

Required fields are shown with yellow backgrounds and asterisks.

Page 1 of \* 12

SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549  
Form 19b-4

File No. \* SR 2021 - \* 802

Amendment No. (req. for Amendments \*) 1

Filing by Options Clearing Corporation

Pursuant to Rule 19b-4 under the Securities Exchange Act of 1934

Initial * <input type="checkbox"/>	Amendment * <input checked="" type="checkbox"/>	Withdrawal <input type="checkbox"/>	Section 19(b)(2) * <input type="checkbox"/>	Section 19(b)(3)(A) * <input type="checkbox"/>	Section 19(b)(3)(B) * <input type="checkbox"/>
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Pilot <input type="checkbox"/>	Extension of Time Period for Commission Action * <input type="checkbox"/>	Date Expires * <input type="text"/>	Rule		
			<input type="checkbox"/> 19b-4(f)(1)	<input type="checkbox"/> 19b-4(f)(4)	
			<input type="checkbox"/> 19b-4(f)(2)	<input type="checkbox"/> 19b-4(f)(5)	
			<input type="checkbox"/> 19b-4(f)(3)	<input type="checkbox"/> 19b-4(f)(6)	

Notice of proposed change pursuant to the Payment, Clearing, and Settlement Act of 2010  
Section 806(e)(1) \*

Section 806(e)(2) \*

Security-Based Swap Submission pursuant to the  
Securities Exchange Act of 1934  
Section 3C(b)(2) \*

Exhibit 2 Sent As Paper Document

Exhibit 3 Sent As Paper Document

### Description

Provide a brief description of the action (limit 250 characters, required when Initial is checked \*).

### Contact Information

Provide the name, telephone number, and e-mail address of the person on the staff of the self-regulatory organization prepared to respond to questions and comments on the action.

First Name \* Joseph Last Name \* Kamnik

Title \* Chief Regulatory Counsel

E-mail \* jkamnik@theocc.com

Telephone \* (312) 322-7570 Fax

### Signature

Pursuant to the requirements of the Securities Exchange of 1934, Options Clearing Corporation has duty caused this filing to be signed on its behalf by the undersigned thereunto duty authorized.

Date 11/16/2021

(Title \*)

By Mark C. Brown

Assistant General Counsel

(Name \*)

NOTE: Clicking the signature block at right will initiate digitally signing the form. A digital signature is as legally binding as a physical signature, and once signed, this form cannot be changed.

Mark C. Brown  
Digitally signed by Mark C. Brown  
Date: 2021.11.16 13:49:10 -06'00'

Required fields are shown with yellow backgrounds and astericks.

SECURITIES AND EXCHANGE COMMISSION  
WASHINGTON, D.C. 20549

For complete Form 19b-4 instructions please refer to the EFFS website.

**Form 19b-4 Information \***

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The self-regulatory organization must provide all required information, presented in a clear and comprehensible manner, to enable the public to provide meaningful comment on the proposal and for the Commission to determine whether the proposal is consistent with the Act and applicable rules and regulations under the Act.

**Exhibit 1 - Notice of Proposed Rule Change \***

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

**Exhibit 1A - Notice of Proposed Rule Change, Security-Based Swap Submission, or Advanced Notice by Clearing Agencies \***

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The Notice section of this Form 19b-4 must comply with the guidelines for publication in the Federal Register as well as any requirements for electronic filing as published by the Commission (if applicable). The Office of the Federal Register (OFR) offers guidance on Federal Register publication requirements in the Federal Register Document Drafting Handbook, October 1998 Revision. For example, all references to the federal securities laws must include the corresponding cite to the United States Code in a footnote. All references to SEC rules must include the corresponding cite to the Code of Federal Regulations in a footnote. All references to Securities Exchange Act Releases must include the release number, release date, Federal Register cite, Federal Register date, and corresponding file number (e.g., SR-[SRO]-xx-xx). A material failure to comply with these guidelines will result in the proposed rule change being deemed not properly filed. See also Rule 0-3 under the Act (17 CFR 240.0-3)

**Exhibit 2- Notices, Written Comments, Transcripts, Other Communications**

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Copies of notices, written comments, transcripts, other communications. If such documents cannot be filed electronically in accordance with Instruction F, they shall be filed in accordance with Instruction G.

