

# NASDAQ OMX<sup>®</sup>

## NASDAQ-CME MICROWAVE WIRELESS CONNECTIVITY

### FREQUENTLY ASKED QUESTIONS

#### WHAT IS THE NASDAQ-CME MICROWAVE OFFERING?

This offering is a true point-to-point microwave connection linking customers in the NASDAQ OMX Data Center in Carteret, NJ to the CME Group Data Center in Aurora, IL to receive the most popular equities, fixed income, and futures market data at the lowest latency. We utilize best in class microwave networks between the data centers to deliver data up to 36% faster than the lowest latency fiber connections between these locations.

#### WHAT DATA IS AVAILABLE IN THE CARTERET DATA CENTER AND AT WHAT LATENCIES?

The following CME Group feeds are available in the NASDAQ OMX Data Center and can be enabled over your existing NASDAQ OMX hand-off:

- **CME Group Data Powered by Epsilon Networks** – consists of depth data\*\* on all outright futures contracts traded on CME, CBOT, NYMEX, and COMEX. Latencies below 4.25 milliseconds (measured from the vendor cabinet in Carteret to the vendor cabinet in Aurora) with improvements scheduled to reduce latency to 4.18 milliseconds by the end of March.
- **CME Group Data Powered by Strike Technologies LLC** – consists of depth data\*\* for select equity, commodity, FX and fixed income futures. Expected latencies below 4.13 milliseconds (measured from the vendor cabinet in Carteret to the vendor cabinet in Aurora).

\*\*The number of price levels available at a particular time in the book may be different and vary over time in order to most efficiently utilize the limited bandwidth available on the microwave networks without negatively affecting the latency.

#### WHAT IS AVAILABLE IN THE AURORA DATA CENTER AND AT WHAT LATENCIES?

The following NASDAQ OMX feeds are available in the CME Group Data Center via a cross connect to the CME's Content Delivery Platform with expected latencies of under 4.13 milliseconds\*:

- **NASDAQ ETF Select Powered by Strike Technologies LLC** –provides the depth of book\*\* market data feed from The NASDAQ Stock Market® for 18 selected ETFs (prioritized by our clients). A listing of the 18 ETFs is available below.
- **NASDAQ OMX eSpeed Direct Powered by Strike Technologies LLC** –provides the best bid and offer price and size, as well as trade price, size, state, and total volume for U.S. Treasury Benchmarks real-time from eSpeed.

\*This is one-way latency SLA measured from the vendor cabinet in Carteret to the vendor cabinet in Aurora.

\*\*The number of price levels available at a particular time in the book may be different and vary over time in order to most efficiently utilize the limited bandwidth available on the microwave networks without negatively affecting the latency.

## HOW IS THE LATENCY MEASURED?

The one-way latency is measured from the vendor gear in Carteret to the vendor gear in Aurora.

## WHAT IS THE AVAILABILITY OF THESE SERVICES?

Since wireless networks are more sensitive to weather issues than fiber, the availability is slightly lower at 99.7% for the calendar month. The most common cause of outage is a heavy rain storm passing through the network path which can cause data packets to drop. This can cause the resiliency of the wireless network to be less than a typical fiber optic network. As a result, we require clients to also take this data via existing fiber routes from NASDAQ OMX or from other vendors.

### **CME Group Data Powered by Epsilon Networks:**

The availability is measured for the calendar month for the outages occurring during the hours of 2:00am to 9:00pm, ET each day that the CME Group and/or NASDAQ OMX markets are operational with the exception of Force Majeure events and planned maintenance. For the purpose of this calculation, the network will be deemed unavailable only during any period of one minute or more in which the bit error rate (BER) exceeds  $1 \times 10^{-6}$  (i.e. 0.000001). BER is the ratio of incorrect bits to the total number of bits transmitted, received or processed over a defined length of time. For instance, if a 1 is transmitted but it is received as a 0, the result is a bit error.

In the event of the monthly availability below the 99.7% SLA, the Customer may cancel the affected Service.

### **CME Group Data, NASDAQ ETF Select and NASDAQ OMX eSpeed Direct Powered by Strike Technologies LLC:**

The availability is measured for the calendar month for the outages occurring during the hours of 8:00am to 5:00pm, ET each day that the CME Group and/or NASDAQ OMX markets are operational) with the exception of Force Majeure events and planned maintenance. For the purpose of this calculation, the network will be deemed unavailable only during any period of one second or more in which the bit error rate level exceeds  $1 \times 10^{-3}$ .

In the event of the monthly availability below the 99.7% SLA, the Customer may cancel the affected Service.

