

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.,
Petitioner,

v.

WILUS INSTITUTE OF STANDARDS AND TECHNOLOGY INC.,
Patent Owner.

Case IPR2025-01111
Patent 10,911,186

**DECLARATION OF ERIK DE LA IGLESIA IN SUPPORT OF PATENT
OWNER'S RESPONSE TO THE PETITION**

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.

Executed on April 3, 2026, at Mountain View, CA.



Erik de la Iglesia

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I, Erik de la Iglesia, 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 Patent Owner for the above-captioned *inter partes* review (“IPR”). I understand that the petition for *inter partes* review involves U.S. Patent No. 10,911,186 (“the ’186 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. My work on this matter is being billed at my normal hourly consulting rate of \$750, with reimbursement for actual expenses. My compensation is not related to the outcome of any proceeding involving the ’186 patent. I have no personal interest in the outcome of the case.

5. In preparing this Declaration, I have reviewed and considered the ’186 patent, the ’186 patent’s prosecution history, the Petition and prior art references submitted with the Petition, the declaration submitted by Dr. Ding in this proceeding and its citations and exhibits, the deposition transcript of Dr. Ding 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 2015.

7. I hold a Bachelor of Science degree in Electrical Engineering from the University of Florida, and a Master of Science degree in Electrical Engineering from Stanford University. While at Stanford, I was an NSF Graduate Research Fellow. My graduate focus included VLSI CMOS architecture, high-speed circuit design, computer networks and protocols, and artificial intelligence. I have worked in several computer and electrical engineering related fields for over 25 years resulting in 68 issued U.S. patents that have been cited over 2850 times in USPTO patent applications. Since 2003, I have served in a number of chief architect and founder roles of companies that have been acquired or gone public. My experiences include the design or implementation of networks and network-based computation and protocol systems similar to the technology of the '186 patent.

8. Between December 1997 and November 1999, I was a circuit design engineer at Intel Corporation within the Mobile and Handheld Products Group. My responsibilities included working on several aspects of mobile processors and chipsets including clock and power distribution, dynamic clock frequency selection, and the circuit design, device simulation, and validation of such features.

Until March of 2000, I worked on similar functionality within the Microprocessor Products Group for the Itanium 3 and 4 products.

9. My work in power distribution included thermal modeling and predictive control of silicon devices and their packaging such as multi-tiered cooling systems for embedded, mobile, and desktop environments. Such systems included multiple tiers of thermal sensors, active and passive thermal control systems, and the feedback and analytic firmware and software control. My models were part of the development of the Thermal Design Power (TDP) metrics used by OEM and system designers to plan thermal control solutions for consumer and industrial products.

10. Between March 2000 and September 2003, I worked as a logic designer and architect for WebStacks and, through acquisition, Extreme Networks. WebStacks built a fully hardware-based TCP and HTTP processing stack for network processing functions including load balancing, proxy processing, and content rewriting. I was responsible for the architecture and design of the HTTP processing engine including header extraction and processing.

11. Between August 2003 and August 2007, I worked as Founder, Chief Architect and Director of Engineering for Reconnex, later acquired by McAfee. Reconnex built a gigabit line-rate network security analyzer capable of classification, heuristic analysis, and policy enforcement on arbitrary protocols and

content types. The Reconnex product captured and analyzed content transmitted over the internet using HTTP and other protocols, including storage protocols. Design of the Reconnex system was based on a modified and customized version of the Linux kernel which included specifically designed driver source code and interfacing between the application and kernel domains. Reconnex technology was employed in the audit and compliance verticals based on its ability to quickly analyze and classify the content of transmissions and interact with protocols and communications crossing corporate and departmental boundaries.

12. My work at Reconnex included architecting and deploying software to analyze and classify relationships within HTTP transmissions and sessions including cookie tracking, temporal analysis, user identification and attribution and other identity-based analyses.

13. Between August 2007 and September 2008, I founded Strangways, a company focused on addressing messaging security for webmail and internet messaging protocols. Products and technology developed by Strangways were sold to SendMail Inc., Iron Port (Cisco), and other companies. The Strangways product utilized a Squid caching server and ICAP content rewrite server to translate HTTP to SMTP.

14. Between September 2008 and April 2014, I worked as Chief Architect for Gridiron Systems and, through acquisition, Senior Director of Technology for

Violin Memory. I held the Senior Director position with Violin Memory both before and after the company's IPO. My responsibilities included architecture and design of flash media controllers, adaptive caching design, and machine learning for application storage behavior analytics.

15. The Gridiron product was a storage accelerator used in many analytic environments such as big data architectures with constant ingest and processing of financial, consumer and IoT data. In my role as Chief Architect, I often worked with customers to implement and accelerate their analytics environments and spoke on related topics at trade shows and industry user groups. During product development and later commercial deployment, I worked with teams at Shopzilla to improve database and storage performance for real-time shopping recommendation and user tracking for online advertising.

16. Additional information regarding my employment history and prior expert testimony is included in Exhibit 2002. As reflected in Exhibit 2002, I have consulted on several matters involving intellectual property disputes including instances of alleged patent infringement requiring analysis of source code, reviewing and analyzing patents, writing expert reports, and testifying in court. This has included cases involving WiFi and Cellular technologies including frame and header field processing.

III. Legal Principles

A. Claim Construction

17. 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 and the prosecution history.

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

19. 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. I am further informed that, other than in cases of "lexicography" (where a patentee provides a definition for a term) or "disclaimer" (where a patentee makes clear, such as explicitly states, that a term excludes a certain scope), a claim term is to be given its plain and ordinary meaning to a POSITA at the time of the invention in view of the intrinsic evidence.

B. Burden of Proof

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

C. Anticipation

21. 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.

22. 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

23. 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.

24. I understand that in an obviousness analysis, one should consider the *Graham* factors, including: the scope and content of the prior art; the differences

between the claimed inventions and the prior art; and the level of ordinary skill in the art. 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.

25. 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.

26. 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.

E. Written description

27. I understand the test for the sufficiency of a written description disclosure (e.g., in a specification or priority application) is whether the disclosure relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date. Whether a given disclosure satisfies the written description requirement requires assessment of several factors, including (1) the existing knowledge in the field of art, (2) the extent and content of the prior art, (3) the maturity of the science or technology, and (4) the predictability of the aspect at issue.

IV. Person of Ordinary Skill in the Art

28. Dr. Ding proposes that a POSITA “would have had a Bachelor’s degree in electrical engineering, computer engineering, computer engineering, or a related field, and at least 3 years of experience in the research, design or development of wireless communication devices, systems, and/or networks, or equivalent. Increased educational experience can make up for less work experience and vice versa.” Ex. 1003, ¶26.

29. For purposes of this declaration, I adopt Dr. Ding’s proposed level of skill in the art, and I am a person of at least ordinary skill in the art.

V. Overview of the '186 Patent

30. The '186 patent was filed on April 8, 2019, and issued on February 2, 2021. It is a continuation of U.S. Patent No. 10,305,638, the national stage of PCT Application No. PCT/KR2016/02199 (the "PCT Application"), filed on March 4, 2016. Ex. 1001 ('186 patent) at pgs. 1-2. The '186 patent further claims priority to (and incorporates by reference) multiple Korean applications filed in 2015, including Korean Application 10-2015-0036754 ("KR '754"). *See* Ex. 1001, 1:9-17.

