Quincy Data Raft Technologies

No Fiber Required: Wireless Market Data from Chicago to London Using HF

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Overview

- Brief overview of high frequency
- Wireless market data infrastructure (review)
- Challenges faced in sending market data over HF
- Our proposed solution
- QHF Offered by Quincy Data and Raft Technologies

What is Short Waves?



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High Frequency (HF) waves travel long distances at the highest speed



Short Wave in use

- First use on 1920'
- Long-distance communication until the 50's
- Today still in use



TECHNOLOGIES

Short Wave advantage - Light moves faster in air



When light travels in a transparent material (ex: a dielectric like glass) its speed is slower



Source: Phys. 102' Lecture 17, Slide 18

Raft Technologies – System structure

Raft developed a full end-to-end system solution, based on its proprietary HF Radio and Modem.



Wireless Market Data



FR2, BKC, MIL, BKC,...

What's the Catch?

- HF bandwidth provides lower latency with lower bandwidth
 - 4 ms faster Chicago to London
- Microwave: 10's of Mbps
 - Conflated book snapshots with aggregated trades
 - Many instruments
- HF: Limited to Kbps
 - A few dozen symbols
 - How many instruments?
 - How do we allocate symbols to instruments?
 - What do the symbols/signals mean?

Our Solution

- Symbols/Signals indicate significant "moves"
- Start with 4 Instruments
 - ES: 6 to 8 symbols (3 to 4 per side)
 - CL: 2 or 4 symbols
 - ZN: 2 or 4 symbols
 - GC: 2 or 4 symbols
- Taking ES as an example:

Signal	Ask Increase	Signal	Bid Decrease
0x0	1-tick	0x3	1-tick
0x1	2-ticks	0x4	2-ticks
0x2	3-ticks	0x5	3-ticks

Defining Large Moves

- Outward removes quantity from bid or ask side
- Inward adds quantity to bid or ask side
- Liquidity event: both sides move by approximately equal amounts in the same (inward or outward) direction
- Price event: one side moves outward, and the other side may move inward



- Only consider changes that remove full limits
- Only consider price events for now
- Ignore changes outside BBO



Price Events

- Ask event
 - One level removed
 - Weak event
 - Bid stays the same
 - Or maintains the spread
- Events in 4 ms sliding window
- 7 ms IFG



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Collisions, IFG, and Sliding Window

Events

IFG

- BW determines IFG
 - Event during IFG is a collision
- After IFG elapses transmission resumes.
 - 2 levels clear
 - 1 level clears
 - Send strong event



Back-testing is Critical

- Choosing thresholds to:
 - Provide actionable, meaningful information to traders
 - Minimize collisions
 - Maximize bandwidth utilization
- Optimal values change with market conditions
- Adjust values periodically as referential data
- Determined by backtesting with recent data

Some Real Data



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Other Approaches

- Limits work well in volatile markets with many trade-throughs
- Produce insufficient number signals in slower markets
- Exploring other approaches:
- Use quantity traded or removed (traded and canceled)
 - One problem: quantities change dramatically through out the day
 - One possible solution: the quantity traded relative to the average quantity on the top five levels appears more constant through out the day.

Conclusion/Future Directions

- QHF available late June
- Future: update thresholds more frequently
 - Daily
 - Inter-day using referential messages
 - Requires more client engagement and input from early adopters
- White paper available
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