

Nasdaq Canada PureStream

Feature Sheet

The background

The growth in electronic trading has greatly increased the amount of natural liquidity that is being governed by an algorithmic execution strategy. As an unintended consequence, institutional natural liquidity has become latent within algorithms and harder to find, compelling institutions to slice large orders into smaller sizes and trade over longer periods of time to minimize price impact.

Our solution

An algorithmic order's available liquidity at any point in time is a fraction of the volume that is actually available. Our belief is that all algo trading strategies can be translated to a target reference rate of the market volume. Once all orders have been translated to the rate space, matching opportunities at the parent level are maximized.

By separating the price discovery process from the liquidity discovery process, we enable algorithmic orders to search, find and yield more liquidity faster without price impact.

The PureStream order type coexists within Nasdaq's CXD dark pool and focuses on improving liquidity discovery and fill rates. It is accessible via broker algorithms and directed orders.

How liquidity discovery currently works

The process of price discovery and liquidity discovery on a displayed market happen simultaneously when one participant goes after a quote and triggers a trade. Dark pools attempt to separate price discovery from liquidity discovery by using the NBBO (National Best Bid Offer) as a reference price for matches. The intent was for institutions to place large orders without fear of impacting the price.

Broker algorithms place small orders in an attempt to achieve the trader's execution strategy. All algo execution strategies are designed to minimize price impact by limiting (scheduling) the liquidity sought in proportion to the volume traded. This proportion, or rate, is embedded in the trader's algorithm strategy choice.

Liquidity discovery with PureStream

PureStream matches orders based on the percentage of the market's future volume a trader is willing to trade – the Liquidity Transfer Rate or LTR.

For example, two compatible orders may each want 10% of the market's future volume and would be paired in a stream at a Liquidity Transfer Rate (LTR) of 10%.

Once paired, the orders will stay paired as long as they remain compatible. While orders are paired in a stream, PureStream will generate a match each time a Reference Trade occurs. Our fills are a function of the stream's LTR and a Reference Trade's quantity and price. A Reference Trade is any trade across all marketplaces of at least one board lot.¹

For example, if orders are paired in a stream with an LTR of 10%, and a reference trade takes place for 1,000 shares at \$36 on an away marketplace, PureStream would match 100 shares @ \$36 from each order in the stream (LTR of 10% multiplied by the Reference Trade of 1,000 @ \$36).

¹ With the exception of other PureStream trades and trades that occur outside of the NBBO.

Example:

Two compatible parent orders with an LTR of 15% are paired in a stream.

	T1	T2	T3
Reference trade	2,000 @ \$36.00	200 @ \$35.99	10,000 @ \$36.01
LTR	15%	15%	15%
Purestream match	300 @ \$36.00	30 @ \$35.99	1,500 @ \$36.01

After the orders are paired, at time T1 a market trade happens. Given the LTR is 15%, we apply 15% to the trade volume of the Reference Trade (2,000 shares) which results in a match of 300 shares between the buyer and seller at \$36.00 (the price of the Reference Trade).

Later at T2, another Reference Trade takes place. Applying the same process, 30 shares are matched @ \$35.99 between the buyer and the seller.

The Reference Trade at T3 in the example is for 10,000 shares at \$36.01. Again, we apply the LTR of 15% to the share quantity of the Reference Trade, resulting in a match of 1,500 shares at the price of the trade (\$36.01).

Key points

- There is no limit to how many streams can simultaneously generate matches based on a Reference Trade. There can be multiple streams all using the same Reference Trade.
- The volume being referenced can also be multiplied to accelerate the liquidity transfer process. For example, using a 200% LTR, the 2,000 shares Reference Trade in the example above could be scaled to 4,000 shares at \$36.00. The only difference being that the LTR is now 200% and not 15%.
- The paired institution's algorithmic orders have bypassed their current latency and fragmentation disadvantages through PureStream's optimization process. By being paired at a Liquidity Transfer Rate, they have effectively "subscribed" to systematically trade with one another in the future as volume trades on the broader market.
- All execution strategies can be expressed as a liquidity transfer rate and because of this, LTR serves as the optimal and highest common denominator to match orders. It enables a user who wants 20% to match with multiple participants seeking to match with lower rates. i.e. 20% matched with 8%,10%,2% etc.

