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Low latency cloud connectivity: A practical approach

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Cloud connectivity: challenges

#1
Cloud-based exchanges push public cloud connectivity as the primary network solution but it was not designed for low latency trading

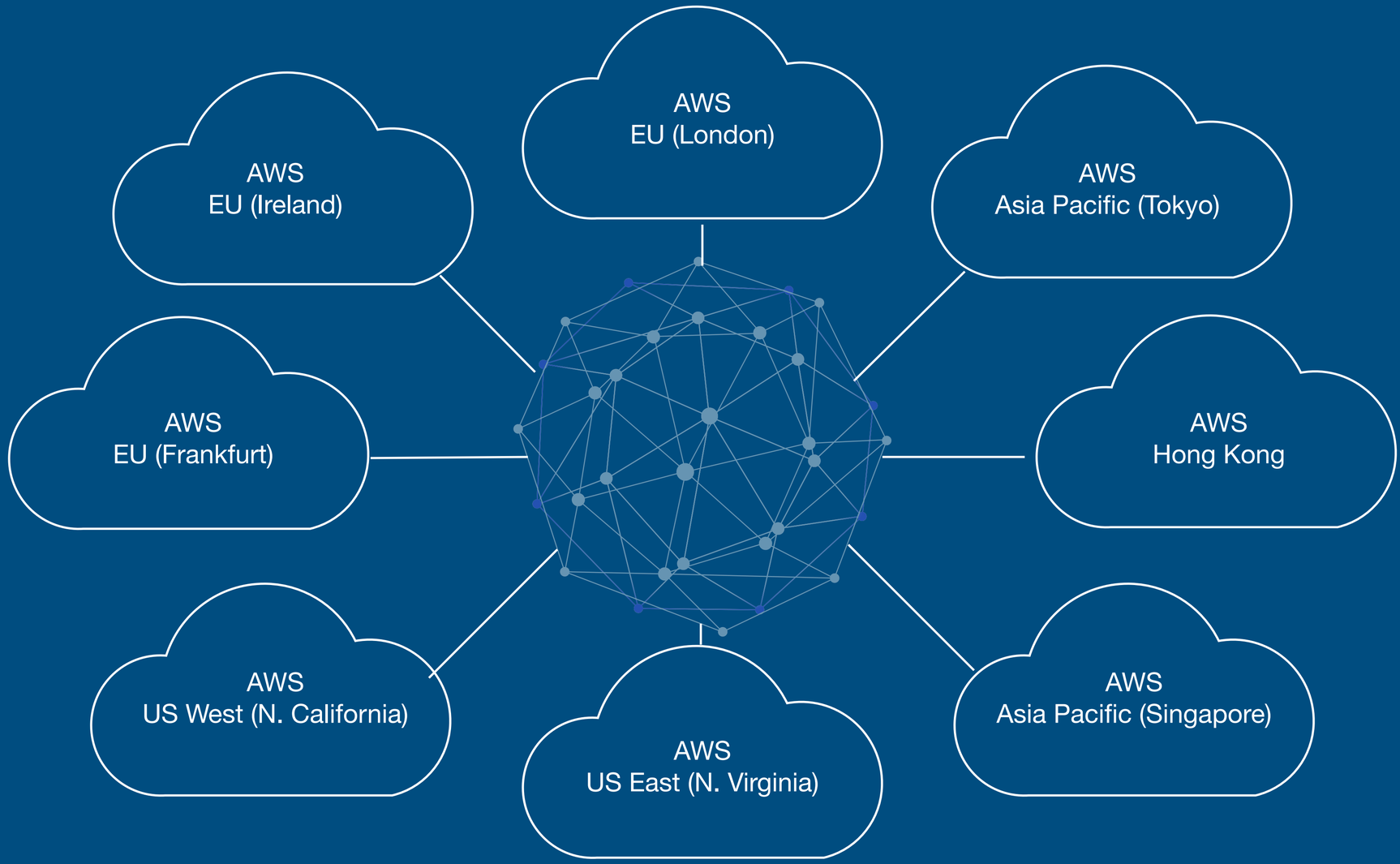
#2
Extra latency in a cloud between client and exchange instances is inevitable and hard to control

#3
Multicast configuration is complicated

Challenge #1

Public cloud connectivity

Connecting different Cloud Regions that are home to major crypto markets...



