SYSTEMS DIVISION

Requirement Specifications
Hybrid Trading

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Hybrid Trading Requirement Specifications

1. Goal

The goal of the Hybrid Trading project is to combine the benefits of open outcry trading with a competing quote model.

2. Objective

The objective of this project is to modify CBOEdirect, TPF and floor systems to accommodate hybrid trading.

3. Current Situation

Various hybrid projects, including Automated Book Priority (ABP), EBook Trigger, Dynamic Quotes with Size and Large Order Utility (LOU), have moved CBOE toward a what-you-see-is-what-you-get (WYSIWYG) environment for customer orders. However, in order to better facilitate competition and offer tighter markets, CBOE would like to move forward into an environment that allows streaming competitive quoting by market makers as well as increased access to the book and automatic execution for other non-customer market participants.

Neither CBOEdirect nor the existing trading floor systems currently offer the full combination of WYSIWYG, competitive quoting and open outcry trading.

4. Proposed Situation

The proposed situation is to modify CBOEdirect, TPF and the client-server systems to combine the two different market models to achieve a hybrid market model, thereby providing the combination of WYSIWYG, competitive quoting and open outcry trading.

5. Assumptions

- Every market maker choosing to participate in electronic trades will have to do so electronically, either with quotes or orders. There will no longer be a crowd quote, RAES allocation or the ability to access the book manually.
- Since TPF/ORS maintains the order database, IQOD will be available with all order information as it is currently.
- Manual trading will be accomplished as it is today, with the exception of manual trading with the book.
- MDR will be available with all market data information as it is today with the exception of quote and size source. Hybrid quotes will be recorded in offlline MDR with a record type of '03'.
- Quote source indicators will not be available on broadcast for hybrid classes.
- Multiple allocation methods are currently available on CBOEdirect: Price/Time, Pro Rata, DPM Participation, Customer Priority and Market Turner. These can be used in conjunction with or in place of UMA.
- There will be no auto-step-up functionality. When CBOE is not the NBBO, TPF/ORS will route orders to PAR for open outcry trading.

- There will be no systems mechanism to prevent automatic crossing. Since all orders between the market are sent to PAR, the crowd should have knowledge of at least one side of a cross, if a firm chooses to book an order and then take out that order with another.
- EBook, RAES, AutoQuote/Vendor Quote, manual quote, ROS and LOU functionality will not be available for those classes that trade in the hybrid environment.
- Most existing surveillance and back office procedures will be used since all order and trade information will continue to reside in TPF/ORS and TPF/TSS.
- The processes currently in place for contract adjustments will remain unchanged.
- Both TPF and CBOEdirect currently perform maintenance and close procedures at the end of the day. Both systems will continue these processes without the need to synchronize data.
- Current procedures for routing statistics to OPRA through TPF/TSS will not change for Hybrid.
- CBOEdirect SBT fill drops will print based on the current SBT parameters.
- Although there will be a minimum quote size of 10 contracts for quotes being sent to CBOEdirect, there will be no system enforcement of that size commitment.
- Auto-ex trades in Hybrid classes will not be displayed on VTATs screens.
- Block trades for Hybrid last sales will display if the class is enabled for block trades.

6. Risk/Exposure

There are both business and systems risks associated with this project. From a business standpoint, this model requires that market makers in the crowd be able to send quotes and/or orders in order to participate in electronic orders, since there is no longer a RAES allocation mechanism. From a systems standpoint there are risks associated with combining CBOEdirect with TPF/ORS and TPF/TSS and passing orders and quotes between the two systems.

7. Functional Requirements

7.1 Communications between CBOEdirect and Existing Trading Floor Systems

7.1.1 Simple Orders

- CBOEdirect will send all orders (including ICM orders) entered via the GUI, FIX or CMi for RTH to TPF/ORS.
- The current RTH session will be used for Hybrid Trading.
- TPF/ORS will send selected orders (either marketable or bookable) to CBOEdirect based on routing parameters. The following relevant data will be included with each order to instruct CBOEdirect on how to handle the order and to prevent potential problems relating to timing differences:
  - TPF/ORS will include: Best-of-the-Rest (BOTR) (no exchange or size data is required) & the current CBOE bid or offer (without size) that

TPF/TSS has stored on all orders sent to CBOEdirect. TPF/ORS will include a zero (0) in the bid or offer field for a market order unless the order has been routed from PAR, in which case, TPF/ORS will include the PAR execution price. (Note: a zero in the offer field in the BOTR indicates that no offers have been received. This should not be treated as an offer of zero.);

- The maximum number of contracts to be executed, regardless of the disseminated size (AutoEx Volume)
- An indicator that any remainder should be re-routed back to TPF/ORS or kept by CBOEdirect (Re-Route)
- An indication as to whether the order should trade with non-ICM orders only or with everything in the CBOEdirect book (Trade with).
- The initial source of the order, i.e. COMPASS, BERS, CBOEdirect, Linkage Server, (FIX/ORS if migration to FIX 4.2 is not complete) in the order information (Source).

- CBOEdirect will return those orders to TPF/ORS that are not tradable or bookable based on the instructions received. TPF/ORS will re-route the returned orders back to CBOEdirect or to PAR, BART or printers based on routing parameters.
- If CBOEdirect receives an order that can trade through multiple price points (re-route=N), it will check at each price to determine whether CBOE is still the NBBO. CBOEdirect will use the BOTR received with the order from TPF/ORS to evaluate at each price point.
- If CBOEdirect is processing an order that will violate maximum width rules it will reject that order to TPF/ORS where it will route to PAR.
- After the close, CBOEdirect will continue to accept and process cancels and fills but will not accept orders.
- Orders, cancel requests, and cancel/replace requests may be rejected by CBOEdirect for various reasons. CBOEdirect will include the reject indicator as well as a reason code, with any rejected transaction. TPF/ORS will route the order to an alternate routing destination such as PAR, BART or the booth printer depending on the reason for rejection.

Non-ICM Orders

- CBOEdirect will send fill reports for non-ICM orders originating from FIX 4.2/CMi or the CBOEdirect GUI directly to the originator and to TPF/ORS. TPF/ORS will not send a fill report back to its originator.
- CBOEdirect will send fill reports for orders originating from COMPASS, FIX/ORS and BERS to TPF/ORS. TPF/ORS will send the fill report back to its originator.
- TPF will use fill report information for submission to CTM for all non-ICM orders. Fills for TP25 firms will not be submitted. All fill reports generated by CBOEdirect will have the appropriate contra-party information, i.e. they will not be anonymous.

ICM Orders from COMPASS

- ICM orders submitted through COMPASS will include the MM acronym in the optional data field denoted as MM _ABC where ABC is the MM's acronym.
- These orders route to TPF/ORS.
- TPF/ORS will route the order directly to CBOEdirect using routing parameters.
- When CBOEdirect receives an ICM order from TPF/ORS it will validate the MM acronym to ensure that it is a valid acronym and that there is profile information associated with it.
- If this validation fails, CBOEdirect will reject the order back to TPF/ORS and TPF/ORS will print the reject in the appropriate booth.
- When an execution occurs against an ICM order, CBOEdirect will add the market maker profile information (as it does today with quotes).
- CBOEdirect will send a last sale to TPF/TSS.
- CBOEdirect will send a fill report to TPF/ORS. TPF/ORS will suppress submission of the trade match record to CTM.
- TPF/ORS will send the fill report through COMPASS.
- CBOEdirect will send a one-sided clearing record to CTM for the ICM order execution. The other side will be received from either TPF/ORS or from CBOEdirect through another one-sided clearing record.
- CTM will flip the origin to an "M" origin.
- CTM will treat the submission as it would a submission from TPF, i.e. CTM will have to match it and it will not be considered locked.

ICM orders from FIX/CMi

- ICM orders submitted through FIX/CMi will include relevant information as they do today.
- When received CBOEdirect will then validate the MM acronym to ensure that it is a valid acronym and that there is profile information associated with it.
- If the validation fails, CBOEdirect will reject the order back through FIX/CMi to the originator.
- The ICM orders with valid information will route to TPF/ORS.
- TPF/ORS will use routing parameters to route the order back to CBOEdirect. When CBOEdirect receives the order back from TPF/ORS, it will use the MM acronym associated with the order when it was received from FIX/CMi.
- When an execution occurs against an ICM order, CBOEdirect will add the market maker profile information (as it does today with quotes).
- CBOEdirect will send a last sale to TPF/TSS.
- CBOEdirect will send the fill report back to the originator and to TPF/ORS. Like all fill reports from CBOEdirect, the contra information will be included.
- TPF/ORS will suppress submission to CTM as well as to the originator.
- CBOEdirect will send a one-sided clearing record to CTM for the ICM order execution. The other side will be received from either TPF/ORS or from CBOEdirect through another one-sided clearing record.
- CTM will flip the origin to an "M" origin.
- CTM will treat the submission as it would a submission from TPF, i.e. CTM

will have to match it and it will not be considered locked.

ICM Quotes

- Quotes will flow directly to CBOEdirect through FIX/CMi.
- When an execution occurs against a quote, CBOEdirect will add the market maker profile information as it does today.
- CBOEdirect will send a last sale to TPF/TSS.
- CBOEdirect will send the execution report back to the originator.
- CBOEdirect will send a one-sided clearing record to CTM for the quote execution. The other side will be received from either TPF/ORS or from CBOEdirect through another one-sided clearing record.
- CBOEdirect will include an "M" origin as it does today.
- CTM will treat the submission as it would a submission from TPF, i.e. CTM will have to match it and it will not be considered locked.

Cancels and Cancel-Replaces

- TPF/ORS will route all cancel-replaces to the destination where the order resides. After successfully applying the cancel request, (assuming the order destination is CBOEdirect). CBOEdirect will route the replace back to TPF/ORS. TPF/ORS will provide the new ORS ID for the replace order at the time the order is first routed to CBOEdirect. TPF/ORS will route the replace order based on the quote when the order is routed.
- If CBOEdirect cannot process a cancel request, CBOEdirect will reject the cancel back to TPF/ORS. A reason (e.g. will trade with non-Q order, TLC, etc.) will be included. CBOEdirect will not evaluate a replace except that if the volume differs between the cancel and the replace, CBOEdirect will reject the cancel-replace.
- TPF/ORS will print the order in the booth as it would today for a rejected cancel replace. NOTE: Although CBOEdirect will not immediately process the replace portion of a cancel-replace, when there is a situation that would cause the cancel to be successful but the replace to fail, CBOEdirect should reject the entire order.
- Like fill reports, CBOEdirect will send all cancel reports to TPF/ORS. For those orders originating from FIX 4.2/CMi and the CBOEdirect GUI, CBOEdirect will send cancel reports directly back to the originator as well as to TPF/ORS. TPF/ORS will forward all cancel reports for orders originating from COMPASS, BERS and FIX/ORS back to the originator.

Nothing Done Processing

- For COMPASS orders existing Nothing Done (ND) processing will be used. A message is sent to CBOEdirect requesting NDs. If CBOEdirect has NDs, CBOEdirect routes the NDs to TPF/ORS for reporting to the firm through COMPASS.
- For CBOEdirect orders, CBOEdirect will route the ND to the firm through CMi or FIX. CBOEdirect will NOT send a drop copy to TPF/ORS.
- CBOEdirect provides TPF/ORS with order status at the end of the day.

CBOEdirect will only report status on those orders still residing in CBOEdirect, not orders that may have originated in CBOEdirect but are now in PAR or printed.

- Since COMPASS does not currently handle NDs for complex or contingency orders, TPF/ORS will print those NDs at the appropriate booth printer.

Contingency Orders

- Certain contingency orders will route to CBOEdirect based on routing parameters.
- STOP orders that are initially routed to PAR and then booked to CBOEdirect will be monitored by CBOEdirect to determine if the STOP condition has been met. When the STOP condition is met, CBOEdirect will attempt to execute the market order. If the market order cannot be fully executed, i.e. there is not enough size available or the market exceeds the maximum width requirements, the order will be routed to PAR. When TPF/ORS routes the order to PAR there will be no STOP contingency included, it will look like a market order.
- If a broker chooses to trade part of a contingency order with the CBOEdirect book using the <Trade w/Book> or <Trade w/All> buttons, TPF/ORS will include a flag to CBOEdirect to ignore the contingency. For example if an 100-contract AON order is on PAR and the broker and the broker wants to trade 50 with the crowd and 50 with the book, TPF/ORS will alert CBOEdirect to ignore the AON contingency so that 50 of the 100 contract order can trade with the CBOEdirect book.