31. The '186 patent describes that there is a continued need "for providing a high-efficiency and high-performance wireless LAN communication technology in a high-density environment" and recognizes that "in a next-generation wireless LAN environment, communication having high frequency efficiency needs to be provided indoors/outdoors under the presence of high-density stations and access points (APs)." Ex. 1001 at 2:37-46. The techniques provided in the '186 patent can improve the efficiency and reliability of the wireless LAN system while reducing unnecessary channel occupancy and increasing spectral efficiency, by using a frame structure consistent with in-development 802.11 standards development which "prevent[s] malfunction of the wireless LAN network by aligning length" of frames, including trigger frames for uplink transmission. '186 patent, 3:61-4:11, 3:1-23.

32. Independent claim 1 of the '186 patent recites the following:

[1Pre] A wireless communication terminal, the terminal comprising:

[1.1] a transceiver; and

[1.2] a processor, wherein the processor is configured to:

[1.3] receive, through the transceiver, a trigger frame indicating uplink transmission of one or more terminals,

[1.4] wherein the trigger frame includes an association identifier (AID) field, and

[1.5] perform, through the transceiver, an uplink transmission in response to the trigger frame,

[1.6] wherein the AID field is used to identify whether the trigger frame includes a padding field to which padding is applied, and

[1.7] wherein the trigger frame further includes the padding field when the AID field is set to a specific value.

Ex. 1001, Cl. 1. The only other independent claim, claim 11, is a method claim that is generally parallel to claim 1. *See* Ex. 1001, Cl. 11.

VI. Priority date of the '186 Patent

33. As noted above, I understand the test for the sufficiency of a written description disclosure (e.g., in a specification or priority application) is whether the disclosure relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date. Whether a given disclosure satisfies the written description requirement requires assessment

of several factors, including (1) the existing knowledge in the field of art, (2) the extent and content of the prior art, (3) the maturity of the science or technology, and (4) the predictability of the aspect at issue.

34. In my opinion, the PCT Application (including by virtue of its incorporation by reference of KR '754) provides written description disclosure for all claims of the '186 patent, because a POSITA would have understood the inventor to have had possession of all of the claimed concepts.

A. Claim 1

1. Elements [1Pre], [1.1], and [1.2]

35. The preamble and the first two limitations of claim 1 recite: “*A wireless communication terminal, the terminal comprising: a transceiver; and a processor, wherein the processor is configured to....*”

36. The PCT Application discloses these requirements. Notably, although the claims of the PCT Application are directed to an access point (AP) terminal whereas the claims of the '186 patent are directed to non-access point terminals, the specification of the PCT discloses both concepts. For instance, the PCT explains:

A station (STA)... broadly includes both non-access point (non-AP) stations as well as access points (APs).... A station for wireless communication includes a **processor** and a **transmitter/receive unit**, and may further include a user interface and a display unit, depending

on the embodiment. The processor may generate frames for transmission over the wireless network, process frames received over the wireless network, and perform various other processing to control the station. The transmitter and receiver are functionally coupled to the processor and transmit and receive frames over the wireless network for the station.

Ex. 1012 at [53]; *see also* Ex. 1012 at [11] (“First, according to an embodiment of the present invention, the base wireless communication terminal includes... a processor... transmitting a trigger frame that ***triggers multi-user uplink data transmission of multiple terminals....***”).

37. As shown above, the PCT Application is explicit in disclosing a non-access point station which includes both a “processor” and a “transmitter/receive unit” (i.e., a transceiver). Ex. 1012 at [53].

2. Limitation [1.3]

38. Limitation [1.3] recites “[*wherein the processor is configured to:] receive, through the transceiver, a trigger frame indicating uplink transmission of one or more terminals.*” In my opinion, the PCT Application discloses this limitation.

39. As discussed above, the PCT Application discloses a non-AP terminal that receives frames over the wireless network from an access point terminal. *See* Ex. 1012 at [53]. The processor is configured (in coordination with the transceiver)

to receive frames received over the network. *See id.* (“The transmitter and receiver are functionally coupled to the processor and transmit and receive frames over the wireless network for the station.”).

40. The PCT Application also explicitly discloses that these frames received over the wireless network include *trigger frames* for allocation of uplink (UL) multi-user (MU) transmissions. For instance, the PCT Application teaches that a “multi-user uplink transmission may be initiated by a trigger frame” which is transmitted “by an AP.” Ex. 1012 at [118] (“In non-legacy WLAN system, the multi-user uplink transmission may be initiated by a trigger frame, i.e., the initialization step 210 of FIG. 9 may be performed by the transmission of a trigger frame by an AP.”).

41. This trigger frame “*indicat[es] uplink transmission of one or more terminals*” as limitation [1.3] requires. *See* Ex. 1012 at [118] (“The trigger frame indicates the start time of the multi-user uplink transmission and may indicate the channel or subchannel information assigned to each uplink transmission STA. STAs that have been assigned a channel or subchannel by the AP transmit upstream data simultaneously at the time specified by the AP.”); *see also id.* at [135] (“According to embodiments of the present invention, padding may also be performed on the trigger frame that triggers a multi-user simultaneous transmission. In a multi-user upstream data transmission and a multi-user

downstream data transmission, a different number of STAs may be allocated for each channel.”).

3. Limitation [1.4]

42. Limitation [1.4] recites: “*wherein the trigger frame includes an association identifier (AID) field.*”

43. The PCT Application is explicit that the trigger frames (including trigger frames which that trigger both multi-user upstream, and trigger frames which trigger multi-user downstream data transmissions) include AID field containing AID information. *See* Ex. ~~12~~2012 at [135] (“In a multi-user upstream data transmission and a multi-user downstream data transmission, a different number of STAs may be allocated for each channel. The trigger frame may include AID information of the STAs assigned to each channel, wherein the amount of information in the trigger frame transmitted may vary for each channel.”); *id.* at [123] (noting that “AID information” includes the “AID for each STA”).

4. Limitation [1.5]

44. Limitation [1.5] recites: “[*wherein the processor is configured to:] perform, through the transceiver, an uplink transmission in response to the trigger frame.*”

45. The PCT Application teaches that the purpose of the trigger frame sent by an access point is to coordinate an uplink transmission from a plurality of terminals,

such that the recited non-access point “terminal” of claim 1 will use the trigger frame to prepare and transmit a frame (the “response frame”) in response to the received trigger frame. For instance, the PCT Application teaches:

The trigger frame indicates the start time of the multi-user uplink transmission and may indicate the channel or subchannel information assigned to each uplink STA. STAs that have been assigned a channel or subchannel by the AP transmit upstream data simultaneously at the time specified by the AP.

