

#### OVERVIEW

The evolution of high-frequency trading together with automated trading systems puts more and more requirements on the trading systems latency. Netcope Technologies offers a solution to minimize latency of trading systems by off-loading the order processing into FPGA hardware.

Tradecope is the first easy-to-use solution for low-latency trading that allows literally everyone to benefit from pure hardware trade processing without the need of being an FPGA expert.

#### WHY DO YOU NEED FPGA

When you implement your feed handler, trading strategies and order generation in software, the operating system slows you down:

- ▶ The processor is shared between the trading software, the operating system and other applications
- ▶ All network communications goes through the kernel network stack
- ▶ Software solutions do not reach fully-parallel processing like in the HW

#### TradeCOPE SOLUTION

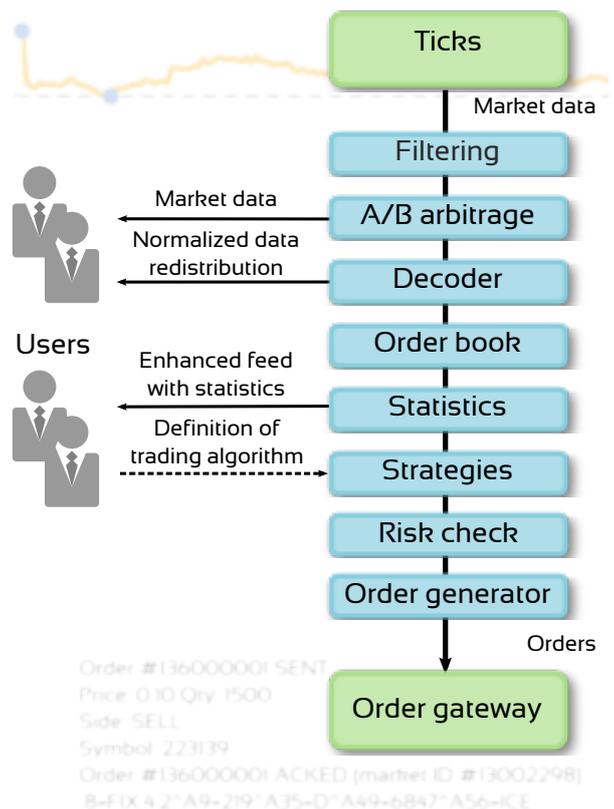
Tradecope is a platform that processes market data directly in FPGA network card and creates book, computes set of predefined statistics, evaluates trading strategies and generates orders. All this is done with sub-microsecond latency thanks to our unique FPGA accelerated solution.

Tradecope gives the power and performance of FPGAs to everyone. Abstraction of the FPGA internals allows a quantitative analyst, equity trader or anyone else to focus on the trading strategy with no needs to worry about low-level programming, market data formats or digital hardware design. All commodity parts (decoder, book, order sending) are resolved, the user just defines trading strategy in a high-level programming language.

Tradecope is delivered as a HW/SW solution composed of an FPGA network interface card with appropriate firmware and an API including examples of software applications. Extremely low latency is achieved thanks to the unique HW/SW co-design.

#### FEATURES

- ▶ A-B channel arbitrage
- ▶ Sequence number gap detection
- ▶ FIX/FAST and binary decoding
- ▶ Message and symbol filtering
- ▶ Building an order book representation in FPGA
- ▶ Computation of pre-defined statistics (EMA, MID etc.)
- ▶ Trading strategy triggered by market update
- ▶ Sending orders to market with risk check
- ▶ All data are accessible in software through an API



#### ORDERING INFORMATION



Please contact Netcope Technologies for pricing and additional information about this product.

[www.tradecope.com](http://www.tradecope.com)

## USE CASES

Tradecope can be used in many different ways, thanks to its modular system based on components. Following use cases demonstrate flexibility and adaptability of Tradecope platform.

### DATA FILTERING

Tradecope has the ability to filter incoming packets according to their IP address and port and perform A/B channel arbitrage. More advanced features include filtering of decoded messages according to the symbol ID or the message type. Combinations of above mentioned types of filtering are possible.

### ACCELERATED FEED HANDLER

Tradecope processes market data directly (filtering, decoding) in the FPGA and creates an order book. Predefined statistics are computed as well. All the data are accessible in software using a highly optimized API.

### DATA NORMALIZATION

Tradecope can be used as a universal decoder for different market feeds. Both FIX/FAST and binary formats are supported. Output from decoder is normalized and a highly optimized API offers fast way for streaming data to the user application.

### ACCELERATED ORDER SENDING

Tradecope may be used as fast order generator and sender. Thanks to unique HW/SW co-design and complete kernel bypass, maximum speed-up of order sending is achieved. Various market protocols are supported, e.g. FIX, Arca Direct and OTTO.

### IN-HARDWARE PROCESSING PIPELINE

Tradecope provides framework for implementing trading strategies in high level programming language. The user code is automatically transformed into an FPGA implementation. Together with accelerated feed handler and order sender unit, Tradecope is able to process market data and send orders back to the market. As the whole pipeline is implemented in hardware, deterministic sub-microsecond latencies are achieved.

### ACCURATE MARKET DATA RECORDING & REPLAYING

As Tradecope is based on high-performance FPGA network interface card with external connector for time synchronisation, it enables traffic recording and replaying and preserving traffic time-characteristics with nanosecond precision.

## DELIVERABLES

- ▶ Tradecope solution including interface for writing trading algos in a high level programming language
- ▼ Various IP cores such as:
  - ▶ FIX/FAST or binary decoder
  - ▶ Order book, order generator and sender
  - ▶ Packet & message filter
- ▶ Assistance with an implementation of your solution
- ▶ Customization & development of turnkey solutions

## SUPPORTED MARKETS