Exhibit Sent As Paper Document

**Exhibit 3 - Form, Report, or Questionnaire**

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Copies of any form, report, or questionnaire that the self-regulatory organization proposes to use to help implement or operate the proposed rule change, or that is referred to by the proposed rule change.

Exhibit Sent As Paper Document

**Exhibit 4 - Marked Copies**

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The full text shall be marked, in any convenient manner, to indicate additions to and deletions from the immediately preceding filing. The purpose of Exhibit 4 is to permit the staff to identify immediately the changes made from the text of the rule with which it has been working.

**Exhibit 5 - Proposed Rule Text**

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The self-regulatory organization may choose to attach as Exhibit 5 proposed changes to rule text in place of providing it in Item I and which may otherwise be more easily readable if provided separately from Form 19b-4. Exhibit 5 shall be considered part of the proposed rule change

**Partial Amendment**

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If the self-regulatory organization is amending only part of the text of a lengthy proposed rule change, it may, with the Commission's permission, file only those portions of the text of the proposed rule change in which changes are being made if the filing (i.e. partial amendment) is clearly understandable on its face. Such partial amendment shall be clearly identified and marked to show deletions and additions.

SR-OCC-2021-802 Amendment No. 1.  
SR-OCC-2021-802 Amendment No. 1

**SECURITIES AND EXCHANGE COMMISSION**  
**Washington, D.C. 20549**

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Form 19b-4

Advance Notice

by

THE OPTIONS CLEARING CORPORATION

Pursuant to Rule 19b-4 under the  
Securities Exchange Act of 1934

**Partial Amendment No. 1 to SR-OCC-2021-802**

The Options Clearing Corporation (“OCC”) is filing this partial amendment (“Partial Amendment No. 1”) to advance notice File No. SR-OCC-2021-802 pursuant to General Instructions for Form 19b-4 Item 11, Exhibit 2(c), which provides, in part, that if after an advance notice is filed but before the Commission takes final action on it, a clearing agency prepares any correspondence or other communications reduced to writing from the clearing agency concerning the advance notice, the clearing agency shall file such communications. Partial Amendment No. 1 is intended to append an Exhibit 2 to documents filed as part of File No. SR-OCC-2021-802 on October 8, 2021. The Exhibit 2 consists of a communication from OCC to its clearing members concerning the changes discussed in File No. SR-OCC-2021-802. OCC also plans on posting the description of the changes to its public website. This amendment does not change the purpose of or basis for the advance notice.

**SIGNATURES**

Pursuant to the requirements of the Securities Exchange Act of 1934, The Options Clearing Corporation has duly caused this filing to be signed on its behalf by the undersigned thereunto duly authorized.

**THE OPTIONS CLEARING CORPORATION**

**By:** \_\_\_\_\_

**Mark C. Brown**  
**Assistant General Counsel**

Exhibit 2



**THE FOUNDATION  
FOR SECURE  
MARKETS®**

**Options Clearing Corporation**  
125. S. Franklin Street, Suite 1200  
Chicago, IL 60606  
312 322 6200 | theocc.com

OCC continues to work diligently on our Renaissance Initiative, a multi-year effort to comprehensively redevelop and modernize our technology infrastructure, including our risk management, clearing and data systems. As we have communicated previously, we intend to expand our use of cloud technology while implementing Renaissance, subject to regulatory review.

We are pleased to share with you that our [Advance Notice filing](#) in connection with our proposed adoption of Cloud Infrastructure has been published by the Securities and Exchange Commission for public comment.

The filing reflects our planned path forward to leverage the Compute, Storage and Network capabilities of a Cloud Service Provider (CSP) while continuing to meet our regulatory requirements as a Systemically Important Financial Market Utility (SIFMU). For your convenience, we are providing an attached summary of the filing and welcome any feedback or questions that you may have relative to our cloud implementation.

We believe our proposal meets the needs of our market participants by providing OCC with:

- **Improved resiliency,**
- **Enhanced security,** and
- **Increased scalability.**

As the exclusive provider of clearance and settlement services for listed options in the U.S., it is vital that our critical services remain continuously available to the markets we serve. To support our operations, we also plan to maintain an on-premises data center in the unlikely event of a CSP outage and have established a robust cloud security program.