Ex. 1012, [118]. In other words, the trigger frame sent by the access point indicates *when* and *on which channel or subchannel* the terminal should “transmit upstream data,” and the terminal uses that information to prepare and transmit a response at the correct time and on the correct channel or subchannel. And the PCT Application is explicit that the purpose of the padding discussed above is to allow the STAs sufficient “processing time to participate in multi-user simultaneous transmission *in response to* the trigger frame.” *Id.* at [136].

46. Accordingly, the PCT Application discloses that the claimed processor is configured to “*perform, through the transceiver, an uplink transmission in response to the trigger frame.*”

5. Limitation [1.6]

47. Limitation [1.6] recites: “*wherein the AID field is used to identify whether the trigger frame includes a padding field to which padding is applied.*”

48. The PCT Application further discloses this limitation. For instance, the PCT Application is explicit that the trigger frames can include padding (which may include either preset padding values or redundant AID values) prior to an FCS field of the trigger frame:

According to embodiments of the present invention, padding may also be performed on the trigger frame that triggers a multi-user simultaneous transmission. In a multi-user upstream data transmission and a multi-user downstream data transmission, a different number of STAs may be allocated for each channel. The trigger frame may include AID information of the STAs assigned to each channel, wherein the amount of information in the trigger frame transmitted may vary for each channel.

According to one embodiment of the present invention, a preset padding may be performed before the Frame Check Sequence (FCS) field of the trigger frame. Thus, the transmission of the trigger frame may terminate at the same time on each channel over which the trigger frame is transmitted. Furthermore, by padding the trigger frame, the STAs may acquire additional processing time to participate in multi-user simultaneous transmission in response to the trigger frame. *According to another embodiment of the present invention, redundant AID information may be inserted prior to the FCS field of the trigger frame.*

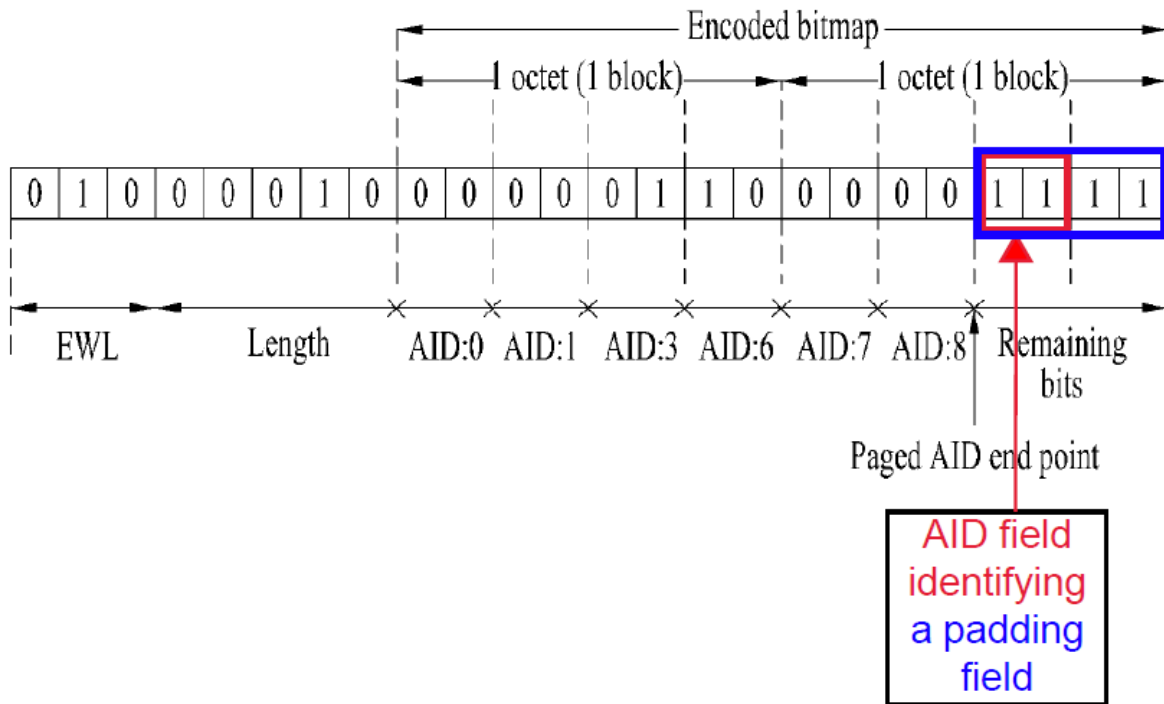
Ex. 1012, [135]–[136].

49. In either the “preset padding” or “redundant AID information” embodiments, the “*AID field is used to identify whether the trigger frame includes a padding field to which padding is applied.*” First, in the “redundant AID information” embodiment, a POSITA would understand that the padding field would repeat a value specified in the AID field of the trigger frame, such that the information in the padding field would have “redundant AID information.” A POSITA would thus understand that when the AID field and the padding field have information “redundant” with one another, padding is present, the padding field is present, and when no redundancy exists, no padding is present.

50. Likewise, the use of a preset padding value additionally satisfies this claim requirement, as confirmed by Dr. Ding’s invalidity theory based on Choi, where Dr. Ding provides a theory where the padding field and AID field overlap.

51. For instance, Dr. Ding alleges that Choi discloses an “AID field” (annotated in red) which identifies “a padding field” (annotated in blue) in FIG. 22 of Choi:

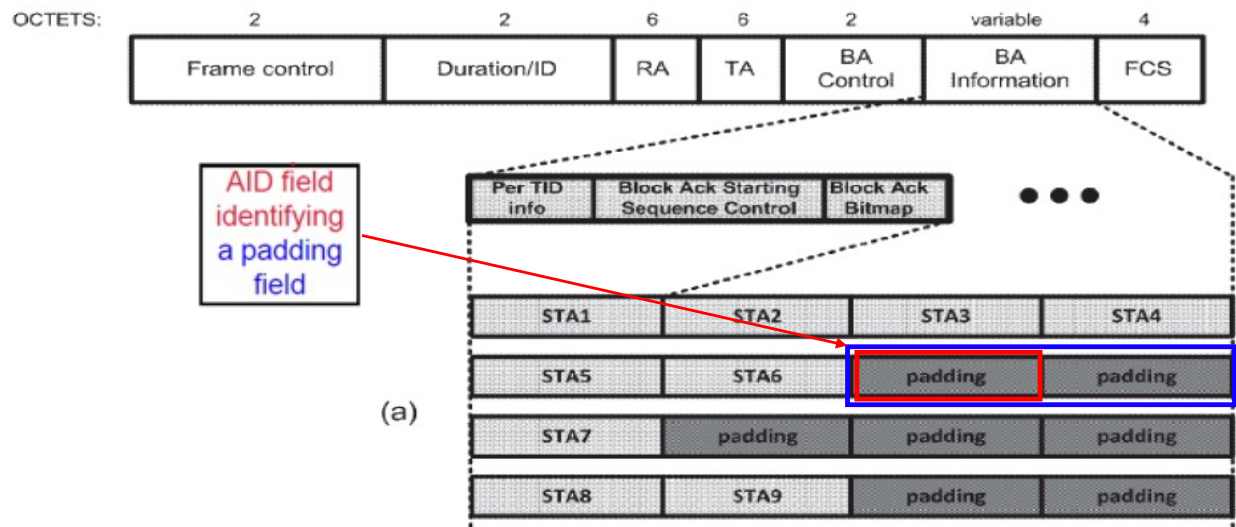
FIG. 22



See Ex. 1003 ¶163 (Dr. Ding’s annotation of Choi’s FIG. 22).