7.1.2 Market Data

- CBOEdirect will send top-of-the-market to TPF/TSS. TPF/TSS will update the series record, update MDR, broadcast the new quote information to floor display systems and send the quote to COPP for OPRA dissemination. NOTE: Because of locked/crossed quote processing, CBOEdirect will send locked quotes to TPF/TSS.
- CBOEdirect will send last sales for all trades done on CBOEdirect to TPF/TSS for price reporting.
- CBOEdirect will send best non-ICM book information to TPF/TSS. The information that will be sent includes the best bid and offer of non-ICM orders; the total non-ICM, non-priority, bid and offer size associated with the BBO; and the bid and offer size of market participants with priority (currently customer “C” orders). TPF/TSS will broadcast the data for display on RCNs.
- TPF/TSS best non-Q book information will included customer and non-ICM price but only customer size, thus the size could be zero even though a price is available.
- CBOEdirect will send pre-open information, including the pre-open bids and offers and the Expected Opening Price (EOP) and Expected Opening Size (EOS) to TPF/TSS. TPF/TSS will broadcast the data for display on RCNs.
- TPF/TSS will send price and volume information for trades that occur outside CBOEdirect directly to CBOEdirect using a new message. Additionally, CBOEdirect will have data that TPF/TSS does not have and that will be

disseminated directly through the APIs.

- CBOEdirect will be the source for all market indicators and changes in system states. These will be handled as follows:
  - Stock Trade Halts and CBOE Trade Halts (“T”): Trade halts can be initiated in one of two ways:
    1. CBOEdirect receives a stock trade halt message from TIPS; or
    2. The Help Desk initiates a halt through the SA GUI, either on a class or series level.
  - For class-level trading halts (TIPS or manually generated): CBOEdirect will send a new class-level trade-halt message to TPF/TSS. If possible, this message will be sent using the existing service used by TNT for trading halts. CBOEdirect will also send each series to TPF/TSS with 998-999. (These messages will be sent through the existing quote service, like any other quote.) When TPF/TSS receives the class-level halt, it will initiate its trading halt procedures. These procedures include initiating the appropriate routing changes and disseminating the halt message. TPF/TSS will disable its current logic that generates 998-999 and instead disseminate the series messages from CBOEdirect which will show 998-999.
  - When a series level trade halt is initiated, CBOEdirect will send 998-999 to TPF/TSS. TPF/TSS will initiate the appropriate routing procedures, including routing incoming orders to the booth. The values will be disseminated to OPRA. 998-999 series level messages should not be confused with trade halt / state change messages. They are dissemination messages and do not trigger any "state change" processing in TPF.
  - When a class-level trading halt is lifted, CBOEdirect will send a clear message to TPF/TSS. TPF/TSS will then accept updates from CBOEdirect including pre-open and opening rotation messages. There will be no series-level clear messages. If/when 998-999 is changed to a valid quote, normal routing will resume.
  - Pre-Open (“P”): CBOEdirect will send pre-open quote messages to TPF/TSS for dissemination to PDS/RCN. These messages will not be disseminated to OPRA or logged in MDR.
  - Opening Rotations (“R”): CBOEdirect will send “R”s during opening rotations for each series when the rotation starts and send a clear (“ “) for each series after it has opened. These indications are part of the current messages passed between CBOEdirect and TPF/TSS. No new Rotation messages will be created. There will be no class-level clear message for rotations. When the class is opened, TPF/TSS may receive a trade prior to receiving a quote. TPF/TSS will make changes to accept the trade without having already received a quote.
  - Non-Firm Markets (“F”): Dissemination of non-firm markets will be initiated by the Help Desk through the SA GUI. CBOEdirect will pass a new class-level message to TPF/TSS as well as class-level clear message. No routing changes will be made but the “F” indicator will be

disseminated to OPRA.
  - Closed: CBOEdirect has a "Closed" state. CBOEdirect will not forward that state to TPF/TSS. Both systems will close as they do today.
  - For hybrid classes, manual updates to market indicators through TPF will not be allowed.

7.1.3 Complex Order Handling

- TPF/ORS will route complex orders to CBOEdirect, PAR, BART or printers based on routing parameters.
- Once an order has routed to CBOEdirect and is accepted (not rejected because of systems reasons), the order will remain in CBOEdirect. CBOEdirect's spread order processing will function as it does today and complex orders will NOT be re-routed back to TPF/ORS. Because of this, TPF/ORS will not include any auto-ex volume or any other parameters that would cause CBOEdirect to return the order to TPF/ORS.
- Orders, cancel requests, and cancel/replace requests may be rejected by CBOEdirect for various reasons. CBOEdirect will include the reject indicator as well as a reason code, with any rejected transaction. TPF/ORS will route the order to an alternate routing destination such as PAR, BART or the booth printer depending on the reason for rejection.

Assumptions

- TPF/ORS will not send to CBOEdirect: orders including stock, orders for more than 4 legs and orders that include multiple underlyings.
- CBOEdirect will not accept spread orders with contingencies. These orders will route based on current non-hybrid routing parameters.
- TPF/ORS will not use CBOEdirect's spread quotes to route spreads.
- TPF/ORS will send pre-open spreads to CBOEdirect or BART based on routing parameters.
- CBOEdirect has a two-step process for creating a spread. This process will be transparent to TPF/ORS.
- It is assumed that a cancel request for a complex order is assumed to be cancel volume remaining.

7.1.4 Order Handling Examples

NOTE: Market data handling is not included in these examples. All changes in market data including quote changes and last sales will result in CBOEdirect sending a message to TPF/TSS and TPF/TSS broadcasting the data to PDS/RCN as well as sending updates to COPP for OPRA dissemination.

Example 1 – COMPASS Order executed in full

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 80 contracts at 1.20 through COMPASS

(non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 80
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- The 80-contract order is executed in full. The order is allocated to the four market makers – 20 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 80 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 80-contract order.
- CBOEdirect sends execution reports through CMi or FIX for each of the market maker's 20 contracts.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits 80-contract fill report to CTM.
- CBOEdirect submits four 20-contract execution reports to CTM.

Example 2 – COMPASS Order blocked by Limit Price
- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 120 contracts at 1.20 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 120
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- 100 contracts are executed. The order is allocated to the four market makers

– 25 contracts each.
- CBOEdirect sends the remaining 20 contracts back to TPF/ORS since the limit price is 1.20.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 100 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 100-contract order.
- CBOEdirect sends execution reports through CMi or FIX for each of the market maker's 25 contracts.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits 100-contract fill report to CTM;
- CBOEdirect submits four 25-contract execution reports to CTM.
- TPF/ORS determines that the order is no longer marketable and routes the remaining 20-contract order to PAR for manual handling.

Example 3 – COMPASS order, CBOEdirect quote moves better
- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 80 contracts at 1.20 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
    - BOTR: 1.20
    - CBOE: 1.20
    - Re-route: Yes
    - Autoex Volume: 80
    - Trade with: All
    - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is now 1.15 for 100 contracts.
- 80 contracts are executed at 1.15. The order is allocated to the four market makers – 20 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.15 for 80 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 80-contract order.
- CBOEdirect sends execution reports through CMi or FIX for each of the market maker's 20 contracts.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.

- TPF/ORS submits 80-contract fill report to CTM.
- CBOEdirect submits four 20-contract execution reports to CTM.

Example 4 – COMPASS order, CBOEdirect quote moves worse

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 80 contracts at 1.20 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 80
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is now 1.25 for 100 contracts.
- CBOEdirect returns the order to TPF/ORS for re-routing.
- Since the order is now between the bid and offer and no longer marketable, TPF/ORS will route the order to the appropriate destination based on routing parameters.
- On PAR, the order is either traded or booked.

Example 5 – COMPASS order trades split-price

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers. The next offer is 1.25 for 100 contracts, also comprised of market maker quote – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.25
- Customer sends Limit order to buy 120 contracts at 1.25 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.25
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 120
  - Trade with: All
  - Source: COMPASS

- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- 100 contracts are executed at 1.20 and allocated to the four market makers – 25 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 100 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 100 contract order.
- CBOEdirect sends execution reports through CMi or FIX for each of the market maker's 25 contracts.
- TPF/TSS disseminates the last sale to COPP/OPRA and broadcasts the last sale to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits 100-contract fill report to CTM.
- CBOEdirect submits four 25-contract execution reports to CTM.
- CBOEdirect reroutes the remaining 20 contracts back to TPF/ORS.
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.25
  - CBOE: 1.25
  - Re-route: Yes
  - Autoex Volume: 20
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.25 for 100 contracts.
- 20 contracts are executed at 1.25 and allocated to the four market makers – 5 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.25 for 20 contracts.
- CBOEdirect sends to TPF/ORS a fill report for 20 contracts.
- CBOEdirect sends execution reports through CMi or FIX for each of the market maker's 5 contracts.
- TPF/TSS disseminates the last sale to COPP/OPRA and broadcasts the last sale to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits 20-contract fill report to CTM.
- CBOEdirect submits four 5-contract execution reports to CTM.

Example 6 – COMPASS order partially executes up to the NBBO

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers. The next offer is 1.25 for 100 contracts, also comprised of market maker quote – 25 each for 4 market makers.

- Parameters are set so that C, F, & B orders can trade up to the disseminated size;
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 120 contracts at 1.25 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 120
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- 100 contracts are executed at 1.20. The order is allocated to the four market makers – 25 contracts each.
- CBOEdirect sends the remaining 20 contracts back to TPF/ORS as an NBBO reject since there is a 1.20 offer away.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 100 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 100-contract order.
- CBOEdirect sends execution reports through CMi/FIX for each of the market maker's 25 contracts.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits 100-contract fill report to CTM.
- CBOEdirect submits four 25-contract execution reports to CTM.
- TPF/ORS routes the remaining 20-contract order to PAR as an NBBO reject for manual handling.

Example 7 – COMPASS order trades split-price, remainder booked

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers. The next offer is 1.25 for 100 contracts, also comprised of market maker quote – 25 each for 4 market makers. The next offer is 1.30 for 100 contracts, also comprised of market maker quote – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size any remainder remains within CBOEdirect.
- BOTR is 1.00 – 1.25
- Customer sends Limit order to buy 300 contracts at 1.25 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to

CBOEdirect with the following additional information:
  - BOTR: 1.25
  - CBOE: 1.20
  - Re-route: No
  - Autoex Volume: 300
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- 100 contracts are executed at 1.20 and are allocated to the four market makers – 25 contracts each. 100 contracts are executed at 1.25 and are allocated to the four market makers – 25 contracts each.
- The remaining 100 contracts are booked. The new market becomes 1.25 – 1.30 100 x 100.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 100 contracts and a last sale of 1.25 for 100 contracts each.
- CBOEdirect sends to TPF/ORS: a fill report for the 100 contracts at 1.20; and a fill report for 100 contracts at 1.25;
- CBOEdirect sends 4 execution reports for each of the market maker's 25 contracts at 1.20 and 4 execution reports for each of the market maker's 25 contracts at 1.25 through FIX/CMi.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits two 100-contract fill reports to CTM
- CBOEdirect submits eight 25-contract execution reports to CTM.

Example 8 – COMPASS order re-routes back to TPF/ORS

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers. The next offer is 1.25 for 100 contracts, also comprised of market maker quote – 25 each for 4 market makers. The next offer is 1.30 for 100 contracts, also comprised of market maker quote – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size any remainder is re-routed to TPF/ORS.
- BOTR is 1.00 – 1.25
- Customer sends Limit order to buy 300 contracts at 1.25 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.25
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 300

    - Trade with: All
    - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- 100 contracts are executed at 1.20 and are allocated to the four market makers – 25 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 100 contracts.
- CBOEdirect sends to TPF/ORS: a fill report for the 100 contracts at 1.20
- CBOEdirect sends 4 execution reports for each of the market maker's 25 contracts at 1.20 through CMi/FIX.
- TPF/TSS disseminates the last sale to COPP/OPRA and broadcasts the last sale to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits the 100-contract fill report to CTM
- CBOEdirect submits four 25-contract execution reports to CTM.
- CBOEdirect re-routes the remaining 200 contracts back to TPF/ORS.
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
    - BOTR: 1.25
    - CBOE: 1.25
    - Re-route: Yes
    - Autoex Volume: 200
    - Trade with: All
    - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.25 for 100 contracts.
- 100 contracts are executed at 1.25 and are allocated to the four market makers – 25 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.25 for 100 contracts.
- CBOEdirect sends to TPF/ORS: a fill report for the 100 contracts at 1.25
- CBOEdirect sends 4 execution reports for each of the market maker's 25 contracts at 1.25 through CMi/FIX.
- TPF/TSS disseminates the last sale to COPP/OPRA and broadcasts the last sale to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits the 100-contract fill report to CTM
- CBOEdirect submits four 25-contract execution reports to CTM.
- CBOEdirect re-routes the remaining 100 contracts back to TPF/ORS. Routing parameters indicate that orders between the market are routed to PAR. Since the current market is 1.00 – 1.30, the remaining 100 contracts is routed to PAR.