## WHO ARE THE VENDORS FOR THIS MICROWAVE OFFERING?

The vendors for this best in class microwave offering are Epsilon Networks, LLC and Strike Technologies Services, LLC.

**Epsilon Networks, LLC** was formed in July 2013 when BGC Partners, Inc., a leading global brokerage company servicing the wholesale financial and property markets, teamed with Thesys Technologies, to invest in the creation of high-speed microwave data networks for the financial community. [Thesys Technologies LLC](#) is the infrastructure affiliate of Tradeworx, serving the high-performance technology needs of all market participants, including institutional investors, professional traders, brokerage firms, exchanges, and regulatory agencies. Epsilon Networks, LLC commercial solutions include data feed subscriptions and secure, private bandwidth capacity over microwave networks.

**Strike Technologies Services LLC** is a fully owned subsidiary of [Strike Technologies LLC](#). Strike Technologies LLC is a solutions provider and technology R&D company focused on innovations that drive the backbone of financial markets. Its commercial solutions include StrikeRisk and pre-trade and post-trade risk management system and StrikeNET long haul and short haul microwave and millimeter radio networks. Its customer base includes trading firms, securities/derivative exchanges, and investment banks.

## WHAT WAS THE PROCESS TO CHOOSE THESE VENDORS?

These vendors were chosen from a field of more than 20 vendors through a rigorous due diligence process in which these vendors ranked the highest in a combination of: technical experience, ultra-low latency microwave network with capabilities to continue to improve, strong SLAs (including latency, availability and service), market data filtering capabilities, and a strong understanding of financial services client needs.

## HOW ARE THE EXCHANGES ENSURING FAIRNESS IN RECEIPT OF THIS MARKET DATA?

The networks and equipment for this service are housed in exchange-controlled infrastructure within the data center and data is delivered directly to the NASDAQ OMX network infrastructure. NASDAQ OMX then distributes the data to all clients, including any affiliates of the vendors, over equidistant cross connects to ensure all co-located clients receive the data at the same latency.

## WHAT ARE THE FEES FOR THESE SERVICES?

Service	Install Fee (NRC)	Monthly Recurring Fee (MRC)
CME Group Data <i>Powered by Strike Technologies LLC</i>	\$5,000*	
Equities Futures (ES, NQ, YM, SP, EMD)		\$10,000
Fixed Income Futures (ZB, ZN, ZF, ZT, UB, GE)		\$10,000
FX Futures (ASD, EUR, GBP, JPY) (6A, 6B, 6E, 6J)		\$5,000
Metal Futures (GC, SI)		\$3,500
CME Group <i>Powered by Epsilon Networks</i>	\$5,000	\$23,500
BMD Globex Futures		
CBOT Globex Commodity Futures		
CBOT Globex Equity Index Futures		
CBOT Globex Interest Rate Futures		
CME Globex Equity Futures		
CME Globex Interest Rate Futures		
CME Globex FX Futures		
CME Globex Commodity Futures		
COMEX Globex Futures		
NYMEX Globex Crude and Crude Refined Futures		
NYMEX Globex Natural Gas and other Non-Crude Energy Futures		
NYMEX Globex Metals, Softs, and Alternative Market Futures		
NASDAQ ETF Select <i>Powered by Strike Technologies LLC</i>	\$5,000*	
Equities ETFs (DIA, EEM, IWM, QQQ, SDS, SPY, SSO, VXX, XLF)		\$10,000
Fixed Income ETFs (IEF, SHY, TBT, TLT)		\$10,000
Energy/ Metal ETFs (GLD, SLV, UNG, USO, XLE)		\$3,500
NASDAQ OMX eSpeed Direct <i>Powered by Strike Technologies LLC</i> (2YR, 3YR, 5YR, 7YR, 10YR, and 30YR)	\$5,000*	\$10,000

\*The install fee is charged once for the service install regardless of the number of asset classes you may choose for this vendor service.

Please contact [Doug Aragones](#) at +1 212 231 5189 or [Rich Mitterando](#) at +1 212 401 8788 for more information on pricing.

## **WHEN WILL THIS SERVICE BE AVAILABLE?**

All services are now available for client use.

## **HOW CAN I ORDER THIS SERVICE?**

You will be able to place orders for CME data received into Carteret using the [CoLo Console](#). On the top of the screen you can select "Market Data" and then "Via Wireless Network," select "CME Wireless (XXXX)" (various choices are available for asset classes or for all data) and then select the "Vendor".

You can place orders for the NASDAQ ETF Select data feed and the NASDAQ eSpeed Direct feed delivered to the Aurora data center by contacting the [CME Co-Location Services Business Development Team](#).