Thank you for your interest and feedback. We look forward to continuing to work with you throughout the development and launch of our new core clearing, risk management and data applications.

Handwritten signature of John P. Davidson in black ink.

John P. Davidson  
Chief Executive Officer

Handwritten signature of Scot E. Warren in black ink.

Scot E. Warren  
Chief Operating Officer

# OCC<sup>®</sup>: Planned Path to Cloud Adoption

OCC has filed an [Advanced Notice](#) with the Securities and Exchange Commission in connection with our proposed adoption of a “Cloud Infrastructure” hosted by a Cloud Service Provider (“CSP”) to support OCC’s new core clearing, risk management, and data management applications currently under development. Advance Notice Filings are required when systemically important financial market utilities (“SIFMU”) propose actions that could have a material effect on the level or nature of risk presented by the SIFMU. Given OCC’s critical role, we believe it is important to provide transparency to market participants about the filing and OCC’s objectives.

The filing reflects our plan to use the virtual equivalent of physical data center resources via a “Virtual Private Cloud.” The Virtual Private Cloud is the cloud-based equivalent of a traditional data center, and offers scalable resources that: (i) handle various computationally intensive applications with load-balancing and resource management (“Compute”); (ii) provide configurable storage (“Storage”); and (iii) host network resources and services (“Network”). Beyond the use of a multi-region cloud solution for primary and backup services, the proposal reflects OCC’s plan to maintain an on-premises tertiary data center to provide the ability to support core clearing, risk management, and data management applications in the unlikely and extraordinary event of a multi-region outage of cloud-based Compute, Storage, and Network services impacting OCC operations at the CSP.

Today, OCC principally provides its core clearing, risk management, and data management service via ENCORE, which is run in two traditional, geographically diverse data centers located in Illinois and Texas. The ENCORE system was launched in 2000 and serves as OCC’s processing engine receiving trade and post-trade data from a variety of sources on a transaction-by-transaction basis, maintaining clearing member positions, calculating margin and clearing fund requirements, and providing reporting to OCC staff, regulators, and clearing members.

ENCORE has accommodated industry growth in processing large volumes and OCC has managed periods of extreme market volatility and stress, including during the 2007-2008 financial crisis and the COVID-19 global pandemic of 2020-21, without interruption. Nevertheless, ENCORE was designed to operate in traditional on-premises data centers that require the acquisition and installation of additional hardware and systems software to accommodate heightened resource needs or new applications. In this regard, the resiliency and scalability of the current infrastructure is less flexible than that offered by Cloud Infrastructure.

OCC’s proposed cloud implementation is a natural progression of our information technology strategy and aligns seamlessly with our overall corporate strategy, which is to:

- Reinforce OCC’s foundational capabilities and deliver effective and efficient services;
- Deliver product and service enhancements that enable growth in OCC’s core capabilities and provide capital efficiencies to market participants; and

- Demonstrate thought leadership in the delivery of innovative solutions that provide long-term value and efficiencies for OCC and its stakeholders.

OCC's objective is the replacement of ENCORE with a resilient solution that meets market participants' needs and the regulatory expectations for a SIFMU. Given advances in cloud technology and information security since 2000, OCC's proposed adoption of Cloud Infrastructure is an important component of achieving that objective.

## **Benefits of the Proposal**

Cloud implementation will enable OCC to leverage the Compute, Storage, and Network capabilities of a CSP, supplemented with compatible third-party vendor solutions, to maintain a modular architecture that will result in:

- Improved resiliency,
- Enhanced security, and
- Increased scalability for OCC's new core clearing, risk management, and data management applications.

## **Improved Resiliency**

As a SIFMU, OCC must ensure that core applications have resiliency and recovery capabilities commensurate with OCC's importance to the functioning of the US financial markets. OCC believes cloud implementation will enhance the resiliency of OCC's core clearing, risk management, and data management applications by virtue of OCC's architectural design decisions, disciplined approach to deployment of Cloud Infrastructure, and the cloud's built-in redundancy and guarantee of persistent availability. As proposed, OCC would provision Compute, Storage, and Network resources in two autonomous and geographically diverse regions, in a hot (primary)/warm (back-up) configuration to increase resources available on demand, maintained by the CSP.