Example 9 – COMPASS order with an Autoex volume

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Class ORT parameters are set so that F orders can trade up 60 contracts
- BOTR is 1.00 – 1.20
- A Firm ("F") sends a Limit order to buy 100 contracts at 1.20 through COMPASS (non-TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 60
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- 60 contracts are executed at 1.20 and are allocated to the four market makers – 15 contracts each.
- CBOEdirect sends the remaining 40 contracts back to TPF/ORS since the Firm Autoex size is 60 contracts.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 60 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 60 contracts at 1.20
- CBOEdirect sends 4 execution reports for each of the market maker's 15 contracts at 1.20 through CMi/FIX.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits a 60-contract fill report to CTM
- CBOEdirect submits four 15-contract execution reports to CTM.
- TPF/ORS routes the remaining 40-contract order directly to PAR for manual handling.

Example 10 – FIX 4.2 Order executed in full

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 80 contracts at 1.20 through FIX 4.2 (cannot be a TP25 firm)
- CBOEdirect receives order, sends it to TPF/ORS

- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 80
  - Trade with: All
  - Source: CBOEdirect
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- The 80-contract order is executed in full. The order is allocated to the four market makers – 20 contracts each.
- CBOEdirect sends a fill report back through FIX 4.2
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 80 contracts.
- CBOEdirect sends to TPF/ORS a fill report for the 80-contract order. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- CBOEdirect sends 4 execution reports for each of the market maker's 20 contracts.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS submits 80-contract fill report to CTM
- CBOEdirect submits four 20-contract execution reports to CTM.

Example 11 – BERS Order executed in full

- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- Customer sends Limit order to buy 80 contracts at 1.20 through BERS (not a TP25 firm)
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 80
  - Trade with: All
  - Source: BERS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- The 80-contract order is executed in full. The order is allocated to the four

market makers – 20 contracts each.
- CBOEdirect sends to TPF/TSS a last sale of 1.20 for 80 contracts.
- CBOEdirect sends to TPF/ORS: a fill report for the 80-contract order.
- CBOEdirect sends 4 execution reports for each of the market maker's 20 contracts through CMi/FIX.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS prints a fill report in the booth based on firm/class parameters
- TPF/ORS submits 80-contract fill report to CTM
- CBOEdirect submits four 20-contract execution reports to CTM.

Example 12 – COMPASS Order from TP25 firm executed in full
- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- TP25 Customer sends Limit order to buy 80 contracts at 1.20 through COMPASS
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 80
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 100 contracts.
- The 80-contract order is executed in full. The order is allocated to the four market makers – 20 contracts each.
- CBOEdirect sends to TPF/TSS sends a last sale of 1.20 for 80 contracts.
- CBOEdirect sends to TPF/ORS: a fill report for the 80-contract order.
- CBOEdirect sends 4 execution reports for each of the market maker's 20 contracts.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS.
- CBOEdirect submits four 20-contract execution reports to CTM.

Example 13 – COMPASS Market Order executed in full
- Disseminated market is 1.00 – 1.20 100 x 100; both sides are made up of market maker quotes – 25 each for 4 market makers.
- Parameters are set so that C, F, & B orders can trade up to the disseminated

size
- BOTR is 1.00 – 1.20
- Customer sends market order to buy 80 contracts through COMPASS
- TPF/ORS receives the order sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE:
  - Re-route: Yes
  - Autoex Volume: 80
  - Trade with: All
  - Source: COMPASS
- CBOEdirect receives the order and compares the current CBOEdirect quote with the BOTR. The trade will not cause an NBBO violation.
- The 80-contract order is executed in full. The order is allocated to the four market makers – 20 contracts each.
- CBOEdirect sends to TPF/TSS sends a last sale of 1.20 for 80 contracts.
- CBOEdirect sends to TPF/ORS: a fill report for the 80-contract order.
- CBOEdirect sends 4 execution reports for each of the market maker's 20 contracts through CMi/FIX.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends fill back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- TPF/ORS submits 80-contract fill report to CTM
- CBOEdirect submits four 20-contract execution reports to CTM.

Example 14 – PAR Order to Trade Against Non-ICM Orders
- Disseminated market is 1.00 – 1.20 100 x 200; the offer is made up of market maker quotes – 25 each for 4 market makers, 1 customer order for 50 contracts, and 1 Firm order for 50 contracts.
- Customers have priority.
- Parameters are set so that C, F, & B orders can trade up to the disseminated size
- BOTR is 1.00 – 1.20
- PAR Order is sent to trade 75 contracts with non-ICM orders
- TPF/ORS receives the order, determines it is marketable, sends it to CBOEdirect with the following additional information:
  - BOTR: 1.20
  - CBOE: 1.20
  - Re-route: Yes
  - Autoex Volume: 75
  - Trade with: Non-ICM
  - Source: PAR
- CBOEdirect receives the order and compares the current CBOEdirect quote with the above information. The CBOEdirect offer is still 1.20 for 200

contracts.
- The 75-contract order is executed in full. 50 contracts are allocated to the resting Customer order and 25 contracts are allocated to the resting Firm order.
- CBOEdirect sends to TPF/TSS sends a last sale of 1.20 for 75 contracts.
- CBOEdirect sends to TPF/ORS fill reports for the 75-contract order, the 50 contract order and the 25 contract order.
- TPF/TSS disseminates the last sales to COPP/OPRA and broadcasts the last sales to all floor display systems.
- TPF/ORS sends 3 fills back through COMPASS.
- TPF/ORS submits 3 fills to CTM.

Example 15 – Cancel Request for Resting CBOEdirect Limit Order through COMPASS
- Customer sends cancel request to cancel a resting limit order to buy 80 contracts at 1.20 through COMPASS (non-TP25 firm)
- TPF/ORS receives the cancel request and forwards it to CBOEdirect.
- CBOEdirect receives the cancel request and determines that the 80-contract limit order is still resting on its book.
- CBOEdirect cancels the resting order.
- The successful cancel report is routed back to TPF/ORS.
- TPF/ORS routes the cancel report back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.

Example 16 – Cancel Request for Resting Limit Order through COMPASS
- Customer sends cancel request to cancel a resting limit order to buy 80 contracts at 1.20 through COMPASS (non-TP25 firm)
- TPF/ORS receives the cancel request and forwards it to CBOEdirect.
- CBOEdirect receives the cancel request and determines that the order has only 60-contracts remaining.
- CBOEdirect cancels 60 contracts and generates a TLC for the remaining 20 contracts.
- CBOEdirect routes both the cancel report and the TLC back to TPF/ORS.
- TPF/ORS routes both the cancel report and the TLC back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.

Example 17 – Cancel Request for Resting Limit Order through FIX 4.2
- Customer sends cancel request to cancel a resting limit order to buy 80 contracts at 1.20 through FIX 4.2 (non-TP25 firm)
- CBOEdirect receives the cancel request and sends it to TPF/ORS.
- TPF/ORS receives the cancel request and forwards it to CBOEdirect.
- CBOEdirect receives the cancel request and determines that the 80-contract limit order is still resting on its book.

- CBOEdirect cancels the resting order.
- CBOEdirect routes the successful cancel report back to the originator through FIX 4.2.
- CBOEdirect routes the cancel report to TPF/ORS TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.

Example 18 – Cancel/Replace for Resting Limit Order

- Customer sends cancel/replace to cancel a resting limit order to sell 50 contracts at 1.20 and replace it with a limit order to sell 50 contracts at 1.15 through COMPASS (non-TP25 firm)
- TPF/ORS receives the cancel/replace and forwards it to CBOEdirect with an additional ORS ID for the replace order.
- CBOEdirect receives the cancel request and determines that the 50-contract limit order is still resting on its book.
- CBOEdirect cancels the resting order.
- CBOEdirect sends the cancel report to TPF/ORS.
- TPF/ORS routes the cancel report back through COMPASS. TPF/ORS prints a drop copy of the report in the firm booth if SBT wire report='y' on firm parameters.
- CBOEdirect sends the replace back to TPF/ORS.
- TPF/ORS receives the replace and routes it from the beginning of ORS based on routing parameters as though it were a new order.

Example 19 – Cancel/Replace for Resting Limit Order

- Customer sends cancel/replace request to cancel a resting limit order to buy 80 contracts at 1.20 and replace it with a limit order to buy 80 contracts at 1.15 through COMPASS (non-TP25 firm)
- TPF/ORS receives the cancel/replace request and forwards it to CBOEdirect.
- CBOEdirect receives the cancel/replace request and determines that the order has only 60-contracts remaining.
- CBOEdirect rejects the cancel/replace request.
- CBOEdirect routes the reject back to TPF/ORS.
- TPF/ORS routes the reject to the booth.

7.2 PAR Functionality

- A PAR broker will have two ways to trade orders with the CBOEdirect book:
  1. Using the existing Book button and
  2. Using new Book contra buttons.

7.2.1 Book Button

- The Book button functionality on PAR will change for hybrid, as follows: When the user touches the book button the order will route to TPF/ORS and then to CBOEdirect. CBOEdirect will either book it or automatically execute as follows.

  Limit Orders

  - Non-marketable limit order will be booked

- Marketable limit order <= disseminated size will execute in full
- Marketable limit order > disseminated size will be executed up to the available size and then either:
  1. Book if it is no longer marketable, or
  2. Execute through more price points and book any remainder.
- Existing CBOEdirect functionality will prohibit executions through NBBO. In such cases, that portion of the order may route to the DPM/crowd PAR contained in the Firm/Class Origin Routing Table (ORT), regardless of where the order originated

Market Orders

- Market order <= disseminated size will execute in full
- Market order > disseminated size may execute at multiple prices,. Existing CBOEdirect functionality prohibits executions through NBBO or beyond the maximum width. In such cases, that portion of the order may route to the DPM/crowd PAR contained in the Firm/Class ORT, regardless of where the order originated
- TPF/ORS will use a different message type for any order returned to PAR indicating that the order had been on a PAR previously. If the order is returned to the originating PAR a message will pop-up on that PAR noting that the order was returned.
- When TPF/ORS receives the order from PAR it will provide a notification to PAR indicating that the transaction was completed, as it does today.
- Assumption: Since a conscious decision by a broker is required when using the BOOK button, most system restrictions will be bypassed. Specifically, the TPF/ORS parameters for <Re-Route> will not be checked, and no such indicator will be sent along with the order from TPF/ORS to CBOEdirect.

7.2.2 Book Contras

- There will be two new contra buttons on PAR:
  1. <Trade With Quote/All> and
  2. <Trade With Book Only>.
- The use of both of these buttons will look the same to PAR and TPF/ORS. The information will be transmitted to CBOEdirect for the purposes of UMA allocation. The contra-party buttons will work as follows:
  - A 40-contract order is on PAR. There are 50 contracts in the book. The PAR broker chooses to trade the entire order with the Quote/All. The PAR broker selects the order, presses <Trade>, presses the <Trade With Quote/All> button and presses <Endorse>. A message is sent to TPF/ORS. TPF/ORS returns an acknowledgement message. The order is removed from PAR. The order is sent to CBOEdirect for execution with the execution price. If CBOEdirect can still execute the order it will be executed. If CBOEdirect can only partially execute the order (or not at all), the remainder (the entire order) will be returned to

the generating PAR with an indication that it had already been there. The remaining portion of the order would show up on the new orders screen along with a message that the order was partially executed. The broker will have to acknowledge the message. TPF/ORS will include any information required by PAR (such as remaining volume or executed volume) in the message. In addition to the pop-up message, the order will be appropriately marked on the New Orders screen. If an order is a partial fill and the balance rejects because of NBBO, the order will be marked as a partial NBBO reject.