There are faster ways to connect:

DIFF >10ms between major crypto markets

Point A	Point Z	AWS*	Low latency proprietary network**	DIFF
AWS London	AWS Tokyo	216.09	138.8	-77.29
AWS Dublin	AWS Tokyo	210.93	146.9	-64.03
AWS Singapore	AWS London	176.25	147.65	-28.6
AWS London	AWS San Jose	137.38	120.4	-16.98
AWS Dublin	AWS San Jose	133.28	116.8	-16.48
AWS Tokyo	AWS San Jose	108.75	92.3	-16.45
AWS Ashburn	AWS Tokyo	144.94	134.4	-10.54

*99th Percentile, round trip delay
** via Avelacom's network (not a STAC benchmark)

Low latency proprietary networks vs Public cloud connectivity

- Optimized routes to run latency sensitive applications, controlled delay up to a microsecond
- Backup routes are also latency-optimized
- Network performance is SLA guaranteed
- Established points of presence and direct connects to multiple clouds (AWS, Alibaba, etc.) in data centers that are associated with the same Clouds' Regions

Challenge #2

Extra latency inside clouds

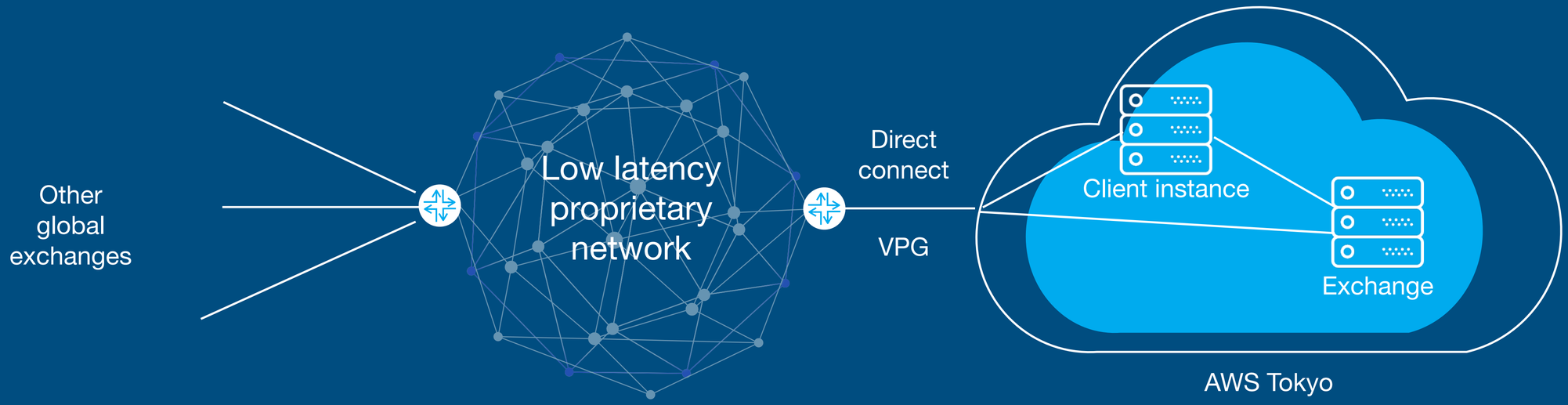
Ways to reduce latency inside clouds:

- Peering with an exchange (direct connect gateway instead of virtual private gateway)
- Running tests in different cloud zones (A, B, C) to ascertain the best location