Each region consists of three zones, each of which has a physical infrastructure with separate and dedicated connections to utility power, standalone backup power sources, independent mechanical services, and independent network connectivity. While not dependent on one another, zones are connected to one another with private fiber-optic networking, enabling the infrastructure of core clearing, risk management, and data management applications to automatically failover between zones without interruption. Each zone can operate independently of one another and failover capability is near instantaneous i.e. a loss of one zone will not affect operations in another zone and no core clearing, risk management, or data management application will be reliant on the functioning of a single zone. This structural framework offers OCC a wide environment within which to run its core clearing, risk management, and data management applications while simultaneously restricting the effect of an adverse event at the CSP to the smallest footprint possible.

Each region will maintain independent and identical copies of all critical applications that are deployed by OCC, allowing OCC to transition its core clearing, risk management, and data management applications from one region to another seamlessly. Production workloads would be run across and shifted between regions regularly to protect OCC against disruptions from intra-regional incidents. In the unlikely event

that a region is temporarily disabled as a result of an extreme event, OCC's applications would fail-over to run in the other region. At any point in time, OCC will have active primary and standby instances of the core clearing, risk management, and data management applications that can be moved to any of the six environments (i.e. three zones in each of the two regions). This is analogous to having six physical data centers with primary and backup systems running out of any two of them at a given point in time. OCC's proposed solution would significantly reduce operational complexity, mitigate the risk of human error, and provide resiliency and assured capacity. Additional capacity will be available to support the resiliency of OCC's core clearing, risk management, and data management applications by way of the six-way redundancy. Moreover, OCC will continue to periodically test the CSP's capacity scaling features and failover capabilities to ensure adequate capacity is available to OCC.

In addition to cloud deployment, OCC will maintain an on-premises data center to provide the ability to support core clearing, risk management, and data management services in the event of a multi-region outage at the CSP that impacts OCC operations. The on-premises data center will operate as a separate, logically isolated back-up to the six levels of redundancy provided for by the Cloud — a back-up to the back-ups — intended to be used only in the unlikely and extraordinary event that OCC completely loses access to the CSP. From an architectural perspective, the on-premises data center is similar to adding a third CSP region with a single zone. Most technologies will remain the same with a fail-over to the on-premises data center and core platform technologies that enable Compute, Network, and Storage services to be operated by OCC with synchronous data replication via dedicated, end-to-end encrypted links between the cloud and the on-premises data center and leaving member connectivity unchanged.

OCC believes cloud implementation will enhance the resiliency of OCC's core clearing, risk management, and data management applications by virtue of its built-in six levels of redundancy, which will provide OCC with easy access to multiple zones within multiple and geographically diverse regions. The redundancy provided to OCC in the Cloud Infrastructure helps ensure that Compute, Storage, and Network resources will be available to OCC on a persistent basis.

## **Enhanced Security**

As a SIFMU and the exclusive provider of clearance and settlement services for listed options in the US, it is vital that OCC's critical services remain continuously available with sufficient security measures in place to detect and defend against possible security threats. The cloud implementation will present OCC with an agile operating environment that can scale throughput to match workloads nearly instantaneously and enable OCC to build a "secure by design" pervasive security methodology that incorporates the National Institute of Standards and Technology ("NIST") Cybersecurity Framework's functions as a roadmap for cloud security. Movement to an agile, cloud-based operating environment further reinforces OCC's commitment to building a comprehensive and adaptable risk-based security methodology instead of a traditional perimeter-centric model.

The physical and cyber security standards that OCC has designed to align with NIST, the Cyber Security Framework ("CSF"), and the Center for Internet Security ("CIS") benchmarks will not change in the proposed Cloud Infrastructure. OCC will add meaningful security capabilities and measures provided by the CSP and selected third-party tools to enhance the security of OCC's core clearing, risk management, and data management applications. Given the scope of their service, CSPs leverage economies of scale and offer infrastructure and services with specialized configuration, monitoring, prevention, detection, and

response tools. Furthermore, unique cloud-specific capabilities, such as services for provisioning credentials and end-to-end configuration change management and scanning, will provide OCC enhanced levels of protection that is not available in traditional on-premises solutions. Finally, the back-up, on-premises data center will be physically isolated from other on-premises networks, such as the development network, and will have consistent controls and equivalent security tools to that of the data centers accessed through the CSP.