- A 40-contract order is on PAR. There are 50 contracts in the book. The PAR broker chooses to trade 30 with three members of the crowd and trade 10 with the book. The PAR broker selects the order, presses <Trade>, endorses 10 contracts each to ABC, DEF, XYZ and <Trade With Book Only>, presses <Endorse>. PAR sends two messages to TPF/ORS, the first indicating the 3 contras ABC, DEF and XYZ with volume and the second including the book contra. TPF/ORS processes the first 30 contracts and then routes the remaining 10 contracts to CBOEdirect. TPF/ORS, PAR and CBOEdirect process them as above.
- A 40-contract order is on PAR. There are 50 contracts in the book. The PAR broker chooses to trade 10 with one member of the crowd and trade 10 with the book. The PAR broker selects the order, presses <Trade>, endorses 10 contracts to ABC and 10 contracts to <Trade With Book Only>, presses <Endorse>. PAR sends two messages to TPF/ORS, the first indicating the contra ABC and the second including the book contra for 10 contracts. TPF/ORS processes the first 10 contracts and the routes the remaining 30 contracts to CBOEdirect. CBOEdirect will execute only 10 contracts (if still possible) and will return the 20 contracts (and any of the ten that were not executable) to TPF/ORS for routing back to the original PAR. The order will show up on the new orders screen with an indication of how many were executed.
- The system will prevent a PAR broker from using both the (Trade with Book Only> and <Trade with Quote/All> to endorse the same order.
- If the PAR broker attempts to use the new contra book buttons for non-hybrid products, TPF/ORS will not accept the order and it will remain on the originating PAR.
- Orders cannot be separated into two parts. If a PAR broker wishes to trade with the Book quickly and endorse the remaining volume afterwards he must change the volume, press Trade, then <Trade with Book Only>, then presses <Endorse>. Any untraded volume will be returned from CBOEdirect to TPF/ORS. TPF/ORS will route the remainder to the originating PAR where it will be shown on the new order screen, with a message informing the broker that it had been there before. The PAR broker may then Trade the selected volume and Endorse contracts to MMs.
- Additional efficiencies may be required to further streamline the

process of trading with the book.
    - Upon selection of an order the NBBO dialog box will be displayed with the same information that is currently displayed for orders routed to PAR.

7.3 Order Execution

- CBOEdirect will execute orders being sent for automatic execution based on instructions from TPF/ORS. Parameters that are passed from TPF/ORS to CBOEdirect will indicate execution price for limit orders; best-of-the-rest; whether to return any remainder of a partially executed order to TPF/ORS for re-routing or keep it for CBOEdirect processing; volume to be executed; whether the orders should be executed against orders only or orders and quotes.
- Execution price: CBOEdirect should execute the incoming order at the execution price or better. Orders that cannot be executed at the execution price or better will be routed back to TPF/ORS as described in section 7.1. There will be an execution price of zero on a market order, except for those market orders routed from PAR. Market orders from PAR will have the execution price set on PAR.
- Best-of-the-rest: CBOEdirect will execute incoming orders only if it will not violate the BOTR. Orders violating BOTR will be rejected back to TPF/ORS as described in section 7.1.
- Re-Route the remainder: CBOEdirect will either book any remainder of a limit order or continue to execute a marketable order through price levels in the book if this flag is set to “N”. Otherwise, CBOEdirect will return the order to TPF/ORS for routing. See Examples 1 - 7 in Section 7.1.5.
- Auto-ex volume: CBOEdirect will only automatically execute an order up to the size in this field. The volume in this field will be populated by TPF/ORS and will be the lesser of the order volume or auto-ex volume in the class Origin Routing Table or the away-exchange auto-ex size for linkage orders. CBOEdirect will return any remainder to TPF/ORS. See Example 9 in section 7.1.5.
- Execution against non-ICM orders or against all: If this field is set to “Non ICM”, CBOEdirect will execute the incoming order against non-ICM orders residing in the book. If this field is set to “ALL”, CBOEdirect will execute against all quotes and orders residing in its book. See Example 14 in section 7.1.5.
    - Execution against non-ICM orders can occur at a price worse than the disseminated top-of-the-market.
        - If the best price in the book is ICM orders only and the next price below in the book is a non-ICM order, an incoming order will execute against the best non-ICM price.
        - CBOEdirect will apply a “late” prefix to the last sale.
- If an order is a Market order and the RFQ Processing is turned off, CBOEdirect will execute the order if it meets all requirements, including that maximum width is not exceeded. If the order cannot be fully executed (or

executed at all) the remainder will be routed back to TPF/ORS with a reason code. TPF/ORS will re-route the order.

- If the order is a Fill-or-Kill (FOK) or Immediate or Cancel (IOC) then the following procedures will be followed:
  - If the AUTOX VOL = order size then there are NO size limitations, CBOEdirect will execute the order following current CBOEdirect procedures which includes exposing the order to participants connected via the API for n seconds. If no response is received within n seconds then the order is automatically cancelled.
  - If the AUTOX VOL does not equal the order size, then the order will be rejected back to TPF/ORS and TPF/ORS will route the order to PAR.
- Assumptions:
  - The RFQ Processing is a configurable parameter (on or off).
  - Current CBOEdirect processing for other (Stop, Stop-limit and All-or-None) contingency orders will be used.

  Orders that are to be treated in a certain manner for UMA and ICM may be submitted under more than one origin code. For example, orders receiving customer priority may be submitted with a "C" origin code or an additional origin code; orders that are part of the group receiving one participation right may have origins of "F" or "B" or other codes; and orders receiving ICM treatment may also have multiple origin codes. This will allow more flexibility in routing orders from members present in a trading crowd. No single order will have more than one origin code.

7.4 Ultimate Matching Algorithm (UMA)

- In-crowd market makers can enter either quotes or orders. These will be treated in the same manner by CBOEdirect. The quotes and orders will be identified by a unique origin code. Anytime the word quote is used in this section it implies ICM orders as well.
- The matching algorithm (UMA) is the average of A, an equal percentage based on the number of participants, and B, each participant's size as a percentage of total size (pro-rata).
  - The number of participants will be configurable so that each origin code will be specified to have an equal participation right or as a portion of a group that has one participation right.
  - Once an allocation has been made to an individual group UMA will again be used to allocate to the participants within the group. At that point each participant will be counted separately.
  - DPM participation rights will be an overlay on UMA. DPMs will receive an allocation equal to their participation right (30%, 40% or 50% depending on the number of participants).
  - Origin code priority (customer for example) will continue to be available as an overlay.
  - Any rounding required in UMA will be done randomly, i.e. any remaining contracts will be assigned randomly to market participants.

- UMA will include the ability to determine within the matching algorithm whether the order is eligible to trade with existing quotes and/or orders.
  - A certain origin (say "M" for example) will be allowed to trade only with non-ICM orders residing in the book. If there is an entry in this field, this field would override any “trade with all” instruction from TPF. There would be no entry in the field unless we decided to restrict certain origins from trading with non-ICM orders.
- The attached Appendix 3 shows UMA examples.

7.5 Crossing and Locking of In-Crowd Market Makers Quotes/Orders

- In-crowd market makers can enter either quotes or orders. These will be treated in the same manner by the system. The quotes and orders will be identified by a unique origin code. Anytime the word quote is used in this section it implies orders as well.

7.5.1 Locked Quotes

- When a quote is entered that will lock another quote, the locked market is displayed and sent to TPF/TSS.
- Both sides of the quote are available for trading by any market participant that can be routed to the book (either directly or through PAR).
- After a period of time – the “Notification Period” -- a locked market message will be sent to participants that are part of the locked quote. This message will include the acronyms of the market makers on the other side of the lock. A value of zero indicates that the locked market message should be sent immediately. A value should be available to indicate that no message should be sent.
- Additionally, if any new participants join the lock, they will receive a locked market message.
- After a period of time – the “Lock Period” – any remaining locked quotes will trade.
- If more than one incoming quote locks the existing quote, the time period will not be restarted each time a new incoming quote is entered.
- Incoming quotes will be executed against resting quotes ~~in the order in which they arrive~~using UMA.
- If an incoming quote locks more than one resting quote, the incoming quote will be allocated to the resting quotes via UMA allocation.
- The Notification and Lock periods are CBOEdirect parameters and will be configurable by class prior to the opening. These parameters will not be configurable intra-day.
- If both market makers want to trade prior to the expiration of the Lock period, the market makers should change their quotes and make the trade in open outcry.

Example 1

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 100 x 100 at 9:05:00

- MM2 sends quote 1.20 – 1.40 200 x 200 at 9:05:10
- Disseminated quote is 1.20 – 1.20 200 x 100
- MM1 sends new quote 1.15 – 1.35 100 x 100 at 9:05:10.5
- Disseminated quote is 1.20 – 1.35 200 x 100

Example 2

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 100 x 100 at 9:05:00
- MM2 sends quote 1.20 – 1.40 200 x 200 at 9:05:10
- Disseminated quote is 1.20 – 1.20 200 x 100
- A locked market message is sent to MM1 and MM2 at 9:05:11
- Customer sends MKT order to sell 50 contracts at 9:05:13
- Customer order is executed against MM2's 1.20 bid for 50 contracts
- Disseminated quote is 1.20 – 1.20 150 x 100
- 100 contracts are traded between MM1 and MM2 at 9:05:20
- Disseminated quote is 1.20 – 1.40 50 x 200

Example 3

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 225 x 225 at 9:05:00
- MM2 sends quote 1.20 – 1.40 200 x 200 at 9:05:10
- Disseminated quote is 1.20 – 1.20 200 x 225
- A locked market message is sent to MM1 and MM2 at 9:05:11
- MM3 sends quote 1.20 – 1.50 50 x 50 at 9:05:12
- Disseminated quote is 1.20 – 1.20 250 x 225
- A locked market message is sent to MM1 and MM3 at 9:05:13
- 200 contracts are traded between MM1 and MM2 and 25 contracts are traded between MM1 and MM3 at 9:05:20
- Disseminated quote is 1.20 – 1.40 25 x 200

Example 4

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 100 x 100 at 9:05:00
- MM2 sends quote 0.95 – 1.20 200 x 200 at 9:05:00
- Disseminated quote is 1.00 – 1.20 100 x 300
- MM3 sends quote 1.20 – 1.40 50 x 50 at 9:05:10
- Disseminated quote is 1.20 – 1.20 50 x 300
- A locked market message is sent to MM1, MM2 and MM3 at 9:0511
- 50 contracts are traded at 1.20 and are allocated to MM1 and MM2 through UMA (MM1 = 21, MM2 = 29) at 9:05:20
- Disseminated quote is 1.00 – 1.20 100 x 250

7.5.2 Crossed Quotes

- Crossed quote processing will work in generally the same manner as locked

quote processing with the exception that incoming quotes will be widened to create a locked quote, rather than a crossed quote. The original quote will be logged so that it can be restored. The market maker will not be specifically notified that the quote was widened, however his system should be able to determine this based on the new quote received back from CBOEdirect.

- The same Lock Period and Notification Period used for locked quotes will be used for crossed quotes.
- The locked market message for locked quotes will be sent to participants in the crossed quotes.
- If a resting quote is removed prior to expiration of the Lock Period, the incoming quote will be restored to its original value. Likewise, if a trade occurs between the quotes, and the incoming quote is the remaining quote, it will be restored to its original value.