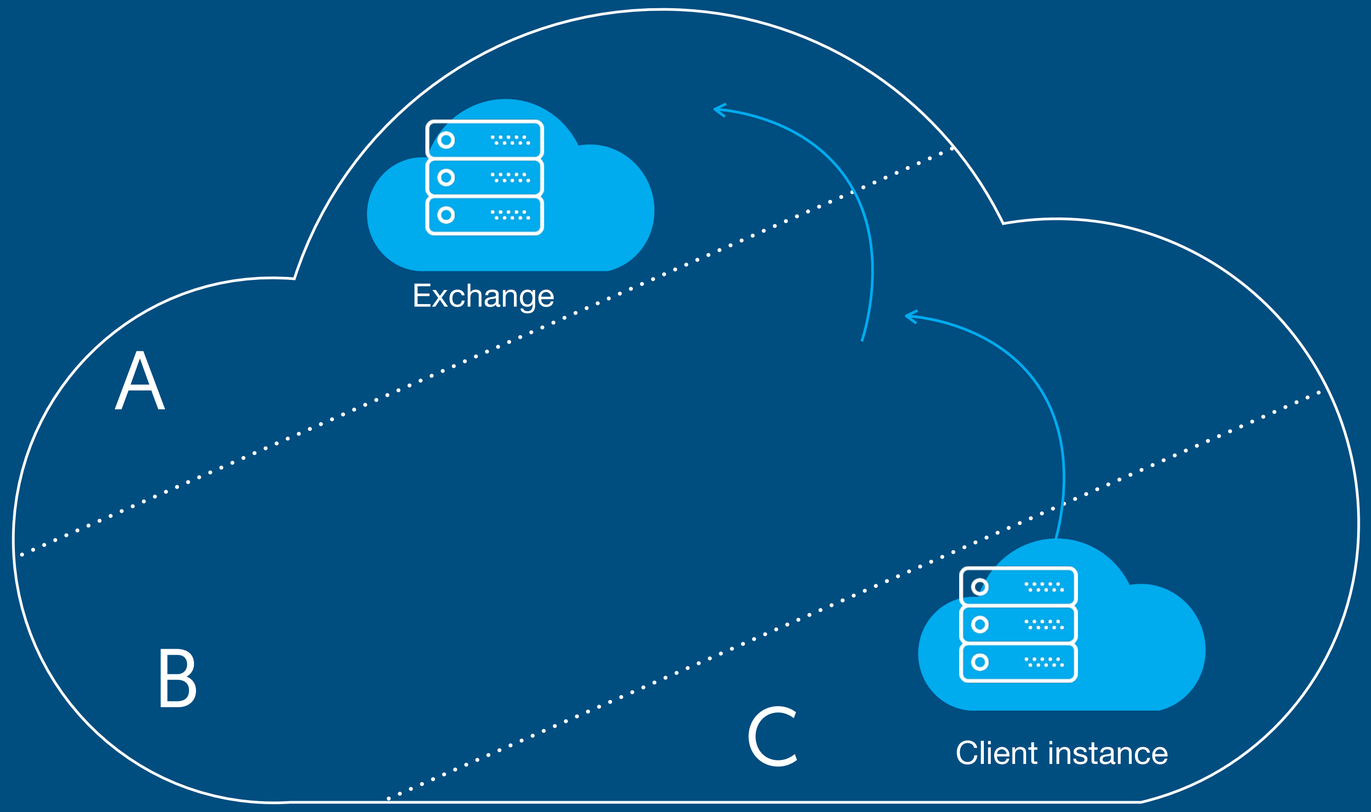
Network diagrams examples

Peering with an exchange

- The lowest latency to access an exchange
- Using direct connect gateway instead of virtual private gateway allows to make multiple peering connections with an exchange and network provider

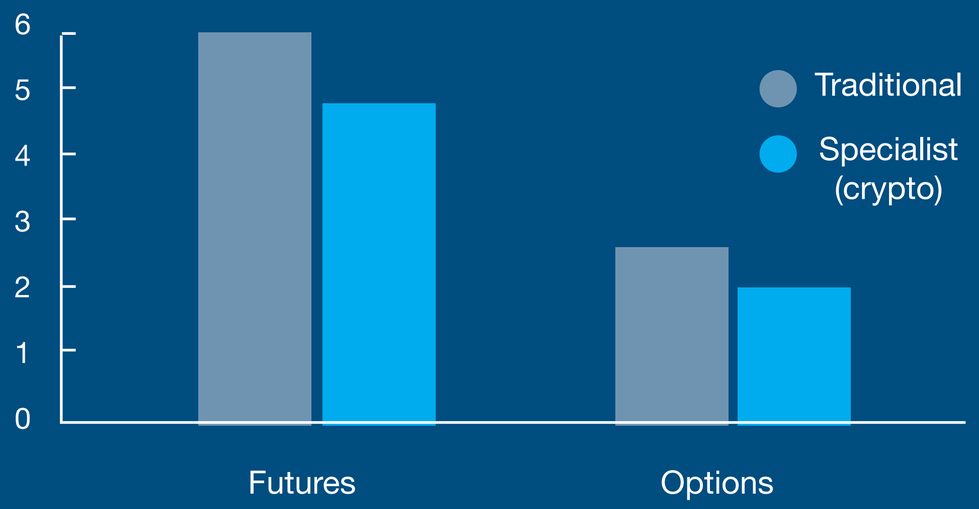


Different availability zones in a Cloud



Crypto traders tend to trade across multiple exchanges with different types of IT infrastructure

