

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TEXARKANA DIVISION**

**PANTECH CORPORATION AND
PANTECH WIRELESS, LLC,**
Plaintiffs,

v.

**LG ELECTRONICS, INC., AND LG
ELECTRONICS U.S.A., INC.,**
Defendants.

CIVIL ACTION 5:25-cv-00113-RWS

EXPERT REPORT OF TODOR COOKLEV, PH.D.

I. INTRODUCTION

1. My name is Todor Cooklev and I have been retained by Plaintiffs in this lawsuit, Pantech Corporation and Pantech Wireless, LLC (collectively, “Pantech” or “Plaintiffs”).

2. I understand that Plaintiffs have filed patent infringement suits against Defendants in this lawsuit, LG Electronics Inc. and LG Electronics U.S.A., Inc. (collectively, “LGE”) asserting certain claims of U.S. Patent Nos. 9,136,924 (“the ’924 Patent”). I will refer to the Plaintiffs and Defendants together as “the Parties”.

II. SCOPE OF WORK

1. I have been asked to submit this report on behalf of Pantech, to provide my opinion regarding certain terms of the ’924 Patent. I have been asked to explain what a person of ordinary skill in the art would have understood certain terms to mean as of the earliest effective filing date of the ’924 Patent in and around July 5, 2010, as well as to explain the relevant technical background related to this patent. An explanation of my opinions is set forth below.

2. Although I am being compensated for my work in this case at my standard hourly rate for consulting services of \$700 per hour for my time reviewing materials and preparing this report, my opinions expressed here are my own. My compensation is in no way dependent on the outcome of this case or upon the Court accepting my opinions, and I have no other financial interest in this matter or the parties thereto.

3. This Report is based on information currently available to me. I understand that further expert discovery will occur at a later stage in this case, including the submission of expert reports on the construction, infringement, and/or validity of the ’924 Patent claims. I reserve the right to continue my investigation. I further reserve the right to expand, modify, update, and/or supplement my opinions in this Report through any further expert reports and/or testimony that I

may provide in this case. I further reserve the right to expand, modify, update, and/or supplement my opinions as additional information becomes available to me, including in response to matters raised by the Defendants and/or Defendants' expert(s), or in view of relevant orders and findings by the Court.

4. If called upon to do so, I am prepared to testify before the Court regarding my opinions expressed here. In such a situation, I may rely on live demonstrations, demonstratives, exhibits, or other visual aids to assist in presenting my testimony.

III. QUALIFICATIONS

5. I am currently a professor of electrical and computer engineering at Purdue University in Fort Wayne, Indiana, where I have had several administrative and faculty appointments.

6. I received a Doctor of Philosophy (Ph.D.) degree in Electrical Engineering from Tokyo Institute of Technology in Tokyo, Japan in 1995.

7. I teach several courses related to the hardware and software architectures of wireless systems and wireless devices. My research interests include most aspects of modern wireless systems, including hardware/software architectures. I have given and continue to give seminars, tutorials, and presentations worldwide.

8. I have received research funding from the National Science Foundation (NSF), the Defense Advanced Research Projects Agency (DARPA), the U.S. Air Force Research Laboratory, the Office of Naval Research, and a number of private companies, including major technology companies.

9. I have authored and co-authored more than 100 peer-reviewed articles. I am also a named inventor on 32 U.S. patents, most of which relate to the hardware or software aspects of

communication systems. For part of this work in 2019, I was inducted into the Purdue Inventors Hall of Fame. A list of my publications and patents appears in my *curriculum vitae* attached as Appendix 1.

10. In addition to my academic experience, I have experience in technology and product development in the computer networking and data communications industry. My work has been in the areas of communication protocols, software, digital signal processing, and integrated circuit design for communication systems.

11. I have contributed to the development of several major standards for communication systems and numerous amendments. I have participated in many meetings of standards committees. I have prepared, submitted, and presented documents relating to technical matters considered by these committees.

12. Between 2000-2002 and 2005-2008 I was a Voting Member of the IEEE 802.11 Working Group. Around 2005-2007 I was Chair or a Study Group within IEEE 802.11. For part of my work I received an award from IEEE Standards Association in 2012.

13. I have reviewed and voted on most IEEE 802.11 standards and amendments published since 2000. During this time period I have also reviewed and voted on other standards. Around 2007-2011 I participated in the Software-Defined Radio Forum (later the Wireless Innovation Forum). Around 2011-2012 I participated in the work of the 3GPP.

14. In 2020, I was elected to serve on the Board of Governors of the IEEE Standards Association for one term beginning January 2021. The Board of Governors provides overall leadership of the IEEE Standards Association.