Example 1

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 100 x 100 at 9:05:00
- MM2 sends quote 1.25 – 1.40 200 x 200 at 9:05:10
- MM2's quote is widened by the system to 1.20 – 1.40 200 x 200
- Disseminated quote is 1.20 – 1.20 200 x 100
- MM1 sends new quote 1.15 – 1.35 100 x 100 at 9:05:10.5
- MM2's quote is restored to 1.25 – 1.40 200 x 200
- Disseminated quote is 1.25 – 1.35 200 x 100

Example 2

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 100 x 100 at 9:05:00
- MM2 sends quote 1.25 – 1.40 200 x 200 at 9:05:10
- MM2's quote is widened by the system to 1.20 – 1.40 200 x 200
- Disseminated quote is 1.20 – 1.20 200 x 100
- Locked market message is sent to MM1 and MM2 at 9:05:11
- Customer sends MKT order to sell 50 contracts at 9:05:13
- Customer order is executed against MM2's 1.20 bid for 50 contracts
- Disseminated quote is 1.20 – 1.20 150 x 100
- 100 contracts are traded between MM1 and MM2 at 9:05:20
- MM2's quote is restored to 1.25 – 1.40 50 x 200
- The new quote is 1.25 – 1.40 50 x 200

Example 3

- Lock period = 10 seconds; Notification period = 1 second
- MM1 sends quote 1.00 – 1.20 100 x 100 at 9:05:00
- Resting book order offered at 1.25 for 300 contracts
- MM2 sends quote 1.25 – 1.40 200 x 200 at 9:05:10
- MM2's quote is widened by the system to 1.20 – 1.40 200 x 200
- Disseminated quote is 1.20 – 1.20 200 x 100

- Locked market message is sent to MM1 and MM2 at 9:05:11
- MM3 sends quote 1.25 – 1.40 200 x 200 at 9:05:12
- MM3's quote is widened by the system to 1.20 – 1.40 200 x 200
- Disseminated quote is 1.20 – 1.20 400 x 100
- Locked market message is sent to MM1 and MM3 at 9:05:13
- MM1 sends new quote 1.30 – 1.50 100 x 100 at 9:05:14
- The resting book order is executed at 1.25 for 200 contracts against MM2 and 100 contracts against MM3
- Disseminated quote is 1.30 – 1.40 100 x 400

7.6 Quote Trigger

- When an ICM quote or order is received by CBOEdirect that is marketable against non-ICM resting order(s), the following will occur:
  - CBOEdirect will remove the quantity of the resting order(s) that is tradeable and hold it and the incoming quote for a period of N seconds;
  - CBOEdirect will disseminate a last sale;
  - CBOEdirect will update the top-of-the-market as though a trade had occurred;
  - During the N seconds other ICM quotes or orders that would also be marketable against the resting order(s) would be accumulated and would further reduce the book size (assuming book size remains);
  - After the N seconds expires the accumulated ICM quotes or orders would trade against the resting order(s) using UMA;
  - CBOEdirect will send fill reports.
- In order to minimize issues associated with multiple timers, when CBOEdirect receives an order on the other side of the quote, the timer will be stopped and the orders and quotes on ~~-~~both sides of the market will be executed immediately.
- When a quote trigger and a quote lock occur at the same time, the quote trigger will take precedence, i.e. the quote trigger timer will be started and after that period ends, the quote lock period will be started.
- When a quote is received that crosses the resting order, i.e. the resting offer is 1.20 and the bid on the quote is 1.25, the quote will be widened so that the bid is 1.20. At the expiration of the quote trigger period, if there is still size remaining in the quote, it will be restored to its original value and, if there is a resting order at the next price another quote trigger period will be started.
- Example 1 (assume N=1 second):
  - 1.00 – 1.20 100 x 50; 1.20 offer is a resting customer order; the next offer is 1.25 for 50 contracts
  - MM1 sends quote 1.20 – 1.40 50 x 50 at 9:02:02:01
  - The resting order is removed
  - Price report is sent
  - New market 1.00 – 1.25 100 x 50
  - MM2 sends quote 1.20 – 1.40 50 x 50 at 9:02:02:05
  - New market 1.20 – 1.25 50 x 50
  - At 9:02:03:01 the two MM quotes for a total of 100 contracts are matched against the customer order; MM1 and MM2 are each assigned 25 contracts through UMA

    - The market remains 1.20 – 1.25 50 x 50
    - Fill reports are sent
- Example 2 (assume N=1 second):
    - 1.00 – 1.20 100 x 50; 1.20 offer is a resting customer order; the next offer is 1.25 for 50 contracts
    - MM1 sends quote 1.20 – 1.40 50 x 50 at 9:02:02:01
    - The resting order is removed
    - Price report is sent
    - New market 1.00 – 1.25 100 x 50
    - MM2 sends quote 1.20 – 1.40 50 x 50 at 9:02:02:05
    - New market 1.20 – 1.25 50 x 50
    - Customer sends limit order to buy 20 contracts at 1.25 at 9:02:02:10
    - Customer order is executed against 1.25 offer for 20 contracts
    - Price report is sent
    - New market 1.20 – 1.25 50 x 30
    - At 9:02:03:01 the two MM quotes for a total of 100 contracts are matched against the customer order; MM1 and MM2 are each assigned 25 contracts through UMA
    - The market remains 1.20 – 1.25 50 x 30
    - Fill reports are sent
- Example 3 (assume N=1 second):
    - 1.00 – 1.20 100 x 50; 1.20 offer is a resting customer order; the next offer is 1.25 for 50 contracts
    - MM1 sends quote 1.20 – 1.40 20 x 20 at 9:02:02:01
    - 20 contracts are removed from the resting order
    - Price report is sent
    - New market 1.00 – 1.20 100 x 30
    - MM2 sends quote 1.20 – 1.40 20 x 50 at 9:02:02:05
    - 20 contracts are removed from the resting order
    - Price report is sent
    - New market 1.00 – 1.20 100 x 10
    - MM3 sends quote 1.20 – 1.40 20 x 50 at 9:02:02:10
    - 10 contracts are removed from the resting order
    - Price report is sent
    - New market 1.20 – 1.25 10 x 50
    - At 9:02:03:01 the three MM quotes for 20 contracts are matched against the customer order; MM1 and MM2 are each assigned 17 contracts and MM3 is assigned 16 contracts through UMA (quantities are rounded in time priority)
    - The market remains 1.20 – 1.25 10 x 50
    - Fill reports are sent
- Example 4 (assume N=1 second):
    - 1.00 – 1.20 100 x 50; 1.20 offer is a resting customer order; the next offer is 1.25 for 50 contracts
    - MM1 sends quote 1.20 – 1.40 20 x 20 at 9:02:02:01
    - 20 contracts are removed from the resting order
    - Price report is sent

  - New market 1.00 – 1.20 100 x 30
  - Customer sends limit order to buy 20 contracts at 1.20 at 9:02:02:10
  - Customer order is executed against 1.20 offer for 20 contracts
  - Price and fill reports are sent
  - New market 1.00 – 1.20 100 x 10
  - MM2 sends quote 1.20 – 1.40 20 x 50 at 9:02:02:15
  - 10 contracts are removed from the resting order
  - Price report is sent
  - New market 1.20 – 1.25 10 x 50
  - At 9:02:03:01 the two MM quotes for 20 contracts are matched against the remaining customer order of 30 contracts; MM1 and MM2 are each assigned 15 contracts through UMA
  - The market remains 1.20 – 1.25 10 x 50
  - Fill reports are sent
- Example 5 (assume N=1 second):
  - 1.00 – 1.20 100 x 50; 1.20 offer is a resting customer order; the next offer is 1.25 for 50 contracts
  - MM1 sends quote 1.20 – 1.40 50 x 50 at 9:02:02:01
  - 50 contracts are removed from the resting order
  - Price report is sent
  - New market 1.00 – 1.25 100 x 50
  - MM1 sends quote 1.15 – 1.35 50 x 50 at 9:02:02:10
  - CBOEdirect rejects MM1's new quote since the original is still being interacted with; once MM1 receives a message indicating that the trade has occurred, he can send a new quote
- Example 6 (assume N=1 second):
  - 1.00 – 1.20 100 x 50; 1.20 offer is a resting customer order; the next offer is 1.25 for 50 contracts
  - MM1 sends quote 1.20 – 1.40 20 x 20 at 9:02:02:01
  - 20 contracts are removed from the resting order
  - Price report is sent
  - New market 1.00 – 1.20 100 x 30
  - MM2 sends quote 1.20 – 1.40 20 x 50 at 9:02:02:05
  - 20 contracts are removed from the resting order
  - Price report is sent
  - New market 1.00 – 1.20 100 x 10
  - MM3 sends quote 1.20 – 1.40 20 x 50 at 9:02:02:10
  - 10 contracts are removed from the resting order
  - Price report is sent
  - New market 1.20 – 1.25 10 x 50
  - Customer sends limit order to sell 10 contracts for 1.20 at 9:02:02:15
  - 1-second timer is stopped.
  - Customer order is executed against 1.20 bid for 10 contracts
  - Price report is sent
  - 10 contracts are allocated to MM1 (4 contracts), MM2 (3 contracts) and MM3 (3 contracts)

-
- The three MM quotes for 20 contracts are matched against the customer order; MM1 and MM2 are each assigned 17 contracts and MM3 is assigned 16 contracts through UMA (quantities are rounded in time priority)
- New market is 1.00 – 1.25 100 x 50
- Fill reports are sent

7.7 Book Depth Information

- Book depth will be viewable by individual market participants based on CBOEdirect enablements. Enablements will be on a session level. There will be no enablements by class.
- Query-based book depth information will include information by origin code at a price.
- A new GUI will be required, possibly as part of the SA GUI, to allow staff to activate book depth information for individual participants.
- Initially only query-based book depth will be available. Dynamic book depth may become available at a later date.

7.8 Opening Procedures

- CBOEdirect's existing opening procedures will be used with the following changes:
  - When the expected opening price (EOP) is published through the APIs, an expected opening size (EOS) will be published as well. The EOS exists in the system currently, however it is not published through the API.
  - When there is a trade imbalance at the open CBOEdirect will allocate the remainder using UMA.

    Example

    At the EOP, the following orders exist:

    1000 contracts to buy, comprised of:

    50 contracts -- market orders

    50 contracts -- limit better than the EOP

    900 – quotes and orders at the EOP

    200 contracts to sell – quotes and orders at the EOP

    Trade Allocation:

    - All 200 contracts to sell will be filled.
    - The buy side will be filled as follows:
      - The 50 contracts to buy at the market will be filled first.
      - The 50 contracts to buy at prices better than the EOP will be filled next.
      - The remaining 100 contracts will be allocated to the 900 buyers using UMA.
  - The selection of the allocation strategy (UMA or FIFO) will be configurable by class for the day.
  - Quotes will trade against quotes in the opening.
  - The conditions for opening will be modified to allow the DPM to manually

control when the open will occur:

- After the opening tick for the underlying security is received, CBOEdirect starts the timer and moves into the Opening Rotation state.
- The EOP and EOS are calculated and disseminated via the CBOEdirect APIs to all logged in DPM's and Market Makers assigned to the class periodically until the actual opening.
- After the timer has expired, CBOEdirect checks to ensure that a valid quote exists from the DPM assigned to the class. If a valid quote does NOT exist, CBOEdirect will NOT change the state of system to Opening Rotation; the system will remain in the pre-opening state. *This will allow the DPM to STOP the opening rotation process by pulling his quotes.*
- If a valid quote from the DPM assigned to the class does exist, CBOEdirect continues with the current opening rotation procedures.

- A manual override is currently available through the SA GUI in the Help Desk in the event that the DPM is unable to submit quotes, there are others quoting, and it is determined that the opening should still occur.
- CBOEdirect will send the EOP and EOS to TPF/ORS for distribution to RCN.

7.9 Trade Match Functionality

- CBOEdirect will submit trades to Trade Match (CTM) for all quotes and for orders from ICMs that were input through FIX/CMi as described above in section 7.1.1.
- As described above in section 7.1.1, all other trades that occur within CBOEdirect will be sent to TPF/ORS.
- TPF/ORS will submit those trades to CTM for real-time feed firms.
- CBOEdirect will submit one-sided trade match records to CTM for the designated trades.
- ETNs will continue to be submitted to CTM as they are today for PAR trades.
- TPF25 firms will continue to be able to submit their own trades. If a TP25 firm chooses to send ICM orders through FIX/CMi those trades will be submitted to CTM.
- TPF will utilize the Branch table to prevent submission to CTM for orders executed utilizing a certain branch ID for non-TP25 firms. The firm sending orders that will not be submitted will be responsible for managing the branch IDs. Additionally, those firms will be responsible for manually submitting the trades to CTM.
- CTM will match trades as it does today, with the addition of those unmatched trades from CBOEdirect.
- CTM will flip origin codes to C, F or M when required.

7.10 Linkage

- Hybrid Linkage will use components of CBOEdirect Linkage and TPF Linkage. See Appendix 1 for reference to CBOEdirect and TPF Linkage Documents.
- All Hybrid classes will be introduced with Linkage Phase 2 functionality (incorporating Phase 1).

7.10.1 Order Handling

Incoming Marketable Customer Orders

- If CBOE is not the NBBO, TPF/ORS will route the order to PAR for manual handling. (When CBOE is the NBBO, there are no linkage implications.)
- PAR will provide the ability to generate a P/A order from the selected customer order.
- TPF/ORS will be required to maintain a reference between the P/A order and the in-coming customer order.
- The P/A order will be sent to the away exchange following current Linkage procedures.