Key benefits

- The PureStream order type is addressing the challenges that asset managers face when executing block trades while minimizing information leakage.
- It has the match characteristics of a block without the price impact of an algo because you are getting a fraction or multiple of everything that trades.
- PureStream orders do not compete for volume, they reference future volume.
- The number of trade counterparties is minimized.

Market structure overview

PureStream prioritizes and matches orders based on percentage rates instead of time priority. The prioritization of orders in the order book is as follows:

Broker – same broker has higher priority

LTR – the higher the LTR, the higher the priority

Size of the order – the larger the order quantity, the higher the priority

Limit price – the better the limit price, the higher the priority

Time – the earlier the order is received, the higher the priority

LTR is expressed as a range where an order has a minimum and maximum LTR

LTR	Minimum Match Rate	Maximum Match Rate
Liquidity Seeking (LS)	1%	Infinity (Block Eligible)
Mach 2	10%	200%
5-30%	5%	30%
5-15%	5%	15%
Custom	1%	500%

Prioritization examples

Example 1 – LTR priority

Order 1 is for 50,000 shares, 5-15% LTR
 Order 2 is for 15,000 shares, 10-200% LTR
 Order 2 would have priority because of the higher LTR range

Example 2 – Size priority

Order 1 is for 50,000 shares, 5-15% LTR
 Order 2 is for 75,000 shares, 5-15% LTR
 Order 2 would have priority because of the larger order quantity

Example 3 – Limit price priority

Order 1 is to buy 50,000 shares, 5-15% LTR, and has a limit price of \$10.00
 Order 2 is to buy 50,000 shares, 5-15% LTR, and has a limit price of \$10.01
 Order 2 would have priority because it has a better limit price

Example 4 – Time priority

Order 1 is for 50,000 shares, 5-15% LTR
 Order 2 is for 50,000 shares, 5-15% LTR
 Order 1 would have priority because of the earlier receipt of the order

Example 5 – Broker priority

Order 1 is for 50,000 shares, 5-15% LTR, and belongs to broker 002
 Order 2 is for 50,000 shares, 5-15% LTR, and belongs to broker 007
 Order 1 would have priority because of the earlier receipt of the order, however, if a contra order belonging to broker 007 is found, Order 2 would take priority and match with the contra order.

The intent is for PureStream's top of book to always be the most liquid order across the key dimensions of liquidity – rate and size.

Streaming examples

Example 1 – Single stream

Order #3, a sell order with a 5-30% LTR for 50,000 shares is received.

It would match with the first order (Size priority) at the maximum LTR of 30% and stream to completion (as long as neither orders became unmarketable nor were cancelled). The stream's length would be 166,667 (50,000 shares/30%) shares of market volume with an average execution price equal to the VWAP of the 166,667 shares traded on the broader market.

Example 2 – Serial Stream

Order #3, a sell order with a 5-30% LTR for 125,000 shares is received.

It would match to the first order completely like in Example 1, and seamlessly transition to Order #2. Order #3 would not be able to determine that there was a second buyer unless Order #2 chose not to be anonymous.

Example 3 – Concurrent Streams

Order #3, a sell order with a Mach 2 (10-200%) LTR for 125,000 shares is received. It would match with the first and second order simultaneously. There would be 2 streams created, one with orders 1 & 3 and one with orders 2 & 3. Each stream would have a LTR of 30% and order #3 in aggregate would achieve an LTR of 60%.

Price Limit impact on Matching

In order to be considered marketable, an order's limit must be able to receive fills anywhere within the NBBO. The PureStream marketability "test" is each order's limit relative to the current NBBO and not relative to its potential contra's limit.

For example, if the market was \$10.01 by \$10.02 the buy would have to have a limit greater than \$10.02 and the seller a limit less than \$10.01.

If the market were \$10.01 by \$10.06, and the buy order had a \$10.04 limit, and the seller had a \$10.03 limit – there would not be a match on PureStream because the buyers limit could not receive a \$10.05 or \$10.06 fill, and the sellers limit could not receive a \$10.01 or \$10.02 fill.

The intent is to only match orders where both the buy and seller can trade at all potential prices within the NBBO. In addition, this higher threshold for matching will reduce the algorithms need to switch between the PureStream liquidity and the conventional market.