15. Currently, I am a Series Editor for Wireless and Radio Communications of the IEEE Communications Standards Magazine (which is the premier journal in the field of

communication standards) and have held that position since 2017. As a member of the Editorial Board I coordinate the review of scholarly manuscripts submitted to the wireless and radio communications series.

16. I am qualified by education and experience to testify as an expert with respect to subject matter in the fields of wireless communications, wireless communications protocols, wireless data transmission, wireless device hardware, data and signal processing hardware and software, and wireless device interoperability.

17. I have attached a current copy of my curriculum *vitae* as Appendix 1, which includes a list of my publications. My CV also includes a list of cases during at least the last five years in which I have testified as an expert either at a trial or deposition.

IV. MATERIALS CONSIDERED

18. I have considered the following materials in preparing the opinions set forth in this Report:

- the '924 Patent, including the abstract, specification, claims, and figures;
- relevant portions of the patent prosecution history of the '924 Patent in the United States Patent & Trademark Office (“the USPTO” or “PTO”);
- Defendants’ Preliminary Constructions And Extrinsic Evidence (and exhibits therein).

19. I have also relied on my knowledge, education, and professional expertise of over 25 years in the area of wireless communications, protocols, and wireless device hardware and software architecture.

V. APPLICABLE LEGAL STANDARDS

20. I am not a lawyer and am not offering any opinions regarding legal matters. However, the legal principles relevant to my opinion herein have been explained to me by Pantech's counsel. In this section, I summarize these legal principles as they have been explained to me.

21. I reserve the right to change or formulate new opinions in the event there is a change in the law concerning my opinions provided in this report.

22. I understand that the claim construction exercise begins with the language of the claims themselves, and that the general rule is that claim terms are given their plain and ordinary meaning to a person of ordinary skill in the art, in view of the specification of the patent, at the time of the invention. I also understand that the intrinsic evidence (i.e., the claims, the written description including the figures, and prosecution history) are the primary sources used in interpreting claim language.

23. I understand that if disputed claim language is clear on its face, the intrinsic evidence should be consulted to determine whether some deviation from the ordinary meaning of the claim language is warranted.

24. When the disputed claim language is not clear on its face, I understand that the intrinsic evidence should be used to resolve, if possible, any lack of clarity. I also understand that the specification is the best evidence of what the patentee intended the term to mean when there is no clear meaning of a claim term, and that the prosecution history may also shed light on the meaning of ambiguous terms. However, I understand that it is improper to import limitations from the specification into a patent claim through claim construction.

25. I have been informed that sometimes the ordinary meaning of claim language as understood by a person of ordinary skill in the art may be readily apparent even to lay persons. I

understand that claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.

VI. PERSON OF ORDINARY SKILL IN THE ART

26. A POSITA in the field of the '924 Patent would have had a bachelor's degree in electrical engineering, or equivalent training, and approximately two years of experience working in the field of networking and wireless devices. Lack of work experience can be remedied by additional education, and vice versa.

VII. BACKGROUND OF THE TECHNOLOGY

27. The '924 Patent is entitled "[t]ransmitting device and a method of communicating therewith, and receiving device and a method of communicating therewith." *See* '924 Patent. The '924 Patent relates to the field of wireless communications that use multiple input multiple output (MIMO), including communication systems like 3GPP, LTE 3GPP, LTE (Long Term Evolution), LTE-A (LTE Advanced), and the like. *Id.* at 1:18-22, 1:27-32. As the '924 Patent explains, in these high capacity communication systems, there is a need to transmit "high capacity data, which is comparable with a wired communication network," but also "minimize loss of information and increase transmission efficiency of the system as to enhance performance of the system." *Id.*, 1:27-37.

28. The '924 Patent addresses this need by disclosing systems and methods for communications that performs precoding using a codebook restriction scheme, and that including precoding matrixes, codebook restricting information, and precoders, such that it includes information to restrict precoding matrix from being used as a precoding matrix of the precoders, in a corresponding codebook with respect to each layer. *Id.*, 1:41-49.

VIII. THE DISPUTED TERMS

A. (Claims 17, 23) “period of transmitting the information relating to the precoding matrix . . .”

29. I understand that the parties’ contentions regarding the term “period of transmitting the information relating to the precoding matrix” as used by the ’924 Patent are set forth below:

Claim Term	Pantech’s Proposed Construction	LGE’s Proposed Construction
“period of transmitting the information relating to the precoding matrix ...”	Plain and ordinary meaning	“time interval between periodically transmitting the information relating to the precoding matrix . . .”