Incoming Marketable Firm or Broker Dealer Orders

- If CBOE is not the NBBO, TPF/ORS will route the order to PAR for manual handling. (When CBOE is the NBBO, there are no linkage implications.)
- PAR will provide the ability to generate a P order from the selected firm or broker dealer order.
- TPF/ORS will **not** be required to maintain a reference between the P order and the in-coming firm or broker dealer order.
- The P order will be sent to the away exchange following current Linkage procedures.

Incoming P/A Orders

- If CBOE is the NBBO, TPF/ORS will route the order to CBOEdirect. (If CBOE is not the NBBO, TPF/ORS will reject the order following current linkage procedures.)
- If after the P/A order is routed to CBOEdirect, CBOEdirect is no longer the NBBO and cannot execute the order, then CBOEdirect will route a reject message to TPF/ORS.
- TPF/ORS will route the reject message to the away exchange following current Linkage procedures.
- If the order is executable within CBOEdirect and is less than or equal to the disseminated size, CBOEdirect will automatically execute the order and send the fill report to TPF/ORS.
- If the order is larger than the disseminated size, CBOEdirect will automatically execute the order up to the disseminated size and will cancel any remaining balance. CBOEdirect will send both a fill and a cancel report to TPF/ORS.
- TPF/ORS will create an execution and/or cancel message for routing to the away exchange following current Linkage procedures.
- If the size available for execution in CBOEdirect is less than the minimum linkage automatic execution size (currently 10 contracts), CBOEdirect will assign any remaining contracts equally to the market makers at the top of the market after the incoming P/A order was executed. If there are no market makers at the top of the market, CBOEdirect will look to the next price point to find market makers.

Incoming P Orders

- If CBOE is the NBBO, TPF/ORS will route the order to CBOEdirect. (If CBOE is not the NBBO, TPF/ORS will reject the order following current linkage procedures.)
- If after the P order is routed to CBOEdirect, CBOEdirect is no longer the NBBO and cannot execute the order, then CBOEdirect will route a reject message to TPF/ORS.
- TPF/ORS will route the reject message to the away exchange following current Linkage procedures.
- If the order is executable within CBOEdirect and is less than or equal to the FPQS (AutoEx volume), CBOEdirect will automatically execute the order following current Linkage procedures. The FPQS will be entered in the AutoEx volume field in the Class Origin Routing Table.
- If the order is larger than the FPQS (AutoEx volume), CBOEdirect will automatically execute the order up to the AutoEx volume. The remaining balance and the fill report will be routed to TPF/ORS. TPF/ORS will send an execution message to the away exchange.
- TPF/ORS will route the remaining balance of the order to PAR.
- If the PAR broker has not addressed the order within 15 seconds, PAR will send a time-out message to TPF/ORS. TPF/ORS will route the remaining balance back to CBOEdirect.
- If CBOEdirect can still execute the order, it will. If it can only partially execute or not execute the order it will execute what it can and cancel the remainder. Both the execution report and the cancel report will route to TPF/ORS. TPF/ORS will send those reports to the away exchange.

Outgoing P/A Orders

- If CBOE is not the NBBO, then there are two methods to send a P/A order:
  - PAR will provide the ability to select an order that was routed to PAR for creation of a P/A order.
  - TNT will provide the ability to select an order from IQOD for creation of a P/A order.
- The P/A order will be sent to the away exchange following current Linkage procedures. *Note: CBOEdirect will NOT provide functionality to create Outgoing P/A orders in the Hybrid environment.*

Outgoing P Orders

- If CBOE is not the NBBO, then there are three methods to send a P Order:
  - Market Makers/DPMs can use their own proprietary system to route an Outgoing P order.
  - DPMs can generate a P order from a blank order template on TNT.
  - DPMs can generate a P order from existing linkage processes on PAR or TNT (IQOD) from existing ORS orders.
- The P order will be sent to the away exchange following current Linkage procedures.

Outgoing Satisfaction Orders

- CBOEdirect will monitor OPRA Last Sale reports to determine if CBOE's customer order book was traded through. If a trade through occurs, CBOEdirect will generate a satisfaction alert and route the alert to PAR via TPF/ORS.
- PAR will enable the DPM to create and route a Satisfaction Order for the Satisfaction Alert size or less.
- The Satisfaction Order will be sent to the away exchange following current Linkage procedures.
- Responses to outgoing Satisfaction Orders will be routed to PAR.
- The ability to reject a filled Satisfaction order will be available if it is made available in Linkage Phase 2 functionality for non-hybrid classes.
- *Note: CBOEdirect will NOT provide functionality to create Outgoing Satisfaction orders in the Hybrid environment.*

Incoming Satisfaction Orders

- TPF/ORS will route the Incoming Satisfaction Order to PAR.
- The DPM will utilize MDR information from TNT to manually determine if execution of the Satisfaction Order is warranted.
- The DPM will allocate the order on PAR or reject it.
- TPF/ORS will create an execution or reject report for distribution to the away exchange following current Linkage procedures.
- *Note: CBOEdirect will NOT provide functionality to process Incoming Satisfaction orders in the Hybrid environment. Therefore, Satisfaction orders resting on PAR will not be able to be traded with the book.*

7.10.2 Assumptions

(See Appendix 2 for detail scenarios supporting these assumptions)

- CBOE systems will **not** provide any mechanism to prevent a market maker from creating a locked or crossed NBBO. Market Makers must have alerts from proprietary systems to prevent NBBO inversions.
- CBOE systems will **not** provide book alerts when a resting order is marketable away. Since a resting book order cannot create the inversion, it is the responsibility of the market that locked or crossed to unlock or uncross.
- CBOEdirect will **not** prevent an in-coming in-crowd market maker order or quote to be automatically executed causing a trade through when the NBBO is inverted.
- CBOE systems will **not** prevent an in-coming order from being booked from PAR when the NBBO market (of which CBOE is a participant) is currently inverted.
- CBOEdirect will **not** automatically prevent incoming market maker quotes from trading against resting orders even if a trade-through results.
- There will be no auto-fade mechanism in hybrid.

7.11 Order Routing

New routing parameters will be created to allow flexibility in introducing and using hybrid functionality.

- In-crowd market maker orders, routed with a unique origin code will receive the following special handling through ORS:
  - ICM orders will route based on existing routing parameters. In order to facilitate this the following change to existing routing logic will be made: If the BOOK parameter on the Firm/Class ORT contains an "A" (book all), the no BOOK VOLs will be checked. The only edits that will not be bypassed for ICM orders are: if Booth Route All is on, Quote=998-999, or the class is closed. In all other situations, the ICM order will route directly to CBOEdirect.
  - ICM orders will be handled by TPF/ORS like a regular order (e.g. cancel capability, fill reporting, etc.)
  - Any order CBOEdirect cannot handle will be routed back to TPF/ORS. TPF/ORS will route the orders for all exception conditions to the booth printers using current booth routing parameters.
  - TPF/ORS will route the fill report to CTM for non-ICM orders via current Real-Time-Feed functionality.
- In-crowd market maker orders, will receive the following handling through CBOEdirect:
  - CBOEdirect will **not** enforce restrictions on the number of ICM orders received - the market maker can stagger the orders.
  - CBOEdirect will process ICM orders as described in section 7.5 Crossing and Locking of In-Crowd Market Makers Quotes/Orders
  - If an ICM order is being held during the "Lock Period" and a cancel for the ICM order is received, the ICM order should be cancelled and the "Lock Period" terminated.
- A new Class Origin Routing Table (ORT) will be created to supplement the Firm/Class ORT. The new table will enable the system to observe DPM or committee-imposed restrictions, including: Auto-ex volume (hybrid classes only); Booking parameters; Whether to re-route the balance of partially executed orders to TPF/ORS (hybrid classes only); and Whether to observe arbitrage blocks (both hybrid and non-hybrid classes).. The existing Firm/Class ORT would then allow firms to be more restrictive on initial wire routes, if desired. Initial routes would check the Firm/Class ORT and Class ORT. BERS orders and re-routes would check the Class ORT only. A sample of the new table follows.

```
                        CLASS/ORIGIN ROUTING TABLE
CLASS HD     POST 04  STATION 05

                -- AUTO EX --     BOOK
ORIGIN          ARB MAX   RRT     DEV
A  AGENT         C  *       N      N
B  BD            L  *       Y      N
C  CUST          C  *       N      0
F  FIRM          C  *       N      +1
M  CBOE MM       C  *       N      N
N  AWAY-MM       C  *       N      N
P  PRINCPL       C  *       N      N
Q  ICM           C  *       N      N
S  SATSFCT       C  *       N      N
U  FB-CUST       C  *       N      N
V  FB-FIRM       C  *       N      N
```

```
   W  FB-BD       C  *      N      N
   X  CUST BD     C  *      N      N
USE ""*"" + PF10/22 FOR GLOBAL UPDATES
PF12/24 - CLASS PARMS     PF4/16  - MODIFY                ENTER KEY - DISPLAY
PF7/19  - BACKWARD        PF8/20  - FORWARD               PF10/22 - GLOBAL
```

- Book routing by origin will be provided through the Firm/Class and Class ORTs. A “BK” field will be included on both tables. Valid entries in the “BK” field are 1) A number from “-9” to “+9” including “0”; 2) “A”; 3) “N”; 4) “P”; or 5) an asterisk. These entries are defined as follows:
  - A number in this field will indicate the number of ticks from the market an order must be to be eligible to route directly to the CBOEdirect book. The Buy (Sell) premium minus (plus) the number must be less (greater) than or equal to the bid (offer). For example, with a bid of 1.00 and an offer of 1.20, a “-1” in the BK filed indicates that Buy orders must have a premium of 0.95 or less and Sell orders must have a premium of 1.25 or greater to route directly to the CBOEdirect book. A value of “0” indicates that Buy orders must have a premium of 1.00 or less and Sell orders must have a premium of 1.20 or greater to route directly to the CBOEdirect book. A value of “+1” indicates that Buy orders must have a premium of 1.05 or less and Sell orders must have a premium of 1.15 or greater to route directly to the CBOEdirect book.
  - An entry of “A” will indicate that all limit orders that are not executed will route directly to the CBOEdirect book. This is consistent with the “A” (book ALL) entry in the price deviation fields on firm/class parameters.
  - An entry of “N” will indicate that the order cannot route to the CBOEdirect book.
  - An entry of “P” will indicate that the order can only be routed to the CBOEdirect book from PAR. The “P” entry will be available on the Class ORT only.
  - An entry of “*” on the Firm/Class ORT will default to the entries in the price deviation fields on Firm/Class Parameters, retaining flexibility to utilize “tiered zero” parameters.
  - An entry of “*” on the Class ORT will be prohibited.
- New wire orders (from COMPASS, FIX or CMi) will check the BK parameter on the Firm/Class ORT and the Class ORT. BERS orders and BART re-routes will check the BK parameter on the Class ORT only.
- Orders received from PAR, when the <BOOK> button is used, will not check the BK parameter on the Firm/Class ORT. These orders will check the BK parameter on the Class ORT. If “N”, the order cannot be booked, even from PAR. The order will be rejected back to PAR.
- An entry of “*” in the Firm/Class ORT will default to DEV1/2 on Firm/Class Parameters.
- An entry of “*” (replaces “A” and “B”) in DEV1/2 will default to the Class ORT.
- The following parameters will no longer be required: FPC PARM LEVEL on Class Parameters and FPC LEVELS on CBOE Parameters.

- The new BK parameter on both the Firm/Class ORT and the Class ORT will be used for both hybrid and non-hybrid classes.
- The flexibility to allow the balance of a partially executed order to remain within CBOEdirect or to be re-routed back through TPF/ORS will be provided on the Class ORT with a new field known as “Re-Route”. The valid entries, which determine the destination for any un-executed balance, are “Y”=route back to TPF/ORS; or “N” = CBOEdirect retains order and executes or books according to existing rules. New wire orders, BERS orders, the replace portion of a successfully cancelled book order, and BART re-routes will check this parameter. Orders sent to CBOEdirect using the PAR <BOOK> button will not check this parameter. This new parameter will apply to hybrid classes only. Existing ABP Split-price or DQWS logic will apply to non-hybrid classes.
- The flexibility to determine whether contingencies will route directly to CBOEdirect or to PAR first will be provided by activating the “BOOK” column on the existing Firm/Class Contingency Routing Table (CRT). Valid entries will be “Y”, “N” or “P”. An entry of “Y” indicates that orders can route directly to CBOEdirect, assuming other book parameter checks are passed. Orders can also be sent to CBOEdirect from PAR. An entry of “N”, will prohibit orders from being booked directly or from PAR. An entry of “P”, will allow orders to be sent to CBOEdirect from PAR only. This parameter will be checked for wire orders, BERS orders, BART re-routes and the PAR <BOOK> button. Cancel/Replaces of resting orders will not check the contingency parameter if the contingency on the replace is the same as the contingency of the original order.
- If “Y” for STP or MIT, then those orders will be able to route directly to CBOEdirect. Other book checks, except for the Firm/Class BOOK VOL checks on initial wire routes, should not be performed.
- Firm/class AutoEx volume will work as it does today in that if a firm puts a volume restriction on orders, then orders that are greater than that volume will not route directly to CBOEdirect, but will route to BART and from there can be re-routed to CBOEdirect.
- If the current quote doesn't meet these criteria, we get the error of "INVALID MARKET QUOTES".
    - For initial routes, the order will go to BART or a booth printer with that message.
    - For BART Reroutes, the order will return to BART with that message.
        - For BK reroutes, that message should be returned to the terminal.