52. As shown by the figure above, Dr. Ding maps the padding field to include the AID field. Applying this same understanding of claim scope to the disclosures in the PCT, the use of a predetermined padding value following the AID field and before the FCS field would have a similar structure, where a reserved “preset padding” value would be used following AID fields that have substantive information. A POSITA would readily understand that in this embodiment, the “padding” field would be identified by a reserved value (wherein whatever the “preset padding” value is, such as all 0s or all 1s) would identify the presence of a padding field, because that is the purpose of the padding being

“preset.” Specifically, by using a “preset” value that does not overlap with any valid AID value, the system will know that the field is a padding field inserted to extend the length of the frame rather than substantive AID information that must be processed, as illustrated below:



Ex. 1012, FIG. 19 (excerpted and annotated to show application under the Dr. Ding’s Choi-based theory of invalidity). For instance, if each STA were identified by an 8-bit AID, each AID value other than the reserved AID value (e.g., “11111111”) would be a substantive AID value, where was the reserved AID value of “11111111” would identify a padding field. Accordingly, the PCT Application discloses “*the AID field is used to identify whether the trigger frame includes a padding field to which padding is applied*” not only via the “redundant AID information” embodiment, but *also* using the “preset padding” embodiment.

6. Limitation [1.7]

53. Limitation [1.7] recites: “*wherein the trigger frame further includes the padding field when the AID field is set to a specific value.*” The PCT Application further discloses these requirements.

54. This limitation is disclosed for both the “preset padding” and “redundant AID information” embodiments. First, in the redundant AID information embodiment, the “specific value” that the AID field is set to is the specific value of a previously-provided AID value. The use of this specific value—redundant AID information—signals to the receiving station that the padding field is present.

55. Likewise, in the “preset padding” embodiment, the “specific value” that the AID field is set to is a specific preset value (such as “00000000” or “11111111”). *See* Ex. 1012, [89] (teaching “zero padding”); Ex. 1008, [0074] (“The zero padding used in the present invention is one embodiment, and padding with 1s can achieve the same effect.”). Based on the disclosures of the PCT Application including KR ’754, a POSITA would have understood the inventors had possession of using a preset AID value of all zeros or all 1s as a padding indicator. Whenever this preset padding value is present in the AID field, that signals to the receiving station that the padding field is present.

B. Claim 2

56. Claim 2 recites: “*The wireless communication terminal of claim 1, wherein a duration of the padding field is set based on a time needed for the one or more terminals to process the trigger frame.*”

57. A POSITA would have understood the inventors to have had possession of claim 2. Specifically, the PCT Application teaches:

According to embodiments of the present invention, padding may also be performed on the trigger frame that triggers a multi-user simultaneous transmission. In a multi-user upstream data transmission and a multi-user downstream data transmission, a different number of STAs may be allocated for each channel. The trigger frame may include AID information of the STAs assigned to each channel, ***wherein the amount of information in the trigger frame transmitted may vary for each channel.***

According to one embodiment of the present invention, a preset padding may be performed before the Frame Check Sequence (FCS) field of the trigger frame. ***Thus, the transmission of the trigger frame may terminate at the same time on each channel over which the trigger frame is transmitted. Furthermore, by padding the trigger frame, the STAs may acquire additional processing time to participate in multi-user simultaneous transmission in response to the trigger frame.*** According to another embodiment of the present invention, redundant AID information may be inserted prior to the FCS field of the trigger frame.

Ex. 1012, [135]–[136].

58. As I discuss in my analysis of claim 1 above, the PCT Application discloses the use of either padding (either by inserting a preset padding value or redundant AID information) so that each trigger frame may “terminate at the same time on each channel” and so that “the STAs may acquire additional processing time.” *Id.* Accordingly, a POSITA would understand that the inventors were in possession of the first padding frame being “*set based on a time needed for the one or more terminals to process the trigger frame.*”

C. Claim 3

59. Claim 3 recites: “*The wireless communication terminal of claim 1, wherein the padding field is contained before a frame check sequence (FCS) field included in the trigger frame.*”

60. A POSITA would have understood the inventors to have possession of claim 3. The PCT Application is explicit that the trigger frames can include padding (which may either be preset padding values or redundant AID values) prior to an FCS field of the trigger frame:

According to embodiments of the present invention, padding may also be performed on the trigger frame that triggers a multi-user simultaneous transmission. In a multi-user upstream data transmission and a multi-user downstream data transmission, a different number of STAs may be allocated for each channel. The trigger frame may include

AID information of the STAs assigned to each channel, wherein the amount of information in the trigger frame transmitted may vary for each channel.

According to one embodiment of the present invention, a preset padding may be performed before the Frame Check Sequence (FCS) field of the trigger frame. Thus, the transmission of the trigger frame may terminate at the same time on each channel over which the trigger frame is transmitted. Furthermore, by padding the trigger frame, the STAs may acquire additional processing time to participate in multi-user simultaneous transmission in response to the trigger frame. *According to another embodiment of the present invention, redundant AID information may be inserted prior to the FCS field of the trigger frame.*

Ex. 1012, [135]–[136].

61. As such, the PCT Application is explicit (under either the preset padding value or redundant AID information padding embodiments) that “*the padding field is contained before a frame check sequence (FCS) field included in the trigger frame.*”

D. Claim 4

62. Claim 4 recites: “*The wireless communication terminal of claim 1, wherein the AID field indicates a start of the padding, when the AID field is set to the specific value.*”

63. A POSITA would have understood the inventors to have possession of claim 4. As discussed above, under the “preset padding” value embodiment, the AID field indicates a start of the padding when the preset padding value is placed in the AID field, indicating that that field is the start of the padding. Likewise, under the “redundant AID information” embodiment, the first instance of redundant AID information in the AID field indicates that that field is the start of the padding. *See* Ex. 1012, [135]–[136].