30. I have reviewed each of the proposed constructions and considered them in view of the claims, specification (including the figures), and prosecution history of the ’924 patent, as well as extrinsic evidence.

31. I agree with Pantech’s proposed definition. It is my opinion that a person of ordinary skill in the art will understand the plain and ordinary meaning of this term and that no construction is necessary. As such, I see no reason to depart from the plain and ordinary meaning of the term.

32. Each of the words in this claim term, either individually or in combination, has a plain meaning. There is neither lexicography or disclaimer to the contrary. LGE’s injection of “periodically” into its definition of “period” as “time interval between . . . transmitting” is unsupported.

33. For example, the specification of the ’924 Patent explains that “[a] feedback period **or interval** of the 1st channel status information and the 2nd channel status information may be different from each other.” ’924 Patent, 14:62-64 (emphasis added). This period or interval may be, “[f]or example . . . based on a short term . . . [or] based on a long term.” *Id.*, 14:64-67. But

these are, as stated, examples of a “period or interval” where one is a shorter term than the longer term. *Id.*, 14:64-15:3. As made clear by the specification, these are provided only as examples.

34. As such, a person of ordinary skill in the art will understand the plain and ordinary meaning of the term “period” as used in “period of transmitting the information relating to the precoding matrix . . .” and a term that requires no construction because it is being used with its well-known meaning.

35. Although the intrinsic evidence fully supports Pantech’s construction, there is supportive extrinsic evidence as well. For example, a definition consistent with the understanding of a person of ordinary skill that provided by the New Oxford American Dictionary, 3rd Ed. (2010), at 1303 (“**pe-ri-od** [1] a length or portion of time; [3] the interval of time between successive occurrences of the same state . . .”).

36. The 3GPP standards use the term “period” in a broad sense, including a “time interval”. For example, 3GPP TS 136.213 refers to 36.133, which contains various references to “period” including “During the period from time point A to time point F ...” See 3GPP TS 36.133 V8.23.0 at p. 244.

37. Based on the foregoing, neither the intrinsic evidence, nor the extrinsic evidence, nor the 3GPP documents require “period” to be associated with strictly periodic events. This fact belies LGE’s apparent attempt to limit the definition of this term to a “time interval between periodically transmitting the information relating to the precoding matrix.” Simply put, this proposed definition would exclude aspects of the plain and ordinary meaning as I have explained above, namely that a “period of transmission” does not necessarily need to be associated with any specific periodic transmission, which would have a different meaning to a person of ordinary skill in the art.

38. Finally, the term “periodically” that LGE seeks to inject into its own definition of “period” appears nowhere in the specification or any intrinsic evidence, and thus there is no evidence that I have reviewed of either lexicography or disclaimer by the patentee adopting LGE’s proposed construction.

IX. SUPPLEMENTATION

39. I understand that after I submit my Report, Defendants will submit their reply claim construction brief further explaining their positions on the meaning of the disputed terms. I also understand that at the same time as I submit my Report, Defendants may submit Reports of their own expert concerning the meaning of the disputed claim terms. I therefore reserve my right to consider and address the Defendants positions at that time, and supplement my opinions accordingly.

40. I reserve the right to supplement or amend my opinions in response to opinions expressed or positions taken by LGE’s experts, or in light of any additional evidence, testimony, discovery, or other information that may be provided to me after the date of this Report. In addition, I reserve the right to consider and testify about issues that may be raised by LGE’s fact witnesses and experts at any hearing or in any expert reports. I also reserve the right to modify or to supplement my opinions as a result of ongoing fact and expert discovery or testimony at trial.

41. I further reserve the right to present any tutorials regarding the background technology and terminology in connection with the opinions in this Report, any supplemental Reports, and/or expert reports that I may prepare in this case. I reserve the right to use demonstrative exhibits and/or refer to publicly available information, including any technical publications, such as books and articles, to aid my testimony, and accordingly reserve the right to

prepare exhibits and demonstrative evidence for any hearing pursuant to the schedule set by the Court.

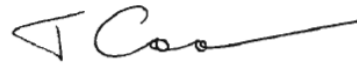
42. I expressly reserve the right to amend or supplement my opinions in this case when additional information is made available to me.

43. This Report is based on my personal knowledge. I am over eighteen years of age, and if called as a witness, I would and could competently testify as to the matters set forth herein.

* * *

I declare under the penalty of perjury of the laws of the United States that the foregoing statements made in this Report are based on my own knowledge and that all opinions given are my own.

Dated: June 23, 2022

A handwritten signature in black ink, appearing to read 'T Cooklev', written over a horizontal line.

Todor Cooklev, Ph.D.