CASE ME/6791/21

ANTICIPATED ACQUISITION BY HITACHI RAIL, LTD OF THALES SA's GROUND TRANSPORTATION SYSTEMS BUSINESS

SUBMISSION TO THE COMPETITION AND MARKETS AUTHORITY: CBTC SIGNALLING PROJECTS FOR METROS IN THE UK

23 March 2023

Voluntary Submission on CBTC Signalling Projects for Metros in the UK

Acquisition by Hitachi Rail, Ltd (Hitachi Rail) of Thales SA's (Thales) Ground Transportation Systems business (the Target) (the Proposed Transaction)

This submission contains the observations and submissions of Hitachi Rail and the Target (together, the **Parties**) regarding the supply of CBTC signalling projects for metros in the UK.[1] This submission is intended to address topics raised during the Parties' site visits on [redacted] and in the CMA's Issues Statement of 17 January 2023 (the **Issues Statement**). The evidence and explanations provided in this submission demonstrate that the Proposed Transaction will not give rise to any substantial lessening of competition (**SLC**) for the supply of CBTC signalling projects for metros in the UK.

1. OVERVIEW

1.1 Communications based train control[2] (**CBTC**) is an alternative to conventional signalling[3] for urban rail systems and is advantageous in terms of performance and maintainability where the network requirements justify the additional investment needed to upgrade to CBTC. CBTC signalling is entirely different from, and separate to, mainline signalling.

1.2 Future CBTC signalling projects in the UK will be located in London. London is a uniquely complex brownfield signalling environment. Existing suppliers have developed bespoke CBTC solutions customised to accommodate the various complexities of the London metro and the specific delivery requirements of Transport for London (**TfL**). This provides them with a considerable incumbency advantage with respect to future CBTC signalling projects in London.

1.3 The Parties are not close competitors for the supply of CBTC signalling projects for metros in London. The Target has supplied CBTC signalling to TfL for nearly three decades, and during this time, has developed a mature relationship with TfL, a deep understanding of the particularities of the London metro[4] and substantial local resources that specialise in the deployment of CBTC signalling in London. By contrast, Hitachi Rail has never won any tenders in London, has no effective references for London projects [redacted]

1.4 This submission makes clear that the Proposed Transaction will not affect competition for the supply of CBTC signalling projects for metros in the UK, let alone give rise to any SLC.

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[1] This submission contains highly sensitive and confidential information that is protected from disclosure under Part 9 of the Enterprise Act 2002.

[2] CBTC is a continuous automatic train control system utilising high resolution train location determination, independent of track circuits; continuous, high capacity, bi-directional train to wayside data communications; and train borne and wayside processors capable of implementing vital functions.

[3] Conventional signalling for urban rail consists of fixed block train detection and interlocking, with lineside signalling and/or Automatic Train Protection functionality.

[4] London metro refers to London Underground, Overground and DLR. *See* Issues Statement, ¶51.

2. <u>CBTC SIGNALLING IS NOT SUBSTITUTABLE WITH MAINLINE SIGNALLING</u>

2.1 CBTC signalling systems are fundamentally distinct from mainline signalling systems.[5] There are seven main differences.

2.2 **Commercial dynamics.** Cities are growing and becoming more densely-populated. Many city authorities are also striving to reduce car dependency, congestion and emissions. This combination places greater demands on metros to achieve more efficient and effective transportation of people within urban environments. A desire to increase the capacity of metros, while ensuring (and enhancing) passenger safety, is typically the main driver for implementing CBTC signalling systems (see paragraphs 5.2, 5.4 and 6.4b.i below). These particular commercial dynamics are less applicable to mainline signalling environments.

2.3 **Bespoke technology.** Unlike ETCS mainline signalling systems, which use standardised technology, CBTC signalling systems deploy a supplier's bespoke technology that is non-standard and does not easily interoperate with the CBTC signalling technology of another supplier. The CBTC signalling supplier also customises their solution for each customer's requirements and the specific deployment. Different suppliers therefore offer different CBTC solutions. [redacted] This means that it is difficult, if not impossible, for one CBTC signalling supplier to modify or extend the CBTC system installed by another supplier.

2.4 **Mode of operation.** Mainline signalling systems cover long distances and typically involve a heterogenous mix of large trains running at a low frequency and high speed, serving a comparatively small number of stops. Metros, on the other hand, operate at a much higher frequency (c. 30-36 trains per hour) and travel at lower speeds, typically stopping every 1.5km. Urban signalling for metros is also typically centralised and automated. Moreover, TfL specify significant non-standard functionality, [redacted] This differentiation between the requirements of mainline and urban

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5 The European Commission has recognised the distinction between mainline signalling and urban signalling. *See, e.g.*, Case COMP/M.8677 *Siemens/Alstom*, ¶614.