E. Claim 5

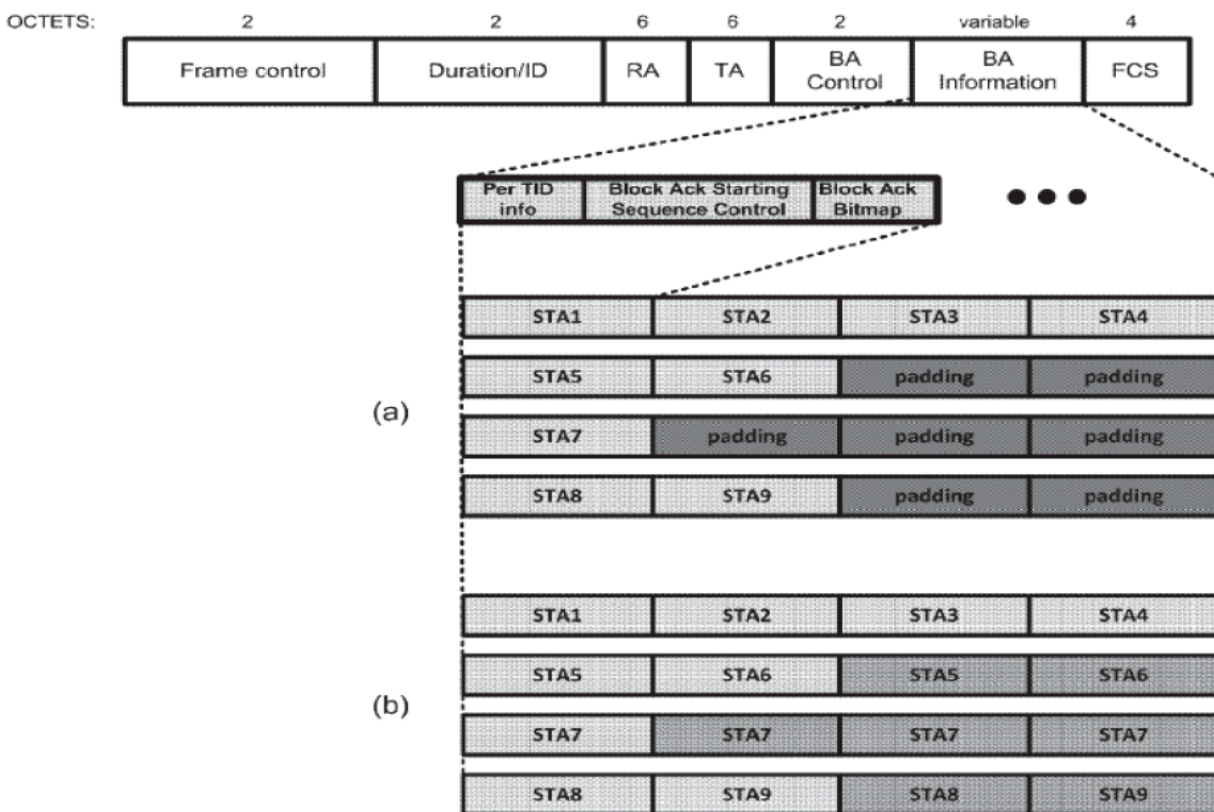
64. Claim 5 recites: “*The wireless communication terminal of claim 4, wherein the predetermined AID field information is duplicated bit information in an AID field.*”

65. A POSITA would have understood the inventors had possession of this additional limitation. For instance, when a preset padding value is used (e.g., all zeros or all ones), that padding value will be duplicated across the AID field, thus constituting “duplicated bit information.” Not only are the bits duplicated (by virtue of repeating ones or zeros), but the reserved preset padding value itself is duplicated across the trigger frame.

66. Likewise, in the redundant AID information embodiment, redundant AID information is duplicated (because it is redundant) across the AID field. For instance, in FIG. 19 of the PCT Application (reproduced below), in the second row

of example (b), STA5 and STA6 are duplicated in the AID field to indicate the presence of padding.

[FIG. 19]



Ex. 1012, FIG. 19. Likewise, in the third row, STA7 is duplicated in the AID field to indicate the presence of padding. Because these AID values are represented by bits, their duplication constitutes “duplicated bit information” as recited in claim 5.

F. Claim 6

67. Claim 6 recites: “*The wireless communication terminal of claim 1, wherein the padding is applied in the trigger frame by using duplicated information.*”

68. A POSITA would have understood the inventors had possession of this claim under either embodiment of the PCT Application (redundant AID information or preset padding values). Under either embodiment, a duplicated preset padding value (e.g., all ones or zeros) or duplicated AID information (e.g., AID information duplicated from prior AID values) is used to apply the padding in the trigger frame.

G. Claim 7

69. Claim 7 recites: “*The wireless communication terminal of claim 6, wherein the padding is applied in the trigger frame by duplicating the predetermined AID field information.*”

70. A POSITA would have understood the inventors had possession of this claim. For example, as discussed above, under either embodiment, predetermined AID field information (e.g., either redundant AID field information or a preset padding value) is duplicated in the trigger frame.

H. Claim 8

71. Claim 8 recites: “*The wireless communication terminal of claim 1, wherein the processor is further configured to: generate an uplink packet to perform the uplink transmission, and perform the uplink transmission in response to the trigger frame by using the generated uplink packet, wherein a padding is applied to the uplink packet to terminate the uplink transmission at a designated*

time.” In my opinion, the PCT Application makes clear that the inventors had possession of this claim.

72. The PCT Application teaches that the purpose of the trigger frame sent by an access point is to coordinate an uplink transmission from a plurality of terminals, such that the recited non-access point “terminal” of claim 1 will use the trigger frame to generate and transmit an uplink packet in response to the received trigger frame. For instance, the PCT Application teaches:

The trigger frame indicates the start time of the multi-user uplink transmission and may indicate the channel or subchannel information assigned to each uplink STA. STAs that have been assigned a channel or subchannel by the AP transmit upstream data simultaneously at the time specified by the AP.

Ex. 1012, [118]. In other words, the trigger frame sent by the access point indicates *when* and *on which channel or subchannel* the terminal should “transmit upstream data,” and the terminal uses that information to prepare and transmit a response at the correct time and on the correct channel or subchannel. And the PCT Application is explicit that the purpose of the padding discussed above is to allow the STAs sufficient “processing time to participate in multi-user simultaneous transmission *in response to* the trigger frame.” *Id.* at [136].

73. A POSITA would have understood that “a *padding is applied to the uplink packet to terminate the uplink transmission at a designated time.*” As

discussed above for claim 1, a POSITA would have understood that the inventors had possession of claim 1's trigger frame for uplink transmission utilizing the recited padding. A POSITA would have understood that these same concepts would be applicable for "a method of frame length alignment via padding in a multi-user simultaneous transmission process." See Ex. 1012 at [134]–[135] ("FIG. 20 illustrates a method of frame length alignment via padding in a multi-user simultaneous transmission process.... According to embodiments of the present invention, padding may also be performed on the trigger frame that triggers multi-user simultaneous transmission."). Accordingly, a POSITA would have understood that when the response frame of the claimed terminal is required for "frame length alignment," the response frame would have included padding for to terminate the uplink transmission at a designated time (such that the durations of uplink transmissions are aligned). See Ex. 1012 at [134].

I. Claim 9

74. Claim 9 recites: "*The wireless communication terminal of claim 1, wherein the AID field is set to the specific value according to the number of user information for the one or more terminal.*"

75. Because the PCT Application teaches that "a preset padding may be performed" (Ex. 1012, [136]), a POSITA would have understood that the inventor had possession of using all 1s as the "preset padding" value, because all zeros and

all 1s are the easiest values to verify via logical operators. For instance, the presence of an all-zero reserved value can be identified by performing a logical “or” operation on each bit in a field; if the result is “0,” then the entire field is comprised of 0 bits. Likewise, the presence of an all-one reserved value can be identified by performing a logical “and” operation on each bit in the field; if the result is “1,” then the entire field is comprised of 1 bits.

