CLOCK SYNCHRONISATION

Final Report

BOARD OF THE
INTERNATIONAL ORGANIZATION OF SECURITIES COMMISSIONS

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1. Executive summary

The synchronisation of clocks used to timestamp a recordable event is important for regulatory purposes. IOSCO previously considered clock synchronisation in the context of trading venues. Specifically, Recommendation 7 of the final report "*Technological Challenges to Effective Market Surveillance – Issues and Regulatory Tools* (FR04/13)" (2013 Report) provided that market authorities[1] should consider requiring trading venues and their participants to synchronise, consistent with industry standards, the business clocks used to record the date and time of a reportable event. Since the 2013 Report, there has been more widespread adoption of Coordinated Universal Time (UTC) within the financial industry. Accordingly, IOSCO believes that it is appropriate to build on this Recommendation by stipulating that where jurisdictions have introduced a synchronisation requirement for business clocks, they should be synchronised to UTC.

2. Background

The synchronisation of clocks used to timestamp a recordable event is important for regulatory purposes in establishing a clear audit trail[2] of when trading events occurred in the secondary markets. This is increasingly important as more trading takes place across multiple venues, jurisdictions and at faster speeds. With the prevalence of automated and computerised trading, trades regularly occur within one microsecond or less.

IOSCO published the 2013 Report in April 2013. Recommendation 7 of this report recommends that market authorities consider requiring trading venues[3] and their participants in their jurisdiction to synchronise, consistent with industry standards, the business clocks they use to record the date and time of any reportable event (Recommendation 7). Although respondents to the public consultation broadly supported this recommendation, a few noted the physical limitation of accurately synchronising the clocks in practice (see Appendix G page 76-77 of the 2013 Report). As a result, the final recommendation did not include more detail.

Even when initially set accurately, all clocks will experience clock drift, caused by clocks counting time at slightly different rates. Timestamps created by different systems or networks can be compared meaningfully only if they are based on the same reference source; for time,

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1 In this report, "Market Authority" refers to the Statutory Regulator, an SRO or the operator of a Trading Venue, which is responsible for conducting and/or overseeing market surveillance efforts.

2 In this report, "Audit Trail" refers to the information needed to monitor effectively market activity (orders and trades), including all records that are available to reconstruct trading activity within a reasonable time. The term may include information possessed by intermediaries, e.g., customer identifiers. However, the term does not cover the audit trail necessary to monitor intermediary compliance with conduct of business rules, or other rules focused specifically on intermediary conduct.

3 In this report "Trading Venue" refers to exchanges or other trading facilities, including alternative trading systems (ATSs) and Multilateral Trading Facilities (MTFs). It also refers to the operator of that particular exchange or trading facility. The concept of a "trading venue" is evolving in a number of C2 member jurisdictions. For example, the concept may, at the discretion of individual members for their jurisdictions, also include swap execution facilities (SEFs) or the European "organised trading facilities" (OTFs). However, a "trading venue" does not include a single dealer system or a broker crossing facility.

the global reference is UTC[4], the primary time standard by which the world regulates clocks and time.

UTC is computed by taking the weighted average of more than 300 atomic clocks located in more than 80 timing laboratories around the world, including many of the IOSCO member jurisdictions. Although UTC itself is a paper timescale that is calculated and published after collating all the data from the timing laboratories, these laboratories each maintain real-time versions of UTC that are made readily available in their respective jurisdictions.

3. Developments

Since the publication of the 2013 Report, various jurisdictions have implemented clock synchronisation requirements or prescribed a more granular and precise clock synchronisation requirement in light of increasingly fast trading speed. For example:

- Australia published guidance in May 2015 on market integrity rules in exchange markets (ASIC RG 223) requiring market operators to synchronise the time for trading, compliance monitoring and reporting purposes to the Australian realisation of UTC (RG223.355).
- In Canada, IIROC issued a guidance note in February 2016 identifying UTC as the accepted reference time source for compliance under its Universal Market Integrity Rules (IIROC Notice 16-0022).
- In Europe, under MiFID II, operators of trading venues and their members or participants are required to synchronise the clocks they use for any reportable events with the UTC (Article 50 of Directive 2014/65/EU and Article 1 of Commission Delegated Regulation (EU) 2017/574).
- In the U.S., the SEC approved the National Market System Plan Governing the Consolidated Audit Trail (CAT Plan) in 2016. The CAT Plan includes provisions that require the self-regulatory organisations, which includes exchanges and FINRA, to synchronise their business clocks to the time maintained by the National Institute of Standards and Technology (NIST), which is one of the clocks that contributes to the UTC. The CAT Plan also includes provisions that require the SROs adopt rules that require their members to synchronise their business clocks to NIST.

