fee7725 187.183.0.186/39310;3526;3212 306 1.2.4 LEAF
200 listpeers d4528d6e46 170.231.46.171/9993;2658;17627 42 1.2.4 LEAF
200 listpeers d4c0efaa53 179.96.46.2/36680;2658;215 207 1.2.12 LEAF
200 listpeers d86dcc0015 179.191.96.194/65450;3526;3472 38 1.2.12 LEAF
200 listpeers e263677c6e 189.50.123.214/1849;2658;12576 76 1.2.4 LEAF
200 listpeers f0a3c49b83 189.50.123.214/1523;2658;2590 66 1.2.12 LEAF
```

```
lucenildo@lucenildo-G8:~$
```

# LXC - Linux Container



- Containers System
  - Offers a closer environment to virtual machine
  - Without separate kernel
  - Without simulating all the hardware
- Tech Characteristics
  - Easy manager over Restful API
  - Compatible with openstack
  - Device passthrough
  - Network Management

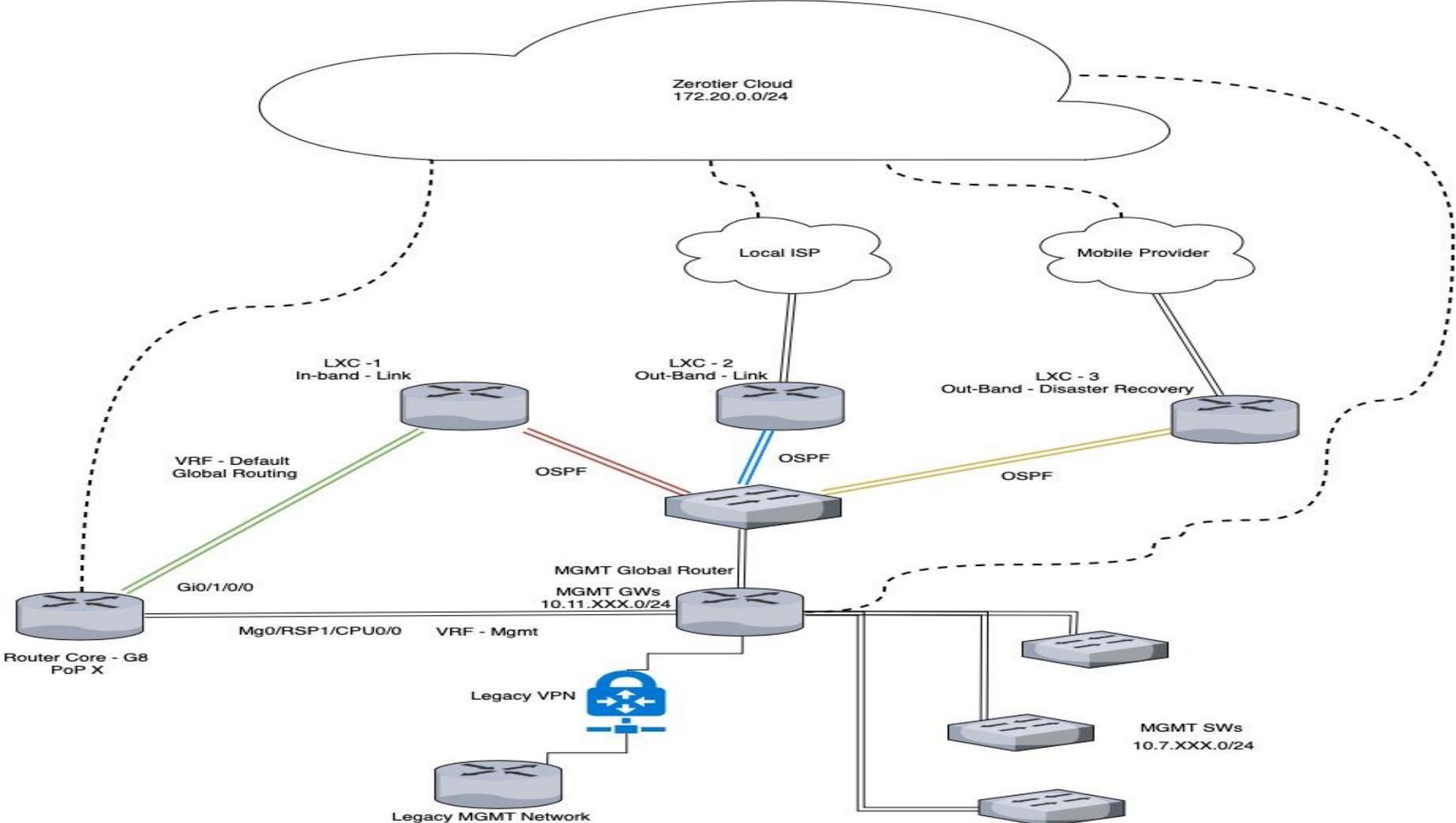
## G8 Solution



- Architectural proposal for integrated concepts of SD-WAN in G8 Management Network
- Rollout 10 locations with multihoming internet access
  - In-band network
  - Out-of-band(Fiber GPON ou DSL)
  - Out-of-band disaster recovery over 3G or 4G power by Vivo Brazil (Telefonica)
- Provider a secure network for G8 Employments anywhere
- Integrate legacy manager networks in new solutions
  - Old Cisco VPN behind CISCO ASA



- Latency Test
  - NUTTCP Test every 15 minutes during 1 minute
  - `nuttcp -i1 -T60 -N10 -u -R5M -v -v -t 10.11.100.11`
- Link State Test
  - ICMP protocol every 5 minutes;
  - G8 Port Check every 30 sec.



Live Demo



Let's test!!

## Next Steps



- Adding VRRP in place that have two machines;
- Rollout in G8 CPEs for employments.



- <https://support.zerotier.com/knowledgebase.php>
- <https://linuxcontainers.org/lxd/introduction/>
- <https://github.com/zerotier/ZeroTierOne>
- <https://www.cisco.com/c/en/us/solutions/enterprise-networks/sd-wan/index.html#~stickynav=2>



Obrigado! Thanks! Gracias!  
Questions?

You can find me at:  
[lucenildo@g8.net.br](mailto:lucenildo@g8.net.br)