



Autobahn Equity EMEA

Routing Logic

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How orders are routed when sent to Autobahn's algorithmic strategies

Deutsche Bank's algorithms utilise its **Smart Order Router (SOR)** and **SOR Dark (SOR-D) Router** to access displayed and non-displayed liquidity respectively. The interactions between algorithms and routers vary depending on the algorithm being used and client objectives.

This document is intended to provide an overview only of the core operating modes of the SOR and SOR-D Router.

Smart Order Router (SOR)

By default, SOR accesses displayed liquidity as well as Deutsche Bank's **Systematic Internaliser (DBES)**. The router determines where and how to send orders based on the following principles:

1. Fulfillment of MiFID II including best execution obligations.
2. Achievement of specific execution objectives for clients. Clients may seek to maximise liquidity, minimise implicit transaction costs (i.e. payment of spread), improve probability of fill or reduce explicit transaction costs if they are cost sensitive.

The SOR has different urgency settings that work to achieve these execution objectives and the logic is further configurable at the client level.

Aims and Modes of Operation

Clients may have specific objectives when placing orders passively or taking liquidity from the market aggressively. Naturally, these objectives may conflict with each other, since optimising for one of them would typically imply the deterioration of the expected outcome with respect to the others.

In order to tailor **SOR** to specific needs, there are a number of configurations that can be invoked by specifying (or defaulting for a particular client) the parameter called "urgency".

The following table summarises the modes supported by SOR:

Urgency	Trade-Off	Possible Use Cases
High	(+) Target destinations with largest visible liquidity first when trading aggressively (-) May incur higher impact	May be useful for when targeting the primary market (normally has the largest visible liquidity) or when fill probability is the primary objective.
Moderate	(+) Targets faster markets to reduce market impact (-) Lower fill probability than High when trading aggressively	May be useful when optimising fill probability vs market impact.
Low	(+) Lowest Transaction Costs (-) Lower speed/probability of execution in fast markets	May be useful when sensitive to explicit transaction costs.
Route-Through	(+) Low latency to reach primary market (-) No price improvement potential	May be useful when special order types are needed, e.g. Native Iceberg.

By default, our algorithms utilise SOR in Moderate Urgency mode.

We consider an order as marketable in the context of SOR if:

- the order is submitted as a 'market' order, or
- the limit price of a buy order is greater than or equal to the EBO (European Best Offer), or
- the limit price of a sell order is less than or equal to the EBB (European Best Bid)

Otherwise, the order is considered non-marketable. An order can switch from being marketable to non-marketable as market data updates and the EBBO moves.

Depending on whether an order is marketable or non-marketable an order will move through various trading sequence phases (again configurable by client). Below is a description of these phases for SOR in Moderate Urgency mode:

Non-Marketable Orders	Marketable Orders
<ol style="list-style-type: none"> 1) Systematic Internaliser Phase – Will IOC (Immediate or Cancel) DBES at the client limit. 2) Lit Passive Phase – Will rest on destinations at the client limit, allocating based on the average latency to access and stock/market specific average trade size data. Will re-split if the price trades through the limit or Primary goes into auction. 	<ol style="list-style-type: none"> 1) SI Phase – Will IOC DBES at EBBO. 2) Lit Aggressive Phase – Will IOC destinations based on displayed price then the average latency to access. This Phase will be repeated when all submissions have returned and market data has updated.

As soon as a marketable order becomes non-marketable, SOR will move to Lit Passive Phase.

SOR Dark (SOR-D) Router

SOR Dark Router (SOR-D) is used when access to dark liquidity is required. It can only be accessed by an algorithm (either via "SuperX+" algorithm or another strategy). In each case the upstream algorithm is responsible for the correct pricing of the routed order, while the router is responsible for the allocation and routing logic.

There are various modes of operation that affect routing, but overall **SOR-D Router** logic is initially driven by its client-specified urgency parameter, venue rankings, explicit or implicit MES* (Minimum Execution Size) instruction and the order size.

