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DECLARATION OF GERARD P. GRENIER

I, Gerard P. Grenier, am over twenty-one (21) years of age. I have never been convicted of a felony, and I am fully competent to make this declaration. I declare the following to be true to the best of my knowledge, information and belief:

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8. The article below has been attached as Exhibit A to this declaration:

A.	G. Bark, "Power control and active channel selection in an LPI FH system for HF communications", Proceedings of MILCOM 97, November 3-5, 1997.

9. I obtained a copy of Exhibit A through IEEE Xplore, where it is maintained in the ordinary course of IEEE's business. Exhibit A is a true and correct copy of the Exhibit, as it existed on or about June 24, 2019.

10. The article and abstract from IEEE Xplore shows the date of publication. IEEE Xplore populates this information using the metadata associated with the publication.

11. G. Bark, "Power control and active channel selection in an LPI FH system for HF communications" was published in the Proceedings of MILCOM 97. MILCOM 97 was held from November 3-5, 1997. Copies of the conference proceedings were made available no later than the last day of the conference. The article is currently available for public download from the IEEE digital library, IEEE Xplore.

12. I hereby 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, and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

I declare under penalty of perjury that the foregoing statements are true and correct.

Executed on: 25 June 2019

EXHIBIT A

Power control and active channel selection in an LPI FH system for HF communications

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Abstract:
To improve the performance of frequency-hopping systems on interference-limited HF channels, so-called adaptive frequency-hopping (AFH), which uses an adaptively selected pool of the "best" hopping-frequencies for communication, has been proposed. We extend the adaptivity of the AFH scheme by adjusting the transmitted power on each channel individually and by adaptively changing the number N/sub a/ of active channels that are selected to the pool. Fewer active channels (up to a certain point) give improved communication performance since the used channels, on the average, are less interfered. However, by decreasing N/sub a/, the protection against hostile detection is decreased. This trade-off between communication and LPI (low probability of intercept) performance with respect to N/sub a/ is shown. Our analysis shows that the codeword error rate is minimized when about 20% of the channels are selected to the active pool, and that the LPI protection against the two tested hostile detectors, as expected, improves for larger N/sub a/. Generally, the hostile detectors require less received signal-to-interference ratio than the legal AFH receiver to obtain acceptable performance. For the parameters we have chosen in our duel simulation, the results indicate that the LPI performance seems to be more sensitive to the choice of active channel pool size than the communication performance.

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