- If the Class ORT has ‘N’ in BOOK DEV for an origin, an order with that origin can NEVER route to the book under any circumstances. If it has ‘P’, only orders from PAR can go to the Book. This applies to orders which ORS wants to book. Under Hybrid, it does not include orders sent to CBOEdirect for Auto-EX or orders sent to CBOEdirect using one of the “Trade with Book” buttons from PAR.
- If ORS decides to route an order to CD for hybrid trading, but CD has not tagged the class:
    - Incoming Wire: order will route to BART
    - Incoming TNT: order will print in booth

- BART reroute (ORS): order will return to BART
- PAR BK request: order will remain on PAR
- PAR Trade w/Book request: order will remain on PAR
- Terminal BK request: error message to terminal

- For sell market orders they will only be sent to CBOEdirect for booking when there is a zero bid will be converted to a 0.05 limit and sent to CBOEdirect from PAR and from terminal BK entry when the offer is 0.05.
- BTM to FBR override routing logic, Book Update Notices and ZOORS BK are not available for hybrid classes.

Complex Orders

- Complex order routing will be provided through a new Firm/Class Complex Order Table (COT). This table will be one dimensional with parameters:
  - AUTO-EX (Y=Yes; N=No)
  - AUTO-EX VOL (This parameter will apply to hybrid classes only).
  - BOOK (Y=Yes; N=No; P=From PAR Only)
  - FBR (Y=Crowd Printer Only; N=No; P=PAR-Eligible)
  - PAR I.D.
  - CROWD PRINTER
  - FBR VOL (checked only for initial wire routes)
  - REPORT PRINTER (if blank, then no fill or cancel reports will print)
  - BART I.D.
- Following is an example of the Firm/Class Complex Order Table

```
                    FIRM-CLASS COMPLEX ORDER TABLE

 FIRM  SAX  CLASS AOL     POST 03  STATION 04

      PAR ID        W270
      BART ID               B008
      REPORT PRTR   P068
      BOOK   ELIG   Y       (Y,N,P)

      FBR:   ELIG   Y       (Y,N,P)
             PRTR   ____
             VOL    ________

      AUTOX: ELIG   Y        (Y,N)
             VOL    ________



USE ""*"" + PF10/22 FOR GLOBAL UPDATES
PF12/24 – FIRM/CLASS          PF4/16  - MODIFY            ENTER KEY - DISPLAY
                              PF10/22 - GLOBAL          (ENTER FIRM - CLASS)
```

- To determine AUTO-EX eligibility, TPF/ORS will evaluate the order against the spread quote that is currently being calculated by TPF/ORS.
- To be eligible for direct automatic execution, AUTO-EX must be set to “Y”.
- For initial wire routes, the order must also be less than or equal to the AUTO-EX

VOL. The volume checks will work as they do today.

- Cancel/Replaces of resting complex orders will not check the AUTO-EX VOL.
- If FBR is “Y”, then orders will be eligible to route to the CROWD PRINTER. If FBR is “P”, then orders will be eligible to route to the designated PAR. If FBR is “N”, then orders will not be eligible to route to the crowd. Initial wire routes must also be less than or equal to the FBR VOL. BERS orders and BART re-routes will not check the FBR VOL. BERS ORDERS and BART re-routes will be prohibited if FBR is “N”. Orders can route to mobile PAR buttons even if FBR is “N” or “Y”.
- For initial routing, BERS-entered orders, a booking transaction from TNT and BART re-routed orders, the following procedures will be followed:
    - AUTOX and AUTOX VOL will be checked.
    - If both checks are passed, the order will be sent to CBOEdirect.
    - CBOEdirect will either execute, book or reject the order.
    - Rejected orders will be sent to TPF/ORS.
    - If AUTOX is “N”, or if the order volume exceeds the AUTOX VOL, then TPF/ORS will NOT send the initial route of the order to CBOEdirect. TPF/ORS will route the order to the crowd (PAR or Crowd Printer) based on eligibility from FBR PARM and FBR VOL parameters.
  - After initial routing, if the order is routed to PAR, the following procedures will be followed:
    - If the <BOOK> button is pressed, if BOOK is “Y” or “P”, then TPF/ORS will route the order to CBOEdirect.
    - AUTOX VOL will NOT be sent by TPF/ORS to CBOEdirect on the order.
    - CBOEdirect will automatically execute or book the order following current CBOEdirect rules for execution and booking, regardless of the size of the order.
    - If BOOK is “N” then TPF/ORS will NOT send the order to CBOEdirect. TPF/ORS will not accept the order and it will have to remain on PAR.
- Assumptions
    - All fields in the new Complex Order Table (COT) are globally updateable.
    - The PAR ID, BART ID, and FBR PRTR fields, will be initialized (during implementation) to the production Firm/Class Parameter PAR ID, BART ID, and FBR PRTR values. When a new class or new routing firm is added, these fields will not be initialized, they will have to be filled in manually.
    - If the REPORT PRTR field is blank, no Fill Report or Cancel Report will print for the complex order, otherwise it must contain a valid printer id.
    - Nothing Done reports will print at the Firm default printer (Menu 3), if the COT REPORT PRTR field is blank.
    - The BOOK ELIG indicator will be used to determine if an order can route to CBOEdirect from ORS, after the initial route of the complex order to PAR.
    - The PAR and BART ID fields, must contain a valid PAR and BART ID accordingly.
    - The Volume fields, must contain valid numeric data.
    - The FBR VOL field replaces the existing SPRD VOL fields, by range, on the

Firm/Class Parameter screen, and will be compared to the aggregate volume of all option legs to determine the complex orders routing destination.

General Routing

- The "SCREEN BASED TRADING" parameter on Class Parameters will allow a third valid entry, "H". If "H", then Hybrid will be in effect. Intra-day changes to "H" are not permitted. Side-by-side trading of TPF/ORS, CBOEdirect and Hybrid will not be supported. Several functions will be impacted by selecting Hybrid, these include: manual quotes and VQI input will not be accepted, LAST SALES will be transmitted to CBOEdirect, etc.
- A percentage will be allowed in the Class AUTO-EX VOL field. If so entered, the volume used would be that percentage of the disseminated size. For example – Class ORT AUTO-EX VOL 10%; Disseminated Size is 1000. AUTO-EX VOL is 100 contracts. This value would be passed to CBOEdirect.
- Control for the existing arbitrage checks will be moved to the Class ORT. The "ARB" field will allow entries of 1) "L"=block when locked or crossed; 2) "C"=block when crossed but not when locked; 3) "N"=do not block when locked or crossed. This functionality applies to all classes.
- It will not be possible to route CBOEdirect fill/cancel drops to a separate report printer than that used for ORS reports.

- Assumptions:
  - The following routing logic will be removed:
    - FPC PARM LEVEL (menu 6)
    - FPC LEVEL (menu 1)
    - PAR Booking Rules parameters
  - Activate auto-ex (RAES active) will not be required for Hybrid.
  - RAES News Inact to stop Auto-ex will not be required for Hybrid.
  - TPF/ORS will not be able to send a spread order to CBOEdirect for screen based trading independent of Hybrid.
  - Existing functionality for ETH will not change with the Hybrid implementation.

8 Performance Requirements

System Performance will be monitored throughout the life cycle of this project to ensure acceptable throughput. Particular attention will be paid to the effects on performance of the heavy data streams between CBOEdirect, TPF and the client-server systems.

9 Operational Setup and Control

10 Backup and Recovery Requirements

11 Fallback Requirements

- If fallback to TPF is required, orders will be manually entered to the fallback system. This may require input from the firms since all of the data may not be recoverable.
- During switches between primary and backup CBOEdirect clusters, all quotes will be removed from the system and the system will come back up in a pre-open state. At that point, all timers including those used for quote trigger and locked/crossed quote processing will be stopped and reverted to the system state before the timers were started.

Appendix 1

UMA Examples

Assumptions: The customer ("C") priority overlay is on; DPM participation is 30%, 40%, 50%;
Firms ("F"), BDs ("B") and market makers ("M", "N", "Y") share one UMA allocation (PROF)
ICMs ("I") each get their own UMA allocation
Remainders are allocated randomly

Example 1 - ICMs Only
Incoming order: 50

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
ICM 1	100	1	0.33333333	0.16	0.246667	12	1	0
ICM 2	25	1	0.33333333	0.04	0.186667	9		0
ICM 3	500	1	0.33333333	0.8	0.566667	28		0
Total	625	3				49		

Example 2 - ICMs and 1 Cust
Incoming order: 50

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	25					25		0
ICM 1	100	1	0.33333333	0.16	0.246667	6		0
ICM 2	25	1	0.33333333	0.04	0.186667	5		0
ICM 3	500	1	0.33333333	0.8	0.566667	14		0
Total	625	3				50		

Example 3 - ICMs and 2 Cust
Incoming order: 50

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					10		0
ICM 1	100	1	0.33333333	0.16	0.246667	6		0
ICM 2	25	1	0.33333333	0.04	0.186667	5		0
ICM 3	500	1	0.33333333	0.8	0.566667	14		0
Total	625	3				50		

Example 4 - ICMs and 2 Cust, Cust take all
Incoming order: 20

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					5		0
ICM 1	100	1	0.33333333	0.16	0.246667	0		0
ICM 2	25	1	0.33333333	0.04	0.186667	0		0
ICM 3	500	1	0.33333333	0.8	0.566667	0		0
Total	625	3				20		

Example 5 - ICMs, 2 Custs, 1 Prof

Incoming order: 100

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					10		0
ICM 1	100	1	0.25	0.148148	0.199074	15		0
ICM 2	25	1	0.25	0.037037	0.143519	11		0
ICM 3	500	1	0.25	0.740741	0.49537	37		0
BD1	50	1	0.25	0.074074	0.162037	12		0
Total	675	4				100		

Example 6 - ICMs, 2 Custs, 2 Profs

Incoming order: 100

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					10		0
ICM 1	100	1	0.25	0.114286	0.182143	14		0
ICM 2	25	1	0.25	0.028571	0.139286	10		0
ICM 3	500	1	0.25	0.571429	0.410714	31		0
PROF	250	1	0.25	0.285714	0.267857	20		0
Total	875	4				100		
BD1	50	1	0.5	0.2	0.35	7		0
Firm 1	200	1	0.5	0.8	0.65	13		0
	250	2				20		

Example 7 - ICMs, 2 Custs, 2 Profs, UMA allocation larger than size

Incoming order: 200

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					10		0
ICM 1	100	1	0.25	0.120482	0.185241	32		0
ICM 2	25	1	0.25	0.03012	0.14006	25		0

ICM 3	500	1	0.25	0.60241	0.426205	75		0
PROF	205	1	0.25	0.246988	0.248494	43		0
Total	830	4				200		
BD1	5	1	0.5	0.02439	0.262195	11		6
Firm 1	200	1	0.5	0.97561	0.737805	32		0
	205	2				43		
Re-allocate overage:		**6**						
Firm 1	168	1	1	1	1	6		
Total	168	1				6		

Example 7 - ICMs, 2 Custs, UMA allocation larger than size

Incoming order: 300

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					10		0
ICM 1	100	1	0.33333333	0.16	0.246667	68		0
ICM 2	25	1	0.33333333	0.04	0.186667	51		26
ICM 3	500	1	0.33333333	0.8	0.566667	156		0
Total	625	3				300		
Re-allocate overage:		**26**						
ICM 1	32	1	0.5	0.085106	0.292553	8		
ICM 3	344	1	0.5	0.914894	0.707447	18		
Total	376	2				26		

Example 8 - ICMs, DPM 2 Custs

Incoming order: 300

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
Cust 1	15					15		0
Cust 2	10					10		0
DPM1	100					83		0
ICM 1	100	1	0.33333333	0.16	0.246667	47		0
ICM 2	25	1	0.33333333	0.04	0.186667	36		11
ICM 3	500	1	0.33333333	0.8	0.566667	109		0
Total	625	3				300		
Re-allocate overage:		**11**						
ICM 1	53	1	0.5	0.140957	0.320479	4		
ICM 3	391	1	0.5	1.039894	0.769947	8	-1	
Total	444	2				12		

Example 9 - 1 ICM, DPM

Incoming order: 100

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage

DPM 1	100					50		0
ICM 1	100	1	1	1	1	50		0
Total	100	1				100		

Example 10 - 1 ICM, DPM

Incoming order: 125

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
DPM 1	100					63		0
ICM 1	25	1	1	1	1	62		37
Total	25	1				125		

Re-allocate overage: 37

DPM1	50					37		

Example 11 - 2 ICMs, DPM

Incoming order: 100

	Size	Participation	Part. %	Pro-Rata	UMA %	UMA Alloc	Remainder	Overage
DPM 1	100					40		0
ICM 1	100	1	0.5	0.666667	0.583333	35		0
ICM 2	50	1	0.5	0.333333	0.416667	25		0
Total	150	2				100		

Appendix 2

Requirements Documentation Reference

The following sections of *WR #2042 CBOEdirect Requirements Specifications for Market Linkage* documents changes to the functional requirements for support of Hybrid.

