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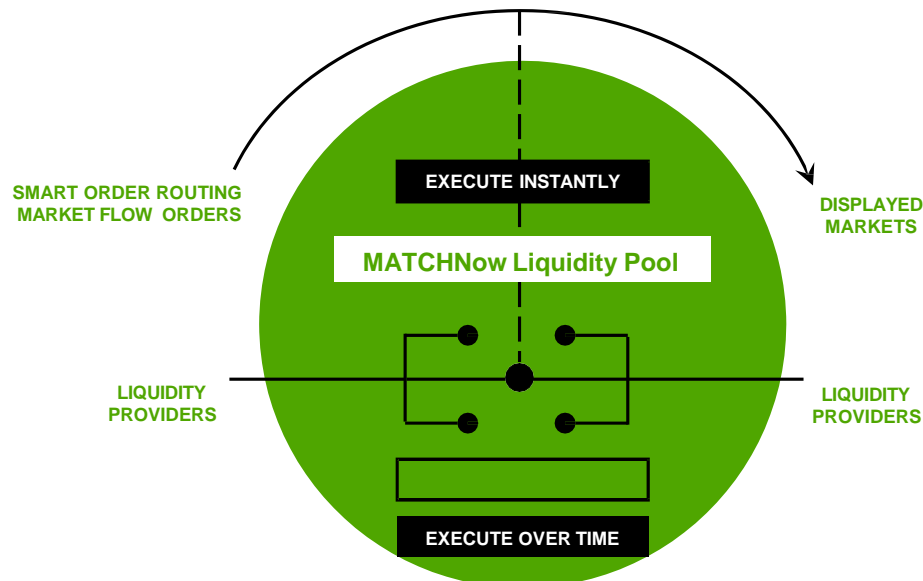
## What is MATCHNow?

MATCHNow is a Canadian marketplace operated by TriAct Canada Marketplace LP (TriAct) for all Canadian listed securities, including exchange listed debentures and notes. Accessing MATCHNow is as easy as choosing one of three destinations from your *existing trading application*.

Canadian investment dealers participate as MATCHNow Subscribers; eligible clients and US dealers execute through, and pay commissions to, the Canadian dealers they choose. MATCHNow acts strictly on a *broker-neutral* basis; it does not participate on an agency or proprietary basis in *any trade*.

Buy and sell orders of all sizes are submitted by Subscribers and their clients as Liquidity Providing, Odd-lot Liquidity Providing or Market Flow orders:

- **Liquidity Providing (LP) Orders:** These passive, confidential orders remain in the MATCHNow book as day orders unless they are filled, cancelled, or expire.
- **Odd-lot Liquidity Providing (OLLP) Orders:** These passive, confidential orders remain in the MATCHNow Odd Lot book as day orders. An OLLP order will be rejected if it is less than the round lot size minus 1 (e.g. 99, 499, 999 shares). An order dropping below the round lot size shares minus 1 will be returned back as “Nothing Done.”
- **Market Flow (MF) Orders:** These are active tradable orders that “glance” into the MATCHNow Liquidity Pool. If a match with a LP order exists it will match *immediately to the extent possible*, and any remaining shares are returned to the smart order routers to be routed to the next specified marketplace.



Designed to offer better execution for institutional, proprietary and retail order flow, MATCHNow combines frequent call matches and continuous execution opportunities in a fully confidential trading book. MATCHNow provides price improvement over the Canadian best bid and offer (CBBO). See Trade Matching and Pricing below for further details.

The MATCHNow system uses real-time quotes for all protected transparent Canadian markets. All orders matched within MATCHNow are executed at a price inside or at the Canadian best bid and offer (CBBO) at the time of the match, to a maximum of 4 decimal places. MATCHNow matches board lot and odd lot orders, for regular, short, and long settlement, and is available from 8:00 am daily, operating during normal market hours, 9:30 am to 4:00 pm. (Holiday trading hours may be adjusted in accordance with protected transparent Canadian markets.)

**Automated, 1-3 Second Call Executions:** MATCHNow searches for matches among LP orders every 1-3 seconds (randomized) at the mid-market price, saving each liquidity provider 50% of the CBBO spread.

**Continuous, Instantaneous Executions:** Matches between Liquidity Providing and Market Flow orders occur on a *continuous basis* at the mid-market price, minimal price improvement or at the CBBO depending on the price improvement being offered. Note: Market Flow orders *do not* wait for the next 1-3 second call auction to execute.

## Improve Your Trading

MATCHNow is designed to offer better execution to institutional, proprietary and retail customers alike. Traders gain several strategic advantages in Canada's capital markets.

### **Access Advantages**

- **Confidential, Continuous Trade Execution:** MATCHNow is a broker-neutral dark book that combines frequent call matches with continuous execution opportunities, all within a confidential marketplace.
- **Available to All Market Participants:** All Canadian registered dealers are eligible to trade in MATCHNow, as principal, or as agent for their retail and institutional clients. Canadian buy side and U.S. firms can access MATCHNow through Direct Electronic Access (DEA) arrangements with a sponsoring Canadian dealer. Participants connect via third-party Access Vendors or directly via FIX.
- **Sweep Multiple Markets in One Step:** When you "smart route" an order through your Access Vendor, your order will be routed to MATCHNow as a Market Flow order when a match exists, you will receive a fill that is priced inside the CBBO, offering very attractive savings and reduced execution fees. However if no match exists, the order is returned to the smart order router which routes the remaining shares onto the displayed market of your choosing. Simply request your access vendor to add MATCHNow to the routing table as a destination.

### **Cost Advantages**

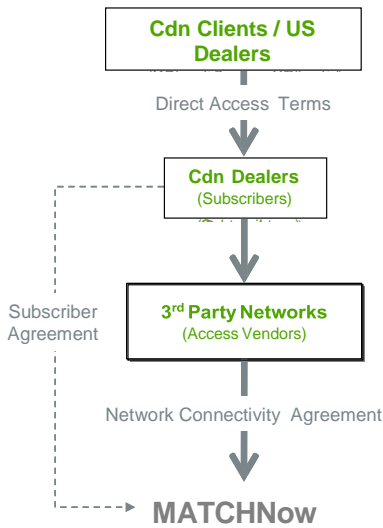
- **Automated Price Improvement:** When a match occurs in MATCHNow, it is priced according to the CBBO at the time of the transaction. Trades in MATCHNow can be priced at mid-point to minimize information leakage and provide attractive savings for both active and passive orders. Passive liquidity providers gain access to natural liquidity checking MATCHNow higher on the routing table which leads to additional liquidity without having to compete with the noise on the displayed markets.
- **Low Transaction Fees:** MATCHNow offers a competitive fee structure. In addition to market impact savings, Dealers and their respective clients achieve substantial execution savings over other Canadian displayed venues. Please see Subscriber Fees below for details.

### **Tactical Advantages**

- **No Public Book Display:** MATCHNow is a fully confidential dark book, displaying no information to the public on participants, order size or pricing. Participants cannot see or modify any orders other than their own. Large orders can be submitted without fear of disclosure.
- **Zero Market Impact:** Information leakage can be virtually eliminated through anonymous trade reporting. Trades for unattributed orders are publicly reported with broker # 001; otherwise, trades print under the regular (TSX) broker number.

- **Execution Control & Risk Management:** MATCHNow combines a number of unique features that enable the trader to automate key trading criteria. With these tools, traders can control execution, minimize risk and achieve overall trading goals. See below for details: Order Attributes and Parameters for Liquidity Providers.
- **Broker Preferencing:** Broker Preferencing is applied to both regular and anonymous trades. MATCHNow offers brokers a venue to help facilitate unintentional crosses from multiple trading groups, allowing institutional trades to automatically trade against incoming retail flow before the displayed markets.

## Access to MATCHNow



*Only Canadian IIROC registered dealers are eligible to become MATCHNow Subscribers and can trade on MATCHNow as principal, or as agent for their retail and institutional clients. Third party networks and registered dealers that maintain their own proprietary market connections (collectively, Access Vendors) connect to MATCHNow for the purpose of transmitting orders submitted by Subscribers and their Direct Electronic Access Clients. MATCHNow acts strictly on a broker-neutral basis; it does not participate on an agency or proprietary basis in any trade.*

**Access Vendors:** Access Vendors must execute the MATCHNow Network Connectivity Agreement. MATCHNow will facilitate a FIX Certification to ensure proper connectivity is established. The FIX Certification process can be completed over the internet reducing setup time. Please see the MATCHNow Fix Guide on our website [www.matchnow.ca](http://www.matchnow.ca) for more information.

**Subscribers:** MATCHNow Subscribers are required to execute the MATCHNow Subscriber Agreement. To qualify for access to MATCHNow, each Subscriber must, among other things:

- Be regulated by Investment Industry Regulatory Organization of Canada Inc. (IIROC) and comply with all applicable regulatory requirements and securities laws, including the Universal Market Integrity Rules (UMIRs).
- Report and settle all MATCHNow trades, either as a CDS Participant or through a qualified agent.
- Use an approved FIX Certified connection to establish FIX connectivity.