## **DO I NEED TO BE APPROVED TO RECEIVE THIS MARKET DATA FROM THE NECESSARY EXCHANGE(S)?**

Yes. You need to be approved to receive the requested market data in the requested data center. We will confirm with the exchange(s) prior to entitling you for the request feed and will assist you, if needed, to get the necessary approvals. Please contact the [NASDAQ OMX CoLo Support Team](#) for further assistance.

## **WILL THESE MARKET DATA FEEDS HAVE THE SAME PROTOCOLS AS THE CURRENT CME GROUP AND NASDAQ OMX MARKET DATA FEEDS PROVIDED OVER FIBER OPTIC NETWORKS?**

No. As these microwave networks have limited bandwidth, the vendors have proprietary efficient binary protocols. The protocols are available for you to review on the [CoLo Console](#). Clients will be able to test this protocol using packet capture files.

## **WILL THIS SERVICE SUPPORT DATA RE-REQUESTS?**

No. Market data re-requests or re-transmissions should be performed on your existing fiber-based connectivity.

## **CAN THIS SERVICE REPLACE MY EXISTING FIBER-BASED FEEDS?**

This service should be a supplement to any other feeds you currently receive via fiber optic networks. The microwave services are not fully redundant and can experience outages due to weather-related events or mechanical events. Customers are solely responsible for establishing and maintaining any redundant or complementary market data services (e.g. by obtaining desired market data feeds through fiber optic networks, other wireless networks or other means) they consider appropriate. We can also provide the filter feeds that can be used to fill in gaps during wireless network outages.

## **HOW LONG IS THE CONTRACT TERM FOR NASDAQ-CME WIRELESS?**

The contract term is month to month. Requests to cancel must be placed in the [CoLo Console](#). After the cancel order is completed in the CoLo Console, the client will be billed the remaining portion of that calendar month.

## **TO RECEIVE THE CME GROUP MARKET DATA IN CARTERET, DO I NEED TO ORDER A CROSS CONNECT (HAND-OFF) IN CARTERET?**

When you order the new market data connectivity service in the [CoLo Console](#), you will need to specify the current hand-off for which you wish to receive this market data. Our Networking team will entitle that specified hand-off with the requested data (assuming you are approved to receive market data from that exchange). If you wish to receive this market data over a new hand-off to NASDAQ OMX, you will need to order it first using the CoLo Console.

## **WHO DO I CONTACT FOR SUPPORT?**

Please contact NASDAQ OMX CoLo Support at +1 212 231 5180, Option #1 or [coloadmin@nasdaqomx.com](mailto:coloadmin@nasdaqomx.com).

## **WHEN AND HOW WILL I BE BILLED FOR THIS SERVICE?**

Similar to other CoLo services, you will be billed in your monthly NASDAQ OMX invoice for this service. The implementation fee will be billed in the month in which the connectivity installation is completed. The monthly recurring fee will be prorated for the time remaining in that month and then the full amount for each month thereafter.

## **IS ORDER ENTRY AVAILABLE VIA THIS MICROWAVE CONNECTIVITY OFFERING?**

Please contact our support team to review other options that may be currently or soon available.

## **WHY ARE NASDAQ OMX AND CME GROUP OFFERING THIS NEW SERVICE?**

We are offering this service for a number of key reasons:

- NASDAQ OMX and CME Group continue to look for innovative services that our clients will find valuable, building our data centers into a hub for their equities, derivatives and futures trading needs.
- We wanted to provide a high quality exchange service that would be fair and equal for all clients. If we were to offer just roof space to limited clients who wanted to place dishes on our data center, we would not have enough room to satisfy all clients' needs. This offering enables us to provide valuable market data to all clients at the same low latency using the latest wireless technology.
- Many of our clients do not have the resources (financial or employee base) to build and maintain their own wireless network, so this enables them to gain the benefits without the large costs of a dedicated network.

## **CAN I PUT MY OWN MICROWAVE DISHES ON THE CME GROUP AURORA DATA CENTER OR THE NASDAQ OMX CARTERET DATA CENTER PROPERTY?**

No. We do not have the space and necessary local approvals to be able to satisfy fair and equal treatment for all requested client dishes on the data center roof or property. Each route would require its own dish which can vary in size from one to six feet depending on the intended distance, which can lead to dozens, if not hundreds, of requested dishes. In addition, these dishes need to be far enough apart to prevent interference which would provide favoritism to those installed first. As a result, clients are not able to place their own dishes or their vendor's dishes on the data center property.

## **WHO SHOULD I CONTACT FOR MORE INFORMATION?**

Contact [Doug Aragon](#) at +1 212 231 5189 or [Rich Mitterando](#) at +1 212 401 8788.