For example, the requirement under MiFID II seeks to ensure that the accuracy and precision of the time stamps are sufficient to enable regulators to reconstruct past events, which, given the market structure in the EU, may be cross-market or cross-jurisdictional. This is reflective of a broader trend where trades are increasingly being undertaken on a cross-jurisdictional basis. For EU market authorities, there is therefore a greater need to piece together trade data taken from venues across multiple locations to effectively monitor and identify instances of potential market abuse and to analyse market events for regulatory purposes. In the EU, by requiring all trading venues and direct market participants to synchronise their time against UTC, a reconstruction of trades across markets and different jurisdictions has become achievable.

4 UTC was devised in 1970 by the International Telecommunication Union, a specialised agency of the United Nations, and maintained by the International Bureau of Weights and Measures (BIPM), through which member states coordinate all matters relating to measurement science and standards.

To gauge the prevalence of clock synchronisation requirements within its member jurisdictions, IOSCO undertook a brief regulator survey at the end of 2018. Out of 24 respondents, 13 member authorities of Committee 2 confirmed the establishment of a regulatory requirement for clock synchronisation that references UTC as the time source. Others reported that, even in the absence of such a requirement, some trading venues in their jurisdiction have adopted UTC as the de facto standard. Without exception, all members that reported the adoption of regulatory requirements for clock synchronisation referenced UTC as the common time source.

On 11 September 2019, IOSCO published a Consultation Report on Clock Synchronisation and encouraged the public to comment by 13 November 2019. In response to the request for comments, 5 comment letters were received and considered by IOSCO in the preparation of this Final Report. Annex A describes and addresses the comments.

4. Recommendation

Accurate and precise time stamps can help regulators reconstruct past events, which may occur on different markets or in different jurisdictions. Regulatory authorities can better use time stamps from synchronised clocks to more effectively monitor and identify instances of potential market abuse and analyse market events for regulatory purposes. Therefore, IOSCO believes that member jurisdictions would likely benefit from establishing a common expectation with respect to timestamping and clock synchronisation for the purposes of recording trade and related events.

Given the heterogeneity of the markets across member jurisdictions, each market authority is best placed to determine an acceptable level of accuracy and granularity of the timestamp in their jurisdiction. However, IOSCO recommends that member jurisdictions use UTC as the standard reference time source to the extent that they have adopted or are considering adopting requirements on clock synchronisation. IOSCO therefore proposes to amend Recommendation 7 in the 2013 Report as set out in the box below (the amendment is underlined).

In jurisdictions with clock synchronisation requirements for trading venues and their participants, setting out a reference time is important in clarifying the timestamping requirement on reportable events. IOSCO believes that this may be achieved in various ways as jurisdictions have different regulatory frameworks and approaches, and not all regulators require time stamping by registered entities and so do not necessarily require a regulatory change. For example, a self-regulatory organisation or local trade association may set this expectation or standard. As UTC may be obtained through a number of different approaches, including radio transmission, navigational satellites such as GPS, internet or other dedicated networks, the level of granularity a market authority stipulates will dictate viable approaches from a technical perspective.

RECOMMENDATION – SYNCHRONISATION OF BUSINESS CLOCKS

> Market Authorities should consider requiring Trading Venues and their participants within their jurisdiction to synchronise, consistent with industry standards, the business clocks they use to record the date and time of any reportable event. <u>Where they do so, business clocks should be synchronised to UTC.</u>

Appendix A - Feedback Statement on the Public Comments Received by the IOSCO Board on the *Consultation Report: Clock Synchronisation*

Public responses were submitted by the following organisations to IOSCO consultation entitled Consultation Report: Clock Synchronisation:

- JSE Limited
- Nasdaq Stockholm AB
- Financial Sector Conduct Authority, South Africa
- Deutsche Börse AG
- Financial Services Commission, Republic of Mauritius

The IOSCO Board is grateful for the responses and took them into consideration when preparing this final report. The rest of this section reports on the main points raised during the consultation.

Comments received

Responses to the consultation paper were supportive of IOSCO's work and were broadly in agreement with the risks identified in the report and the recommendation set out.

One respondent indicated that the recommendation should also apply to Systematic Internalisers (as defined in the European Union in MiFID II[5]) and another indicated that Trading Venues and their participants should regularly monitor the business clocks they use to ensure that the clocks remains synchronised to UTC. While IOSCO can see the merit in these suggestions, they would expand the scope and standards of the proposed recommendation and so the recommendation in the Consultation Report has not been amended. However, the use of UTC by trading venues should encourage its adoption in the wider financial system.

5 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0600&from=EN