**Direct Electronic Access Clients:** Prior to granting clients direct access to MATCHNow, Subscribers must comply with IIROC's "Provisions Respecting Third-Party Electronic Access to Marketplaces" and National Instrument 23-103 "Electronic Trading and Direct Electronic Access to Marketplaces":

- Establish standards to manage the attendant risks and client eligibility.

- Enter into a written agreement with each client.
- Establish and maintain appropriate risk management, supervisory and compliance controls for orders entered under Direct Electronic Access (including the appropriate automated pre-trade controls and pre-determined credit or capital thresholds).
- Establish and maintain appropriate risk management, supervisory and compliance policies and procedures for Direct Electronic Access.
- Establish procedures for reporting to IROC non-compliance by a client.

Direct Electronic Access Clients' use of the MATCHNow system is subject to certain terms and conditions specified in the MATCHNow Subscriber Agreement.

## Order Attributes

MATCHNow supports both market and limit orders. The MATCHNow system accepts board lot, odd-lot and mixed lot DAY and IOC orders only, for regular and special settlement.

When mixed lot orders are sent to the MATCHNow Market Flow destination, MATCHNow will automatically parse the odd-lots and send them to the MATCHNow Odd-lot Order Book.

MATCHNow accepts execution limit prices up to four decimal places.

The following selected attributes are supported for *all Market Flow (MF) orders and Liquidity Providing (LP) single and list orders*:

- **Short Sales:** Both LP and MF short sales may trade below the last sale price; both LP and MF short sales may trade below the consolidated Canadian last sale (effective October 15th, 2012). Starting April 1, 2013, short sales will be rejected for any order with the Short Marking Exempt market (Fix Tag 7729=0).
- **Anonymous:** Trades for unattributed (anonymous) orders are publicly reported with broker #001. If the order is not marked "anonymous", the trade is attributed to the executing broker's (TSX) broker number. Broker preferencing is applied to anonymous orders at the executing broker number and printed as a 001 trade.
- **Jitney:** Jitney orders are accepted and will trade under the executing broker number.
- **Price Protection:** By specifying a limit price, users can establish a cap/floor above/below which their orders will not trade. LP orders can act like mid-market pegs through the day as they trade inside the CBBO up to the limit price, this is ideal to reduce IROC messaging fees generated by peg order types on displayed markets.
- **Short Marking Exempt ("SME") Marker:** MATCHNow will accept FIX Tag 7729=0 for directionally neutral accounts. The SME marker will have no impact on trade matching or allocation. The SME marker will be passed onto IROC as a regulatory marker.
- **Minimum Shares Executed:** Minimum fill size per order. The minimum fill size will apply against the total amount that can be executed in one matching session and can be aggregated across any number of partial fills against multiple counterparties. Minimum Shares Executed can be set in conjunction with Minimum Tradelet Size and both restrictions will apply independently to each matching session per price improvement level.
- **Minimum Tradelet Size Executed:** Minimum size for each pro-rata allocated fill reported against each counterparty. Allows traders to control how their orders are traded in the MATCHNow pro-rata environment. Once the remaining volume of an order is equal or less

than the minimum fill size it will only execute against one counterparty to complete the order for the full amount remaining. Minimum Tradelet Size cannot be set in conjunction with Minimum Shares. Subscribers can provide a minimum tradelet size in their order instructions or set a pre-defined default for their Trader ID.

## Market Flow defaults and Large Security Orders

Market Flow orders can trade with all levels of price improvement available in MATCHNow including at the CBBO when they are large ETF or equity orders (i.e. may not receive any price improvement.) The Market Flow order will only trade at the CBBO if it qualifies as a “large” order. (Note, the UMIR definition of large is >50 board lots or >\$100,000 CAD notional.) Subscribers have the option to configure their Market Flow orders/trader IDs to trade only at mid-point. These mid-point only, Market Flow, orders will not trade with Minimal Price Improvement orders either. Alternatively, Subscribers may request that their Market Flow orders be eligible for execution either at the mid-point of the CBBO, or at the Minimal Price Improvement matching level. Such orders always get price improvement at the mid-point or at the Minimal Price Improvement matching level; they do not cross the spread and interact with At The Touch order flow.

## Market Flow Liquidity Filter

The MATCHNow liquidity filter is placed in front of the MATCHNow matching engine. This internal filter will allow MATCHNow to return any active orders that have a low probability of receiving a match. By canceling back orders before they reach the matching engine, two goals are accomplished:

- 1) Reduced latency for active orders, allowing unfilled orders to be routed to the next destination on the smart order router table;
- 2) Reduced IROC message fees, since orders returned before the matching engine do not qualify as IROC Messages.

MATCHNow also checks incoming order designations and rejects any unsupported orders to the Access Vendors. Where an order has been accepted by MATCHNow, designations that are not required for purposes of MATCHNow matching are reported to the Investment Industry Regulatory Organization of Canada (IROC) in accordance with the Universal Market Integrity Rules (UMIR).

Please see the *MATCHNow FIX Specification & Access Vendor Guide* for comprehensive details on MATCHNow messaging, including accepted and rejected order tags.

## Parameters for Liquidity Providers

MATCHNow combines a number of unique features that enable users to control trade execution, minimize risk, and achieve overall trading goals.

LP single and list orders can be sent with the following optional settings:

- **Expiration Time:** Specifies how long an LP order remains in the system. Open orders in the MATCHNow book can also be cancelled at any time. By default, all LP orders expire at 4pm.
- **Minimal Price Improvement:** Caps the price improvement provided by the passive participant to the regulatory minimum of 1 tick, or ½ a tick when the spread is 1 tick wide.
- **Trading Large Securities Orders (LSO) At The Touch:** LSO LP orders can be designated to trade with Large Market Flow orders at the CBBO (i.e. no price improvement given by the LP order). LSO Liquidity Providers will have the same order entry size restrictions as Large Market Flow orders. The qualifying criterion is that the order be greater than 50 standard trading units (board lots) or have a value greater than \$100,000 CAD. The order value for buys is determined by the original order quantity times the Canadian Best Offer (CBO) and for sells is determined by the original order volume times the Canadian Best Bid (CBB). Once a LSO order is qualified upon receipt it will remain eligible to trade at the CBBO until it is completed or cancelled. The LSO LP Orders will remain open until completed or cancelled. MATCHNow will qualify each LSO upon receipt even if it is a correction to a former order. If a LSO volume or limit is corrected lower so that is below the qualifying criteria it will be still be booked but set to provide minimal price improvement.

Please note, when mixed lot orders are sent to the MATCHNow Liquidity destination, only the board lot portion will be filled, any odd-lot remaining in the Liquidity destination will be cancelled via a “Nothing Done” message.

LP lists can also be sent with the following optional settings:

- **Buy/Sell Imbalance:** maximum dollar value by which portfolio buys can exceed sells / vice- versa.
- **Cancel Time and Minimum Shares:** can be set for the entire list and applies to each order in the list. If comparable parameters are included for any single order in the list, these order-level parameters take precedence over the list parameters.

These parameters can be configured by MATCHNow with specific user defaults. Additionally, from an Access Vendor trading application, users can override these defaults by establishing order / list– specific parameters.



## Parameters for Odd-lot Liquidity Providers

### Odd-lot Liquidity Providers (OLLP); No Designated Market Makers

Unlike other Odd-lot facilities in Canada, there will be no designated market makers that are assigned symbols or have requirements to guarantee a two-sided market. IIROC dealers and their clients can submit liquidity into the Odd-lot order book in as many symbols as they want. Each UMIR Trader ID will be limited to book one order per side of each symbol at any moment in time and Liquidity Providers will be encouraged to post sizeable two-sided markets on as many symbols as possible.

For clarity, the second buy or sell order from the same UMIR Trader ID will be rejected. The trader, however, will be able to cancel or correct their orders at their discretion. The OLLP retains limit price and volume control of the orders and has the right to stop providing Odd-lot liquidity by canceling their orders. The OLLP can re-enter orders and increase or decrease the available Odd-lot liquidity throughout the day. All active participants can remove Odd-lot liquidity from the MATCHNow Odd-lot Order Book. Each participant will be limited to a maximum of five (5) OLLP Trader IDs.

### Odd-lot Liquidity Orders

By setting a marketable limit the OLLP could prevent executing at undesirable prices due to a sudden/excessive movement in the security price/quotes.

If a limit order is not marketable at the time of a matching session, the matcher will skip that Odd-lot liquidity order and put it to the bottom of the ranking so the active order can check the next order.

An order with or without a limit price will not influence its ranking when it is booked. Broker Preferencing will apply first than across all other brokers in the set order for that match.

## Order Routing

MATCHNow is available from 8:00am daily for order entry. From their existing trading applications, users can choose the MATCHNow Liquidity destination to route orders and portfolios directly to MATCHNow's confidential book. To route an order through MATCHNow before trading on another marketplace, users can choose their Access Vendor's smart order router destination, and request it be configured to automatically route orders via MATCHNow Market Flow as a default setting.