6 [redacted]

7 [redacted].

8 [redacted]

signalling means that suppliers offer different technical solutions depending on the application, with limited standardisation.

2.5 **Staff licensing requirements**. Network Rail and TfL projects require different training, expertise and qualifications for staff. [redacted] Employees with London Underground licenses require additional training to be able to work on Network Rail projects: some, but not all, London metro installation experience is relevant for mainline signalling environments. [redacted]

2.6 **Equipment**. Separate equipment is required for CBTC signalling and mainline signalling. This allows the two systems to coexist (primarily on a small number of lines in the greater London area). For example, Chiltern Railways trains and London Underground Metropolitan Line tubes share the same tracks and stations [redacted] Even components that deliver similar functionalities within a mainline signalling system and a CBTC signalling system (such as point machines, that move trains from one track to another) have very different specifications and operational interfaces depending on their deployment. In the specific case of point machines, mainline and CBTC signalling systems require a different number and type of engine. [redacted]

2.7 **Physical environment**. Metros mostly run underground, which increases the complexity of CBTC signalling installation and maintenance, and typically operate in a closed loop, unlike mainline signalling systems.

2.8 **Customer-type**. Generally speaking, whereas mainline signalling systems are operated by very large national or regional infrastructure managers, urban signalling systems are run by less expansive local operators.

3. BESPOKE CUSTOMISATION OF CBTC TECHNOLOGY PROVIDES AN INCUMBENCY ADVANTAGE FOR BROWNFIELD PROJECTS

3.1 Every metro network is unique in its design and operation. And every customer has their own requirements and expectations. The design of CBTC solutions must be customised, and their delivery adapted, to meet the particular specificities of a given network. In greenfield projects, the specificities have minimal impact on project delivery because the entire signalling system is being installed afresh. However, brownfield projects involve a much greater degree of customisation to account for the metro system already in operation and its deployment environment. This means that a

9 [redacted]

brownfield supplier's solution is bespoke to a particular customer's requirements and deployment environment.

3.2 Brownfield CBTC signalling projects can require suppliers to navigate interfaces with conventional signalling systems (e.g., intersections with lines that are not subject to a CBTC upgrade), requirements for mixed-mode operations,[10] and a heterogenous mix of rolling stock made by different manufacturers (some of which may not have been designed in contemplation of CBTC), all while minimising disruption to, and maintaining the safety of, existing metro services.

3.3 For these reasons, it is more difficult, unpredictable, time-consuming and expensive for non-incumbent suppliers to supply CBTC signalling in a brownfield environment. By contrast, existing suppliers have a significant incumbency advantage with respect to (i) being familiar with a metro's lines and junctions, and space and access constraints, (ii) developing a skilled workforce with a local presence, (iii) having signalling solutions already adapted to the signalling principles applied in the relevant city, and (iv) building strong relationships with the public transport authority customer.

4. LONDON IS A UNIQUELY COMPLEX BROWNFIELD ENVIRONMENT

4.1 The London metro has been operating for more than 160 years and has expanded significantly (and incrementally) during that period. The London Underground serves over a billion passengers annually on lines that operate 17 or 18 hours per day, with certain lines operating a 24-hour service on Fridays and Saturdays.

4.2 The number of lines, narrow tunnels, intricate junctions, interfaces between different lines, tunnels/platforms that are not straight and the sheer age of the system contribute to the London metro's characterisation as one of the world's most complex brownfield environments. The interplay between urban and mainline signalling on certain portions of certain lines adds a further layer of complexity.

4.3 In order to compete for a CBTC signalling project for the London metro, a supplier needs to be able to demonstrate four main capabilities.

a. **Sufficient technical capability**. Suppliers need to have a proven track record of successfully delivering comparably complex brownfield projects. Owing to the particular complexities of the London metro, in practice, suppliers need to have London references to credibly compete for TfL tenders: other global references are ineffective in actuality. The volume of people relying on the London metro's effective operation, together with the Department for Transport/TfL's need to be effective stewards of public funds and achieve value for money, contribute to TfL choosing suppliers that have demonstrable technical capabilities at the requisite level.

b. **Suitable logistical capacity.** Suppliers need to be able to deliver projects within the short periods of time (typically [redacted] hours at night) during which CBTC signalling installation can take place on London metro lines, [redacted]

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10 Mixed mode operation involves CBTC signalling-equipped and conventional signalling-equipped operating on the same track at the same time.