Number of exchanges traded



Source: Acuiti's survey, April 2021 (among latency sensitive prop trading firms)

BTC futures open interest ($m)

Binance	3577
Bybit	2894
CME Group	2413
FTX	2256
OKEx	2142
Deribit	1765
Huobi	1472
BitMEX	1420
BTSE	854
Bitfinex	683
Bakkt	49
CoinFLEX	33

Cloud-based exchanges

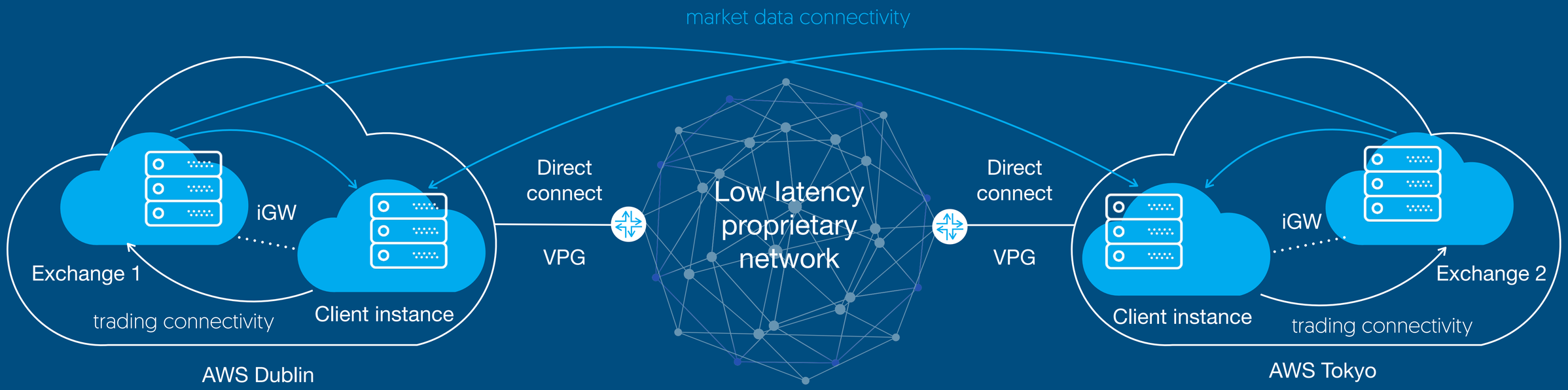
Traditional exchanges (DC-based)

Specialist exchanges (DC-based)

Source: bitcoinfuturesinfo.com

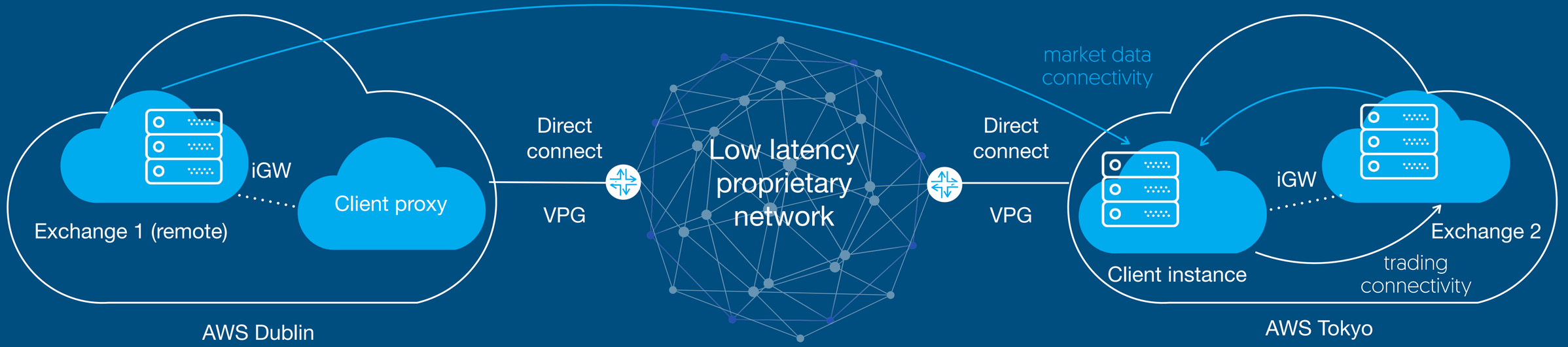
Arbitrage between exchanges

- This solution allows to collect and process market data from multiple exchanges and trade simultaneously across all the markets