### ***MATCHNow Liquidity Destination:***

By choosing the MATCHNow Liquidity destination, market participants send orders directly to MATCHNow's confidential book. These orders remain in the MATCHNow book as day orders unless they are filled, cancelled, or expire. Liquidity providers take advantage of the reduced market impact for large orders while gaining access to true contra liquidity higher in the routing table avoiding the noise on the displayed markets.

### ***MATCHNow Market Flow Destination:***

The Market Flow destination is ideal for active orders looking for price improvement over the CBBO spread. In today's expensive displayed market maker/taker fee structure, active orders have significant advantages to routing through MATCHNow on the way to the displayed market.

This incentive provides a significant opportunity for liquidity providers to find size by interacting with this natural liquidity before it routes to the displayed markets.

### ***MATCHNow Odd-lot Destination:***

Odd-lots sent to MATCHNow using the MarketFlow destination will be automatically sent to the Odd-lot book and the Odd-lot portion of mixed lots will be segregated and sent to the Odd-lot book (see Appendix D for structural overview). Odd-lot trades will occur at the CBBO, with the OLLP buying at the bid and selling at the offer. The MATCHNow Odd-lot book will be an extension of MATCHNow's matching process and will occur in sequence as outlined in the matching priority table below. Broker Preferencing is maintained for the MATCHNow Odd-lot book with a round robin allocation for other brokers supplying liquidity. Odd-lots will not be broken up. Odd-lot orders will either trade in full or returned unfilled to the sender.

The MATCHNow system supports the FIX protocol. The MATCHNow FIX Specification provides further details on MATCHNow messaging.

## **Trade Matching & Pricing**

Trading in MATCHNow occurs during normal market hours, 9:30 am until 4:00 pm. The MATCHNow system uses real-time quotes for all protected Canadian lit markets that provide order transparency. Only stocks with a valid, current quote are eligible for trading within MATCHNow. Should a stock be halted by IIROC or the listing market at the time a match is run, or if there is no valid bid/offer, that stock will not be eligible for MATCHNow matching at that time.

All orders matched within MATCHNow are executed at three levels of price improvement tiers: 1) the mid-point of the CBBO; 2) one price increment better than the CBBO or; 3) at the bid or offer for Large<sup>1</sup> Market Flow orders that trade with Large Liquidity Orders. Price discovery is based only on the CBBO; not on order limit prices.

MATCHNow only accepts securities settled in Canadian dollars and USD traded Canadian securities. Currency is assumed to be that of the stock symbol. All MATCHNow trade prices are based on the quote for the symbol, with no currency adjustment.

The time an order is received does not affect its standing in the MATCHNow book. Shares are distributed among LP orders on a pro-rata basis. Orders with the same broker number are matched before orders with different broker numbers. Anonymous orders receive broker preferencing based on the underlying executing broker number and are printed under 001.

MATCHNow orders are executed according to an algorithm that maximizes the share volume traded. The system adjusts share distribution to achieve this goal. MATCHNow utilizes a pro-rata allocation method to reward size while maximizing participation among all liquidity providers.

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<sup>1</sup> Large orders are defined as greater than 50 Standard Trading Units or greater than \$100,000 in value and when they are either an exchange traded fund (ETF) or designated as eligible to trade at the CBBO by MATCHNow.

## Match Priority

Matching Priority	Match Allocation	Match Details
First	Traded at mid-point same broker	Broker preferencing applied to matching (priority to execution broker for attributed and anonymous orders.) Fills will be allocated on a pro-rata basis within the same broker.
Second	Traded at mid-point among brokers	Remaining unfilled quantity will be matched on a pro-rata basis across all other brokers.
Third	Traded at minimal price improvement <sup>2</sup> with same broker	Broker preferencing applied to matching (priority to execution broker for attributed and anonymous orders.) Fills will be allocated on a pro-rata basis within the same broker.
Fourth	Traded at minimal price improvement among brokers	Remaining unfilled quantity will be matched on a pro-rata basis across all other brokers.
Fifth (only available to Large MF orders trading with Large LP Orders)	Traded at the CBBO with same broker	Broker preferencing applied to matching (priority to execution broker for attributed and anonymous orders.) Fills will be allocated on a pro-rata basis within the same broker.
Sixth (only available to Large MF orders trading with Large LP Orders)	Traded at the CBBO among brokers	Remaining unfilled quantity will be matched on a pro-rata basis across all other brokers.
Seventh Odd-lot portion of a mixed lot or an Odd-lot order	Traded at the CBBO with same broker	Broker preferencing applied to matching (priority to execution broker for attributed and anonymous orders.) Odd-lot fills are not pro-rated but are based on a round robin ranking methodology.
Eighth Odd-lot portion of a mixed lot or an Odd-lot order	Traded at CBBO with next broker in line.	Remaining unfilled quantity will be matched based on a round robin ranking methodology. Odd-lot fills are not pro-rated.

Order Priority is **not** based on price or time priority except for Odd-lot liquidity orders entered after the open 9:30 am. Price limits on an order will determine if the order is eligible to participate in the match. The execution price is determined by the amount of price improvement provided by the LP order(s) based on the CBBO.

Since the execution price is calculated from the CBBO, the price limit (i.e. two, three or four decimals) submitted on an order does not affect the amount of price improvement nor does it affect or establish priority in the matching process or pro-rata allocation. The limit price in FIX Tag 44 simply determines if an order is eligible to be included in a match.

Trading restrictions, such as minimum size or minimum tradelet size does not affect the amount of price improvement nor does it affect or establish priority in the matching process so long as the restrictions can be met in the allocation process.

All executions in MATCHNow will comply with the “better price” requirements set by marketplace regulation and the Universal Market Integrity Rules (UMIR).

<sup>2</sup> Minimum Price Improvement as required by IROC Provisions Respecting Dark Liquidity is “a minimum of one trading increment except, when the difference between the best ask price and the best bid price is one trading increment, the amount shall be a minimum of one-half of one trading increment”. See <http://www.securities-administrators.ca/aboutcsa.aspx?id=1045&terms=Provisions+Respecting+Dark+Liquidity> (April 13, 2012).

## Broker Prefrencing Allocation Methodology:

Attributed and Anonymous Orders	Prefrencing by Execution Broker
Jitney Orders	No Prefrencing by execution broker

Example: Ticker 'XYZ' is bid @ \$5.60 and offered @ \$5.64

### Market Flow – Provider



### Provider – Provider



**Continuous, Instantaneous Executions:** Matches between Market Flow and LP orders occur on a continuous basis, as Market Flow orders arrive. When orders trade the amount of price improvement received by the Market Flow order is determined by the LP order.

**Automated, 1- to 3-Second Call Executions:** MATCHNow searches for matches among LP orders every 1 to 3 seconds (randomized), at the mid-market price, allowing each liquidity provider to find additional liquidity.

Following are further examples of the MATCHNow price improvement model.

**Example:** Ticker 'XYZ' is bid @ \$5.60 and offered @ \$5.67

MATCHNow Order Type	Order Entry	MATCHNow Volume Traded	MATCHNow Trade Price	Displayed Mkt Trade Price	Savings	Result
Passive (LP)	Buy 5,000 @ \$5.64	5,000	\$5.635	No Trade (\$5.67)	Liquidity Found	Buy limit is met and a trade occurs. Trade occurs priced better than the quote.
Passive (LP)	Sell 10,000 @ Mkt	5,000	\$5.635	\$5.60	\$175.00	
Passive (LP)	Buy 10,000 @ \$5.63	5,000	\$5.635	No Trade	N/A	No trade occurs because the trade is priced inside the CBBO which is above the buyers limit.
Active (MF)	Sell 5,000 @ Mkt	5,000	\$5.635	No Trade	N/A	
Active (MF)	Buy 5,000 @ \$5.64	0	\$5.635	No Trade (\$5.67)	Liquidity Found	The trade occurs at midpoint and both orders find liquidity not available on the displayed market.
Passive (LP)	Sell 10,000 @ \$5.63	0	\$5.635	No Trade (\$5.67)	Liquidity Found	

## ***MATCHNow Pro-Rata***

MATCHNow utilizes a proprietary pro-rata matching algorithm that is designed to reward size while optimizing allocations to ensure maximum participation on every match. The pro-rata algorithm begins with a standardized pro-rata allocation process and rounds all allocations down to the nearest board lot. This ensures that users are only allocated board lot fills and the pro-rata rewards larger orders with more shares.

The remaining unallocated shares are then used to either help fulfill orders with restrictions or are split into board lots and are randomly assigned to orders that have not received an allocation during the initial allotment. This process allocates board lots to larger orders and works down the order size list. If there are multiple orders with the same size and not enough board lots a randomization process is used to assign the board lot.

If an order with restriction still cannot be satisfied the allocated shares are split up among other orders with the priority again given to large sized orders. Please see Appendix A for examples.