[redacted]

c. **Adequate local deployment and commissioning resources**. Suppliers need to have local personnel, signalling equipment and related resources (e.g., vans and training facilities) – [redacted] – in order to be able to meet TfL's demands and requirements. [redacted]

d. **Appropriately highly qualified and certified staff**. TfL requires suppliers to have appropriate qualifications and certifications for personnel working on CBTC signalling projects for metros: [redacted] Product safety assurances also require testing by licensed personnel. In addition, personnel need to have expertise in conventional signalling technology in order to effectively design and implement an upgrade to CBTC signalling [redacted]

4.4 The pre-qualification questionnaire for TfL's Deep Tube Upgrade Programme (**DTUP**) demonstrates the requirements that suppliers of brownfield CBTC signalling projects in London must meet. [redacted]

4.5 [redacted] Such challenging requirements can only be addressed by very experienced suppliers who provide mature, flexible solutions that can be tailored to the complex operational and spatial environment found in London. [redacted]

4.6 The Target's strength in CBTC signalling in London dates back to 1994 when CBTC was first introduced in the UK by the Target on the DLR.[11] [redacted] Over several decades, the Target has developed a deep understanding of the complexities of the London metro, nurtured a strong relationship with TfL, designed a highly-tailored CBTC solution for London and accumulated a portfolio of proven capabilities to manage the complex delivery demands of the London metro. [redacted]

4.7 Siemens [redacted] is the other current supplier of CBTC signalling in London.[12] [redacted] As existing providers of CBTC signalling to TfL, who, in the intervening period, have increased their number of valid references for future CBTC signalling projects in London, [redacted]

4.8 [redacted].[13] This undermines any suggestion that the Target and Hitachi Rail are close and effective competitors in the supply of CBTC signalling projects for metros in London.

5. CBTC SIGNALLING UPDATES AND ENHANCES URBAN RAIL NETWORKS

5.1. CBTC is an alternative to conventional signalling for urban rail systems and is advantageous in terms of performance and maintainability where the network requirements justify the level of additional investment needed to upgrade to CBTC. Demand to upgrade conventional signalling in urban environments to CBTC signalling is attributable to six main factors.

5.2. **Capacity**. Conventional signalling's fixed-block model significantly limits the maximum number of trains within existing infrastructure. This prevents operators from fully utilising the true capacity of their networks. CBTC signalling, by contrast, relies on moving block and continuous radio-based communication between the train and the tracks, and can accommodate many more trains safely within the existing infrastructure. This allows CBTC systems typically to facilitate up to [redacted] trains per hour compared to

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11 *See* Thales, Thales and the DLR: Celebrating 30 Years of Enabling Greater Journeys in East London (31 July 2017).

12 [redacted]

13 [redacted]

a maximum of [redacted] trains per hour for conventional signalling. Upgrades from conventional signalling to CBTC systems typically increase capacity by more than [redacted]%, without needing to build new lines and tunnels.

5.3. **Flexibility.** In CBTC signalling systems, the role of the train operator changes from driver to customer support and Degraded Mode Working System operator. The time required for training and qualifying train operators is accordingly reduced for CBTC signalling systems. In addition, CBTC technology can be implemented in a driverless configuration, which means that the number of trains in CBTC systems can be increased without needing a corresponding increase in the roster of skilled drivers.

5.4. **Safety.** CBTC's continuous Automatic Train Protection and Automatic Train Operation dramatically reduces the scope for human error. Signals are transmitted from trackside sensors and speed measurement systems directly to a train's on-board unit. By contrast, conventional signalling systems require train drivers to read wayside signals and manually control the train, especially when the system is old.

5.5. **Recovery.** CBTC systems' automatic train operation, automated controls and bi-directional operation[14] mean that it is possible to quickly recover after incidents and disruption, and to adjust timetables as necessary. By contrast, the fixed-block model of conventional signalling systems increases the propensity for reactionary delays following holdups. Opportunities to maintain services following disruption are further limited by the absence of bi-directional operation in legacy conventional signalling systems.

5.6. **Reliability**. As a newer and more automated signalling system, that requires less wayside equipment CBTC signalling systems are more reliable than older conventional signalling systems.

5.7. **Maintainability.** CBTC signalling involves fewer assets compared with conventional signalling, which reduces costs and alleviates the need for maintenance. For example, track circuits and axle counters may [redacted] As a modular, computer-based system, CBTC signalling also provides opportunities for remote diagnostics and centralised fault management. Where required, spares and replacement parts are also easier to obtain for newer CBTC than conventional signalling systems, which can sometimes be impossible to procure due to the age of the conventional signalling system.