76. The inventors’ possession of this concept is further confirmed by the disclosures contained in KR ’754 (which is incorporated by reference by the PCT Application—*see* Ex. 1012, [50]). Specifically, KR ’754 discloses that padding can be accomplished by “padding with 1s.” Ex. 1008, [0074] (“The zero padding used in the present invention is one embodiment, and padding with 1s can achieve the same effect.”). As discussed above, the PCT Application is explicit that padding can be performed with a preset padding field for a trigger frame for uplink transmission. In light of that disclosure, as well as KR ’754’s teaching that padding with 1s can be used as a preset padding value, a POSITA would understand that the inventor had possession of use of a preset padding field for uplink transmission, wherein all of the bits in the padding field are set to 1s.

77. Furthermore, when the “preset padding” value is all 1s, “*the specific value*” indicating padding would be determined “*according to the number of user information for the one or more terminal[s]*.” For instance, if eight bits were used

for an AID field, the number 255 (or “11111111”) in binary would be the maximum possible AID value that could be represented—i.e., that would be the maximum number of users that could be indicated. If “11111111” were a reserved value to indicate padding, the maximum valid AID value would then be 254, so that “the specific value” would be set to be one more than the “number of user[s]” that could be indicated under that signaling scheme, and would thus be set “according to the number of user information for the one or more terminal[s].”

J. Claim 10

78. Claim 10 recites: “*The wireless communication terminal of claim 1, wherein all bits of the padding field are set by repeating a specific value when the padding field is included in the trigger frame.*”

79. This limitation is disclosed for both the “preset padding” and “redundant AID information” embodiments. First, in the redundant AID information embodiment, the “specific value” that the AID field is set to is the specific value of a previously-provided AID value. The use of this specific value—redundant AID information—signals to the receiving station that the padding field is present.

80. Likewise, in the “preset padding” embodiment, the “specific value” that the AID field is set to is a specific preset value (such as “00000000” or “11111111”). *E.g.*, Ex. 1008, [0074]. Whenever this preset padding value is

present in the AID field, that signals to the receiving station that the padding field is present.

81. In either embodiment, all bits of the padding field are set by repeating the specific value when the padding field is present.

K. Claims 11–18

82. Claims 11–18 generally correspond to claims 1–8, such that the priority support for claims 1–8 discussed above also provides priority support for claims 11–18.

VII. Kim is not prior art.

83. As discussed above, it is my opinion that all claims of the '186 patent are entitled to a priority date of no later than March 4, 2016, the filing date of the PCT Application.

84. In contrast, Kim has a filing date of January 8, 2018. Kim also cites three provisional applications filed in January of 2017. *See* Ex. 1014 at (60). Even if Kim were entitled to a priority date of any of its provisional applications, Kim would still have a later priority date than the March 4, 2016 priority date of the '186 patent.

85. Because it is my opinion that Kim does not qualify as prior art, I have not performed an analysis regarding Kim's disclosures and whether or not it would disclose or render obvious any limitations if it were prior art.

VIII. I also disagree with Dr. Ding's Ground 2 analysis.

A. Overview of Chu

86. Chu teaches a comprehensive padding structure, wherein a frame that is used to schedule uplink transmissions (i.e., Chu's "scheduling frame") "includes one or more padding bits at the end of the scheduling frame 902 to provide sufficient time for the client stations 25 to prepare for uplink transmission based on the uplink scheduling information provided by the scheduling frame 902. Ex. 1015, [0093]. Chu teaches that the padding bits are located "at the end of the scheduling frame 902 to provide sufficient time for the client stations 25 to prepare for uplink transmission based on the uplink scheduling information provided by the scheduling frame." *Id.*

87. Chu is explicit regarding how this padding is identified. First, "a MAC header included in the scheduling frame 902 indicates a length of a valid payload, wherein the one or more padding bits follow the valid payload." *Id.* Additionally, "a signal field of a PHY preamble of the scheduling frame 902 includes an indication of the entire length of the scheduling frame 902, which includes the one or more padding bits at the end of the scheduling frame 902." *Id.*; *see also id.* at [0144] (similar teachings).

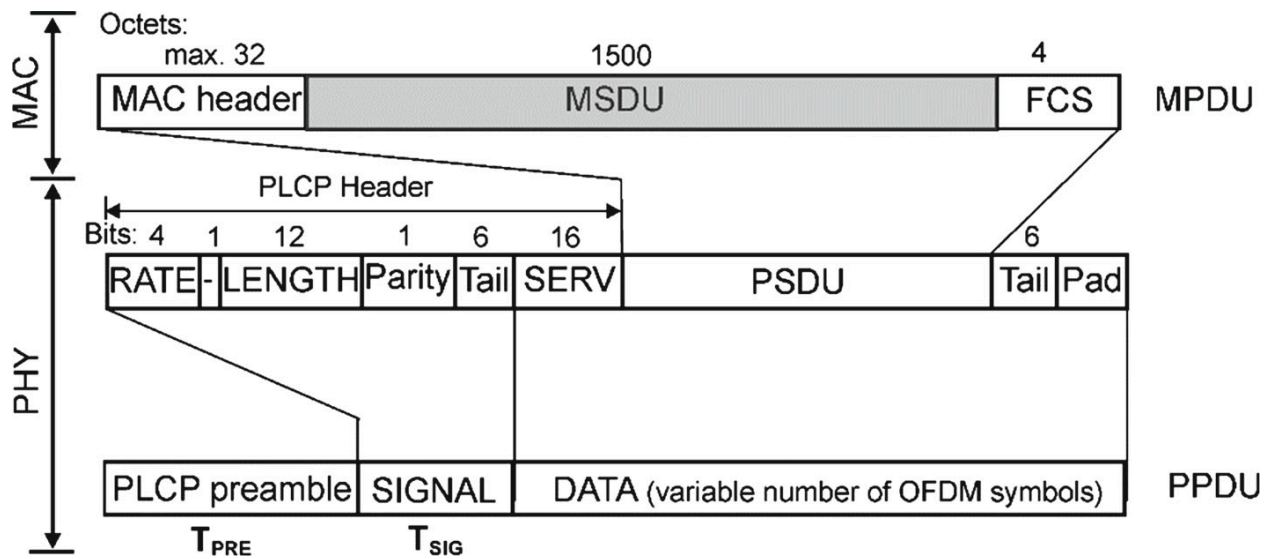
88. In other words, Chu teaches that a MAC header of Chu's scheduling frame 902 "indicates the length of a valid payload" (which *does not* include the

padding bits), and a PHY preamble of Chu's scheduling frame 902 indicates the *entire* length of the frame (which entire length *does* include the padding bits). Accordingly, the start of the padding bits is determined by simply identifying the end of Chu's "valid payload" (which information is provided in Chu's MAC header). And the end of the padding bits is determined by identifying the end of the entire scheduling frame (which information is provided in Chu's PHY preamble).

89. Chu thus explicitly teaches a mechanism for receiving stations to identify the beginning and end of Chu's padding bits through usage of existing fields in the MAC header and PHY preamble.