## ***MATCHNow List Based Orders***

MATCHNow's proprietary allocation algorithm allows for list orders. A list is defined as multiple and different symbols that can be on one side or both sides of the market. Certain constraints may be specified for a complete list of orders submitted to the MATCHNow-Liquidity destination. The Market Flow destination does not support lists. These constraints apply to all orders with the list and take precedence over constraints specified at the user default, or system default levels. List orders accept the same attributes and constraints as single orders and allow for the setting of cash constraints. Cash constraints allow the setting of a buy imbalance value and or a sell imbalance value as part of the list instructions. List constraints are specified in the ListExecInst (Fix Tag 69) field of the FIX New Order-List message.

For matching and allocation, the individual orders in the list will be handled the same as a single order when a contra order is received and an auction is run for that symbol. If the order from the list can participate in the auction (i.e. limit price is marketable, the current cash imbalance for the entire list allows for at least one board lot to trade and any minimum or tradelet restrictions are less than the contra order) it will follow the same matching priority and allocation process as a single order with one exception, it will only trade up to and not exceed the net cash constraint value at the time of the auction. The pro-rata allocation applies the same as for single orders. When the matching engine is evaluating restrictions on the orders in the auction, the optimization process will enforce the cash constraint rule by never allocating too many board lots to the list order which would cause a violation of the cash constraint. The shares that exceed the cash constraint are allocated back to other orders that can take those shares. See Appendix B for examples.

## ***Setting the No Self Trade Exclusion***

MATCHNow's "No Self Trade" feature is an optional designation that suppresses trades from the MATCHNow matching algorithm where orders on both sides of the trade are from the same Subscriber and have been identified by the Subscriber to be excluded from matching with each other. Subscribers will provide MATCHNow with the trading ID(s) that should not trade with each other. The "No Self Trade" feature is intended to only apply to unintentional self trading. The change was introduced to provide Subscribers with similar functionality available on competing marketplaces. The Subscriber requesting the "No Self Trade" feature on a trader ID will have to provide notification to MATCHNow of the affected ID's and confirm that the setting of the "No Self Trade" feature is solely used for preventing unintentional wash trades where there will be no change of beneficial ownership.

## ***Price Protection Out of Range***

MATCHNow Price Protection Out of Range filter provides an automated check on the entered limit price to avoid manual mistakes caused by 'fat finger' limit price errors.

Example: In the case a trader enters an extra zero in limit price (buy XYZ @ \$20.00 instead of \$2.00), Price Protection functionality will reject the order and prevent the order from trading on MATCHNow.

The Price Protection Out of Range filter takes effect if the Limit Price is over 25% away from the last mid-point price calculated from the CBBO (mid-point price = (Bid+Ask)/2) for equity securities.

For Listed Debentures and Listed Notes (*includes .DB, .NT and .IR*) the Price Protection Out of Range filter takes effect if the Limit Price is over 25% away from the last mid-point price calculated from the CBBO (mid-point price = (Bid+Ask)/2).

If the CBBO is not available the last trade price or previous close, whichever is more recent will become the reference point used by the filter. If the last quote mid-point price is less than \$1.00, a limit price tolerance of \$1.00 away from the last quote mid-point price is enforced.

The order with a reject message will be returned to the Access Vendor/Subscriber with the text “Price Protection out of range”.

## **Marketplace Thresholds**

Pursuant to IROC Rules, MATCHNow has put in place certain marketplace thresholds that will help to control short-term volatility and prevent erroneous trades. These thresholds require MATCHNow to check the National Last Sale Price (NLSP) and the last minute price for trading to ensure that any change in price does not exceed certain percentage thresholds. MATCHNow will REJECT an order with a limit price that is outside the threshold. This is an order validation check for new orders (or corrections) only, and NOT for trading. The applicable threshold percentage is based on the Previous Close Price (or initial price set for IPO) of a symbol as listed below:

<b>Class of Security</b>	<b>Previous Close</b>	<b>Threshold Level</b>
NOT subject to SSCB	< 0.50	300 %
NOT subject to SSCB	>= 0.50 and < 1.00	50 %
NOT subject to SSCB	>= 1.00 and < 5.00	30 %
NOT subject to SSCB	>= 5.00 and < 10.00	20 %
NOT subject to SSCB	>= 10.00 and < 30.00	15 %
NOT subject to SSCB	>= 30.00	10 %
ETF	ALL	10 %
Subject to SSCB (not ETF)	ALL	10 %

(SSCB = Single Stock Circuit Breaker)

A file must be downloaded daily from the IROC website to determine which symbols are subject to the SSCB for the calculations required in accordance with the chart above. The file is available for download by date at: <http://www.iroc.ca/industry/rulebook/Pages/SSC-Breakers.aspx>.

The Order Limit price is to be checked for the above-noted percentages against two prices:

1. The NLSP, which is the LAST TRADE price that is known.
2. The NLSP that occurred on the most recent minute interval, aka the “One Minute Reference Price” (OMRP). For example, if the NLSP at 10:13:00.000 was 2.55, it will be used as OMRP between 10:13:00.000 and 10:13:59.999, at which point it gets reset to the next minute price. To avoid race conditions, OMRP may be used in P5 while the Price Server maintains the latest OMRP using cyclic snapshots.

Both the price percentage thresholds and the interval to get the NLSP prices (which is 1

minute) should be configurable. Thus, the one-minute interval can become a 30-second interval, or 30% for a range of \$1.00 to \$5.00 can become 25%.

MATCHNow will accept orders at any price before the first trade of the day (when no Last Trade price is available). The same applies post-regulatory HALT - after it is lifted until it trades for the first time.

MATCHNow has a provision to override the thresholds to allow a trade for a symbol if the IIROC Market Integrity Official instructs MATCHNow to override the thresholds in special cases.

Examples:

- 1) Order comes in at 9:30:50 with limit of \$2.16. Based on PrevClose, threshold is 30%. NLSP is 2.15, OMRP at 9:30:00 is \$2.10.
  - First Threshold is \$2.15 +/-30%, which will be \$1.51 to \$2.80 OK
  - Second Threshold is \$2.10 +/-30%, which will be \$1.47 to \$2.73 OK
  - Order is accepted.
- 2) Order comes in at 9:32:40 with limit of \$1.25. Based on PrevClose, threshold is 30%. NLSP is 2.15, OMRP at 9:32:00 is \$2.10.
  - First Threshold is \$2.15 +/-30%, which will be \$1.51 to \$2.80 NOT OK - REJECT (no need to check second one)
  - Order is rejected.
- 3) Order comes in at 9:32:50 with limit of \$2.83. Based on PrevClose, threshold is 30%. NLSP is 2.18, OMRP at 9:32:00 is \$2.17.
  - First Threshold is \$2.18 +/-30%, which will be \$1.53 to \$2.83 OK, continue checking next one
  - Second Threshold is \$2.17 +/-30%, which will be \$1.52 to \$2.82 NOT OK - REJECT
  - Order is rejected.

## Order & Trade Reporting

The system returns a FIX Execution Report for each trade to the originating Access Vendor immediately following each match.

Public trade reports are disseminated in real time via TSX Datalinx, TMX Information Processor or via our FIX based market Data feed in standard format (similar to TL1). All matches are printed as having been completed in MATCHNow, with broker numbers, or with broker 001 for orders that were marked anonymous, in accordance with UMIR requirements. MATCHNow does not charge a subscription fee for public market data.

A FIX drop copy of executions for settlement can be provided to Subscribers for \$750 CAD/month +GST/HST.

Private (encrypted) and public order and trade information is also distributed in real time, in standard format (similar to TBF) via TSX Datalinx, and is accessible to Subscribers through decryption keys provided by MATCHNow personnel. Counterparty information for traded orders that were marked as anonymous is provided to brokers through an end-of-day query.

Data distributors that receive MATCHNow trade reports are encouraged to integrate MATCHNow trades with TSX and other markets' trades of the same security in their "time and sales" displays.

Daily MATCHNow trade reports are sent to CDS; it is the Subscribers' responsibility to clear and settle accordingly.

# Harmonization with UMIR

The Investment Industry Regulatory Organization of Canada Inc. (IIROC) is responsible for market regulation of MATCHNow and its Subscribers. Following is a summary of IIROC's position on the MATCHNow business model as it relates to UMIR, as detailed in Market Integrity Notice 2007-002 – Provisions Respecting Competitive Marketplaces. For further details on the application of UMIR to MATCHNow, please refer to Market Integrity Notices 2006-017 and 2006-020.

**Subscribers and Direct Access Clients:** MATCHNow Subscribers (Canadian IIROC registered investment dealers) fall within the UMIR definition of a "Participant" or "Participating Organization". MATCHNow Direct Access Clients *do not fall within the definition of an "Access Person"*.

**Call Market Orders:** MATCHNow Liquidity Providing (LP) orders fall within the UMIR definition of a Call Market Order.

**Last Sale Price:** As all MATCHNow trades result from a Call Market (i.e. LP) Order, they do *not* set the "last sale price".

