

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

BMW OF NORTH AMERICA, LLC and ROBERT BOSCH LLC,  
Petitioners,

v.

FORAS TECHNOLOGIES LTD.,  
Patent Owner

---

IPR2023-01373  
Patent No. 7,502,958

---

**DECLARATION OF NIGEL A. JONES IN SUPPORT OF PATENT  
OWNER'S RESPONSE**

## TABLE OF CONTENTS

|      |                                                                                   |   |
|------|-----------------------------------------------------------------------------------|---|
| I.   | INTRODUCTION.....                                                                 | 1 |
| II.  | BACKGROUND AND QUALIFICATIONS .....                                               | 2 |
| III. | LEGAL PRINCIPLES.....                                                             | 3 |
| A.   | Claim construction.....                                                           | 3 |
| B.   | Burden of Proof .....                                                             | 4 |
| C.   | Anticipation.....                                                                 | 4 |
| D.   | Obviousness .....                                                                 | 4 |
| IV.  | PERSON OF ORDINARY SKILL IN THE ART.....                                          | 6 |
| V.   | GROUND 1 – A POSITA WOULD NOT BE MOTIVATED TO<br>COMBINE BIGBEE WITH NGUYEN ..... | 7 |

I, Nigel A. Jones, hereby declare as follows:

**I. INTRODUCTION**

1. I am over the age of eighteen (18) years and otherwise competent to make this declaration.

2. I have been retained as an expert witness on behalf of Foras Technologies Ltd. (“Foras”) for the above-captioned *inter partes* review (“IPR”). I understand that the petition for *inter partes* review involves U.S. Patent No. 7,502,958 (“the ’958 Patent”).

3. I make this declaration based on my personal knowledge, educational background and training, consideration of the materials I discuss herein, and my expert opinions.

4. I am being compensated at a rate of \$600 per hour for my time in this matter. My compensation does not depend on the outcome of this proceeding, and I have no financial interest in its outcome.

5. In preparing this Declaration, I have reviewed and considered the ’958 Patent, the ’958 Patent’s prosecution history, the Petition, Dr. Michael C. Brogioli’s declaration, Ex. 1002, submitted in this proceeding, and each document cited in my declaration.

## **II. BACKGROUND AND QUALIFICATIONS**

6. My qualifications for forming the opinions given in this declaration are summarized here and are addressed more fully in my curriculum vitae, which is submitted as Exhibit 2008. That exhibit also includes a list of my publications and expert testimony as of the date of this declaration.

7. I am currently the President of R.M.B. Consulting Inc. in Frederick, MD, a company that advises a variety of clients on engineering and intellectual property matters, and I have been with R.M.B. Consulting since 1995.

8. I am a named inventor on multiple issued and pending patent applications in several different engineering disciplines, including telecommunications, life-support systems, and embedded systems.

9. I obtained a first-class honours degree in engineering from Brunel University, London U.K. I have forty years of experience designing complex electronic systems in a number of fields. I have extensive experience designing life support systems which are safety critical systems where errant behavior of a processor could lead to loss of life. I also have extensive experience in writing low-level, real-time firmware designed to interact with the hardware features of a microprocessor. I am a senior member of the IEEE and a member of the IEEE's Communications Society.

10. I have previously served as an engineering consultant and testifying witness on matters related to, and including telecommunication systems, cloud computing systems, and embedded computer system hardware and software. This experience is encompassed in my work as a system designer and architect, as well as my work as an engineering consultant and expert witness over the past 40 years.

11. My current curriculum vitae, provided in Exhibit 2008, contains more information on my background and experience, as well as the cases over the past decade in which I have served as an expert witness.

12. No part of my compensation is contingent upon the outcome of this litigation. I have no other interests in this litigation or with any of the parties.

### **III. LEGAL PRINCIPLES**

#### **A. Claim construction**

13. I understand that the first step in performing a validity analysis of the patent claims is to interpret the meaning and scope of the claims by construing the terms and phrases found in those claims. I understand that the appropriate construction of a claim term is its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent.

14. I understand that standard for claim construction in an *inter partes* review is the same standard as is applied in district court proceedings.

15. I understand that a determination of the meaning and scope of the claims is a matter of law. I have been informed that to determine the meaning of the claims, one should consider the intrinsic evidence, which includes the patent's claims, written description, and prosecution history.