90. A POSITA would thus understand Chu to disclose that a length field of a MAC header identifies the length of the MAC frame, whereas a length field of a PHY preamble identifies the length of the PHY frame. Given that Chu's padding bits occur "*at the end of*" Chu's scheduling frame (Ex. 1015, [0093]), they necessarily occur in the PHY frame (after the end of the MAC frame, including after the FCS field that is at the end of the MAC frame).

91. This concept of inserting padding after a MAC frame, at the end of a PHY frame, is not unique to Chu's disclosure, but was instead generally known in the art. For example, an exemplary frame format in 802.11a (a standard that was first ratified in 1999) is shown below:



Ex. 2017 at 12. As shown above, the PHY frame includes a PSDU MAC frame, which MAC frame terminates with a frame check sequence (FCS) field. Then, following the MAC frame (but still within the PHY frame), a 6-bit tail value is provided, followed by padding for the remainder of the length of the PHY frame. While Chu is not inconsistent with the use of tail bits (because the beginning of the padding region would, in the case of a 6-bit tail field, be calculated as beginning 6 bits after the end of the MAC frame), a POSITA would also understand that not all PHY frames require tail bits. Accordingly, in the event no tail bits are utilized, Chu's padding region would begin immediately after the MAC frame terminates (i.e., immediately after the length of the valid payload that is identified in the MAC header of Chu's scheduling frame 902).

92. Dr. Ding, at his deposition, acknowledged that Chu discloses these concepts, including that "by providing the length of a valid payload of the MAC

frame and the entire length of the scheduling frame 902 using the PHY preamble, that would allow a receiving station to delineate the padding region of the scheduling frame from other parts of the scheduling frame.” *See* Ex. 2016 at 39:4–40:14.

93. Dr. Ding stated that this may “not always [be] the best solution” because “one would really have to incorporate a valid payload length into the MAC header,” Ex. 2016 at 40:11–15, but he elsewhere acknowledged that “a length value” must be provided “in the MAC header” regardless of whether Chu’s padding technique is used. *See* Ex. 2016 at 37:17–38:4. Dr. Ding appeared to be under the apprehension that a valid payload length would be a separate field. However, a POSITA would readily understand no separate length value would be required because Chu discloses that its padding occurs at the end of the PHY frame, *after* the MAC frame. Thus, by knowing both the length of the MAC frame (as expressed in the MAC header) and the length of the PHY frame (as expressed in the PHY preamble), one would know the beginning and end of Chu’s padding bits.

94. Chu also teaches that within the MAC frame of the scheduling frame 902, a “station identifier subfield 756 (AID)” is included. *See* Ex. 1015, [0079], [0090].

B. Overview of Choi

95. Choi discloses the use of a Δ AID field to signal AID values. Rather than directly disclosing the AID value of a given station (other than the first station), Choi's Δ AID field can be used to calculate AID values for stations. This is notably different from the Chu, which teaches that the AID values are identified directly using a "station identifier subfield" with no encoding based on Δ AID values. Ex. 1015 at FIG. 7B, [0079], [0090].

96. Choi discloses that padding bits are used in place of substantive Δ AID values if the total length of substantive Δ AID values "is less than a multiple of an octet." Ex. 1016 at [0184]. The purpose of this padding is thus to align bits within the octet requirements of a MAC frame (a problem that there is no evidence exists in Chu's frame structure), which is different than the purpose of the padding bits in Chu (in which the padding bits are provided *after* the MAC frame "to provide sufficient time for the client stations 25 to prepare for uplink transmission." Ex. 1015, [0093].

C. Dr. Ding's proposed combination of Chu with Choi would not have been obvious.

1. Dr. Ding's alleged motivation to combine is not supported by Chu.

97. Dr. Ding provides the following discussion regarding the combination of Chu with Choi:

Although Chu anticipates the need for padding in multi-user uplink scheduling, *it provides no implementation detail regarding how the presence of padding is indicated or how a receiver would distinguish padding from meaningful data payload*. This lack of specificity would present a challenge to a POSITA seeking to implement Chu’s system reliably—particularly in scenarios involving rapid, frame-level processing where structural clarity is helpful.

A POSITA would have recognized this shortcoming and been motivated to look for solutions that improve padding identification and frame robustness. Choi, which is directed to the same general field of multi-user wireless communication, presents a straightforward and well-understood mechanism for addressing this issue. Its use of a specific reserved AID or Δ AID value (e.g., 11) to mark the start of padding offers a simple, modular solution that does not require altering the underlying frame structure. SAMSUNG-1016, [0214].

Ex. 1003, ¶¶152–153; *id.* at ¶149 (alleging that Chu “lacks any explanation of whether specific values, markers, or reserved field entries are used to allow a receiving station to delineate the padding region from other parts of the frame”).

98. Accordingly, at the time he wrote his report, Dr. Ding’s opinions were based on the premise that Chu “provides no implementation detail regarding how the presence of padding is indicated,” and based on this premise, Dr. Ding asserted that Choi’s teachings regarding how to indicate padding would improve Chu.

99. Dr. Ding’s opinions, however, are directly inconsistent with a POSITA’s understanding of Chu. Specifically, as discussed above, Chu explicitly teaches how to know where the padding begins—by evaluating the length specified in the length of the MAC header (to determine the length of the MAC frame), such that the padding would begin after the end of the MAC frame (i.e., at the end of the scheduling frame). The padding bits would simply begin after the MAC frame ends, and continue until the PHY frame ends, wherein the lengths of both frames are specified by the MAC header and PHY preamble, respectively.

100. Dr. Ding acknowledged that his characterization of Chu was incorrect, because he acknowledged that Chu *does* teach a “suggested solution” for how “to delineate the padding [region] from other parts of the frame”:

14 Q Okay. So -- so you agree that Chu discloses a
15 way of allowing a receiving station to delineate the
16 padding ranging from other parts of the frame; correct?
17 A I acknowledge that Chu suggests an example,
18 but it does not really limit -- Chu -- his invention to
19 this one particular suggested solution. And to the
20 extent that Chu's invention is quite broad, includes
21 many other aspects, and this particular padding is only
22 one of many inventive aspect of Chu.

Ex. 2016 at 36:14–22.

101. Accordingly, Dr. Ding’s premise—that Chu provides no detail of how to identify where padding begins—is inapplicable to Chu itself. Given that Chu has no problem in this regard, Dr. Ding’s opinions as expressed in his declaration are based on a simple misunderstanding of the prior art.

102. I also disagree with other of Dr. Ding’s statements, which do not address Chu’s actual teachings regarding how to identify padding. For example, Dr. Ding alleges that there would be a “design improvement” from the combination, including “more reliable frame parsing, reduced risk of decoding errors, and improved synchronization of uplink transmissions across multiple stations” (Ex. 1003 ¶¶155–156), Dr. Ding does not explain how this would be an improvement over Chu’s actual teachings which *do* teach how to reliably parse frames, reduce decoding errors, and synchronize uplink transmissions. In my opinion, Dr. Ding does not explain why a POSITA would have plausibly expected any *improvement* over Chu alone. Instead, a POSITA would have understood that Chu, by virtue of unambiguously signaling the location of the padding content through length fields, would not have any issues with parsing, synchronization, or misinterpreting padding as data, such that Choi does not solve any problems in Chu.

