EXHIBIT BB

EXPERT REPORT OF TIM A. WILLIAMS, PH.D.
REGARDING THE INFRINGEMENT OF U.S. PATENT NO. 7,447,516

Apple Inc. v. Samsung Electronics Co., Ltd. et al.

Case No. 11-CV-01846-LHK (N.D. Cal.)

March 22, 2012

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1.   I have been retained by counsel for Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively, "Samsung") to serve as an expert in this litigation. I expect to testify at trial regarding the matters set forth in this report.

2.   I am being compensated at my usual hourly rate of $550. I am being separately reimbursed for any out-of-pocket expenses. My compensation does not depend in any way on the outcome of this litigation or the particular testimony or opinions that I express.

I.   SUMMARY AND SCOPE OF OPINIONS

3.   In my opinion, claims 1-6, 14-20, and 28 ("the Asserted Claims") of U.S. Patent No. 7,447,516 ("the '516 patent," attached as Exhibit F) are infringed, directly, indirectly, and under the doctrine of equivalents, by the Apple iPhone 4 (all AT&T models) and the iPad 2 3G (all AT&T models).[1]

4.   I understand that claim construction is an issue of law for this Court to decide. I also understand that the Court has not yet ruled on some of the parties' disputed claim terms. I have therefore set forth my opinions under both parties' proposed claim constructions (as identified in the parties' Patent Local Rule 4-2 Disclosures, attached as Exhibits H and I). In my opinion, the Asserted Claims are infringed under either party's construction.

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[1] It is my understanding that a separate expert report will address infringement of the Apple iPhone 4S, which uses a different baseband processor than the iPhone 4 and iPad 2 3G.

II.   BACKGROUND/EXPERIENCE

5.   My qualifications can be found in my Curriculum Vitae attached as Exhibit A. Exhibit A is incorporated into my report in full.

6.   My educational background includes a BSEE from Michigan Technological University (1976) , as well as MSEE (1982) and a Ph.D. degree in Electrical Engineering from The University of Texas at Austin (1985).

7.   I worked at Motorola from 1976 to 1991 during which time I was the Sr. Technical Manager for Integrated Circuit implementations of the following cellular standards: GSM, US TDMA, Japanese Digital Cellular, and CDMA.

8.   My career has included the design, implementation and sale of many wireless components and systems, including 2-way paging, IEEE 802.11, and 60 GHz wireless LAN.

9.   I have completed reports, depositions and testimony regarding cellular protocols and systems in several patent litigation cases over the past 12 years.

10.   I am knowledgeable about and familiar with wireless and telecommunications systems industry standards, and as shown in Exhibit A. I am also knowledgeable and familiar with microprocessor architecture and associated software and firmware design for wireless and mobile telecommunications terminals and fixed or base stations.

III.   MATERIALS CONSIDERED

11.   In forming the opinions set forth in this report, I have considered and relied upon my education, knowledge of the relevant fields, and experience. I have also reviewed and considered the documents cited in this report, the asserted patents and their file histories, and other materials listed in Exhibit B.

12.   I have reviewed Samsung's Disclosure of Asserted Claims and Infringement

Contentions filed September 7, 2011 as they relate to the '516 patent (attached as Exhibit C). I

agree with these infringement contentions, and I adopt those as my own opinions as they relate to

the Asserted Claims[2] and the Accused Apple Products.[3] Exhibit C is incorporated by reference

into my report.

13.   I also considered the deposition testimony of several witnesses in this litigation,

including that of the inventors of the '516 patent, Ju-Ho Lee, Joon-Young Cho, Young-Bum

Kim, and Yong-Jun Kwak, Jason Shi, and Marcus Paltian. Although I have provided certain

citations to supporting testimony, I may rely on the entirety of these depositions at trial.

14.   I also considered numerous documents produced in this case by Samsung, Apple,

Intel, Alcatel-Lucent, Ericsson, and AT&T,[4] including source code for the baseband processors

found in the Accused Apple Products. A list of the evidence I relied on in forming my opinions

is attached as Exhibit B.

15.   I reserve the right to rely upon any additional information or materials that may be

provided to me or that are relied upon by any of Apple's experts or witnesses, if called to testify

or to give additional opinions regarding this matter.

IV.   RELEVANT LEGAL STANDARDS

16.   It is my understanding that an assessment of infringement is a two-step process.

First, the language of the patent claims must be construed as a matter of law by the Court to

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[2] I understand that Samsung is no longer asserting claims 9, 10, 23, and 24 in this case.

[3] I understand that Samsung is no longer accusing the iPhone 3G, iPhone 3GS, and iPad 3G of infringing the '516 patent.

[4] I understand that discovery from third-parties is still on-going. I reserve the right to supplement this report if additional discovery is received.

determine their proper scope. Second, the claims as construed are applied to the accused

products or processes to determine whether the accused products or processes meets every

limitation of the claim as construed by the Court.

17.   It is my understanding that there are two types of infringement: direct and indirect

infringement.

18.   I understand that in this case the Court has not yet construed all the parties'

disputed claim terms. I have therefore analyzed whether the Accused Apple Products infringe

under all parties' asserted claim constructions as disclosed in the parties' Patent Local Rule 4-2

disclosures (attached as Exhibits G and H).

A.   Direct Infringement

19.   It is my understanding that direct infringement can be found either literally or

through the doctrine of equivalents.

1.   Literal Infringement

20.   It is my understanding that to literally infringe a patent claim, an accused product

or process must meet every limitation of the claim. If an element is missing, it is my

understanding that there is no literal infringement of that claim, but an accused product or

process may still infringe under the doctrine of equivalents.

2.   Doctrine of Equivalents

21.   I understand that a product or process may be found to infringe the claims of a

patent under the doctrine of equivalents. Specifically, if a product or process does not literally

infringe, based upon the express terms of a patent claim, the product or process may nonetheless

be found to infringe if the accused product or process is considered to be an equivalent product

or process to a patented invention. Such equivalency is typically found, I understand, if the

accused product or process contains "insubstantial" changes from the claim invention. I

understand that whether equivalency exists may be determined based on the "insubstantial differences" test or based on the "triple identity" test, namely, whether the element of the accused product or process performs substantially the same function in substantially the same way to obtain substantially the same result.

22.   It is my understanding that the doctrine of equivalents should be applied to each individual element in the claim, not to the product or process as a whole. I also understand that an analysis of the role played by each element in the context of the specific patent claim will help inform the inquiry as to whether (a) an accused substitute element matches the function, way, and result of the claimed element, or (b) the accused substitute element plays a role substantially different from the claimed element, because things that are equivalent in one context may be inequivalent in another context, and things inequivalent in one context may be equivalent in another context.

23.   I also understand that the doctrine of equivalents does not allow claim limitations to be ignored. Thus, if any element is missing or not satisfied there can be no infringement under the doctrine of equivalents.

B.   Indirect Infringement

24.   I understand that indirect infringement has two sub-categories: induced infringement and contributory infringement.

25.   I understand that to establish a claim of induced infringement, a patentee must show that there has been an underlying direct infringement. I further understand that the patentee must also show the alleged infringer knowingly induced infringement and possessed specific intent to encourage another's infringement. I understand that this specific intent requirement necessitates that a patentee must show the alleged infringer was aware of the patent,

the alleged infringer induced direct infringement, and that the alleged infringer knew or should have known that his actions would induce direct infringement.

26.   I understand that to establish a claim of contributory infringement, a patentee must show that there has been an underlying direct infringement. I further understand that the patentee must also show the accused products or processes have no substantial non-infringing uses, and that the accused infringer imported, sold for importation, or sold after importation within the United States the accused components that contributed to another's direct infringement.

27.   I understand with regards to induced infringement that while the legal statute requires knowledge that the induced acts constitute infringement, courts have held that liability also attaches to violators who are willfully blind to their acts. Furthermore, I understand that intent may be proven by circumstantial evidence.

28.   I understand that evidence of underlying direct infringement can be proven through direct or circumstantial evidence. I understand that circumstantial evidence of the indirect infringer's sales and dissemination of instructions for operation in an infringing manner can support a finding of direct infringement by end-users, such as customers. I also understand that there need not be evidence showing that every customer infringes; it is sufficient to present evidence by which an inference can be made that at least one customer directly infringes.

29.   It is my understanding that a finding of inducement of infringement also requires proof that the alleged infringer intended to induce infringement by others. It is my understanding that proof of intent can be inferred from conduct of the infringer.

V.   OVERVIEW OF THE ACCUSED DEVICES

30.   Both the Apple iPhone 4 (all AT&T models) and the iPad 2 3G (all AT&T models) (collectively, the "Accused Apple Products") contain an Intel (formerly Infineon) PMB 9801 baseband processor (also called the X-Gold 616 or ICE 3) that is responsible for managing the wireless network connectivity. (*See* Apple's Response to Samsung's Interrogatory No. 19, Exhibit K; *see also* ██ ██). All models of the iPhone 4 and iPad 2 3G contain the same baseband processor, and no other baseband processor has ever been used in these products. (*See* Apple's Response to Samsung's Interrogatory No. 19, Exhibit K; *see also* ████████████████████). In addition, ███████████ ███ ██. As such, the baseband processors used in the Accused Apple Products function exactly the same way in the hands of consumers and end-users of Accused Apple Products as they do when shipped from Intel. (*See id.*)

31.   The Accused Apple Products and their corresponding baseband processors are compliant with Release 6 of 3GPP Technical Specification ("3GPP Standard") and support HSUPA ("High-Speed Uplink Packet Access"), which is a 3GPP Release 6 feature. (*See, e.g.,*

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32.   It is my opinion that when a mobile device is compliant with the 3GPP Standard,

it must include circuitry and associated software and firmware that practices the '516 patent.   In

fact, the Intel engineer who was responsible for writing the baseband processor firmware that

implements the uplink power control ███████████████████████████████████

██

██

██

█████████████.