The main factors affecting the decision to route the orders are:

- The number of dark destinations accessed.
- The price peg.
- MES thresholds are designed to specify the smallest individual order with which the strategy will interact. If not supplied by the client the selected values are based on the historical trade sizes and depend on the urgency as well. The urgency will decide the MES based on the stock specific average execution size in general. The higher the urgency the smaller the MES will be compared to the average execution size for that stock. Depending on the size of the MES relative to the order size, the number of venues selected for allocation may change.
- As with the **SOR**, the **SOR-D Router** is further controlled by explicit client instructions and configurations.

Aims and Modes of Operation

Clients may have specific goals when placing orders through SOR-D Router. These goals include:

- Maximising the (expected) trading rate
- Reducing the information leakage from partial executions
- Reducing the cost of trading
- Maximising the spread capture

Naturally these objectives may conflict with each other, since optimising for one of them would typically imply the deterioration of the expected outcome with respect to the others. In order to tailor **SOR-D Router** to the specific needs of individual clients there are a number of configurations that can be invoked by specifying (or defaulting for particular client) the "urgency" parameter.

First, **SOR-D** sends an IOC order for the full size to DBES. Depending on the urgency parameter, the cycle can be repeated for unexecuted residuals iterating through permissible external venues in order of the venue ranking logic. Unexecuted residuals are then allocated to and rest in one or more permissible venue at Near, Mid or Far touch depending on client urgency and supported price points. **SOR-D Router** will then dynamically reallocate the residual based upon order amendments and/or market executions.

The basic characteristics, the suggested usage and the standard settings of the SOR-D Router are listed below:

Urgency Setting	Trade-Off	Possible Use Cases	Standard Settings
Very High	(+) Maximises the expected trading rate (-) Highest proportion of spread cross incurred (-) Potential for highest information leakage	May be useful when liquidity demands are highest and there is a low sensitivity to information leakage. Broadest list of destinations accessed at maximum of Far Touch.	<ul style="list-style-type: none"> - Lowest MES Setting - IOC All Destinations at Mid/Far, destinations ordered by 'Category' then 'Latency' - Rest the unexecuted balance of the order in all of the available venues pegged to Far in DBES otherwise pegged to Mid according to the SOR-D Router Allocation Phase - In parallel rest qualifying conditional orders in Turquoise Plato Block Discovery and BATS LIS
High	(+) High expected trading rate (-) Potential for high information leakage	May be useful when there is high liquidity demand while not willing to pay extra cost of transacting. Narrower list of destinations and trades at Mid Price or better.	<ul style="list-style-type: none"> - Low MES Setting - IOC DBES at Mid - Rest the unexecuted balance of the order pegged to mid in all of the available venues according to the SOR-D Router Allocation Phase - In parallel rest qualifying conditional orders in Turquoise Plato Block Discovery and BATS LIS
Moderate	(+) Moderate expected trading rate (-) Moderate information leakage	May be useful when there is a balanced desire to trade (up to midpoint) versus leak information. Accesses the same destinations as High but with higher MES settings. Trades at Mid Price or better.	<ul style="list-style-type: none"> - Moderate MES Setting - IOC DBES at Mid - Rest the unexecuted balance of the order pegged to Mid in all the available venues according to the SOR-D Router Allocation Phase - In parallel rest qualifying conditional orders in Turquoise Plato Block Discovery and BATS LIS
Low	(+) Low information leakage (-) Low expected trading rate	Low immediacy demanded, interacts with DBES only in full size. Trades at Mid Price or better.	<ul style="list-style-type: none"> - High MES Setting - IOC DBES at Mid - Periodically sends IOC order to SI at Mid
Very Low	(+) Lowest information leakage (+) Most Price Opportunistic (-) Lowest expected trading rate	Very low liquidity demands. Only fills at Near Price. Only goes to DBES in full size.	<ul style="list-style-type: none"> - Lowest MES Setting to maximise probability of near side liquidity - IOC DBES at Near - Periodically sends IOC order to DBES at Near

Please note:

- For orders above SMS, DBES will be allocated at least SMS or no allocation at all
- Orders below SMS will not be sent to DBES at any urgency.
 - For low and very low urgencies, these orders will be rejected back
 - For urgency of Moderate and above, orders will be allocated to external venues only



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