

Performance benchmarking of open source networking solutions

A series of tests were executed to compare leading open source networking solutions including OpenZiti, Netmaker, Tailscale, ZeroTier and Wireguard. We picked solutions which advertise themselves as open source zero trust networking, open source secure networking or open source VPNs.

Methodology

Cloud: Oracle Cloud Platform

- All solutions shall be provisioned on the same VCN
- All setup must have same VM specifications. We used the recommended sizing for medium: VM.Standard.E3.Flex [2 Core OCPU / 8 GB Memory]

Test topology:

- Long Haul → US West [Phoenix] to Singapore
- Short Haul → US West [Phoenix] to US East [Ashburn]
- Short Haul → Mumbai to Singapore

Tooling:

- Tool: iPerf3 with default settings and 60 second tests, run both directions

Results and notes

Although all of these solutions add encryption, so it is not apples-to-apples, open Internet serves as a good baseline.

OpenZiti has endpoints for both edges (e.g. containers or VMs used for cloud-to-cloud or server-to-server data) and individual endpoints (phone, tablet, computer, IoT device). Both were tested.

Some of these solutions have “Fabrics”, essentially software defined networks (SDNs) which enable NAT and firewall traversal in situations in which direct routing fails. This likely accounts for the superior performance of OpenZiti – as a multicloud native solutions, it has Fabric Routers in every cloud, so takes very direct paths. Other solutions seem to be in a limited number of clouds or data centers, causing backhaul.

Open Internet					
Source	Destination	Sender		Receiver	
		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	2.63 GB	377Mbits/s	2.63 GB	377Mbits/s
OCP Mumbai	OCP Singapore	2.29 GB	327 Mbits/s	2.29 GB	327 Mbits/s
OCP Phoenix	OCP Ashburn	2.69 GB	385 Mbits/s	2.68 GB	384 Mbits/s
OCP Ashburn	OCP Phoenix	3.05 GB	437 Mbits/s	3.05 GB	436 Mbits/s
OCP Singapore	OCP Phoenix	821 MB	115 Mbits/s	821 MB	115 Mbits/s
OCP Phoenix	OCP Singapore	536 MB	74.7 Mbits/s	533 MB	74.5 Mbits/s
OpenZiti router endpoints					
Source	Destination	Sender		Receiver	
		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	935 MB	131 Mbits/s	905 MB	127 Mbits/s
OCP Mumbai	OCP Singapore	1.83 GB	263 Mbits/s	1.81 GB	259 Mbits/s
OCP Phoenix	OCP Ashburn	1.24 GB	178 Mbits/s	1.51 GB	216 Mbits/s
OCP Ashburn	OCP Phoenix	1.71 GB	244 Mbits/s	1.69 GB	242 Mbits/s
OCP Singapore	OCP Phoenix	774 MB	108 Mbits/s	754 MB	105 Mbits/s
OCP Phoenix	OCP Singapore	580 MB	81.1 Mbits/s	564 MB	78.5 Mbits/s
OpenZiti device endpoints					
Source	Destination	Sender		Receiver	
		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	656 MB	91.7 Mbits/s	651 MB	90.9 Mbits/s
OCP Mumbai	OCP Singapore	620 MB	85.1 Mbits/s	6.97 MB	975 Kbits/s
OCP Phoenix	OCP Ashburn	689 MB	96.3 Mbits/s	685 MB	95.6 Mbits/s
OCP Ashburn	OCP Phoenix	667 MB	93.1 Mbits/s	573 MB	80.2 Mbits/s
OCP Singapore	OCP Phoenix	557 MB	44.7 Mbits/s	553 MB	74.7 Mbits/s
OCP Phoenix	OCP Singapore	570 MB	79.2 Mbits/s	546 MB	76.3 Mbits/s
NetMaker					
Source	Destination	Sender		Receiver	

		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	205 MB	28.6 Mbits/s	203 MB	28.4 Mbits/s
OCP Mumbai	OCP Singapore	257 MB	35.9 Mbits/s	255 MB	35.6 Mbits/s
OCP Phoenix	OCP Ashburn	270 MB	37.8 Mbits/s	268 MB	37.5 Mbits/s
OCP Ashburn	OCP Phoenix	255 Mbytes	35.6 Mbits/s	253 MB	35.4 Mbits/s
OCP Singapore	OCP Phoenix	118 MB	16.5 Mbits/s	115 MB	16.0 Mbits/s
OCP Phoenix	OCP Singapore	113 MB	15.8 Mbits/s	111 MB	15.5 Mbits/s

Tailscale

Source	Destination	Sender		Receiver	
		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	349 MB	48.8 Mbits/s	348 MB	48.6 Mbits/s
OCP Mumbai	OCP Singapore	236 MB	32.9 Mbits/s	233 MB	32.6 Mbits/s
OCP Phoenix	OCP Ashburn	415 MB	58.0 Mbits/s	413 MB	57.7 Mbits/s
OCP Ashburn	OCP Phoenix	415 MB	58.0 Mbits/s	412 MB	57.5 Mbits/s
OCP Singapore	OCP Phoenix	111 MB	15 Mbits/s	107 MB	15 Mbits/s
OCP Phoenix	OCP Singapore	82.7 MB	11.5 Mbits/s	80.6 MB	11.3 Mbits/s

ZeroTier

Source	Destination	Sender		Receiver	
		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	188 MB	26.3 Mbits/s	183 MB	25.5 Mbits/s
OCP Mumbai	OCP Singapore	227 MB	31.7 Mbits/s	226 MB	31.5 Mbits/s
OCP Phoenix	OCP Ashburn	133 MB	18.6 Mbits/s	133 MB	18.5 Mbits/s
OCP Ashburn	OCP Phoenix	166 MB	23.2 Mbits/s	161 MB	22.6 Mbits/s
OCP Singapore	OCP Phoenix	95.3 MB	13.3 Mbits/s	94.2 MB	13.1 Mbits/s
OCP Phoenix	OCP Singapore	132 MB	18.4 Mbits/s	129 MB	18.1 Mbits/s

Wireguard

Source	Destination	Sender		Receiver	
		Data Transfer	Bit rate	Data Transfer	Bit rate
OCP Singapore	OCP Mumbai	168 MB	23.4 Mbits/s	166 MB	23.2 Mbits/s

OCP Mumbai	OCP Singapore	273 MB	38.2 Mbits/s	270 MB	37.8 Mbits/s
OCP Phoenix	OCP Ashburn	258 MB	36.1 Mbits/s	256 MB	35.8 Mbits/s
OCP Ashburn	OCP Phoenix	321 MB	44.9 Mbits/s	318 MB	44.4 Mbits/s
OCP Singapore	OCP Phoenix	131 MB	18.3 Mbits/s	127 MB	17.7 Mbits/s
OCP Phoenix	OCP Singapore	125 MB	17.5 Mbits/s	122 MB	17.1 Mbits/s