

Dense Interconnection Points for Global Financial Markets Common Meeting Places Benefit All Participants



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No stranger to turbulent change, the financial services industry continues to face revenue and cost pressures as well as an increased need to operate globally. Exchanges have merged and relocated, new financial centers and trading venues have appeared, and the market share for incumbent players has declined. Established players have been required to adjust both strategically and operationally to survive in this evolving marketplace. As a result, many firms are rethinking their technological infrastructure and evaluating co-located services.

Demand for fast, reliable and cost-effective technology has grown significantly in the last decade. Reliability and throughput are more important than ever before, and firms that were once content to operate their own data centers or co-locate infrastructure with a financial extranet are evaluating their ability to maintain a competitive position at a manageable total cost of ownership. At the same time, the number of options to consider when determining where an order may be best executed has increased.

As a result, the number of required connection points has grown. In this environment, the ability of network-rich

data centers to connect to the various execution venues has made their value more apparent. Bringing together network providers, asset managers, brokerages, exchanges and trading platforms as well as market data and analytics providers, these data centers can dramatically lower the number and cost of high-speed interconnections.

Although data centers owned by network providers currently provide a range of co-location services, they have not proven effective in supporting traffic outside their own network. Increasingly, network-neutral data centers are seen as an effective option for firms pursuing global markets across the evolving financial ecosystem.

Trends in capital markets

As 2009 drew to a close, the Aite Group drafted an impact note outlining what it saw as the most significant trends affecting capital markets in 2010. Drivers include:

- **Market fragmentation and increased competition, particularly from multilateral trading facilities (MTFs) in Europe and alternative trading systems in the Canadian and Asia-Pacific markets.**
- **Increasing commoditization of high-frequency trading, particularly as independent traders have opened their own trading desks.**
- **Developing a global presence and managing global risk. Aite sees the importance of having a global presence as "one of the key issues for sell-side and buy-side firms."**
- **Demand for trading infrastructure innovation, including low latency, throughput and support for multi-asset class trading.**

Taken together, these trends underscore the important role that technology vendors will play in

supporting participants in the global financial ecosystem. At the same time, those vendors are evolving, and the roles they play are shifting to better serve asset managers, brokerages, and exchanges and trading platforms.

The growth of co-location services

The changes in roles for technology vendors started a decade ago, when financial services firms began looking for opportunities to ensure capacity (headroom), improve connectivity, strengthen business resilience and manage costs.

Financial services firms typically evolve their use of data center vendors in four stages:

1) Building a data center adjacent to or in a networked building

2) Co-locating in a phone company data center

3) Co-locating in a financial extranet data center

4) Co-locating in a network-rich data center

The most mature and effective co-location strategy employs a network-rich data center. In such installations, financial services firms are able to access dozens of carriers and extranets, leverage global market data and order flow sources and add substantial space, power, cooling and headroom.

The network-rich data center also helps manage overall cost and improve throughput, typically driving down latency through improved access and connectivity. Six-sigma uptime (99.999%) supports business resiliency, as well.

Comparing distributed and hub (co-location) models

To manage the growing complexity of the financial services ecosystem,

many firms have pursued a model in which specialist services are distributed across a wide variety of network connections. In this model exchanges, data vendors, clearing firms, financial extranets, broker-dealers and others have operated as nodes on a far-flung network.

This approach is effective in supporting specialization within a firm, and network utility and system value of a financial network has increased as users and providers are added to the distributed ecosystem. Unfortunately, the nature of this global marketplace means that the need for high-volume, reliable interconnections have increased exponentially.

The distributed model fails as the number of endpoints increases. The distributed model has also struggled to maintain the capacity required to support algorithmic trading, among other demands. The result: bandwidth requirements are increasing rapidly, and infrastructure upgrades are trending toward continuous.

By comparison, a centralized financial ecosystem leverages economies of scope and scale for all participants. By co-locating within a network-rich data center, exchanges, data vendors, clearing firms, financial extranets, broker-dealers and others can dramatically reduce the number of circuits required to support multiple counterparties.

This approach helps financial services reduce and better manage costs while also improving throughput. Participants in a network-rich data center pay for one data connection into the data center, and counterparty transactions take place within the data center.

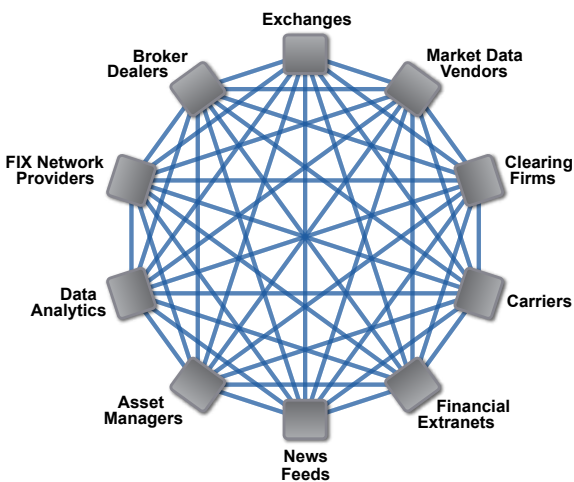
The centralized or hub model also improves throughput. The efficient, network-rich data center configuration reduces latency to its physical minimum. The shared internal connections support significant growth, so individual user bandwidth can increase without incurring any cost increases or penalties. The value of a shared centralized financial

ecosystem is also seen in availability. As noted earlier, 99.999% uptime is the standard for these configurations.

Unquestionably, the financial industry will continue to scale, and its technology must increasingly do so in new, more predictable and more effective ways. By migrating from a distributed architecture to one that capitalizes on the "law of the hub," financial services firms will be able to:

- **Use dense interconnection points to reduce costs for circuits;**
- **Leverage economies of scale for all participants in the centralized network;**
- **Simplify connection needs by housing participants in a limited number of geographic locations; and**
- **Simplify network management by unifying connection standards in an environment in which throughput and uptime are critical measures.**

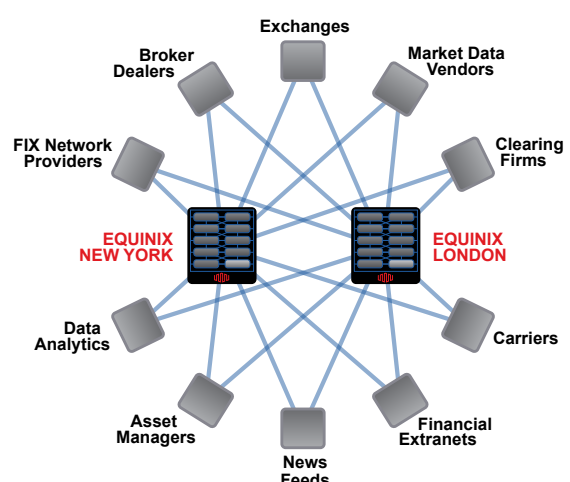
Distributed model fails as bandwidth requirements and/or number of end points increase



10 End-points = 45 Connections
 100 = 4950 Connections
 10,000 = 49,995,000 Connections

Metcalfe's Law: $\frac{N(N-1)}{2}$
 Reed's Law: $2^N - N - 1$

Centralized interconnection points leverage economies of scope and scale for all participants



100 Counter Parties = 200 Circuits (96% reduction)

The Law of the Hub: HN

Any thoughts about this or other articles?
 Please send any comments direct to:
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- **Dense interconnection points reduces costs for circuits**
- **Economies of scale available for all the participants in the network**
- **Limited geographic locations simplify connection needs**
- **Bandwidth can increase exponentially as needed**