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14 CBTC signalling systems are designed to operate effectively and efficiently in both directions. Conventional signalling systems are designed to run in one direction; their operation in the reverse direction is less efficient.

6. FUTURE CBTC OPPORTUNITIES IN THE UK ARE IN LONDON

6.1 [redacted], the Issues Statement correctly focuses on the supply of CBTC signalling to the London metro.[15] In view of the factors described in section 5 that motivate transport authorities to implement CBTC signalling, future CBTC signalling projects for metros in the UK will be in London.

6.2 Four London Underground lines remain to be upgraded to CBTC signalling. These were the subject of the cancelled DTUP.

a. [redacted]

b. [redacted]

c. [redacted]

d. [redacted]

6.3 [redacted][17]

6.4 With respect to the other metros mentioned in the Issues Statement:[18]

a. **Glasgow** will have no demand for a new system once Hitachi Rail completes the installation of its CBTC signalling system.

b. **Tyne and Wear** [redacted]

i. [redacted]

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15 Issues Statement, ¶51.

16 *See* https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/bakerloo-line-extension.

17 *See* https://crossrail2.co.uk/news/crossrail2-update-november-2020/ ("*Given TfL's current finances and the lack of a viable funding package for the scheme at the moment, we are not in a position to confirm when our work on seeking consent can restart*").

18 Issues Statement, footnote 27.

[redacted]

ii. [redacted]

7. REFERENCES OUTSIDE OF LONDON ARE NOT PERSUASIVE FOR FUTURE CBTC SIGNALLING PROJECTS IN LONDON

7.1 The Issues Statement recognises the Target as being "*by some distance the largest provider of CBTC signalling projects for TfL services*".[19] By contrast, Hitachi Rail has never won any tenders in London [redacted]. Owing to the unique complexity of the London metro, suppliers of CBTC signalling projects to TfL need London-specific references to credibly compete. Accordingly, the Target and Hitachi Rail are not close and effective competitors for CBTC signalling projects in London.

7.2 Hitachi Rail is the supplier of CBTC signalling for the Glasgow metro. However, Glasgow is not an effective reference for a CBTC signalling project in London for three main reasons.

a. **Glasgow is not a complex system.** Though it is a relatively old brownfield metro, the Glasgow subway is not nearly as complex as the London metro. It consists of a simple line (or 2 unidirectional lines) spanning 15 stations across 10.5km, with no intersections. Only 17 trains run on the Glasgow metro, which serve only 13 million passengers annually. It operates 15 hours a day, with no 24-hour service.

b. **The Glasgow tender bundled rolling stock and signalling.** The rolling stock portion represented [redacted] over the overall value and importance of the project.

c. [redacted]

7.3 Beyond the UK, TfL may accept global references for CBTC signalling projects in London. However, in practice, global references are significantly weaker than London

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19 Issues Statement, ¶52.

references due to the particular complexities of the London metro and other metros' subsequently limited practical relevance/applicability.

7.4 Certain major complex metro systems, though closer in complexity to London than other metros, remain incomparable to London.[20]

a. **New York City Subway.** Opening in 1904, the New York City Subway has a similar number of lines and annual passengers as London. [redacted]

b. **Madrid Metro**. The Madrid Metro opened in 1919. It has a similar number of lines to London (12 and 13 respectively) and stations (302 vs 272). However, the Madrid metro has significantly less footfall, with approximately 670 million (vs over a billion) passengers a year, and uses conventional signalling for [redacted] lines (and CBTC signalling for only [redacted]).

c. **Seoul Metro.** Compared to London, Seoul has a greater number of stations (768 vs 272) and lines (23 vs 13), and many interconnecting junctions. The Seoul metro system is, however, much more modern: it began service in the 1970s (vs 1860s in London), such that many more of its projects have been greenfield. Moreover, the Seoul metro is equipped mainly with conventional signalling systems.