**B. Burden of Proof**

16. I understand that in an *inter partes* review, the petitioner has the burden of proving unpatentability by a preponderance of the evidence.

**C. Anticipation**

17. I have been instructed by counsel and understand that a reference is anticipated if a single prior art reference discloses each and every claim element, either explicitly or inherently, as arranged in the same way as in the claim. I understand that where even one claim element is not disclosed in a reference, a contention of anticipation fails.

18. I further understand that when a reference fails to explicitly disclose a claim element, that reference inherently discloses that element only if the reference must *necessarily* include the undisclosed claim element.

**D. Obviousness**

19. I have been instructed by counsel and understand that a combination of prior art references may render a claim obvious if, at the time of the invention, a person of ordinary skill in the art would have selected and combined those prior-art

elements in the normal course of research and development to yield the claimed invention.

20. I understand that in an obviousness analysis, one should consider the *Graham* factors: the scope and content of the prior art; the differences between the claimed inventions and the prior art; the level of ordinary skill in the art; and certain secondary considerations, identified below. I further understand the obviousness analysis is to be performed on a claim-by-claim basis. I understand that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton.

21. I have been instructed by counsel and understand that obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. I understand obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have been ***motivated*** to combine those references in a manner that would include all limitations of the challenged claim, and, in making that combination, a person of ordinary skill in the art would have had a ***reasonable expectation of success***.

22. I also understand that an obviousness analysis must be conducted with awareness of the distortion caused by hindsight bias and with caution of arguments reliant upon *ex post* reasoning. For instance, I understand that when considering

obviousness, I should put myself in the position of a person of ordinary skill in the field at the time of the invention, rather than considering new information that is known today but was not known before the priority date of the challenged patent.

23. In particular, I understand that it is improper to use the challenged patent's disclosure or invention as a roadmap to find its prior-art components, because such an approach discounts the value of combining various existing features or principles in a new way to achieve a new result.

#### **IV. PERSON OF ORDINARY SKILL IN THE ART**

24. I understand that a person of ordinary skill in the art ("POSITA") is considered to have the normal skills and knowledge of a person in a certain technical field, as of the time of the invention at issue. I understand that factors that may be considered in determining the level of ordinary skill in the art include: (1) the education level of the inventor; (2) the types of problems encountered in the art; (3) the prior art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the education level of active workers in the field.

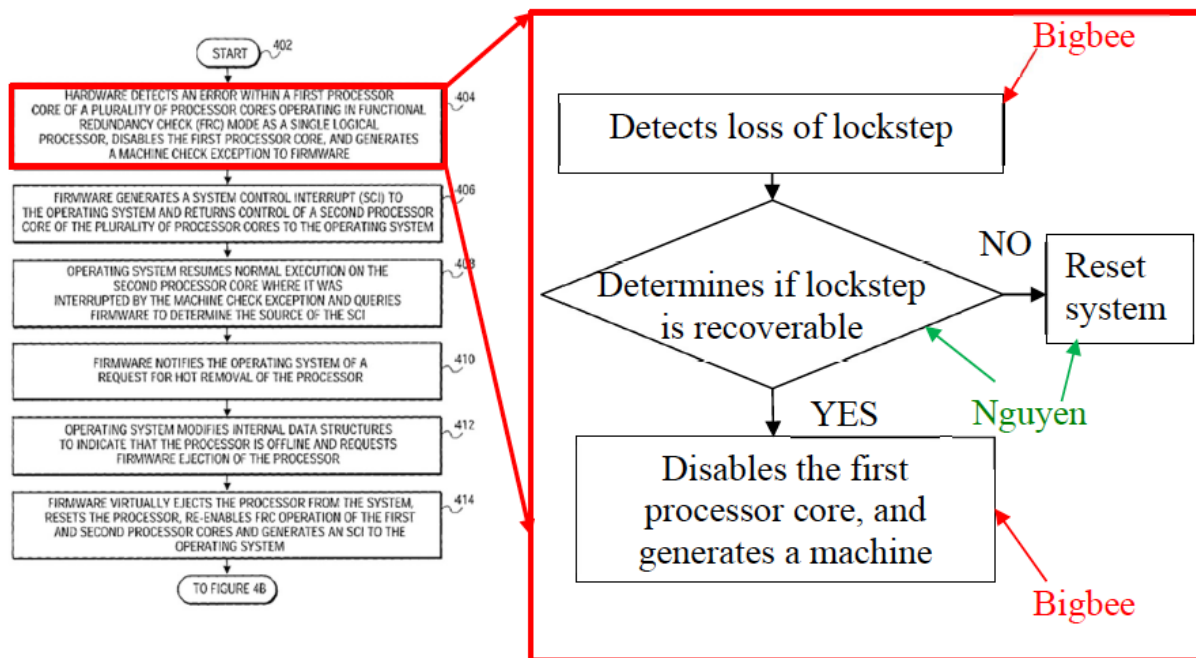
25. Dr. Brogioli states that "a person of ordinary skill in the art as related to the '958 Patent would have at least a bachelor's degree in Computer Science, Computer Engineering, or equivalent, and at least two years of prior work experience with computer architecture design, including experience relating to