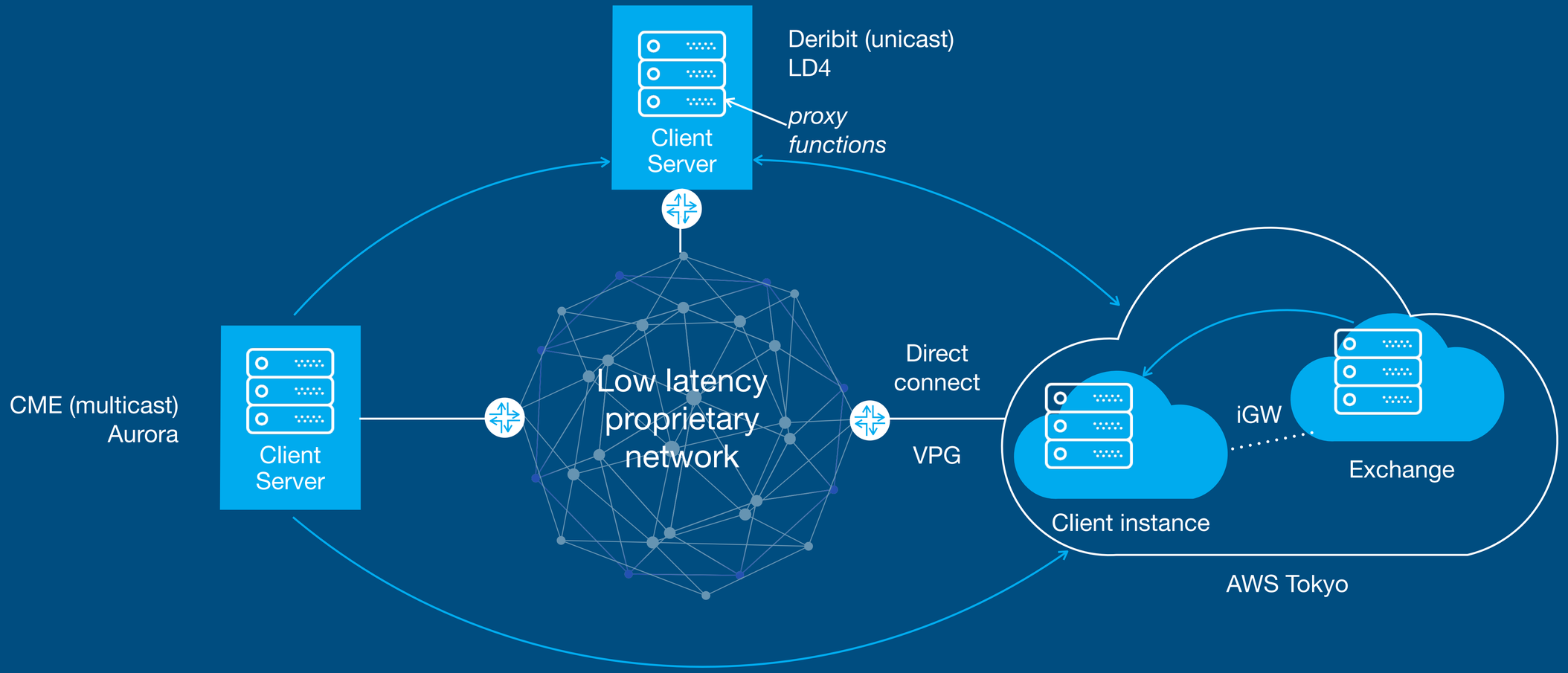


Market data connectivity

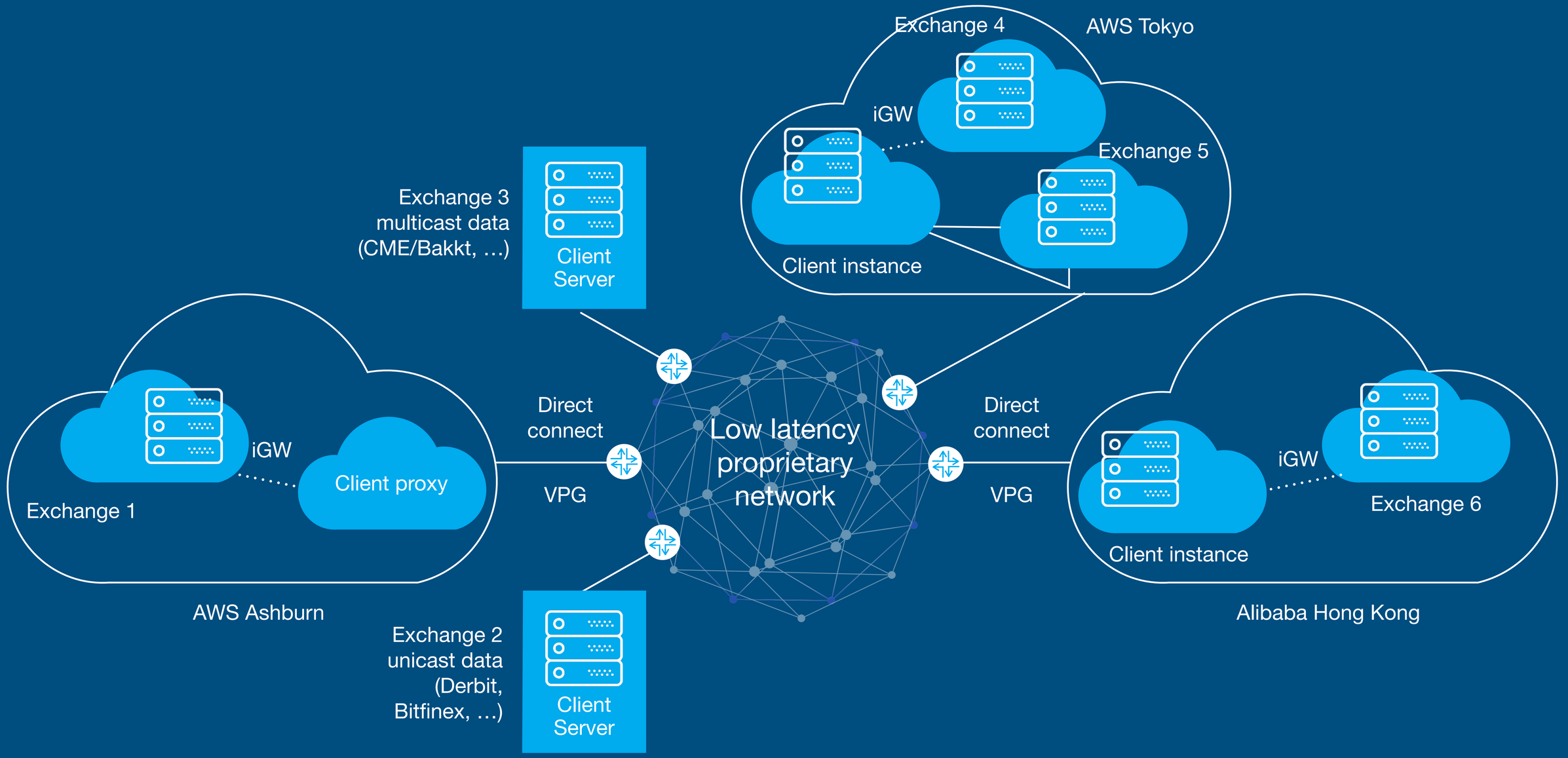
- Client trading server is in the same Cloud Region with an exchange
- Software proxy is deployed to access market data from a remote exchange



Cloud-to-DC:
two types of DC-based exchanges



Mix with different connection types



The best locations to gain proximity: top 10

BitMEX	Dublin Interxion AWS
Binance, Huobi, FTX, Bitflyer	Tokyo CC1 / TY2 AWS, Azure
Bybit	Singapore Global Switch AWS
OKEx	Hong Kong Mega I Alibaba / HK1 AWS
Coinbase	Ashburn DC5 AWS
Kraken	San Jose SV1 (SV5) AWS
Bitstamp	Frankfurt FR5 AWS