- Section 9.6 Incoming Customer Order Procedure – CBOE is Not the NBBO
  - CBOEdirect will **not** be required to provide a GUI to enable the DPM to send a P/A linkage order to the NBBO exchange.
- Section 9.8.2 Incoming Principal Orders
  - CBOEdirect will not cancel the remainder of a P order; the remainder will be routed to PAR through TPF/ORS.
- Section 9.9 Satisfaction Order
  - CBOEdirect will be responsible for trade through detection and generation of a Satisfaction alert to PAR
  - CBOEdirect will **not** be required in Hybrid to provide a GUI to create Outgoing Satisfaction Orders.
  - CBOEdirect will **not** be responsible for providing a GUI interface for the DPM to process Incoming Satisfaction Orders.

The following sections of *WR #2042 TPF Requirement Specifications for Market Linkage Phase 1* documents changes to the functional requirements for support of Hybrid.

- Section 3.3 Internal Functions and Section 3.4 Interface Functions
  - TPF/ORS will be modified to accept the current status of an order from CBOEdirect (executed, rejected).

Appendix 3
Market Linkage Assumptions and Examples

Assumptions

1. DPM acts as agent for customer orders requiring Linkage representation.
2. No manual quotes are accepted in a Hybrid Trading environment.
3. It is assumed that a PA order is associated with a customer order on the book and should be allocated to the customer fully regardless of UMA.
4. TPF/ORS will determine if an in-coming Linkage order should be accepted or rejected. It will perform the NBBO check as the 1st routing decision made for all accepted incoming Linkage orders.
5. Origin codes in TPF/ORS will determine routing for execution.
6. For all in-coming marketable orders subject to EFPC eligibility, if CBOE is not the NBBO, TPF/ORS will route the order to the reject destination.
7. It is assumed the Market Makers will have alerts from proprietary systems for NBBO inversion situations.
8. It is assumed CBOE systems will provide GUI functionality enabling the creation and routing of a P order.
9. It is assumed CBOE systems will NOT provide alerts for quote-throughs of our book.
10. It is assumed CBOE systems will provide GUI functionality to notify the DPM when a trade through occurs and enable the DPM to create and route a Satisfaction order.
11. An in-coming order or quote will be automatically executed causing a trade through when the NBBO is inverted. (See scenario #7).
12. CBOE systems will not prevent an in-coming order from being booked from PAR when the NBBO market (of which CBOE is a participant) is currently inverted. (See scenario #8).
13. CBOEdirect will not automatically prevent ICM quotes or orders from trading against resting orders. (See scenario #17 & 18)

Examples

	Origin	NBBO	Order Description	Hybrid Routing Functionality	Hybrid Linkage Functionality
1.	Customer, Firm, Broker Dealer		• Non-Marketable • Worse than the best book	• TPF/ORS will route the order to CBOEdirect. • CBOEdirect will book the order.	No Special Linkage Treatment by CBOE systems
2.	Customer, Firm, Broker Dealer	CBOE is NBBO	• Marketable	• TPF/ORS will route the order to CBOEdirect. • CBOEdirect will automatically execute the order.	No Special Linkage Treatment by CBOE systems

3.	Customer, Firm, Broker Dealer	CBOE is not NBBO	• Marketable	• TPF/ORS will route the order to PAR for DPM Handling.	• DPM Handling:
					  • Manually Step up to NBBO
					  • Trade Through expecting Satisfaction Order
					  • Ability to send a Linkage order away:
					  Customer Order - PA or P
					  F, BD Order - P

4.	Customer, Firm, Broker Dealer	CBOE is not NBBO	• Between NBBO • Betters same side of quote (middle)	• TPF/ORS will route the order to PAR for DPM Handling	No Special Linkage Treatment by CBOE systems

5.	Customer, Firm, Broker Dealer	CBOE is not NBBO	• Marketable against NBBO but not equal CBOE quote	• TPF/ORS will route the order to PAR for DPM Handling	• DPM Handling:
					  • Manually Step up to NBBO
					  • Trade Through expecting Satisfaction Order
					  • Ability to send a Linkage order away:
					  Customer Order - PA
					  F, BD Order – P

6.	Customer, Firm, Broker Dealer	CBOE Lock with NBBO	Equals same side of best book
			
			Example:
			NBBO
				• TPF/ORS will route the order to PAR for DPM Handling.	• DPM Handling:
					  • Book order
					  • Manually Step up to NBBO
					  • Ability to send a Linkage order away:
					  Customer Order - PA

	Origin	NBBO	Order Description	Hybrid Routing Functionality	Hybrid Linkage Functionality
			B- 1.00 A- 1.00 CBOE $1.00 - 1.10 In-Coming Order 1.0 buy		F, BD Order - P
7.	Customer, Firm, Broker Dealer	NBBO Inverted by away Market	CBOE = NBBO on opposite side • Marketable **Example**: NBBO B- 1.00 A- .95 CBOE $1.00 - 1.10 In-Coming Order 1.00 sell	• TPF/ORS will route the order to CBOEdirect for automatic execution.	• DPM Handling: • Trade Through (causing a print to go out that is worse than an away offer). • If the DPM trades the customer order he will be subject to trade through review by Regulatory under the Linkage Plan and can expect a Satisfaction Order. Trading Procedures for these situations will need to be reviewed.
8.	Customer, Firm, Broker Dealer	Book inverted with NBBO	CBOE = NBBO on same side **Example**: NBBO B-$1.00 A- $.95 CBOE $1.00 - $1.10 In-Coming Order $1.00 buy	• TPF/ORS will route the order to PAR for DPM Handling.	• DPM Handling: • Book order • Manually Step up to NBBO • Ability to send a Linkage order away: Customer Order - PA F, BD Order – P
9.	PA, size = 215	CBOE is NBBO	• Marketable	Phase 1 Linkage	Phase 1 Linkage

	Origin	NBBO	Order Description	Hybrid Routing Functionality	Hybrid Linkage Functionality
	Disseminated size = 212			• TPF/ORS will reject the PA order since it cannot be totally executed. Phase 2 Linkage • TPF/ORS will route the order to CBOEdirect.	• Reject PA order since it cannot be totally executed. Phase 2 Linkage • CBOEdirect will execute the order up to the disseminated size (212). • CBOEdirect will route the remainder to TPF/ORS (3). • TPF/ORS will cancel the remainder (3).
10.	PA or P	CBOE is not NBBO	• Non-Marketable	• TPF/ORS will automatically reject the order to the Linkage Hub.	
11.	P	NBBO Inverted	CBOE = NBBO on opposite side • Marketable **Example:** NBBO B- $1.00 A- $.95 CBOE $1.00 - $1.10 In-Coming Order $1.00 sell	• TPF/ORS will route the order to CBOEdirect	• CBOEdirect will automatically execute the order based on origin code parameters up to a size of 10.
12.	PA	NBBO Inverted	CBOE = NBBO on opposite side • Marketable	• TPF/ORS will route the order to CBOEdirect.	• CBOEdirect will automatically execute the order up to the disseminated size.

	Origin	NBBO	Order Description	Hybrid Routing Functionality	Hybrid Linkage Functionality
			Example: NBBO B- $1.00 A- $.95 CBOE $1.00 - $1.10 In-Coming Order $1.00 sell		
13.	In-crowd MM Order	NBBO Locked by in-crowd MM Order	**Example:** NBBO B- $1.00 A- $1.10 CBOE $.95 – $1.15 In-crowd MM Order $1.10 buy	• MM proprietary system will route the order to CBOEdirect.	• CBOEdirect books the in-crowd MM order • CBOEdirect bypasses logic to route the order to PAR for manual handling.
14.	In-crowd MM Order	NBBO Locked by in-crowd MM Order	• Marketable **Example:** NBBO B- $1.00 A- $1.10 CBOE $.95 – $1.10 In-crowd MM Order $1.10 buy	• MM proprietary system will route the order to CBOEdirect.	• No special Linkage treatment by CBOE systems. CBOEdirect will disseminate CBOE market as B- $1.10 – A- $1.10 CBOEdirect will initiate a 10 second timer for the MM to either cancel the order or CBOEdirect will automatically execute.
15.	In-crowd MM Quote	NBBO & CBOE Locked by in-crowd MM Quote	**Example:** NBBO B- $1.00 A- $1.10 CBOE	• MM proprietary system will route the quote to CBOEdirect.	• No special Linkage treatment by CBOE systems. CBOEdirect will disseminate CBOE market as

	Origin	NBBO	Order Description	Hybrid Routing Functionality	Hybrid Linkage Functionality
			$.95 – $1.15 In-crowd MM Quote $1.10 – $1.20 New NBBO $1.10 – $1.10		B – $1.10 – A - $1.15 The MM is responsible for knowing the incoming quote locks with the NBBO and unlock it or send a P order to move the market away from lock.
16.	In-crowd MM Quote	NBBO Locked by in-crowd MM Quote	• Marketable **Example:** NBBO B- $1.00 A- $1.10 CBOE $.95 – $1.10 In-crowd MM Quote $1.10 – $1.20 New NBBO $1.10 – $1.10	• MM proprietary system will route the quote to CBOEdirect.	• No special Linkage treatment by CBOE systems. CBOEdirect will disseminate CBOE market as 1.10 – 1.10 CBOEdirect will initiate a 10 second timer for the MM to either fade the quote or CBOEdirect will automatically execute.
17.	In-crowd MM Quote	NBBO Inverted	• Marketable **Example:** NBBO B- $1.05A- $1.10 CBOE $.1.00 – $1.20 In-crowd MM Quote $1.20 – $1.40 New CBOE $1.20 - $1.20	• MM proprietary system will route the quote to CBOEdirect.	• CBOEdirect will accept quote and allow potential trade through after 10 seconds, expecting Satisfaction Order.
18.	Customer order	NBBO Inverted by	**Example:**	• MM proprietary system will	CBOEdirect will accept quote and allow trade

	Origin	NBBO	Order Description	Hybrid Routing Functionality	Hybrid Linkage Functionality
	resting on book	in-coming quote	NBBO B- $1.05 A- $1.10 CBOE $1.00 – $1.20 Customer order on book – $1.20 sell In-coming Quote $1.20 – $1.40	route the quote to CBOEdirect	through at 1.20 expecting Satisfaction Order.
19.	Customer order resting on book	NBBO Inverted by away Market	**Example:** NBBO B- $1.25 A- $1.10 CBOE $1.00 – $1.20 Customer order on book – $1.20 sell		No special Linkage treatment required, however, the customer could get a better fill away ($1.25). • Open Issue – Alternatives 1. DPM uses his own proprietary system to be alerted of the conditions and to submit a P order to the away market. 2. CBOEdirect alerts the DPM to send a P order away to represent a customer order on the CBOE book. The DPM uses his own proprietary system to submit a P or N order to the away market. 3. CBOEdirect alerts the DPM and creates a PA order for direction by the DPM to send to the away market. The DPM accepts risk by sending a PA order away; the order in the book could be executed from under him while he is waiting for a Linkage order response.