fault tolerant computer architecture design, as of the earliest priority date of the '958 Patent—October 25, 2004. If a person did not have a bachelor's degree, additional relevant and practical experience with fault tolerant computer systems could provide an acceptable substitute. Likewise, further education beyond a bachelor's degree could compensate for a deficiency in practical experience.” Ex. 1002, ¶ 29. For purposes of this declaration, I adopt Dr. Brogioli's proposed level of skill in the art. Based at least on my educational and work experience, it is my opinion that I qualify as a POSITA.

**V. GROUND 1 – A POSITA WOULD NOT BE MOTIVATED TO COMBINE BIGBEE WITH NGUYEN**

26. In my opinion, a POSITA would not have been motivated to arrive at the combination of Bigbee with Nguyen that the Petition and Dr. Brogioli suggest.

27. Dr. Brogioli asserts that the “Bigbee-Nguyen system would have been capable of handling both recoverable and non-recoverable errors efficiently.” Ex. 1002, ¶ 85. In this proposed combination of Bigbee (Ex. 1005) and Nguyen (Ex. 1006), Dr. Brogioli starts by “[t]aking step 404 of Bigbee's Figure 4A [see Ex. 2009, 74:14-75:9], and adding Nguyen's step of determining whether lockstep is recoverable after Bigbee detects loss of lockstep.” Ex. 1002, ¶ 85. Dr. Brogioli then presents the following figure:



Ex. 1002, ¶ 85; *see also* ¶ 79.

28. As I explain further below, I disagree with Dr. Brogioli’s assertion that a POSITA would be motivated to combine Bigbee and Nguyen to “add[] Nguyen’s step of determining whether lockstep is recoverable after Bigbee detects loss of lockstep.” Ex. 1002, ¶ 85.

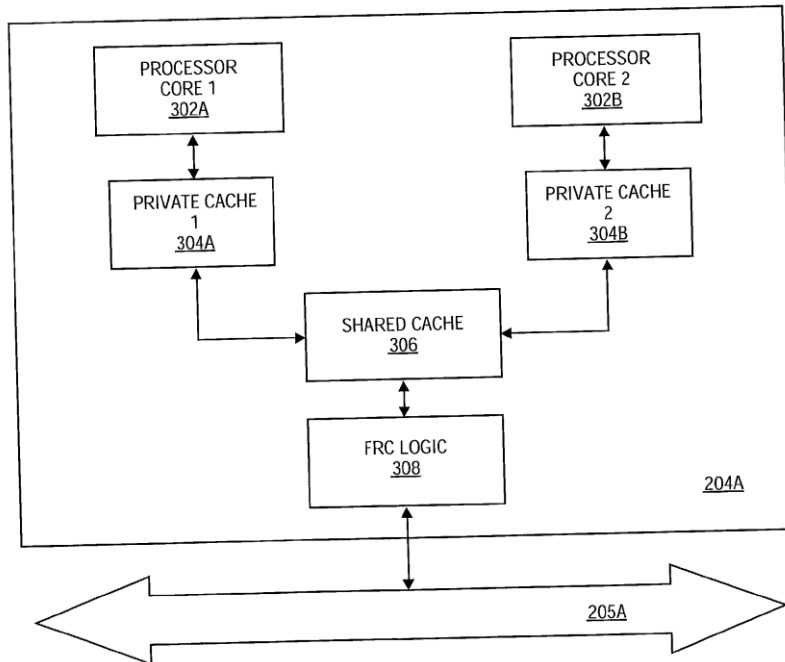
29. Dr. Brogioli’s starting point for the proposed combination is Bigbee’s detection of loss of lockstep at step 404 as shown in Fig. 4A. This step recites that “HARDWARE DETECTS AN ERROR WITHIN A FIRST PROCESSOR CORE OF A PLURALITY OF PROCESSOR CORES OPERATING IN FUNCTIONAL REDUNDANCY CHECK (FRC) MODE AS A SINGLE LOGICAL PROCESSOR...” Ex. 1005, Fig. 4A, Step 404; *see also* [0035] (“hardware (e.g.