33.   In my analysis below, I include an overview of how the '516 patent is practiced

by the Accused Apple Products, both by virtue of their compliance with the 3GPP Standard and

by a technical analysis of the source code and related hardware documentation provided by Intel[5]

for the baseband processors included in the Accused Apple Products. A more thorough analysis

of each claim limitation can be found in my detailed infringement analysis attached as Exhibit D

to this report and incorporated by reference herein in its entirety.

VI.   OVERVIEW OF THE '516 PATENT AND THE ASSERTED CLAIMS

A.   Level of Ordinary Skill in the Art

34.   The '516 patent relates to the more efficient use of radio resources in a mobile

communication system. For the purposes of this report, a person of ordinary skill in the art of the

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[5] I understand that discovery from Intel is on-going. I reserve the right to supplement this report if
additional source code or hardware documentation is made available.

'516 patent at the time of the invention is one having a Bachelor's degree in Electrical

Engineering, or the equivalent, and two years work experience in wireless communications

protocols and digital cellular standards.

B. Technology Background

35.   Below is a brief technology background to aid the understanding of my analysis

in this report.

1. Standards Organizations

36.   Wireless standards are created to facility the communication between devices in a

wireless network. Standards organizations, which are comprised of members from equipment

manufacturers throughout the world, create these standards for the purpose of clear

understanding of the requirements for devices in the network. Examples of devices that are

present within the network are subscriber mobile devices and fixed or base station equipment.

Current standards allow for the communication of both voice and data between subscriber

mobile devices and the network.

37.   One such telecommunications standard organizations is the European

Telecommunications Standards Institute ("ETSI") (www.etsi.org). ETSI "produces globally-

applicable standards for Information and Communications Technologies (ICT), including fixed,

mobile, radio, converged, broadcast and internet technologies." (ETSI,

http://www.etsi.org/WebSite/AboutETSI/AboutEtsi.aspx (last visited Mar. 20, 2012)).

38.   The Global System for Mobile Communications or "GSM" in short is a widely

available standard for wireless mobile devices. According to the GSM Association

(www.gsma.com), which represents network carriers based on various GSM standards, the GSM

project was initiated by an agreement between France and Germany in 1982, followed by the

endorsement by the European United Heads of States in 1986. In 1989, the Groupe Speciale

Mobile became the ETSI technical committee that defines the GSM standard as the internationally accepted digital cellular telephony standard. (GSMA, http://www.gsma.com/history (last visited Mar. 20, 2012)). GSM is often referred to as a "2G" cellular technology.

39.   Today, the 3rd Generation Partnership Project ("3GPP") (www.3gpp.org) governs the standardization of GSM and its later variations, known as Universal Mobile Telecommunications System ("UMTS") or "3G" cellular technology. The Accused Apple Products operate in accordance with standards set by the 3GPP committee.

2.   Wireless Telephony

40.   Wireless telephones (cell phones or mobile phones) are widely available today. Mobile phones communicate with cell towers and the network by transmitting and receiving signals at a radio frequency ("RF").

41.   The particular type of wireless networks, with which this litigation is concerned, are those owned and operated by service providers. such as AT&T Mobility, who in exchange for providing access to their networks, charge and collect usage fees from the subscribers.

42.   While specifics regarding architecture and technology vary, the wireless networks owned and operated by service providers consist of a wireless portion and a wired portion, as depicted in the figure below.
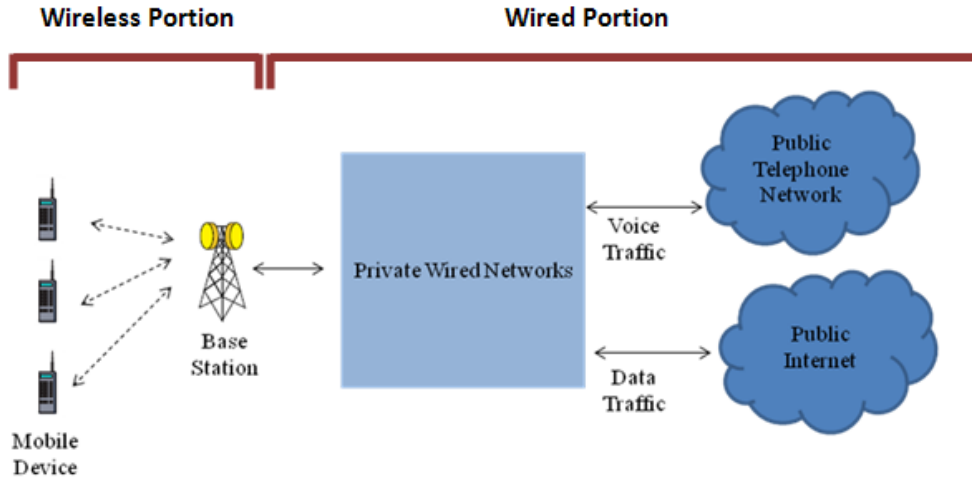
43.　　The base station, more commonly known as a cell tower, communicates with mobile devices wirelessly by transmitting and receiving the RF signals, which correspond to the wireless portion of wireless networks. The base station is also known as the "Node B," and the mobile device is known as the user equipment ("UE") in the context of the 3GPP standards.

44.　　Traditionally, each base station (or Node B) includes only minimal functionality and is controlled by a Radio Network Controller ("RNC"). The RNC is responsible for radio resource management, mobility management functions, and most higher level functionality. The Node B and RNC hardware collectively is sometimes referred to as the UMTS radio access network or Universal Terrestrial Radio Access Network ("UTRAN").

45.　　In the figure shown above, there are two types of wireless communication: the communication from a base station (i.e., Node B) to the mobile device (i.e., UE), and the communication from the mobile device to a base station. The communication from the base station to the mobile device is referred to as the "downlink" communication or transmission, and the communication from the mobile devices to the base station is referred to as the "uplink" communication or transmission. Because there is a single base station and multiple mobile devices in a cell region, there are significant differences between the uplink communication and

the downlink communication. This is because when a mobile device in a cell region

communicates with the base station, it is unaware of other mobile devices in the same cell region

communicating with the same base station, and therefore potential interference exists. On the

other hand, when the base station communicates, it can control the communication such that the

intended mobile device can receive the signal from the base station efficiently, with as little

interference from other mobile devices as possible.

46.   There is a limit for the signal power that can be used in the wireless portion of the

networks, which is determined by, for example, the transmitter power of mobile devices,

regulatory mandates, and network capacity considerations. Thus, the geographic dimension of

area that each base station can serve is limited.

47.   When a mobile device moves out of a region served by one base station and

moves into another base station's region (or cell region), it is necessary to coordinate these base

stations to maintain the connection to the mobile device, a process known as the "hand-off."

48.   Once the RF signals from mobile devices reach the base station, the signals are

converted into electrical or optical forms and traverse across the wired portion of service

provider's network. Depending on the type of information contained in the signals, e.g., voice or

data, the signals are routed toward the final destinations via the public telephone networks or the

public Internet.

3.   3rd Generation Partnership Project (3GPP)

49.   As I explained above, 3GPP is a standard organization that governs the GSM

standard and its later variants known as UMTS. According to the 3GPP, it represents ETSI and

its member network carriers. (3GPP, http://www.3gpp.org/Partners (last visited Mar. 20, 2012)).

50.   The UMTS standard is an "umbrella term for the third generation radio

technologies developed with 3GPP." (3GPP, http://www.3gpp.org/article/umts (last visited

Mar. 20, 2012) (emphasis added)). UMTS networks are used through the United States and the

world. Network operators, such as AT&T Mobility, are able to support a wide variety of voice

and data applications using the UMTS standard.

4. HSUPA and Enhanced Uplink Channels

51. Release 6 of the 3GPP UMTS standard included support for High-Speed Uplink

Packet Access ("HSUPA"). (*See* 3GPP - HPAS, http://www.3gpp.org/HSPA (last visited Mar.

20, 2012)). HSUPA supports high speed data communication in the uplink direction (from the

mobile device to the base station). Several different categories of HSUPA exist. Each

increasing category number supports faster uplink speeds. A category 6 HSUPA mobile device

would support uplink speeds of 5.7 Mbit/s. (593DOC000323).

52. To support these fast uplink data rates, a new type of uplink channel was

developed. This new channel was termed an "enhanced" uplink channel. The enhanced uplink

channel is associated with both a data channel, called Enhanced Dedicated Physical Data

Channel (E-DPDCH), and a control channel, called Enhanced Dedicated Physical Control

Channel (E-DPCCH). The data channel generally carries data that the user wishes to transmit

while the control channel generally carries other types of data, such as control information.