OCC has established a robust cloud security program to manage the security of the core clearing, risk management, and data management applications that will be running in the cloud and to monitor the CSP's management of the security of the Cloud Infrastructure, which it operates. The enterprise security program encompasses all OCC assets in OCC offices, data centers, and within the Cloud Provider's Cloud Infrastructure. Identity and Access Management (IAM) controls will ensure "least privileged" user access to applications in the Cloud. OCC has appropriate controls in place to ensure the security of confidential information in-transit between OCC data centers and the Cloud Infrastructure, between systems within the Cloud Infrastructure, and at-rest. All network communications between OCC and the cloud will rely on industry standard encryption for traffic while in transit, and data at rest will be safeguarded through pervasive encryption. Finally, automated delivery of business and security capability via the use of the "Infrastructure as Code," cloud agnostic tools, and continuous integration/continuous deployment pipeline methods help to ensure security controls are consistently and transparently deployed.

## **Increased Scalability**

The proposed cloud implementation will provide OCC with more dynamic scalability of Compute, Network, and Storage resources to support OCC's core clearing, risk management, and data management applications. In the current on-premises environment, immediate scalability is limited by the capacity of the on-premises hardware. Accordingly, OCC would need to obtain additional physical servers and network equipment to scale beyond the limits of the on-premises hardware, potentially affecting its ability to quickly adapt to evolving market conditions, including spikes in trading volume. In the cloud, however, additional Compute Storage, or Network resources can be launched on demand, so the scalability is considerable and instantaneous. With a Cloud Infrastructure, OCC can quickly provision or de-provision these resources to meet demands, including elevated trade volumes, increased creation of development and test environments for back testing and stress testing, and other systems development needs. Regulators' and market participants' expectations are for OCC to "be efficient and effective in meeting the requirements of its participants and the markets it serves," and to regularly review the "efficiency and effectiveness of our clearing and settlement operations and operating structure, including risk management policies, procedures, and systems." Consistent with these expectations, there are several significant efficiency benefits to the cloud implementation, including:

- Ad-hoc reporting capability with new filtering functionality and application programming interfaces to make it easier to procure and submit data to and from the system.
- Capability to quickly add or remove Compute, Storage, or Network resources to meet changing application needs and market volatility.
- Scalability to more efficiently meet historical data storage needs, provide data access through standard data services, and to respond quickly to regulatory requests.

- Secure, easy access to high-quality, high-fidelity data, including a centralized, enterprise-wide repository to store and provide timely access to system of record data.

## **Proposed Implementation Timeframe**

OCC expects to launch the new core clearing, risk management, and data management applications into production no earlier than the second quarter of 2024. The proposed path to launch includes several milestones, such as connectivity testing in the first quarter of 2023, external environment testing in the second quarter of 2023, and certification of readiness from clearing members and exchanges in the first quarter of 2024.

## **Conclusion**

OCC believes that the proposed cloud implementation meets the needs of the market participants we serve and is consistent with regulatory expectations and requirements. The proposed cloud implementation would provide OCC with a resilient, secure, and scalable environment to run core clearing, risk management, and data management systems that far exceed what is currently possible using only on-premises infrastructure. The cloud implementation will enhance OCC's ability to withstand and recover from adverse events by provisioning redundant Compute, Storage, and Network resources in three zones in each of two autonomous and geographically diverse regions. This will afford the OCC six levels of redundancy in the cloud with a primary and secondary virtual data center running in a hot (primary)/warm (back up) configuration.

The proposed cloud implementation will ensure that OCC systems have a high degree of security, resiliency, operational reliability, and adequate, scalable capacity. This would enable OCC to be more efficient and effective in meeting the requirements of its regulators, its participants and the markets it serves and promoting the stability of the broader financial system.