**2.1 Just and Equitable Principles:** MATCHNow will not introduce specific Odd-lot abuse policies. MATCHNow will monitor Odd-lot trading and work with IIROC to identify any violations of UMIR 2.1 UMIR has sufficient rules that should protect market integrity. The proposed model of open access for the MATCHNow Odd-lot promotes fair and efficient markets.

**2.2 Manipulative or Deceptive Method of Trading:** MATCHNow Subscribers may inadvertently place orders that trade with their own contra orders, resulting in no change in beneficial or economic ownership. Subscribers must establish policies and procedures to ensure that this does not regularly occur. MATCHNow offers a "No Self Trade" feature that can be configured to ensure self trading does not occur. Please contact MATCHNow support [support@matchnow.ca](mailto:support@matchnow.ca) to enable this functionality.

**5.1 Best Execution of Client Orders:** Participants must diligently pursue the execution of each client order on the most advantageous terms for the client. In determining whether a Participant has diligently pursued the best execution of a client order, IIROC considers a number of factors, including whether the Participant has considered possible liquidity on a non-transparent marketplace such as MATCHNow if (a) displayed **volume** is inadequate to fully execute the client order on advantageous terms for the client; and (b) the non-transparent marketplace has demonstrated a reasonable likelihood of liquidity for the specific security. In the view of IIROC, these requirements are the minimum that a Participant should do in obtaining best execution. IIROC states specifically, "For example, if a non-transparent marketplace has been structured to provide price improvement over the best ask price or best bid price, the Participant may wish to consider possible trading opportunities on that marketplace if the non-transparent marketplace has demonstrated that there is a reasonable likelihood that it will have liquidity for the specific security."

MATCHNow is designed to facilitate best execution through automatic price improvement over the best bid/ask

**5.2 Best Price Obligation:** Participants must make reasonable efforts prior to execution of a client order to ensure that the order is executed at the best price, subject to some exceptions. While UMIR would not require a Participant to determine if a "better-priced" order existed on MATCHNow prior to executing on another marketplace, it is IIROC's position that MATCHNow essentially



system-enforces compliance with UMIR 5.2. MATCHNow provides price improvement over the “best ask price” and the “best bid price” on the execution of a trade at the time of execution. As such, no order executing on MATCHNow would owe a “best price obligation” to an order on another marketplace.

Under UMIR 5.2(2)(c), Subscribers may enter client orders as MATCHNow LP (Call Market) orders – rather than on the best bid/ask – but only if so directed or consented to by the client.

**5.3 Client Priority:** Subscribers that enter MATCHNow LP orders as non-client or principal are not obligated to give priority to their firm’s client LP orders (which are, by definition, at the same price) in MATCHNow, pursuant to several exemptions to Rule 5.3, provided the client order is entered immediately upon receipt and not varied except on the specific instructions of the client. However, please note that MATCHNow Subscribers must not solicit and enter client LP orders as agent, then take advantage of the MATCHNow pro-rata matching algorithm to trade a non-client or principal order alongside, or trade ahead of the client LP order on another marketplace.

**6.1 Entry of Orders to a Marketplace:** MATCHNow trades may be executed with any level of accuracy, if permitted by the information processor or information vendor. MATCHNow trade prices are accurate to 4 decimals (not necessarily in half-penny increments).

**6.3 Exposure of Client Orders:** With respect to MATCHNow Market Flow orders, it is the view of IIROC that client orders which are routed to a non-transparent marketplace to determine if liquidity is available on that marketplace at prices that are the same or better than displayed in a consolidated market display would comply with Rule 6.3 if any unexecuted portion of the client order was then immediately entered on a marketplace that did provide order transparency.

With respect to MATCHNow LP orders, the following exemptions to Rule 6.3 may apply to client orders:

- the order is over 50 standard trading units or \$100,000 value
- the client has directed or consented to the order being entered as a MATCHNow LP order
- the Participant determines based on market conditions that entering the order to a transparent market would not be in the best interests of the client

**8.1 Client-Principal Trading:** Subject to some exceptions, Participants that receive a client order for 50 standard trading units or less of a security with a value of \$100,000 or less may execute the client order against a principal order or non-client order at a better price, provided the Participant has taken reasonable steps to ensure that the price is the best available price for the client taking into account the condition of the market at that time.

Under the dark liquidity rules, any active order less than 50 standard trading units or \$100,000 in value, must receive minimum price improvement of one tick or half a tick when the spread is one tick wide.

Given the mechanism by which the trade price is calculated on MATCHNow, IIROC is of the opinion that the trade price on MATCHNow satisfies the requirements to be the “best available price” and also satisfy minimum price improvement, taking into account the condition of the market.

UMIR 8.1 does not apply if the client has directed or consented that the client order be entered as a MATCHNow LP (Call Market) order. *Subscribers are reminded to obtain explicit permission from a client prior to entering an LP order on their behalf.*

## Subscriber Fees

### Set-up and Access Fees

There is a onetime set-up fee of \$150 +GST/HST and an annual access fee of \$250 +GST/HST.

### Trading Fees

Non ETF Trading at Mid-Point and MPI

Stock Price	Trade Type	Trading Fee	Maximum Fee
\$5.00 and over	2-sided trade	\$.0010 / share / side	\$10 / side
\$1.00 to \$4.99	2-sided trade	\$.0005 / share / side	\$10 / side
Under \$1.00	2-sided trade	\$.0001 / share / side	\$5 / side
Unintentional Cross \$1.00 and over	Cross	Free	N/A
Unintentional Cross under \$1.00	Cross	Free	N/A

### Exchange Traded Funds

Subscribers pay the following trading fees for Exchange Traded Fund (ETF) traded orders:

Destination	Trading Fee
Market Flow (Active)	\$0.0005 / share
Market Flow (Active) Unintentional Cross	Free
Liquidity (Passive)	<b>Free</b> For Liquidity to Liquidity (mid-point), both sides are free, even for trades amongst brokers

### Trading Equity Securities At The Touch

Any Canadian equity can be traded At The Touch. Orders need a special FIX tag value to be eligible to trade. All at-the-touch orders need to be "Large" size (orders must be > 50 Standard Trading Units or > \$100,000).

Stock Price	Trading Fee	Maximum Fee
Under \$1.00	\$0.0001 / share / side	\$3 / side
\$1.00 and above	\$0.0002 / share /side	N/A
Unintentional Cross	Free	N/A

## Odd Lots

Subscribers pay the following trading fees for Odd-lot orders:

<b>Destination</b>	<b>Trading Fee</b>
Market Flow (Active)	Free
Liquidity (Passive)	Free

## Listed Debentures and Listed Notes: *(includes .DB, .NT and .IR)*

Subscribers pay the following trading fees for Debenture and note trading:

<b>Destination</b>	<b>Trade Type</b>	<b>Trading Fee</b>
Market Flow (Active)	2-Sided Trade	\$0.02 per \$1000 value / Side
Liquidity (Passive)	2-Sided Trade	\$0.02 per \$1000 value / Side
Unintentional Cross	Cross	Free

Trading fees are exempt from GST/HST (CRA Case Number: 135513)

## Market Data and Post Trade Information Fees

### Public Feeds (Last Sale Information Only)

Provided by TSX Datalinx and TMX Information Processor. MATCHNow does not charge any user fees or vendor access fees for public data provided by TSX Datalinx or TMX Information Processor.<sup>3</sup>

### Private Feeds (Order and Trade Information)

Provided by TSX Datalinx and is the primary source of order and trade execution to be used as a drop copy. MATCHNow does not charge any user fees or vendor access fees for private data provided by TSX Datalinx.<sup>4</sup>

### Settlement and Clearing Fees

MATCHNow at the request of a subscriber or access vendor will build custom Fix protocol post trade drop copies for clearing and settlement for multiple connections at a cost of \$750+GST/HST per month.

### Communication Fees

Access Vendors that connect to MATCHNow are responsible for carrier communications costs. MATCHNow can arrange for network cross connects for access vendors for a one time set-up fee of \$500+GST/HST and on-going monthly fees of \$500+GST/HST. Networking and cross connects from Toronto Data Centers will be provided by ITG Canada Corp.

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<sup>3</sup> TSX Datalinx and TMX Information Processor may charge access, communication, and set-up fees as outlined in their respective fee schedules.

<sup>4</sup> TSX Datalinx may charge access, communication, and set-up fees as outlined in their fee schedules.

## Appendix A – Order Attributes Examples

### Minimal Price Improvement:

Example #1 ten cent spread: Market Flow Buy order for 2,000 XYZ at price limit of \$10.12 is sent to MATCHNow. The current CBB is 5,000 shares at \$10.00 and the CBO is \$10.10 for 900 shares. There are two resting liquidity orders in MATCHNow a sell for 1,000 XYZ at market to trade at mid-point and a sell for 4,000 XYZ with a price limit of \$10.07 marked with Minimal Price Improvement.