Figure 2 of the '516 patent illustrates the basic transmission/reception procedures of the

enhanced uplink channel.
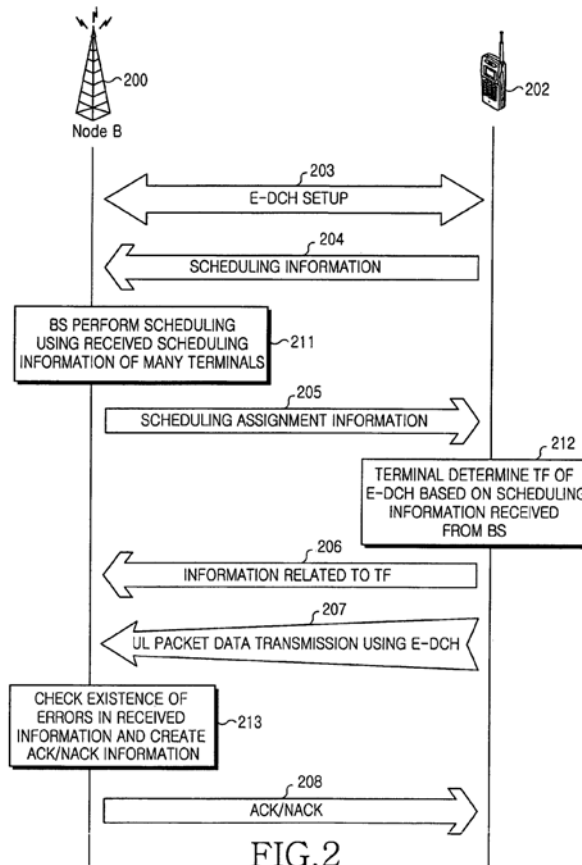
FIG.2
(PRIOR ART)

53.   First, a mobile device sends an enhanced uplink channel setup message to a base station requesting to establish an enhanced uplink channel. Then, the mobile device informs the base station of various scheduling information. The scheduling information may contain information about the mobile device's transmit power, from which uplink channel information can be derived, an indication of the mobile device's free transmit power, or the amount of data to be transmitted.

54.   The base station then performs scheduling for all the mobile devices that have sent scheduling information. When the base station determines to permit uplink communication from a particular mobile device to the base station, it transmits scheduling assignment

information to the mobile device. The scheduling assignment information may include an indication of an allowed data uplink rate, allowed timing, and other information.

55. The mobile device then determines a Transport Format ("TF") to send data over the enhanced uplink channels using the scheduling assignment information. The TF may include such information as the coding scheme to use and the transport block size.

56. The mobile device then sends a Transport Format Resource Indicator ("TFRI") to the base station. The TFRI includes information related to the determined TF. The mobile device also sends uplink packet data to the base station over the enhanced uplink channel.

57. Finally, the base station determines whether the information sent by the mobile device has errors. The base station then sends acknowledgment information to the mobile device. If the acknowledgement information indicates that the data was successfully received (a positive acknowledgment or ACK), the mobile device may send another portion of data to the base station. If the acknowledgement information indicates that the data was not successfully received (a negative acknowledgment or NACK), the mobile device may resend the same portion of data to the base station.

58. The retransmission scheme used on the E-DPDCH channel(s) is called Hybrid ARQ or HARQ. The HARQ protocol is a form of error correction and retransmission used in both HSUPA and its downlink counterpart High-Speed Downlink Packet Access ("HSDPA"). With respect to the HSUPA channels, only the E-DPDCH channels support HARQ. The enhanced uplink control channel (E-DPCCH) as well as the other uplink channels (such as DPDCH/DPCCH) do not support HARQ.

C. **The Invention Described in the '516 Patent**

59. The '516 patent is related to controlling the transmit power of a mobile device. Generally, the more power used to transmit information to a base station, the stronger the

transmission and the greater likelihood that the transmission will be successfully received. However, within any given base station coverage area there will be many mobile devices wishing to transmit. If all the mobile devices transmitted at maximum power, a great amount of interference would result.

60.   To combat this potential problem, some sort of transmit power control is desirable. The most efficient system would allow each mobile device to transmit at a power level that is small enough to ensure quality communications, but no higher. For example, typically the base station may control a mobile device's transmit power through control messages. The base station may attempt to keep a device's transmit power at a level sufficient to maintain a good signal to noise (SNR) ratio, but not too high to create a significant amount of interference with other devices or to quickly drain a device's battery.

61.   The mobile device may also set a maximum transmit power based on the capabilities of the device itself (e.g., based on the capabilities of a power amplifier inside the mobile device). The mobile device, therefore, must inform the base station of its maximum transmit power limit so that the base station can control the transmit power of the device in an appropriate way.

62.   When a mobile device exceeds its maximum allowable transmit power (either set by the network, by the device, or both), the device must scale back its transmit power. Because UMTS supports several different types and number of uplink channels, scaling a device's transmit power is a fairly complicated endeavor. For example, as shown in the figure below taken from the 3GPP Standard, an HSUPA-capable device includes one or more of each of the following channel types: DPCCH, DPDCH, HS-DPCCH, E-DPDCH, and E-DPCCH.
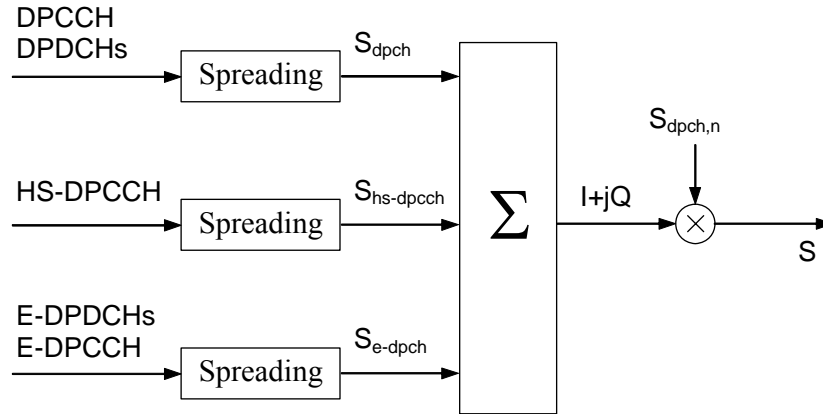
Figure 1: Spreading for uplink dedicated channels

(APLNDC-WH-A 0000019675).

63.   All of these channels are summed and into a single stream which is then scrambled and transmitted over the radio network. Before summing, each channel is weighted individually using a gain factor. For example, as shown in the figure below (again taken from the 3GPP Standard), a distinct gain factor β_{ed} is applied to each of the K E-DPDCH data channels and yet another gain factor β_{ec} is applied to the E-DPCCH control channel. Similar weighting using gain factors is performed for the other types of uplink channels (DPDCH, DPCCH, and HS-DPCCH).
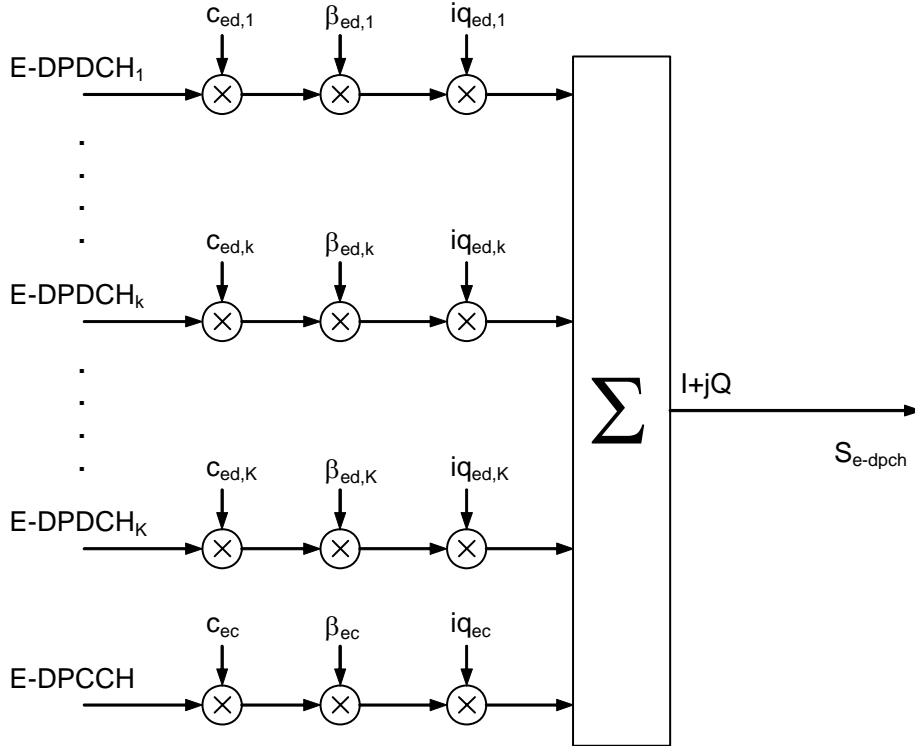
Figure 1c: Spreading for E-DPDCH/E-DPCCH

(APLNDC-WH-A 0000019678).

64.   When a device exceeds its maximum allowable transmit power, traditionally all

the uplink channels were scaled down equally until the device was at or below the allowable

transmit power. With HSUPA, however, several new channels were developed, most notably E-

DPDCH and E-DPCCH. In addition, a single mobile device could support up to 4 separate

uplink E-DPDCH channels and 6 separate uplink DPDCH channels. The table below illustrates

the variety in number and type of uplink channels supported by a single device simultaneously.