Key learnings

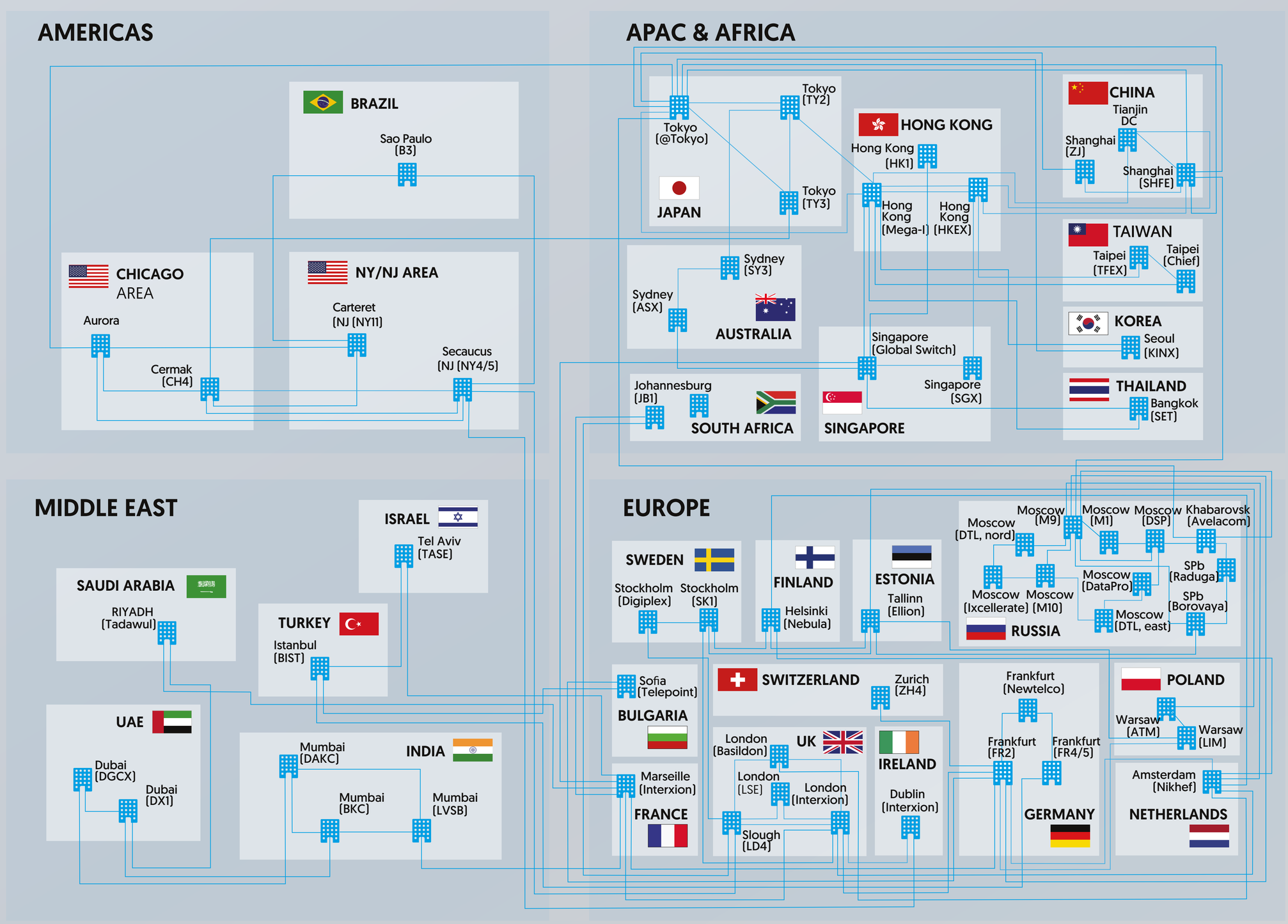
Use proprietary low latency networks that combine the fastest routes between different Cloud Regions and direct connect services in data centers, that are associated with particular Cloud Regions

Deploy your infrastructure in the same Cloud Region

Use direct connect gateway (instead of virtual private gateway)

Keep testing and re-evaluating latency in different cloud zones (A, B, C) to ascertain the best locations

Any challenges
to use proprietary
networks to connect
to Public Clouds?..