The Market Flow order will receive two fills: 1,000 @ \$10.05 (mid-point) and 1,000 at \$10.09 (CBO less 1 increment). The Market Flow order has been filled for an average price of \$10.07 which is better than the posted offer and has not impacted the market.

Example #2 two cent spread: Market Flow Buy order for 2,000 XYZ at price limit of \$10.02 is sent to MATCHNow. The current CBB is 5,000 shares at \$10.00 and the CBO is \$10.02 for 900 shares. There are two resting liquidity orders in MATCHNow a sell for 1,000 XYZ at market to trade at mid-point and a sell for 4,000 XYZ with a price limit of \$10.00 marked with Minimal Price Improvement.

The Market Flow order will receive two fills: 1,000 @ \$10.01 (mid-point) and 1,000 at \$10.01 (CBO less 1 increment or in this case mid-point). The Market Flow order has been filled for an average price of \$10.01 which is better than the posted offer and has not impacted the market. The Minimal Price Improvement order trades at the same price and priority as the mid-point order.

### Trading At The Touch for Listed Exchange Traded Funds (ETFs)

Example: Market Flow Buy order for 6,000 XIUs at price limit of \$18.61 is sent to MATCHNow with the order attribute permitting the order to trade at the CBO. The current CBB is 1,000 shares at 18.60 and the CBO is 18.61 for 500 shares. There are two resting liquidity orders in MATCHNow a sell for 2,000 XIU at market to trade at mid-point and a sell for 20,000 XIU with a price limit of 18.61 to trade at the offer price.

The Market Flow order will receive two fills: 2,000 @ \$18.605 (mid-point) and 4,000 at \$18.61 (CBO). The Market Flow order has been filled for an average price of 18.6083 which is better than the posted offer and has not impacted the market.

### Trading At The Touch for Large Security Orders

Example: Market Flow Buy order for 6,000 BB at price limit of \$12.09 is sent to MATCHNow with the order attribute permitting the order to trade at the CBO. The current CBB is 1,000 shares at 12.08 and the CBO is 12.09 for 500 shares. There are two resting liquidity orders in MATCHNow a sell for 2,000 BB at market to trade at mid-point and a LSO sell for 20,000 BB with a price limit of 12.08 which will trade at the best offer price which is currently 12.09.

The Market Flow order will receive two fills: 2,000 @ \$12.085 (mid-point) and 4,000 at \$12.09 (CBO). The Market Flow order has been filled for an average price of 12.08833 which is better than the best posted offer and has not impacted the lit market even though the lit offer was insufficiently of size to execute this order.

## Minimum Tradelet Size Executed

Example: A Market Flow buy order for 1,000 ABX at a limit price of \$29.60 is sent to MATCHNow. There are 10 sell orders resting in MATCHNow. The Market Flow buy order's worst possible allocation is 10x100 share fills due to the pro-rata methodology.

By specifying a Minimum Tradelet Size of 400 shares, this trade will be allocated to no more than 3 fills.

Scenario A: 2x400 fills and a 1x200 fill (Since the first 2 fills leave 200 shares, the Min Tradelet Size is automatically reduced to the remaining quantity of 200 shares)

Scenario B: a 1x1,000 fill

Scenario C: a 1x600 fill and a 1x400 fill

The fill quantity scenario is based on what liquidity is resting in MATCHNow.

## Appendix B – Pro-Rata Allocation Examples

The internal matcher allocates the available shares based on the pro-rata, i.e. an order a larger size will capture more contra liquidity.

Assuming that Sell Total is less than Buy Total, formula will be:  $\text{Allocated shares} = (\text{BuyOrder Size} / \text{BuySideTotal}) * \text{SellSideTotal}$

Order ID	Side	Size	Pro-Rated allocation	Remarks
Ord1	B	1000	$=(1000 / 5000) * 2000 = 400$	Gets 20% share based on the size
Ord2	B	4000	$=(4000 / 5000) * 2000 = 1600$	Gets 80% share based on the size
Ord3	S	1000	1000	Trades fully
Ord4	S	1000	1000	Trades fully

Distribution of Odd-lot Shares After the Round-lot Pro-rata

In many cases, the Pro-Rated allocation is not in the round lot size. In that case, Pro-Rated allocation is truncated to the round lot size. Then, the remaining shares are distributed in round lot size to the available parties in two ways:

First, allocate round-lot size to the parties who did not get a fill. This allocation is on random basis.

Then, it will allocate the rest of these between the other available parties, bigger size orders receive priority.

**Test case 1: bigger** orders receive an additional 100 shares each

Order ID	Side	Size	Pro-Rated allocation	Truncated to lot size	Final after distribution	Remarks
Ord1	B	1000	$=(1000 / 2500) * 900 = 360$	300	400	Gets another 100 due to larger size
Ord2	B	1000	$=(1000 / 2500) * 900 = 360$	300	400	Gets another 100 due to larger size
Ord3	B	500	$=(500 / 2500) * 900 = 180$	100	100	
Ord4	S	900	900		900	Total 200 left on the table are given to two buy orders as above.

**Test case 2: Out of 200 shares** left, the first 100 goes to the order without a fill and then randomly to the larger sized order.

Order ID	Side	Size	Pro-Rated allocation	Truncated to lot size	Final after distribution	Remarks
Ord1	B	1000	$=(1000 / 2600) * 900 = 346$	300	400	Randomly receives another 100 due to size
Ord2	B	1000	$=(1000 / 2600) * 900 = 346$	300	300	Potential to receive another 100 due to size
Ord3	B	500	$=(500 / 2600) * 900 = 173$	100	100	
Ord4	B	100	$=(100 / 2600) * 900 = 35$	0	100	The extra 100 goes to the party that did not receive a fill in the first round
Ord5	S	900	900		900	Total 200 left on the table are given to two buy orders as above.

**Test case 3: Out of 200 shares** left, the first 100 goes to the order without a fill and then randomly to the larger sized order.

Order ID	Side	Size	Pro-Rated allocation	Truncated to lot size	Final after distribution	Remarks
Ord1	B	1000	$=(1000 / 5100) * 1000 = 196.08$	100	100	
Ord2	B	4000	$=(4000 / 5100) * 1000 = 784.31$	700	800	Gets another 100 due to larger size
Ord3	B	100	$=(100 / 5100) * 1000 = 19.61$	0	100	Gets 100 based on above explanation
Ord4	S	1000	1000		1000	Total 200 left on the table are given to two buy orders as above.

## Handling of Orders with Restrictions

In case of one or more orders utilizing a restriction such as the minimum shares restriction, the initial “simple pro-rata allocation” marks the orders that will violate the constraint. This violated list is revisited later on to see if we can change the allocation to maximize the traded shares by meeting restrictions. However, if any order cannot be met because the restrictions require more than the total available contra liquidity, it will be taken out of the allocation logic.

The MATCHNow proprietary optimization algorithm will now attempt to satisfy any restrictions while maximizing the total volume traded on every match. The algorithm accomplishes this by cycling through various allocation scenarios maximizing the traded volume while protecting initial allocations and satisfying restrictions when possible.

If restrictions cannot be met, the initially allocated shares from the restricted order will be redistributed to other orders.

The below scenarios are indicative of the redistribution of excess shares once the simple pro-rata percentage is determined and the mixed lots are rounded down to board lots.

**Test case 4:** the minimum of 600 shares are met by allocating 100 shares (round lot size)

Order ID	Side	Size	Min Sh	Pro-Rated allocation	Min Sh violated?	Needed	Optimization	Remarks
Ord1	B	600	600	500	Y	100	+100 to 600	Ord1 receives 100
Ord2	B	600	300	500			-100 to 400	
Ord3	S	1000					1000	

**Test case 5:** minimum of 100,000 shares are met by allocating 200 shares

Order ID	Side	Size	Min Sh	Pro- Rated allocation	Min Sh violated?	Needed	Optimization	Remarks
Ord1	B	100,000						
Ord2	S	100,000	100,000	99,800	Y	200	+200 to 100,000	
Ord3	S	300	300	200	Y	100	-200 to 0	The shares were redistributed to the larger order



**Test case 6:** minimum of 700 shares for Ord2 are met by re-allocating 200 shares (100 from each of the other two orders).