Table 0: Maximum number of simultaneous uplink dedicated channels

Configuration #	DPDCH	HS-DPCCH	E-DPDCH	E-DPCCH
1	6	1	-	-
2	1	1	2	1
3	-	1	4	1

(APLNDC-WH-A 0000019675).

65.   The inventors of the '516 patent developed a novel way to solve the uplink power

scaling problem. Their elegant solution not only takes into account all the different types of

uplink channels, but also takes into account transmission efficiency. Because E-DPDCH

supports retransmission in the form of HARQ and the remaining channels do not, if a mobile

device exceeds its maximum allowable transmit power, the inventors created a technique that

first reduces power on the channels that support HARQ. If further reduction is needed after the

channels that support HARQ have been scaled down, then the inventors' technique equally

reduces power allocated to the channels that do not support HARQ.

**D.   <u>Samsung's Role in Proposing the Solution to 3GPP and 3GPP's Ultimate
        Adoption of Samsung's Solution into the 3GPP Standard</u>**

66.   Samsung presented a proposal describing the invention of the '516 patent at a

3GPP meeting called the RAN Working Group meeting #38 in August of 2004 held in Prague.

(*See* Official Minutes, R1-041469, available at http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/

TSGR1_39/Docs/R1-041469.zip (last accessed Mar. 20, 2012) ("R1-041469")). The proposal

was entitled "Power Control at the Maximum Power Limit for E-DCH" and referenced as "R1-

040859" by the 3GPP working group. (R1-040859, available at

http://www.3gpp.org/ftp/tsg_ran/WG1_RL1/ TSGR1_38/Docs/Zips/R1-040859.zip (last

accessed Mar. 20, 2012)).

67.   In Samsung's R1-040859 proposal, Samsung noted the cases where a device's

total transit power might exceed the maximum allowed power. (R1-041469 at 1). Samsung also

presented two alternative options for addressing the power control problem. First, Samsung

suggested equally scaling all channels. Second, Samsung suggested scaling only the E-DPDCH

channels and then applying equal scaling if the total transmit power was still larger than the

maximum allowed value. (*Id.* at 2). In its proposal, Samsung concluded that the E-DPDCH only

scaling method was superior and recommended that method. (*Id.*).

68.   Because there was no time at the RAN Working Group meeting #38 to address

Samsung's proposal, Samsung's proposal was again raised in RAN Working Group meeting #41

in Athens, Greece in May of 2005. (*See* Meeting Minutes, APLNDC-WH-A 0000011139-78).

At this meeting, Samsung's proposal was restyled as R1-050519 (APLNDC-WH-A

0000011006-09). After the meeting, Samsung's proposal was agreed upon by the 3GPP

participants over the 3GPP email distribution list, called the Reflector. (APLNDC-WH-A

0000011160).

E.   The Asserted Claims

69.   I understand Samsung is asserting claims 1-6, 14-20, and 28 of the '516 patent

(the "Asserted Claims") against the Accused Apple Products. Claims 1-6 and 14 are method

claims, while claims 15-20, and 28 are corresponding apparatus claims. The asserted claims

cover the complete framework for controlling the power scaling of a mobile device transmitting

both channel(s) supporting HARQ and channel(s) not supporting HARQ using the invention

described in the '516 patent and described in the 3GPP Standard.

70.   The language of the asserted claims reads as follows:

> **1.** A method for transmitting data of a first channel not supporting Hybrid
> Automatic Retransmission Request (HARQ) and a second channel supporting the
> HARQ in a mobile telecommunication system which supports an enhanced uplink
> service, the method comprising the steps of:
>   determining transmit power factors for the channels and determining if
> total transmit power required for transmission of the channels exceeds the
> maximum allowed power;
>   scaling-down the transmit power factor for the second channel if the total
> transmit power exceeds the maximum allowed power; and
>   transmitting data through the first and second channels using the scaled-
> down transmit power factor for the second channel and the transmit power factor
> for the first channel.

2. The method as claimed in claim 1, wherein the scaling step is performed on a slot-by-slot basis.

3. The method as claimed in claim 1, wherein the total transmit power is determined based on the transmit power factors for the first and second channels and a Transmit Power Control (TPC) command issued by the system.

4. The method as claimed in claim 1, further comprising the step of equally scaling transmit power factors corresponding to the other channels comprising the first channel when the transmit power factor for the second channel is scaled down below a predetermined minimum value.

5. The method as claimed in claim 4, wherein the predetermined minimum value indicates a status where the second channel is not transmitted.

6. The method as claimed in claim 1, further comprising the step of equally scaling transmit power factors for the other channels exclusive of the second channel if the total transmit power still exceeds the maximum allowed power even after the transmit power factor for the second channel has been scaled-down.

14. The method as claimed in claim 1, wherein the transmit power factors are determined based on Transport Formats (TF) which are selected according to scheduling assignment information received from a Node B, respectively.

15. An apparatus for transmitting data of a first channel not supporting Hybrid Automatic Repeat reQuest (HARQ) and a second channel supporting the HARQ in a mobile telecommunication system which supports an enhanced uplink service, the apparatus comprising:
    a controller for determining transmit power factors for the channels, determining if total transmit power required for transmission of the channels exceeds the maximum allowed power, and scaling down the transmit power factor for the second channel if the total transmit power exceeds the maximum allowed power;
    first and second channel generators for generating first and second data frames by performing channel-coding and modulation of the first and second channel data; and
    a gain scaling unit for adjusting the transmit powers of the first and second channels, with which the data frames of the first and second channels is transmitted, using the scaled transit power factor for the second channel and the transmit power factor for the first channel.

16. The apparatus as claimed in claim 15, wherein the controller scales the transmit power factor for the second channel from slot to slot when the total transmit power exceeds the maximum allowed power.

17. The apparatus as claimed in claim 15, wherein the controller determines the total transmit power based on the transmit power factors for the first and second channels and a TPC command issued by the system.

18. The apparatus as claimed in claim 15, wherein the controller equally scales transmit power factors corresponding to the other channels comprising the first channel when the transmit power factor for the second channel is scaled-down below a predetermined minimum value.

19. The apparatus as claimed in claim 18, wherein the predetermined minimum value indicates a status where the second channel is not transmitted.

20. The apparatus as claimed in claim 15, wherein the controller equally scales transmit power factors for the other channels exclusive of the second channel if the total transmit power still exceeds the maximum allowed power even after the transmit power factor for the second channel has been scaled.

28. The apparatus as claimed in claim 15, wherein the transmit power factors are determined based on Transport Formats (TF) which are selected according to scheduling assignment information received from a Node B, respectively.

F.   The File History

71.   The application that resulted in the '516 patent was filed on June 9, 2005 (App. No. 11/148,181, "the '181 application") and issued on November 4, 2008. The file history is attached to my report as Exhibit G. The named inventors are Youn-Hyoung Heo, Ju-Ho Lee, Joon-Young Cho, Young-Bum Kim, and Yong-Jun Kwak.

72.   The asserted claims of the '516 patent claim priority from Korean patent application 10-2004-0042300, filed June 9, 2004, 10-2004-0062190, filed August 6, 2004, 10-2004-0073552, filed September 14, 2004, 10-204-0093947, filed November 17, 2004, and 10-2005-0029192, filed April 7, 2005.

73.   The application was allowed on August 18, 2008 without a single Office Action being issued. (APLNDC-WH-A 0000014749-56).

G. The Parties' Claim Constructions

74. The parties disagree only about a single term in the Asserted Claims. Samsung contends the term "gain scaling unit" should be given its plain and ordinary meaning (Exhibit H), while Apple contends the term should be specifically construed. (Exhibit I). I have addressed infringement below under both parties' constructions.

'516 Patent Term	Samsung's Proposed Construction	Apple's Proposed Construction
"gain scaling unit" (claim 16)	Plain meaning	A device that reduces gain based on a scale factor

H. The Accused Apple Products Infringe the Asserted Claims of the '516 Patent

75. It is my opinion, for the reasons explained below and more fully set forth in Exhibit D, that the Accused Apple Products meet every limitation of the Asserted Claims of the '516 patent, both by virtue of their compliance with the 3GPP Standard and through an analysis of the technical documentation and source code associated with the baseband processors inside the Accused Apple Products. For an analysis of Apple's own direct and indirect infringement of the Asserted Claims, see § VII below.

76. My opinions below have also been confirmed by an independent third-party Chipworks, Inc. who has submitted a detailed test report[6] confirming support in the Accused Apple Products for the uplink channel power scaling as described in the 3GPP Standard. (*See* Exhibit P). I have reviewed the Chipworks test report (Exhibit P), agree with its methodology and findings, and incorporate the report and its findings into my report in its entirety. As concluded by Chipworks, "[l]ab test results confirm the presence of the E-DPDCH power

reduction functionality, as specified in the 3GPP TS 25.214 Release 6, inside the target [Accused Apple Products]." (Exhibit P at 42).

