UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MICROSOFT CORPORATION,

Petitioner,

v.

DIRECTSTREAM, LLC,
Patent Owner.

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IPR2018-01594 (Patent 6,434,687 B1)
IPR2018-01599 (Patent 6,076,152)
IPR2018-01600 (Patent 6,247,110 B1)
IPR2018-01601 (Patent 7,225,324 B2)
IPR2018-01602 (Patent 7,225,324 B2)
IPR2018-01603 (Patent 7,225,324 B2)
IPR2018-01604 (Patent 7,421,524 B2)
IPR2018-01605 (Patent 7,620,800 B2)
IPR2018-01606 (Patent 7,620,800 B2)
IPR2018-01607 (Patent 7,620,800 B2)

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DECLARATION OF DR. TAREK EL-GHAZAWI

I. ENGAGEMENT

1. I have been retained by counsel for Patent Owner as an expert witness in the above-captioned proceedings.

2. It is my understanding that Microsoft has filed and the Board has instituted 10 IPR Petitions (IPR2018-01594, -1599, -1600, -1601, -1602, -1603, -1604, -1605, -1606, -1607) (I understand that the -1601, -1602, and -1603 have been consolidated into one IPR and that the -1605, -1606, and -1607 have been consolidated into one IPR).

3. It is my understanding that the various mentioned IPRs cover U.S. Patent Nos.: 6,434,687 ("'687"); 6,076,152 ("'152"); 6,247,110 ("'110") 7,225,324 ("'324"); 7,421,524 ("'524"); and 7,620,800 ("'800") (collectively, "the Patents-in-Suit").

4. All of the opinions stated in this report are based on my personal knowledge and/or professional judgment. If called as a witness during the trial in this matter, I am prepared to testify competently about them. I am over the age of eighteen.

II. QUALIFICATIONS

5. My *curriculum vitae* is attached as Exhibit A. A summary of my qualifications relevant to this case is provided below.

6. I am a Professor of Electrical and Computer Engineering at The George Washington University (GWU), where I lead the university-wide Strategic Academic Program in High-Performance Computing. My research interests include, among other

areas, high-performance computing, computing architectures, and reconfigurable and embedded computing.

7. I was the founding director of the GW Institute for Massively Parallel Applications and Computing Technologies (IMPACT) and was a founding Co-Director of the NSF Industry/University Center for High-Performance Reconfigurable Computing at GWU and directed it for about ten years. I have led many industry and federally funded research projects in reconfigurable computing and published close to three hundred research publications. I received many honors in my field, a few examples follow. I was elected an IEEE Fellow for my contributions to reconfigurable computing and parallel programming (only one in a thousand members get that honor). Professor El-Ghazawi is a Fellow of the IEEE and was selected as a Research Faculty Fellow of the IBM Center for Advanced Studies, Toronto. I was also awarded the Alexander von Humboldt Research Award, from the Humboldt Foundation in Germany (given yearly to 100 scientists across all areas from around the world), and the GW SEAS Distinguished Researcher Award. El-Ghazawi has served as a senior U.S. Fulbright Scholar. I was selected an IEEE Computer Society Distinguished Visitors Program Speaker and a Distinguished Visiting Fellow by the U.K. Royal Academy of Engineering.

8. As an expert in the High-Performance Computing Domain, I have been interviewed by major public and technical media when important relevant events occur, including IEEE Spectrum and the Washington Post. Further, I participated in more than

one task force trying to define future research directions in High-Performance Computing and Reconfigurable Computing.

9. My research was funded extensively by such government organizations like NSA, DARPA, NSF, AFOSR, NASA, ONR, and industrial organizations such as Intel, AMD, HP, SGI.

10. I have served in many editorial roles including an Associate Editor for the IEEE Transactions Parallel and Distributed Computing and the IEEE Transaction on Computers. I also chaired and co-chaired many IEEEE international conferences and symposia including IEEE PGAS 2015, IEEE/ACM CCGrid2018, IEEE HPCC/SmartCity/DSS 2017 to name a few.

III. COMPENSATION AND PRIOR TESTIMONY

11. I am being compensated $495 per hour for my work in this matter but my compensation does not depend on the opinions I render or the outcome of these proceedings. I do not have a personal interest in the outcome of this proceeding.

12. I have only previously testified in the co-pending district cases against Microsoft and Amazon and that was by deposition and declaration. Those cases are listed below:

(a) *SRC Labs, LLC et al v. Microsoft Corporation*, No. 2:18-cv-00321-JLR (W.D. Wash.).

(b) *SRC Labs, LLC et al v. Amazon Web Services, Inc et al*, No. 2:18-cv-00317-JLR (W.D. Wash.).

13. The opinions expressed in this declaration are not exhaustive of my opinions on the patentability of any of the claims in the Patents-in-Suit. Therefore, the fact that I do not address a particular point should not be understood to indicate any agreement on my part that any claim otherwise complies with any patentability requirements.

14. I am not an employee of the Patent Owner or any affiliate or subsidiary thereof or any prior owner of the Patents-in-Suit. I also have no direct or indirect financial or other interest of any kind in the underlying litigation, dispute, or outcome thereof, between the Patent Owner and Microsoft, including, without limitation, no financial interest in any of the Patent Owner's patents.

IV. INFORMATION CONSIDERED

15. My opinions are based on my years of education, research, prior publications, and experience, as well as my review of several prior art references I was asked to review as described in greater detail below.

16. Any material I independently searched for and found and/or reviewed and used to support my opinions will be specifically mentioned in my opinions below and a copy attached to this declaration as Exhibit B, if possible.

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