103. I note that at his deposition, Dr. Ding raised an idea (which I did not see in his declaration) that MAC and PHY do not indicate a number of bits, they

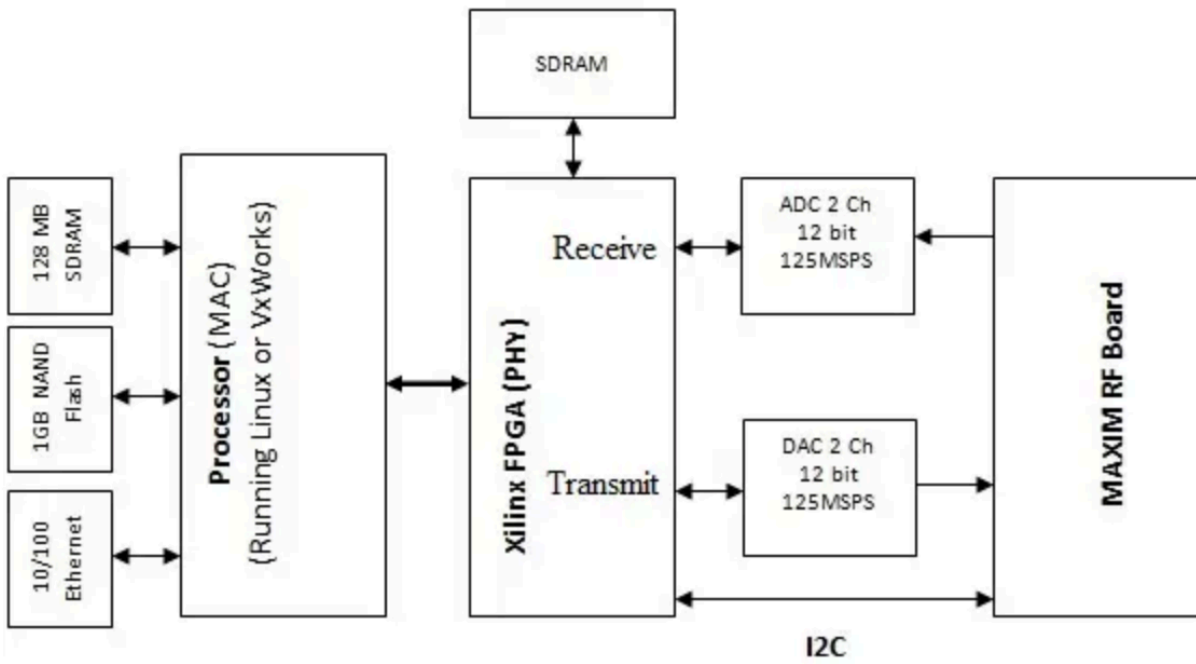
instead indicate an “octet” or a “byte” length. *See* Ex. 2016 at 40:23–41:21. On this basis, he implied that Chu could not indicate where, at the bit level, the padding begins. *See id.* But as I noted above, Chu’s bit padding begins after the MAC frame has ended. In the event, for example, that there is a 6-bit tail following the MAC frame, the beginning of the padding would be exactly 6 bits after the end of the MAC frame. In contrast, if no tail follows the MAC frame, the beginning of the padding would be immediately at the end of the MAC frame. Chu’s technique thus allows a POSITA to know *precisely* (to the bit level) where the padding begins, without the need for any other length fields.

2. A POSITA would have avoided Dr. Ding’s combination of Chu with Choi for additional reasons.

104. Dr. Ding’s combination of Chu with Choi also creates what a POSITA would have viewed as significant disadvantages (relative to Chu’s disclosure) that Dr. Ding fails to account for. In actuality, a POSITA would have avoided the proposed combination.

105. A POSITA would readily understand that processing of data in MAC frames requires significantly more overhead and system resources than processing data that is exclusive to a PHY frame. This is because MAC processing is typically implemented in software, whereas PHY processing is typically handled primarily through dedicated hardware solutions. An example of such an implementation is

shown below, where a dedicated FPGA handles PHY processing, whereas a general purpose processor running Linux or Windows handles MAC processing.



Ex. 2018 at 4 (showing the PHY layer being processed in an FPGA but the MAC layer being processed in higher-level software, such as an application in Linux or Windows). Exhibit 2018 provides a high-level overview of a system for processing PHY and MAC frames; while this is not the only way to implement such a system, it is consistent with what a POSITA as of the March 2016 critical date would have been well aware of, and is consistent with my own understanding as of 2016.

Regardless of whether the specific diagram was available to a POSITA, a POSITA would have been well aware of the concept that because the MAC layer is a higher

layer than the PHY layer, additional system resources are required to process data transmitted at the MAC layer than data transmitted solely at the PHY layer.

106. Because MAC processing typically requires a software / firmware implementation, processing of data at the PHY layer is more efficient and consumes less overall system resources (including processing cycles and memory) than processing data at the MAC layer. Furthermore, bits processed in the MAC layer are processed within *both* the PHY and MAC layers, thus requiring an additional level of processing for the MAC layer. Accordingly, a POSITA would *not* be motivated to move processing from the PHY layer to the MAC layer, assuming that the processing could be placed in either location, because doing so would lead to increased need for system resources.

107. As discussed above, Chu is clear that its padding bits are located in the PHY layer, because it is the “length” field of the PHY preamble that specifies the length of the frame including the padding bits, and the “length” field of the MAC header that specifies the length of the MAC payload data (excluding the padding bits). Ex. 1015, [0093]; *see also id.* (noting that “the one or more padding bits follow the payload” such that they are “at the end of the scheduling frame 902”). Chu additionally makes this clear because it teaches that the padding bits are located “at the end of the scheduling frame” (Ex. 1015 at [0093]), even though

a POSITA would have understood that the FCS field is necessarily located the end of any MAC frame.

108. Because of the increased efficiency of handling the padding bits at the PHY layer as opposed to at the MAC layer (and because these padding bits do not include substantive information that would require processing at the MAC layer), a POSITA would have avoided an implementation that would have required moving Chu's padding bits from the end of the PHY frame such that they would instead be contained within the MAC frame. Accordingly, in my opinion a POSITA would not have found it obvious to move Chu's padding bits from the end of Chu's PHY frame into the middle of Chu's MAC frame, as Dr. Ding's proposal would require.

109. In my opinion, Dr. Ding's modification of Chu in this way would fundamentally change Chu's frame structure, by moving the padding from outside the MAC frame to inside the MAC frame.

110. Furthermore, Choi's Δ AID system requires a separate "Length" field (beyond the already-required length fields of the PHY preamble and MAC header). *See* Ex. 1016, [0182] ("The Length field specifies the length of the encoded bitmap in octets."). In my opinion, a POSITA would recognize that requiring an additional length field would be undesirable, because it would create additional overhead in the MAC frame. Dr. Ding does not account for this disadvantage or explain why a POSITA would have been motivated to implement a change to Chu that would

require this disadvantage, particularly given that Chu already teaches a comprehensive padding technique.