> **1.** **Claim [1A]: "A method for transmitting data of a first channel not supporting Hybrid Automatic Retransmission Request (HARQ) and a second channel supporting the HARQ in a mobile telecommunication system which supports an enhanced uplink service, the method comprising the steps of"**

77.   All of the Accused Apple Products perform "[a] method for transmitting data of a first channel not supporting Hybrid Automatic Retransmission Request (HARQ) and a second channel supporting the HARQ in a mobile telecommunication system which supports an enhanced uplink service," as recited by the preamble of claim 1. For an analysis of why the Accused Apple Products actually perform this method in operation when connected to AT&T's network and during testing, see § VII below.

78.   The Apple iPhone 4 is part of a mobile communication system, as shown in the following figure.

(Apple, http://www.apple.com/iphone/iphone-4/specs.html (last visited Mar. 20, 2012) (emphasis added).)

79.   As the underlined portion of the above figure illustrates, the Apple iPhone 4 (all AT&T models) conforms to the UMTS, HSDPA, and HSUPA standards and transmits data on one of a number of supported frequencies. (*See id.*; ███████████████████████████).

80.   The Apple iPad 2 3G (all AT&T models) is also part of a mobile communication system, as shown in the following figure.

(Apple, http://www.apple.com/ipad/specs/ (last visited March. 20, 2012) (emphasis added).)

81.   As the underlined portion of the above figure illustrates, the Apple iPad 2 3G (all

AT&T models) conforms to the UMTS, HSDPA, and HSUPA standards and transmits data on

one of a number of supported frequencies. (*See id.*; ███████████████████████).

███ All of the Accused Apple Products and their corresponding baseband processors

support HSUPA. (████████████████████████████████

[REDACTED]

<CDR-HSD-240>   **Simultaneous E-DCH (HSUPA) and HSDPA**

Summary: Simultaneous E-DCH (HSUPA) and HSDPA must be supported.

(ATT000125).

    (a)   <u>**All of the Accused Apple Products Infringe Claim [1A]
Because They are Compliant with the 3GPP Standard**</u>

83.   HSUPA is described in 3GPP[1-3].[7] Figure 1 of 3GPP[1] shows the spreading of the uplink dedicated physical channels.
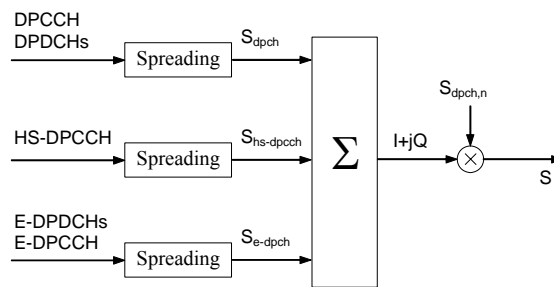
Figure 1: Spreading for uplink dedicated channels

(APLNDC-WH-A 0000019675).

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[7]   As defined herein, "3GPP[1-3]" means 3GPP TS 25.213 v6.4.0 (2005-09) (Release 6) ("3GGP[1]"); TS 25.214 v6.6.0 (2005-06) (Release 6) ("3GGP[2]"); and TS 25.309 v6.6.0 (2006-03) (Release 6) ("3GPP[3]"); corresponding disclosure may be found in earlier versions as well.

84.   The E-DPDCH channels support HARQ (*see* 3GPP[3] §§ 6.1; 7.3.6; 8) while the DPDCH channels do not. (*Id.* at § 7.3.6).

85.   As described in the 3GPP Standard, "[o]ne HARQ entity is capable of supporting multiple instances (HARQ processes) of stop and wait HARQ protocols. ***Each process is responsible for generating ACKs or NACKs indicating delivery status of E-DCH transmissions***. The HARQ entity handles all tasks that are required for the HARQ protocol." *Id.* (emphasis added).

86.   It is thus my opinion that each of the Accused Apple Products satisfies this limitation of the claim.

(b)   The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [1A]

The Product Specification also confirms HARQ is used for the E-DPDCH channels. For example,

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90.   It is thus my view that the documentation and source code for the Accused Apple

Products supports my opinion that these products infringe Claim [1A], which recites "[a] method

for transmitting data of a first channel not supporting Hybrid Automatic Retransmission Request

(HARQ) and a second channel supporting the HARQ in a mobile telecommunication system

which supports an enhanced uplink service," literally. A more thorough analysis of this claim

limitation can be found in the detailed infringement analysis attached as Exhibit D and

incorporated into this report.

2.   Claim [1B]: "determining transmit power factors for the channels and determining if total transmit power required for transmission of the channels exceeds the maximum allowed power"

91.   All of the Accused Apple Products "determin[e] transmit power factors for the

channels and determining if total transmit power required for transmission of the channels

exceeds the maximum allowed power," as recited by claim 1.

(a)   All of the Accused Apple Products Infringe Claim [1B] Because They are Compliant with the 3GPP Standard

92.   For example, $\beta_{ed,k}$ represents the transmit power factors (*e.g.*, gain factors) for the

E-DPDCH channels.
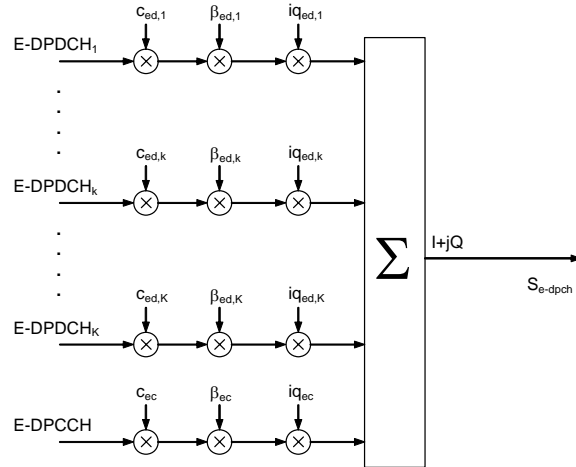
Figure 1C: Spreading for E-DPDCH/E-DPCCH

(APLNDC-WH-A 0000019678).

93.   As described in the 3GPP Standard, "[t]he value of $\beta_{ed,k}$ shall be computed as specified in [6] subclause 5.1.2.5B.2, based on the reference gain factors, the spreading factor for E-DPDCH$_k$, the HARQ offsets, and the quantization of the ratio $\beta_{ed,k}/\beta_c$ into amplitude ratios specified in Table 1B.2 for the case when E-TFCI $\leq$ *E-TFCI$_{ec,boost}$* and Table 1.B.2B, for the case when E-TFCI $>$ *E-TFCI$_{ec,boost}$*." (3GPP[1] § 4.2.1.3).

94.   The computation of the corresponding gain factors for the DPDCH channels is described in 3GPP[1] § 4.2.1.1.

95.   As explained in 3GPP[2], "[w]hen E-DCH is configured, if the total UE transmit power (after applying DPCCH power adjustments and gain factors) ***would exceed the maximum allowed value***, the UE shall firstly reduce all the E-DPDCH gain factors $\beta_{ed,k}$ by an equal scaling factor to respective values $\beta_{ed,k,reduced}$ so that the total transmit power would be equal to the maximum allowed power. (3GPP[2] § 5.1.2.6).

96.   It is thus my opinion that each of the Accused Apple Products satisfies this limitation of the claim.

(b) **The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [1B]**

100.   It is thus my view that the documentation and source code for the Accused Apple Products supports my opinion that these products infringe Claim [1B], which recites "determining transmit power factors for the channels and determining if total transmit power

required for transmission of the channels exceeds the maximum allowed power," literally. A

more thorough analysis of this claim limitation can be found in the detailed infringement analysis

attached as Exhibit D and incorporated into this report.

(c) Infringement of Claim [1B] Under the Doctrine of Equivalents

101. If the Court determines any of the elements of Claim [1B] are not met literally, it

is my opinion that the difference between each of the Accused Apple Products and Claim [1B] is

insubstantial. They both perform substantially the same function of determining gain factors for

the channels, in substantially the same way of concatenating several relative factors, and achieve

substantially the same result of setting the transmit power for each channel. It is thus my opinion

that each of the Accused Apple Products satisfies Claim [1B] under the doctrine of equivalents.

3. Claim [1C]: "scaling-down the transmit power factor for the second channel if the total transmit power exceeds the maximum allowed power"

102. All of the Accused Apple Products practice the step "scaling-down the transmit

power factor for the second channel if the total transmit power exceeds the maximum allowed

power," as recited by claim 1.

(a) All of the Accused Apple Products Infringe Claim [1C] Because They are Compliant with the 3GPP Standard

103. For example, as explained in 3GPP[2], "[w]hen E-DCH is configured, if the total

UE transmit power (after applying DPCCH power adjustments and gain factors) would exceed

the maximum allowed value, the UE shall firstly reduce all the E-DPDCH gain factors $\beta_{ed,k}$ by an

equal scaling factor to respective values $\beta_{ed,k,reduced}$ so that the total transmit power would be

equal to the maximum allowed power." (*Id.*)

104. It is thus my opinion that each of the Accused Apple Products satisfies this

limitation of the claim.

      (b)   **The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [1C]**

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107.   It is thus my opinion that the documentation and source code for the Accused Apple Products supports my opinion that these products infringe Claim [1C], which recites "scaling-down the transmit power factor for the second channel if the total transmit power exceeds the maximum allowed power," literally. A more thorough analysis of this claim limitation can be found in the detailed infringement analysis attached as Exhibit D and incorporated into this report.