7.5 Hitachi Rail's global CBTC references are not comparable to London in terms of size, complexity or installation constraints. With regard to the references referred to specifically in the CMA's Phase 1 Decision:[21]

a. **Copenhagen metro**. Significantly less extensive than the London metro, the Copenhagen metro has only four lines and 39 stations. Its footfall is also considerably less than London: only 50 million passengers annually. Additionally, the Copenhagen metro has involved greenfield projects only.

b. **Brussels metro**. The Brussels metro is less extensive than the London metro, and comprises only six lines and 61 stations. The Brussels metro also has longer headways of 6-10 minutes between trains.

c. **Paris Metro.** Operational since 1900, Paris has a similar number of metro stations to London (309 vs 272) and comparable ridership (over a billion annually). However, the lines in the London metro are deeply interconnected and share the same signalling infrastructure, such that any CBTC application needs to be integrated with the rest of the network. By contrast, the lines in Paris

20 [redacted]

21 CMA decision of 9 December 2022, ¶384.

are generally more disconnected, allowing the possibility of “standalone” CBTC applications from the rest of the network.[22]

d. **Thessaloniki metro**. The Thessaloniki metro consists of only two lines and 13 stations and is a greenfield project.

e. **Ho Chi Minh City metro**. Construction of the Ho Chi Minh metro remains ongoing, but the project to date comprises only one line spanning 19.7km. There are 14 stations, only three of which are underground. Ho Chi Minh City metro is a greenfield project.

f. **Taipei City metro**. The Taipei City metro comprises 6 lines and 131 stations over 131 km. Annual ridership is also considerably lower than London: around 765 million. Hitachi Rail provided the signalling system for the Circular Line, which was a greenfield project.

g. **San Francisco Bay Area Rapid Transit**. BART is not an effective reference for a London project for five main reasons.

   i. **BART is not a complex system.** BART is mainly a suburban commuter network that only has five lines, which run predominantly in parallel, with few interconnecting junctions and only 30km of underground tunnels.

   ii. **Traffic headways are far greater than the London metro** (15 minutes on weekdays) and its network topology is far simpler than the London metro. Combined with the fact that it is a relatively new metro (c. 50 years old), this makes BART much simpler and less risky from a project delivery perspective than the old, interconnected lines in London.

   iii. **BART is closed at night.** Hitachi Rail has eight hours to carry out signalling works on BART, in comparison to only four or five hours on the London metro.

   iv. **BART is not a "high capacity" metro.** On an average weekday, BART has around 134,000 passengers. By contrast, the London Underground has around 15 times the footfall, with around two million people using it per day. London therefore has a far greater number of users who would be impacted by any closures, particularly with up to 36 trains an hour running on a single line (compared to up to 24 trains on BART). This materially increases the risk profile of the London metro compared to BART.

   v. **Installation is not yet complete.** [redacted]

22 [redacted]

8. HITACHI RAIL IS NOT A CREDIBLE COMPETITOR FOR A CBTC SIGNALLING PROJECT IN LONDON

8.1 [redacted]

8.2 Regardless of any previous ambitions in this area, Hitachi Rail's experience in supplying CBTC signalling in brownfield environments in the UK has been unusually negative. [redacted]

8.3 **Hitachi Rail is not a credible competitor for brownfield CBTC projects in London.** Hitachi Rail does not have the credentials, prior experience or local resources to credibly compete for a CBTC signalling project in London. [redacted]

8.4 [redacted]

> [redacted][25]

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23 [redacted]

24 [redacted]

25 [redacted]

8.5 [redacted]

9. SIEMENS HAS CREDIBLE REFERENCES TO COMPETE FOR FUTURE CBTC SIGNALLING PROJECTS IN LONDON; ALSTOM-BOMBARDIER IS THE MOST LIKELY ADDITIONAL CHALLENGER

9.1 [redacted] Siemens supplied CBTC signalling for the Victoria line in 2012 and was awarded the CrossRail project in 2012, which it spent the last 10 years delivering in close collaboration with TfL, demonstrating the inherent difficulties in operating in the London Metro environment.

9.2 [redacted]

9.3 [redacted]

9.4 [redacted] Alstom-Bombardier since they have an ongoing, long-standing and significant relationship with TfL regarding rolling stock, and a historic relationship with TfL in signalling, including the beginnings of the original SSR project (ultimately retendered as the 4 Lines Modernisation project) [redacted]

10. CONCLUSION

10.1 Future CBTC signalling projects for metros in the UK will consist of complex brownfield projects in London: the particularities and intricacies of the London metro environment are among the most complicated globally. The Target and Hitachi Rail are not close competitors for the supply of such CBTC signalling projects for metros. Whereas the Target has a long history as an established successful supplier of CBTC signalling to TfL, [redacted], Hitachi Rail is not active in London and [redacted]

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26 [redacted]

[redacted] In any event, Hitachi Rail's references in Glasgow and the Bay Area, in addition to any others globally, do not demonstrate complex brownfield capabilities that would be persuasive to TfL.

10.2 Accordingly, the Proposed Transaction will not affect competition for the supply of CBTC signalling projects for metros in the UK and does not give rise to any SLC.