Order ID	Side	Size	Min Sh	Pro- Rated allocation	Min Sh violated?	Needed	First Optimization	Second Optimization	Remarks
Ord1	B	1000	500	200	Y	300	-100 to 100	0	Gives 100 after 1st round
Ord2	B	1500		300			-100 to 200	200 / 300	Gives 100 after 1st round. 2nd optimization leads to 100 shares randomly allocated between Ord 2 and 3
Ord3	B	2000	700	500	Y	200	+200 to 700	800 / 700	Receives 200 shrs on first round. 2nd optimization leads to 100 shares randomly allocated between Ord 2 and 3
Ord4	S	1000					1000	1000	

**Test case 7: Shares are allocated and then** reallocated to satisfy restriction through optimization:

Order ID	Size	Simple Pro- Rata Allocation	200 Share Allocation	Min Restriction	Optimization	Final Trades
Buy Ord1	1200	500	+100 to 600	700	+100 to 700	700
Buy Ord2	1000	400	400	400	400	400
Buy Ord3	2000	900	+ 100 to 1000		-100 to 900	900
<b>Total Buy</b>	<b>4200</b>	<b>1800</b>	<b>2000</b>		<b>2000</b>	<b>2000</b>
Remarks		200 unallocated	The 200 is split between the two largest orders		100 shares is reallocated from order	
Sell Ord4	2000	2000	2000			2000

## Appendix C – List Based Order Examples

### Allocation for Cash Constrained List Orders

Customer sends in a list of 5 buys and 5 sells all at market with a cash constraints on the list (Buy Imbalance = \$10,000 and sell imbalance = \$10,000)

The initial orders for the list are as follows (with a net trade cost of zero if all are executed)

	Side	Volume	Last	value
ABX	Buy	1000	\$ 21.20	\$ 21,200.00
AEM	Buy	1000	\$ 34.06	\$ 34,060.00
AGU	Buy	1000	\$ 91.01	\$ 91,010.00
ARX	Buy	1000	\$ 25.60	\$ 25,600.00
BAM.A	Buy	1000	\$ 36.84	\$ 36,840.00
BB	Sell	1000	\$ 10.90	\$ 10,900.00
BBD.B	Sell	6700	\$ 4.70	\$ 31,490.00
BCE	Sell	1000	\$ 42.60	\$ 42,600.00
BMO	Sell	1000	\$ 65.10	\$ 65,100.00
BNS	Sell	1000	\$ 58.62	\$ 58,620.00

All test cases are for trades within the same broker (so no added complexity of broker preferencing is included in the test cases)

### Test Case 1 (simple one to one match)

Market Flow sell order of 500 AGU @ mkt is received (bid 91.00 offer 91.02 mid-point = 91.01) Current Imbalance = 0

Order ID	Side	Size	Pro-Rated Allocation	Truncated to Lot Size	Final Allocation	Remarks
List Ord1	Buy AGU	1,000	500	500	100	Cash Constraint restricts the fill to 100 shares @ 91.01 or \$9,101 of the 10,000 buy imbalance
Ord2	Sell AGU	500	500	500	100	400 shares returned unfilled

If another sell order for AGU is received there will be no trade until the list sells to offset the negative imbalance.

**Test Case 2 (simple one to one match as imbalances adjust)**

Market Flow buy order of 1,000 BCE @ mkt is received (bid 42.60 offer 42.62 mid-point = 41.61) Current Imbalance = (\$9,101)

Order ID	Side	Size	Pro- Rated Allocation	Truncated to Lot Size	Final Allocation	Remarks
Ord1	Buy BCE	1,000	1,000	1,000	400	600 shares returned unfilled
List Ord2	Sell BCE	1,000	1,000	1,000	400	Cash Constraint restricts the fill to 400 shares @ 41.61 or \$16,644 moving the

If another buy order for BCE is received there will be no trade until the list buys to offset the positive imbalance. The list can sell \$2,457 of securities at this time and can buy \$17,543 of securities.

**Test Case 3 (multiple orders and pro-rata allocation)**

Market Flow Sell order of 1,000 ABX @ mkt is received (bid 21.20 offer 21.22 mid-point = 21.21) Current Imbalance = \$7,543

Order ID	Side	Size	Pro-Rated Allocation	Truncated to Lot Size	Final Allocation	Remarks
List Ord1	Buy ABX	1,000	286	200	300	List order gets additional 100 shares from round robin. Cash Constraint does not restrict the fill and trades 300 shares @ 21.21 or \$6,363 moving the imbalance to a sell imbalance of \$1,180
Ord2	Buy ABX	500	143	100	100	Single order gets no additional shares from round robin (smallest order)
Ord3	Buy ABX	2,000	571	500	600	Single order gets additional 100 shares from round robin (largest order)
Ord4	Sell ABX	1,000	1000	1000	1000	

**Test Case 4 (multiple orders and pro-rata allocation)**

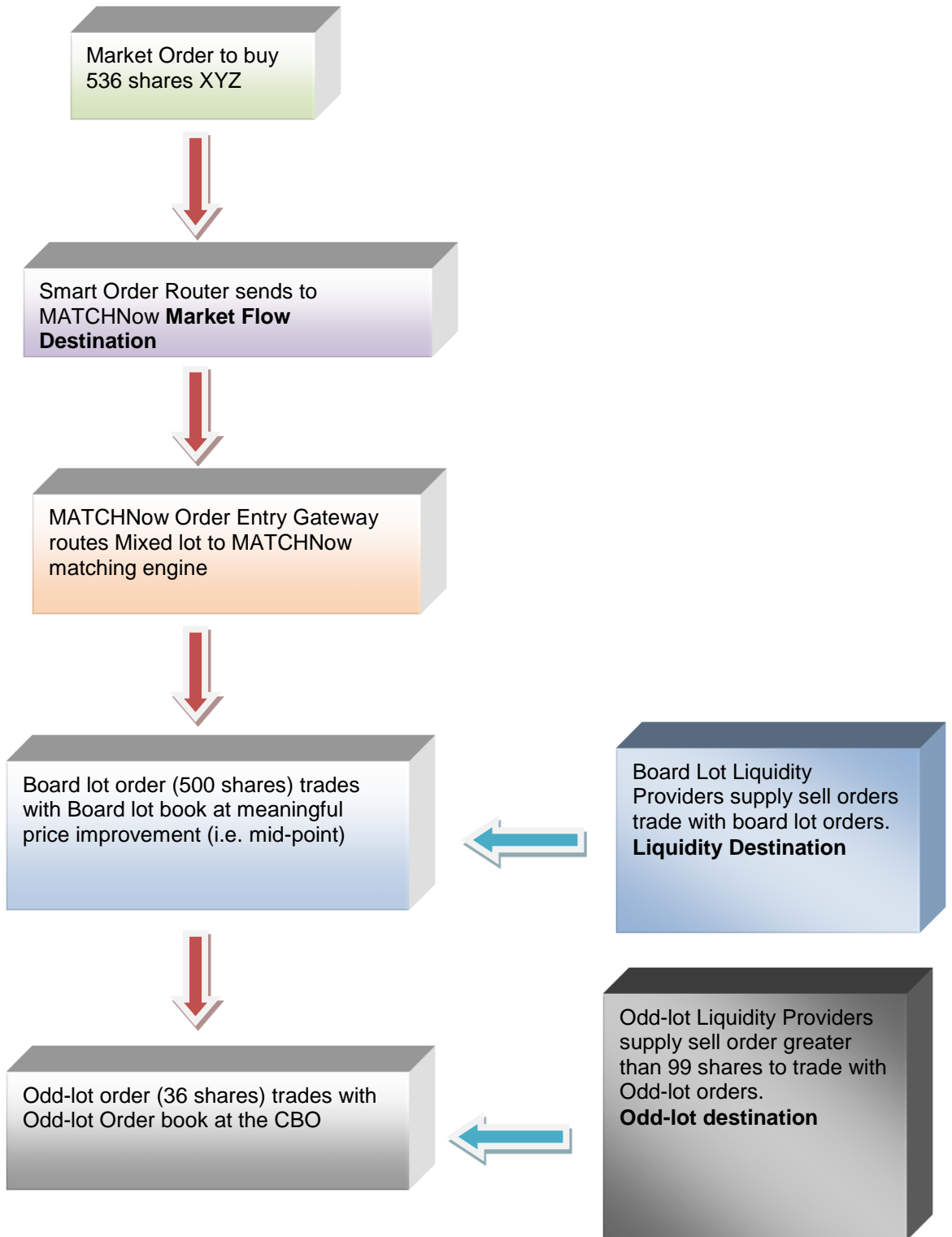
Market Flow Buy order of 9,000 BBD.B @ mkt is received (bid 4.70 offer 4.72 mid-point = 4.71) Current imbalance = \$1,180

Order ID	Side	Size	Pro-Rated Allocation	Truncated to Lot Size	Final Allocation	Remarks
Ord1	Buy BBD.B	9,000	9,000	9,000	4,800	Order does not completely trade as list order is constrained.
List Ord2	Sell BBD.B	6,700	6,216	1,800 (cash constraint)	1,800	Cash Constraint restricts the fill and trades 1,800 shares @ 4.71 or \$8,478 moving the imbalance to a sell imbalance of \$9,658
Ord3	Sell BBD.B	2,000	1,856	1,800	2,000	Orders are completed because cash constraint left shares to be reallocated.
Ord4	Sell BBD.B	1,000	928	900	1,000	Orders are completed because cash constraint left shares to be reallocated.