      (c)   **Infringement of Claim [1C] Under the Doctrine of Equivalents**

108.   If the Court determines any of the elements of Claim [1C] are not met literally, it is my opinion that the difference between each of the Accused Apple Products and Claim [1C] is insubstantial. They both perform substantially the same function of scaling down the transmit

power of channels supporting HARQ, in substantially the same way of reducing the gains

associated with those channels, and achieve substantially the same result of reducing the total

transmit power to the maximum allowed transmit power. It is thus my opinion that each of the

Accused Apple Products satisfies Claim [1C] under the doctrine of equivalents.

4.   Claim [1D]: "transmitting data through the first and second channels using the scaled-down transmit power factor for the second channel and the transmit power factor for the first channel"

109.   All of the Accused Apple Products practice "transmitting data through the first

and second channels using the scaled-down transmit power factor for the second channel and the

transmit power factor for the first channel," as recited by claim 1.

(a)   All of the Accused Apple Products Infringe Claim [1D] Because They are Compliant with the 3GPP Standard

110.   After scaling down the transmit power factor(s) for the channel(s) supporting

HARQ, data is transmitted through the channels. For example, spreading of the uplink dedicated

physical channels (DPCCH, DPDCHs, HS-DPCCH, E-DPCCH, E-DPDCHs) is used to transmit

data through the E-DPDCH and DPDCH data channels as well as through the various control

channels. (*See* 3GPP[1] § 4.2.1).

111.   It is thus my opinion that each of the Accused Apple Products satisfies this

limitation of the claim.

(b)   The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [1D]

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114.   It is thus my opinion that the documentation and source code for the Accused

Apple Products supports my view that these products infringe Claim [1D], which recites

"transmitting data through the first and second channels using the scaled-down transmit power

factor for the second channel and the transmit power factor for the first channel," literally.

(c)   Infringement of Claim [1D] Under the Doctrine of Equivalents

115.   If the Court determines any of the elements of Claim [1D] are not met literally, it

is my opinion that the difference between each of the Accused Apple Products and Claim [1D] is

insubstantial. They both perform substantially the same function of transmitting on all the

channels, in substantially the same way of multiplying each channel by its respective gain factor

and then summing the channels, and achieve substantially the same result of transmitting each

channel at its appropriate transmit power. It is thus my opinion that each of the Accused Apple

Products satisfies Claim [1D] under the doctrine of equivalents.

5.   Claim [2]: "wherein the scaling step is performed on a slot-by-slot basis"

116.   All of the Accused Apple Products practice the limitation "wherein the scaling

step is performed on a slot-by-slot basis," as recited by claim 2.

(a)   All of the Accused Apple Products Infringe Claim [2A] Because They are Compliant with the 3GPP Standard

117.   As describe in the 3GPP Standard, "[a]ny scaling, and any reduction in the E-

DPDCH gain factor as described above, shall only be applied or changed at a DPCCH slot

boundary." (3GPP[2] § 5.1.2.6). If the gain factor is applied on a DPCCH slot boundary, then

the scaling is performed on a slot-by-slot basis.

118.   It is thus my opinion that each of the Accused Apple Products satisfies this limitation of the claim.

        (b)   **<u>The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [2A]</u>**

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121.   In my view, therefore, the documentation and source code for the Accused Apple Products supports my opinion that these products infringe Claim [2A], which recites "wherein the scaling step is performed on a slot-by-slot basis," literally.

        (c)   **<u>Infringement of Claim [2A] Under the Doctrine of Equivalents</u>**

122.   If the Court determines any of the elements of Claim [2A] are not met literally, it is my opinion that the difference between each of the Accused Apple Products and Claim [2A] is insubstantial. They both perform substantially the same function of applying scaling on a slot-by-slot basis, in substantially the same way of programming gain registers at each slot boundary, and achieve substantially the same result of applying new gain factors at each slot boundary. It is thus my opinion that each of the Accused Apple Products satisfies Claim [2A] under the doctrine of equivalents.

6.   Claim [3]: "wherein the total transmit power is determined based on the transmit power factors for the first and second channels and a Transmit Power Control (TPC) command issued by the system"

123.   All of the Accused Apple Products practice the limitation "wherein the total transmit power is determined based on the transmit power factors for the first and second channels and a Transmit Power Control (TPC) command issued by the system," as recited by claim 3.

(a)   All of the Accused Apple Products Infringe Claim [4] Because They are Compliant with the 3GPP Standard

124.   For example, the initial transmit power of the DPCCH and DPDCH channels are set by higher layers and then through uplink TPC procedures:

The initial uplink DPCCH transmit power is set by higher layers. Subsequently the uplink transmit power control procedure simultaneously controls the power of a DPCCH and its corresponding DPDCHs (if present). The relative transmit power offset between DPCCH and DPDCHs is determined by the network and is computed according to subclause 5.1.2.5 using the gain factors signalled to the UE using higher layer signalling.
(3GPP[2] § 5.1.2.1).

125.   TPC commands are derived using one of two supported algorithms described in 3GPP[2] §§ 5.1.2.2.2 and 5.1.2.2.3.

126.   According to the 3GPP Standard, "[a]fter deriving of the combined TPC command TPC_cmd using one of the two supported algorithms, the UE shall adjust the transmit power of the uplink DPCCH with a step of β_{DPCCH} (in dB) which is given by: $\beta_{DPCCH} = \beta_{TPC} \times$ TPC_cmd." (3GPP[2] § 5.1.2.2.1).

127.   It is thus my opinion that each of the Accused Apple Products satisfies this limitation of the claim.

(b)   The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [3]

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130.   In my view, therefore, the documentation and source code for the Accused Apple Products supports my opinion that these products infringe Claim [3], which recites "wherein the total transmit power is determined based on the transmit power factors for the first and second channels and a Transmit Power Control (TPC) command issued by the system," literally.

(c)   Infringement of Claim [3] Under the Doctrine of Equivalents

131.   If the Court determines any of the elements of Claim [3] are not met literally, it is my opinion that the difference between each of the Accused Apple Products and Claim [3] is insubstantial. They both perform substantially the same function of determining the total transmit power, in substantially the same way of receiving a TPC command, and achieve substantially the same result of controlling the total transmit power. It is thus my opinion that each of the Accused Apple Products satisfies Claim [3] under the doctrine of equivalents.

7.   Claim [4]: "The method as claimed in claim 1, further comprising the step of equally scaling transmit power factors corresponding to the other channels comprising the first channel when the transmit power factor for the second channel is scaled down below a predetermined minimum value"

132.   All of the Accused Apple Products practice the limitation "equally scaling transmit power factors corresponding to the other channels comprising the first channel when the

transmit power factor for the second channel is scaled down below a predetermined minimum

value," as recited by claim 4.

        (a)   **All of the Accused Apple Products Infringe Claim [4] Because They are Compliant with the 3GPP Standard**

133.   For example, predetermined minimum gain factors are specified in Table 1B.2

and described in 3GPP[2] § 5.1.2.6. Any additional scaling maintains enumerated power ratios,

so that equal scaling results. (3GPP[2] § 5.1.2.6).

134.   It is thus my opinion that each of the Accused Apple Products satisfies this

limitation of the claim.

        (b)   **The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [4]**

136.   In my view, therefore, the documentation and source code for the Accused Apple

Products supports my opinion that these products infringe Claim [4], which recites "[t]he method

as claimed in claim 1, further comprising the step of equally scaling transmit power factors

corresponding to the other channels comprising the first channel when the transmit power factor

for the second channel is scaled down below a predetermined minimum value," literally.

        (c)   **Infringement of Claim [4] Under the Doctrine of Equivalents**

137.   If the Court determines any of the elements of Claim [4] are not met literally, it is

my opinion that the difference between each of the Accused Apple Products and Claim [4] is

insubstantial. They both perform substantially the same function of applying additional scaling,

in substantially the same way of scaling the channels that do not support HARQ equally, and

achieve substantially the same result of a reducing the total transmit power to the maximum

allowed power. It is thus my opinion that each of the Accused Apple Products satisfies Claim

[4] under the doctrine of equivalents.

8.   Claim [5]: "wherein the predetermined minimum value indicates a status where the second channel is not transmitted"

138.   All of the Accused Apple Products practice "wherein the predetermined minimum

value indicates a status where the second channel is not transmitted," as recited by claim 5.

(a)   All of the Accused Apple Products Infringe Claim [5] Because They are Compliant with the 3GPP Standard

139.   For example, the predetermined minimum gain factors specified in Table 1B.2

and described in 3GPP[2] § 5.1.2.6 indicate a discontinuous transmission (DTX) status where the

E-DPDCH channel is not transmitted. As stated in the 3GPP Standard:

> In case a DPDCH is configured, if any $\beta_{ed,k,reduced}/\beta_c$ is less than the smallest quantized value of Table 1B.2 in [3] subclause 4.2.1.3, ***DTX may be used on that E-DPDCH*** (E-DPCCH is, however still transmitted using β_{ec}).

(3GPP[2] § 5.1.2.6 (emphasis added)).

140.   It is thus my opinion that each of the Accused Apple Products satisfies this

limitation of the claim.

(b)   The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [5]

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142.   In my view, therefore, the documentation and source code for the Accused Apple Products supports my opinion that these products infringe Claim [5], which recites "wherein the predetermined minimum value indicates a status where the second channel is not transmitted," literally.