PoP locations

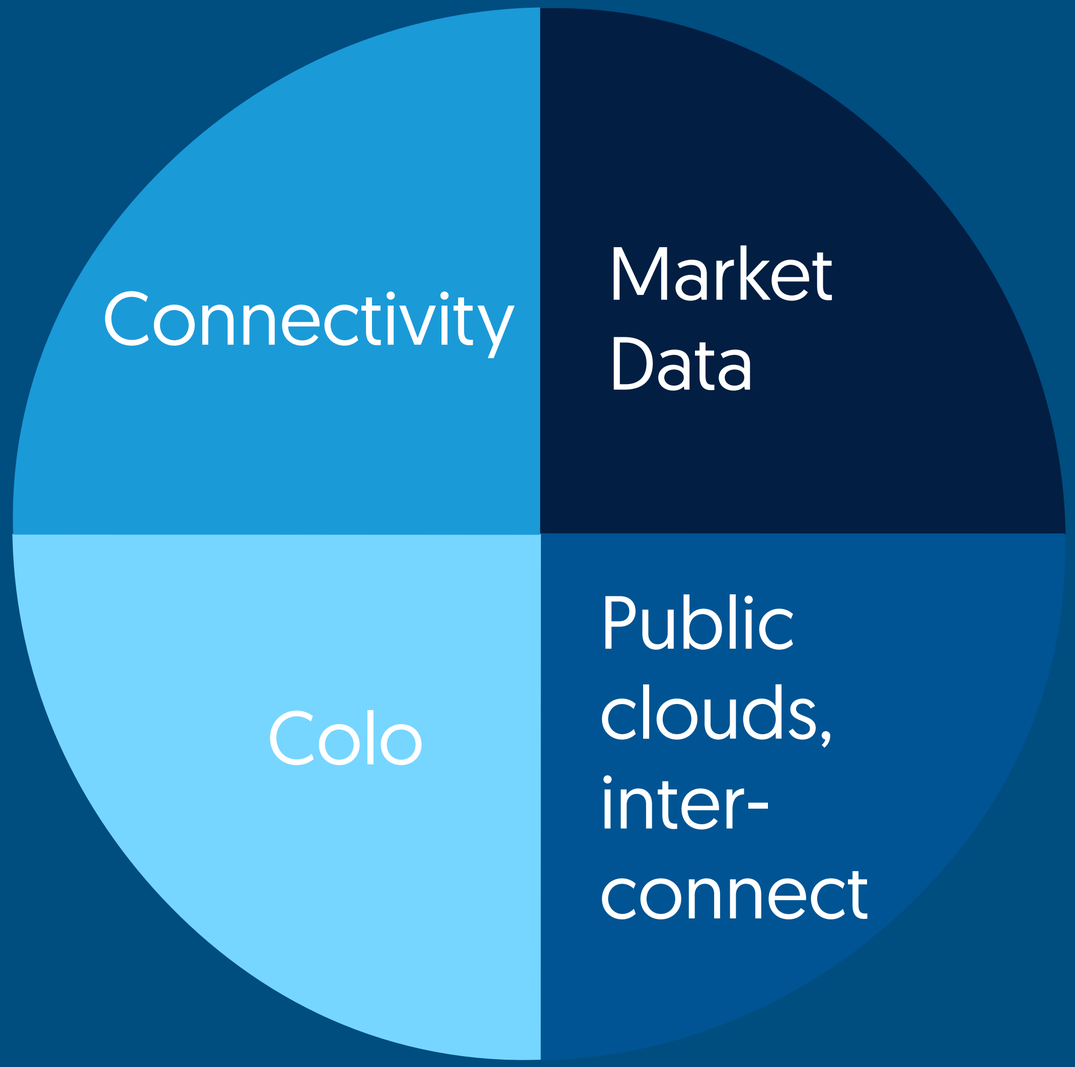
Avelacom PoP

Avelacom Network Coverage: crypto markets

Avelacom's one-stop shop solutions for HFTs and latency sensitive trading firms

High-speed, resilient connectivity: shortest, unique and protected paths between major exchanges

Colo/low latency servers located physically closest to exchanges' matching engines



Real-time MD feeds; free historical feeds, ultra-low latency order entry

Low latency access to public clouds (AWS, CloudFlare, Microsoft Azure, Google, etc.)

Try Avelacom
cloud-to-coud connectivity for free

Cross connects are not needed.

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