Updated view of trade list with fills

	Side	Open Orders	Last	Value	Filled
ABX	Buy	700	\$ 21.20	\$14,840.00	Bot 300 ABX
AEM	Buy	1000	\$ 34.06	\$34,060.00	
AGU	Buy	900	\$ 91.01	\$81,909.00	Bot 100 AGU
ARX	Buy	1000	\$ 25.60	\$25,600.00	
BAM.A	Buy	1000	\$ 36.84	\$36,840.00	
BB	Sell	1000	\$ 10.90	\$10,900.00	
BBD.B	Sell	4400	\$ 4.70	\$20,680.00	Sold 1,800 BBD.B
BCE	Sell	600	\$ 42.60	\$25,560.00	Sold 400 BCE
BMO	Sell	1000	\$ 65.10	\$65,100.00	
BNS	Sell	1000	\$ 58.62	\$58,620.00	
					\$9,658 Imbalance (positive cash)

# Appendix D – Odd-lot Order Book Routing Diagram



## Appendix E – Odd-lot Matching Examples

### Pre-Market and Order Entry

Step 1 – Pre-market orders are booked into MATCHNow Odd-lot liquidity destination

Entry Time	Order Volume	Limit Price	Buy/Sell	Broker
8:30 am	12,000	MRKT	Buy	Broker A
8:35 am	10,000	MRKT	Buy	Broker B
8:45 am	20,000	MRKT	Buy	Broker C

Step 2 - MATCHNow opens for trading at 9:30 am, MATCHNow randomizes the order of Odd-lot liquidity

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
8:35 am	1	10,000	MRKT	Buy	Broker B
8:45 am	2	20,000	MRKT	Buy	Broker C
8:30 am	3	12,000	MRKT	Buy	Broker A

Step 3 - New Orders arrive they are ranked at time of time of arrival after the market opens for trading

Entry Time	Order Volume	Limit Price	Buy/Sell	Broker
10:00 am	200	MRKT	Buy	Broker D
10:30 am	8,000	MRKT	Buy	Broker E

Step 4 – Example of ranking for trades at 10:45 am

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
8:35 am	1	10,000	MRKT	Buy	Broker B
8:45 am	2	20,000	MRKT	Buy	Broker C
8:30 am	3	12,000	MRKT	Buy	Broker A
10:00	4	200	MRKT	Buy	Broker D
10:30	5	8,000	MRKT	Buy	Broker E

### Round Robin and Broker Preferencing

Incoming Active Odd-lot Order #1 from Broker F to Sell 67 shares Trades with **Broker B (first in ranking)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>8:35 am</b>	<b>1 (moves to 6)</b>	<b>10,000 - 67</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker B</b>
8:45 am	2	20,000	MRKT	Buy	Broker C
8:30 am	3	12,000	MRKT	Buy	Broker A
10:00	4	200	MRKT	Buy	Broker D
10:30	5	8,000	MRKT	Buy	Broker E

Incoming Active Odd-lot Order #2 from Broker D to Sell 52 shares

Trades with **Broker D (broker preferencing)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
8:45 am	2	20,000	MRKT	Buy	Broker C
8:30 am	3	12,000	MRKT	Buy	Broker A
<b>10:00 am</b>	<b>4 (moves to 7)</b>	<b>200 - 52</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker D</b>
10:30 am	5	8,000	MRKT	Buy	Broker E
8:35 am	6	<b>9,933</b>	MRKT	Buy	Broker B

Incoming Active Odd-lot Order #3 from Broker G to Sell 39 shares  
Trades with **Broker C (next in line)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>8:45 am</b>	<b>2 (moves to 8)</b>	<b>20,000 - 39</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker C</b>
8:30 am	3	12,000	MRKT	Buy	Broker A
10:30 am	5	8,000	MRKT	Buy	Broker E
8:35 am	6	9,933	MRKT	Buy	Broker B
10:00 am	7	<b>148</b>	MRKT	Buy	Broker D

Incoming Active Odd-lot Order #4 from Broker A Sell 15 shares  
Trades with Broker A (**broker preferencing but happens to be next in line**)

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>8:30 am</b>	<b>3 (moves to 9)</b>	<b>12,000 - 15</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker A</b>
10:30 am	5	8,000	MRKT	Buy	Broker E
8:35 am	6	9,933	MRKT	Buy	Broker B
10:00 am	7	148	MRKT	Buy	Broker D
8:45 am	8	19,961	MRKT	Buy	Broker C

Incoming Active Odd-lot Order #5 from Broker H Sell 89 shares  
Trades with **Broker E (next in line)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>10:30 am</b>	<b>5 (moves to 10)</b>	<b>8,000 - 89</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker E</b>
8:35 am	6	9,933	MRKT	Buy	Broker B
10:00 am	7	148	MRKT	Buy	Broker D
8:45 am	8	19,961	MRKT	Buy	Broker C
8:30 am	9	11,985	MRKT	Buy	Broker A

Incoming Active Odd-lot Order #5 from Broker D Sell 55 shares  
Trades with **Broker D (broker preferencing)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
8:35 am	6	9,933	MRKT	Buy	Broker B
<b>10:00 am</b>	<b>7 (cancels back order)*</b>	<b>148 - 55</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker D</b>
8:45 am	8	19,961	MRKT	Buy	Broker C
8:30 am	9	11,985	MRKT	Buy	Broker A
10:30 am	10	7,911	MRKT	Buy	Broker E

\* **Broker D buy fills back buy of 55 shares and cancels back the remaining 93 shares which is less than 99 shares**

Incoming Active Odd-lot Order #6 from Broker H Sell 27 shares  
 Trades with **Broker B (next in line)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>8:35 am</b>	<b>6 (moves to 11)</b>	<b>9,933 - 27</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker B</b>
8:45 am	8	19,961	MRKT	Buy	Broker C
8:30 am	9	11,985	MRKT	Buy	Broker A
10:30 am	10	7,911	MRKT	Buy	Broker E

**At 10:59 am Broker C cancels his buy order**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>8:45 am</b>	<b>8</b>	<b>cancelled</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker C</b>
8:30 am	9	11,985	MRKT	Buy	Broker A
10:30 am	10	7,911	MRKT	Buy	Broker E
8:35 am	11	9,906	MRKT	Buy	Broker B

Incoming Active Odd-lot Order #7 from Broker J Sell 88 shares  
 Trades with **Broker A (next in line)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>8:30 am</b>	<b>9 (moves to 12)</b>	<b>11,985 - 88</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker A</b>
10:30 am	10	7,911	MRKT	Buy	Broker E
8:35 am	11	9,906	MRKT	Buy	Broker B

**At 11:00 am Broker D adds new buy order**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
10:30 am	10	7,911	MRKT	Buy	Broker E
8:35 am	11	9,906	MRKT	Buy	Broker B
8:30 am	12	11,897	MRKT	Buy	Broker A
<b>11:00 am</b>	<b>13</b>	<b>20,000</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker D</b>

**At 11:05 am Broker B adds new buy order but from a different trading ID**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
10:30 am	10	7,911	MRKT	Buy	Broker E
8:35 am	11	9,906	MRKT	Buy	Broker B
8:30 am	12	11,897	MRKT	Buy	Broker A
11:00 am	13	20,000	MRKT	Buy	Broker D
<b>11:05 am</b>	<b>14</b>	<b>10,000</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker B-2</b>

Incoming Active Odd-lot Order #8 from Broker B Sell 45 shares  
 Trades with **Broker B (broker preferencing)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
10:30 am	10	7,911	MRKT	Buy	Broker E
<b>8:35 am</b>	<b>11 (moves to 15)</b>	<b>9,906 - 45</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker B</b>
8:30 am	12	11,897	MRKT	Buy	Broker A



11:00 am	13	20,000	MRKT	Buy	Broker D
11:05 am	14	10,000	MRKT	Buy	Broker B-2

Incoming Active Odd-lot Order #9 from Broker B Sell 55 shares  
 Trades with **Broker B-2 (broker preferencing)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
10:30 am	10	7,911	MRKT	Buy	Broker E
8:30 am	12	11,897	MRKT	Buy	Broker A
11:00 am	13	20,000	MRKT	Buy	Broker D
<b>11:05 am</b>	<b>14</b>	<b>10,000 -55</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker B-2</b>
8:35 am	15 (moves to 15)	9,861	MRKT	Buy	Broker B

Incoming Active Odd-lot Order #10 from Broker H Sell 20 shares  
 Trades with **Broker E (next in line)**

Entry Time	Ranking	Order Volume	Limit Price	Buy/Sell	Broker
<b>10:30 am</b>	<b>10 (moves to 16)</b>	<b>7,911 - 20</b>	<b>MRKT</b>	<b>Buy</b>	<b>Broker E</b>
8:30 am	12	11,897	MRKT	Buy	Broker A
11:00 am	13	20,000	MRKT	Buy	Broker D
11:05 am	14	10,000 -55	MRKT	Buy	Broker B-2
8:35 am	15	9,861	MRKT	Buy	Broker B

**REVISION HISTORY**

Date	Version	Author	Description
2017/05/21	2.0	Vince Poil	Revision History Starts