(c)   Infringement of Claim [5] Under the Doctrine of Equivalents

143.   If the Court determines any of the elements of Claim [5] are not met literally, it is my opinion that the difference between each of the Accused Apple Products and Claim [5] is insubstantial. They both perform substantially the same function of not transmitting the E-DPDCH channels if they are reduced below a minimum threshold, in substantially the same way of setting the gains for these channels to zero, and achieve substantially the same result of a not transmitting the channel if its transmit power falls too low. It is thus my opinion that each of the Accused Apple Products satisfies Claim [5] under the doctrine of equivalents.

9.   Claim [6]: "The method as claimed in claim 1, further comprising the step of equally scaling transmit power factors for the other channels exclusive of the second channel if the total transmit power still exceeds the maximum allowed power even after the transmit power factor for the second channel has been scaled-down"

144.   All of the Accused Apple Products practice "equally scaling transmit power factors for the other channels exclusive of the second channel if the total transmit power still

exceeds the maximum allowed power even after the transmit power factor for the second channel

has been scaled-down," as recited by claim 6.

(a)   All of the Accused Apple Products Infringe Claim [6] Because They are Compliant with the 3GPP Standard

145.   The 3GPP Standard provides for additional scaling if the total transmit power still

exceeds the maximum allowable power. The additional scaling must maintain enumerated

power ratios, resulting in the channels not supporting HARQ to be equally scaled down. (*See*

3GPP[2] § 5.1.2.6).

146.   It is thus my opinion that each of the Accused Apple Products satisfies this

limitation of the claim.

(b)   The Accused Apple Products' Documentation and Source Code Further Demonstrate that They Infringe Claim [6]

148.   In my view, therefore, the documentation and source code for the Accused Apple

Products supports my opinion that these products infringe Claim [6], which recites "equally

scaling transmit power factors for the other channels exclusive of the second channel if the total

transmit power still exceeds the maximum allowed power even after the transmit power factor

for the second channel has been scaled-down," literally.

(c)   Infringement of Claim [6] Under the Doctrine of Equivalents

149.   If the Court determines any of the elements of Claim [6] are not met literally, it is my opinion that the difference between each of the Accused Apple Products and Claim [6] is insubstantial. They both perform substantially the same function of providing additional power scaling, in substantially the same way of equally scaling down the channels that do not support HARQ, and achieve substantially the same result of reducing the total transmit power below the maximum allowed transmit power. It is thus my opinion that each of the Accused Apple Products satisfies Claim [6] under the doctrine of equivalents.

10.   Claim [14]: "wherein the transmit power factors are determined based on Transport Formats (TF) which are selected according to scheduling assignment information received from a Node B, respectively"

150.   All of the Accused Apple Products practice "wherein the transmit power factors are determined based on Transport Formats (TF) which are selected according to scheduling assignment information received from a Node B, respectively," as recited by claim 14.

151.   For example, "[s]cheduling and transport format selection is controlled by the MAC-hs sublayer in the Node B." (3GPP[2] § 6A.1). The transmit gain factors are determined based on the specific Transport Format Combination (TFC) used. As explained in the 3GPP Standard, there are two ways of controlling the gain factors for different TFCs: either the gains may be signaled for the TFC or computed for the TFC based on the signaled settings for a reference TFC. (3GPP[2] § 6A.1). (*See* 3GPP[2] § 5.1.2.5.1).

152.   Moreover, the Intel engineer responsible for the uplink power control used in the baseband processors found in the Accused Apple Products confirmed that the transmit power factors are determined through signaling from the base station or Node B. (Paltian Rough Dep. Tr. 70:24-71:8; 72:13-73:18).

153.   It is thus my opinion that each of the Accused Apple Products satisfies this

limitation of the claim.

(b)   Infringement of Claim [14] Under the Doctrine of Equivalents

154.   If the Court determines any of the elements of Claim [14] are not met literally, it

is my opinion that the difference between each of the Accused Apple Products and Claim [14] is

insubstantial. They both perform substantially the same function of determining transmit gains,

in substantially the same way basing the new gains on a TFC, and achieve substantially the same

result of deriving new gains for the transmit channels. It is thus my opinion that each of the

Accused Apple Products satisfies Claim [14] under the doctrine of equivalents.

11.   Claim [15A]: "An apparatus for transmitting data of a first channel not supporting Hybrid Automatic Repeat reQuest (HARQ) and a second channel supporting the HARQ in a mobile telecommunication system which supports an enhanced uplink service, the apparatus comprising"

155.   The Accused Apple Products infringe this limitation for at least the same reasons

described above in connection with claim 1. (*See* § VI(H)(1).)

12.   Claim [15B]: "a controller for determining transmit power factors for the channels and determining if total transmit power required for transmission of the channels exceeds the maximum allowed power"

156.   All of the Accused Apple Products include "a controller for determining transmit

power factors for the channels and determining if total transmit power required for transmission

of the channels exceeds the maximum allowed power," as recited by claim 15.

157.   The Accused Apple Products infringe this limitation at least for at least the same

reasons described above in connection with claim 1. (*See* § VI(H)(2)).

13. **Claim [15C]: "scaling down the transmit power factor for the second channel if the total transmit power exceeds the maximum allowed power"**

158.   All of the Accused Apple Products practice "scaling down the transmit power factor for the second channel if the total transmit power exceeds the maximum allowed power," as recited by claim 15.

159.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 1. (*See* § VI(H)(3)).

14. **Claim [15D]: "first and second channel generators for generating first and second data frames by performing channel-coding and modulation of the first and second channel data"**

160.   All of the Accused Apple Products include first and second channel generators for generating first and second data frames by performing channel-coding and modulation of the first and second channel data," as recited by claim 15.

161.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 1. (*See* § VI(H)(1)). The first and second channels generators include at least the "TxMod" peripheral and the "TxBitProc" peripheral described in the Product Specification. (593DOC003211-521).

15. **Claim [15E]: "a gain scaling unit for adjusting the transmit powers of the first and second channels, with which the data frames of the first and second channels is transmitted, using the scaled transit power factor for the second channel and the transmit power factor for the first channel"**

162.   All of the Accused Apple Products practice "a gain scaling unit for adjusting the transmit powers of the first and second channels, with which the data frames of the first and second channels is transmitted, using the scaled transit power factor for the second channel and the transmit power factor for the first channel," as recited by claim 15.

(a) **Infringement under Samsung's Proposed Construction**

163.   Samsung contends the term "gain scaling unit" should be given its plain and ordinary meaning. (Exhibit H). I agree. A person of ordinary skill in the art would understand that a "gain scaling unit" could include any combination of hardware and/or software that adjusts the gain or transmit power factor of a channel. As described in the specification, the gain scaling unit is used to "adjust[] the transmit powers of the first and second channels" and may include, for example, one or more gain scalers shown in Figure 8 as well as transmission controller 706 ('516 patent at 4:54-67; 9:26-10:20; Figure 8). As such, the specification supports Samsung's construction.

164.   Under this plain and ordinary meaning, the Accused Apple Products clearly include "gain scaling unit" because of their compliance with the 3GPP Standard. (*See* § VI(H)(3)(a)).

165.   Moreover, the source code and related documentation confirm my opinion. For example, the gain multiplication block shown in figure 96 of the Product Specification show separate gain weighting blocks for each channel. (593DOC003229). These blocks are responsible for adjusting the transmit powers for the transmit channels using gain scaling factors for each channel. (593DOC003229-31).

166.   In addition, as described above, ███████████████████████████ ██ ██ ██████████████████████████████████████ Thus, the software and associated hardware comprise the "gain scaling unit."

167.   It is thus my opinion that each of the Accused Apple Products satisfies this limitation of the claim under Samsung's construction.

(b) **Infringement under Apple's Proposed Construction**

168. Apple asserts that the term "gain scaling unit" should be construed as "a device that reduces gain based on a scale factor." (Exhibit I).

169. As described above, ███████████████████████████████████████

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170. Therefore, it is my opinion that the Accused Apple Products infringe this limitation under either party's proposed construction.

(c) **Infringement of Claim [15E] Under the Doctrine of Equivalents**

171. If the Court determines any of the elements of Claim [15E] are not met literally, it is my opinion that the difference between each of the Accused Apple Products and Claim [15] is insubstantial. They both perform substantially the same function of scaling down the transmit power factor, in substantially the same way of reducing the gain factor, and achieve substantially the same result of reducing the total transmit power below the maximum allowed transmit power. It is thus my opinion that each of the Accused Apple Products satisfies Claim [15E] under the doctrine of equivalents.

16. **Claim [16]: "wherein the controller scales the transmit power factor for the second channel from slot to slot when the total transmit power exceeds the maximum allowed power"**

172.   All of the Accused Apple Products practice the limitation "wherein the controller scales the transmit power factor for the second channel from slot to slot when the total transmit power exceeds the maximum allowed power," as recited by claim 16.

173.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 2. (*See* § VI(H)(5)).

17. **Claim [17]: "wherein the controller determines the total transmit power based on the transmit power factors for the first and second channels and a TPC command issued by the system"**

174.   All of the Accused Apple Products practice the limitation "wherein the controller determines the total transmit power based on the transmit power factors for the first and second channels and a TPC command issued by the system," as recited by claim 17.