FRC logic) detects an error within a first processor core of a plurality of processor cores operating in an FRC mode as a single logical processor”), [0019] (“FRC logic detects errors within individual processor cores of the described embodiment which causes hardware 102 to break lock step between at least two processor cores within a processor package, disabling FRC mode operation.”); *see also* Ex. 2009, 14:18-15:10, 75:16-77:11. As Dr. Brogioli correctly notes, Bigbee’s determination of loss of lockstep at step 404 in Fig. 4A is a determination of loss of lockstep from a recoverable error. Ex. 1002, ¶ 81 (citing Ex. 1005, [0019], [0035], [0037], “error recovery routine re-enables FRC operation of the processor cores”).

30. After this determination of loss of lock step from a recoverable error, Dr. Brogioli suggests that the next step to be taken (“Determines if lockstep is recoverable”) would be provided by Nguyen. This step, however, is completely unnecessary because Bigbee has already “determine[d] if lockstep is recoverable.” A POSITA would not be motivated to make this combination. Not only would a POSITA find the inclusion of Nguyen’s step of “determin[ing] if lockstep is recoverable” to be duplicative and unnecessary, but would also find that the inclusion would come with increased cost.

31. In Fig. 3, Bigbee describes that the FRC logic (which Bigbee describes as “detect[ing] errors within individual processor cores,” Ex. 1005, [0019], [0035], and “detect[ing] inconsistencies in the generated results which

indicate an FRC mismatch error,” Ex. 1005, [0033]) operates on the data written to the shared cache 306:



Ex. 1005, Fig. 3; see also [0033] (“FRC logic 308 monitors processor core store operations or ‘writes’ to shared cache 306”).

32. Dr. Brogioli contends that it would have been obvious to “modify Bigbee’s firmware FRC logic to perform Nguyen’s disclosed determination of whether lockstep is recoverable.” EX1002, ¶86. He also asserts that a person of skill in the art would have been motivated to incorporate Nguyen’s determination of whether lockstep is recoverable in Bigbee’s firmware FRC logic to reduce impact of errors and increase system fault tolerance and availability. I disagree. A person of skill in the art would recognize that implementing Nguyen’s “FRC

checker's compare unit" in firmware code would be impractical for several reasons. First, detecting errors by comparing data from both cores using firmware would require a separate processor running approximately twenty times faster than the processor cores being monitored. This adds complexity and expense. Second, proving by formal methods that firmware configured to perform bit-by-bit error checking is operating correctly is much more difficult than proving the same for a hardware implementation. This means that it is more difficult to assure reliable performance in a firmware implementation compared to a hardware implementation. Third, firmware is more vulnerable than hardware to malicious attacks, which a person of skill in the art would consider as highly relevant in a system designed for reliability.

33. Dr. Brogioli also contends that a firmware implementation of Nguyen would be desirable because "firmware is flexible" and it "can be modified after production, updated, and supported relatively quickly and inexpensively." I agree with Dr. Brogioli that firmware is more flexible and more easily modified, but I do not agree that those qualities would be viewed by a person of skill in the art as desirable in the context of Nguyen's error detection hardware. To the contrary, a person of skill in the art would recognize that when reliability, speed, stability, and accuracy are import—which they would be in this context—the flexibility and ease of modification of firmware serve to introduce more opportunities for error, which

is undesirable. A person of skill in the art would recognize that in a system designed to provide “high levels of reliability and availability,” (Ex. 1006 at [0004]) an implementation that can be easily modified is undesirable because it introduces more opportunities for intentional or unintentional errors. For the same reasons, I also disagree that a firmware implementation of Nguyen would have been obvious to try. Ex. 1002 at ¶ 97. A person of skill in the art would have instead understood the disadvantages of firmware in this context and would have been affirmatively dissuaded from using it. I therefore disagree that a POSITA would have been motivated to combine Nguyen with Bigbee as Dr. Brogioli suggests.

\*\*\*

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true.



July 12, 2024

---

Nigel A. Jones