175.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 3. (*See* § VI(H)(6)).

18. **Claim [18]: "wherein the controller equally scales transmit power factors corresponding to the other channels comprising the first channel when the transmit power factor for the second channel is scaled-down below a predetermined minimum value"**

176.   All of the Accused Apple Products practice the limitation "wherein the controller equally scales transmit power factors corresponding to the other channels comprising the first channel when the transmit power factor for the second channel is scaled-down below a predetermined minimum value," as recited by claim 18.

177.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 4. (*See* § VI(H)(7)).

19. **Claim [19]: "wherein the predetermined minimum value indicates a status where the second channel is not transmitted"**

178.   All of the Accused Apple Products practice the limitation "wherein the predetermined minimum value indicates a status where the second channel is not transmitted," as recited by claim 19.

179.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 5. (*See* § VI(H)(8)).

20. **Claim [20]: "wherein the controller equally scales transmit power factors for the other channels exclusive of the second channel if the total transmit power still exceeds the maximum allowed power even after the transmit power factor for the second channel has been scaled"**

180.   All of the Accused Apple Products practice the limitation "wherein the controller equally scales transmit power factors for the other channels exclusive of the second channel if the total transmit power still exceeds the maximum allowed power even after the transmit power factor for the second channel has been scaled," as recited by claim 20.

181.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 6. (*See* § VI(H)(9)).

21. **Claim [28]: "wherein the transmit power factors are determined based on Transport Formats (TF) which are selected according to scheduling assignment information received from a Node B, respectively"**

182.   All of the Accused Apple Products practice the limitation "wherein the transmit power factors are determined based on Transport Formats (TF) which are selected according to scheduling assignment information received from a Node B, respectively," as recited by claim 28.

183.   The Accused Apple Products infringe this limitation at least for at least the same reasons described above in connection with claim 10. (*See* § VI(H)(10)).

VII. APPLE'S DIRECT AND INDIRECT INFRINGEMENT OF THE '516 PATENT

1. Apple's Direct Infringement

184. It is my opinion that Apple directly infringes all of the asserted claims by its importation and sale of the Accused Apple Products in the United States. The Accused Apple Products are all compliant with Release 6 of the 3GPP Standard, support HSUPA, and therefore necessarily infringe the '516 patent. (*See, e.g.*, ███████████████████████████

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████████████████████████████████████). Chipworks, Inc., an independent third-party, has also confirmed support for the uplink channel power scaling as described in the 3GPP Standard in the Accused Apple Products. (Exhibit O).

185. It is also my opinion that Apple directly infringes the asserted claims when Apple tests its products. (*See* Shi Dep. Tr. at 19:22-24:23).

186. Apple extensively tests its products for a variety of reasons. ███████████████

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██). When Apple

performs these tests, or when a third party performs these tests for Apple, it necessarily infringes

the '516 patent

187.   Apple must comply with a large set of requirements in order to sell its products

for use on AT&T's network. ██

████████████████████████████████████ When Apple performs these tests,

it necessarily infringes the '516 patent.

2.   **Apple's Indirect Infringement**

188.   It is my opinion that Apple indirectly infringes the Asserted Claims by inducing

and/or contributing to the infringement of the '516 patent.

189.   It is my opinion that Apple induces its customers and end users to infringe the

asserted claims because it knows or has reason to know that selling or testing the Accused Apple

Products together with Apple's created user manuals, operating instructions, packaging

materials, and other materials will cause others to operate the accused products in an infringing

manner on a UMTS network. (*See, e.g.*, ████████████████████████

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190.   Apple's customers and end users directly infringe the claims by using the accused

products on a UMTS network that is complaint with the 3GPP Standard and HSUPA. For

example, AT&T Mobility, the network operator of the network on which the Accused Apple

Products transmit and receive data, uses ████████████████████████████

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████████████████████ Chipworks, Inc., an independent third-party, has also confirmed

support for the uplink channel power scaling as described in the 3GPP Standard in the Accused

Apple Products. (Exhibit P).

    192.   It is my opinion that Apple encourages such use by, for example, advertising the

accused products' wireless capabilities on its website, and by publishing and distributing user

guides advertising the accused products' wireless capabilities. Apple induces such infringement,

for example, with at least the following distributed documents:

- Apple, http://www.apple.com/iphone-4/specs.html (last visited Mar. 20, 2012)

- Apple, http://support.apple.com/kb/SP587 (last visited Mar. 20, 2012)

- Apple, http://www.apple.com/ipad/specs/ (last visited Mar. 20, 2012)

- Apple, http://manuals.info.apple.com/en_US/iphone_user_guide.pdf (last visited Mar. 20, 2012)

- Apple, http://manuals.info.apple.com/en_US/iphone_4_finger_tips.pdf (iPhone 4 Finger Tips –Quick Start Guide) (last visited Mar. 20, 2012)

- Apple, http://manuals.info.apple.com/en_US/iPhone_iOS4_User_Guide.pdf (iPhone User Guide for iOS 4.2 and 4.3 Software) (last visited Mar. 20, 2012)

- Apple, http://manuals.info.apple.com/en_US/iPhone_iOS3.1_User_Guide.pdf (iPhone User Guide for iPhone OS 3.1 Software) (last visited Mar. 20, 2012)

- Apple, http://manuals.info.apple.com/en_US/ipad_2_user_guide.pdf (iPad 2 User Guide (For IOS 4.3 Software)) (last visited Mar. 20, 2012)

193. It is my understanding that Apple had actual notice of the '516 patent at least as early as May 16, 2006 when U.S. Patent Application No. 11/148,181 was declared essential to the 3GPP standard. (*See* APLNDC-WH-A 0000009415-423). It is also my understanding that Apple also had notice of the '516 patent no later than April 27, 2011, when Samsung filed its Complaint against Apple asserting infringement of the '516 patent.

194. It is also my opinion that Apple further contributes to infringement because it sells the Accused Apple Products knowing that they (1) are not staple articles of commerce and (2) have no substantial noninfringing uses. Rather, the Accused Apple Products are specially designed and adapted for use in the infringement of the Asserted Claims. As explained throughout my report, to operate on an HSUPA network compliant with the 3GPP Standard, the '516 patent must necessarily be infringed. One of the major reasons why Apple customers buy the Accused Apple Products is for its high speed uplink communications with efficient transmit power scaling. Without the HSUPA capabilities that the Accused Apple Products provide, the products would not be adequate for the purposes they are marketed.

VIII.   RESPONSE TO APPLE'S SUPPLEMENTAL NON-INFRINGEMENT

CONTENTIONS

195.   I understand that Apple recently served supplemental response to Samsung's

Interrogatory No. 12 regarding non-infringement. (Exhibit J). I have reviewed Apple's

supplemental responses.

196.   Apple initially argues that Samsung has not shown that the Accused Apple

Products have the features described in 3GPP TS 25.214. From my analysis above, however, all

the Accused Apple Products are compliant Release 6 of the 3GPP Standard and HSUPA and

therefore are fully compliant with the requisite version (version 6.6.0) of 3GPP TS 25.214. *See,*

e.g., ██

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████████████. Release 6 and HSUPA compliance is even mandated by the network operator,

AT&T Mobility, and detailed in its Requirements Document. (*See, e.g.,* Exhibit M at ch. 7). In

addition, Chipworks, Inc., an independent third-party, has also confirmed support for the uplink

channel power scaling as described in the 3GPP Standard (3GPP TS 25.214) in the Accused

Apple Products. (Exhibit P).

197.   Moreover, I have performed a detailed analysis of the source code associated

with the baseband processor found within the Accused Apple Products and my findings confirm

my opinion that the Accused Apple Products do in fact have the features described in 3GPP TS

25.214 (version 6.6.0) and are fully compliant with this standard. The hardware design

documentation, the source code functions, and the comments to the source code functions all

clearly indicate support for the transmit power scaling functionality developed by Samsung and

adopted into the 3GPP Standard.

198.   Apple also argues that Samsung contends that the claimed first channel not

supporting HARQ is a single DPDCH channel and the claimed second channel supporting

HARQ is a single E-DPDCH channel. Samsung does not so contend. Rather, the claimed first

channel comprises all the channels of the type that do not support HARQ as indicated in the

preamble of the claim (e.g., including one or more of DPDCH, DPCCH, HS-DPCCH, and E-

DPCCH). As such, the total transmit power can be the sum of all the channels transmitted by the

device because the first channel and second channel can include more than one channel. The

notion of a "channel" including more than one physical channel is well-known. For example, the

first type of channel can include all the channels not supporting HARQ and the second type of

channel can include all the channel supporting HARQ (thus, all the E-DPDCH channels). This

interpretation is consistent with the description throughout the patent specification. Moreover,

Intel's own engineer who programmed the firmware relating to the uplink power control in the

Accused Apple Products admitted that he personally uses a single channel type descriptor (such

as E-DPDCH) to refer to more than one channel (e.g., all four uplink channels of the E-DPDCH

type). (*See* Paltian Rough Dep. Tr. 139:25-140:14). As another example, one of ordinary skill in

the art would consider the "E-DCH" channel as including all the enhanced physical uplink

channels, not just a single channel. (*Id.*).

IX.   APPLE'S POTENTIAL "DESIGN-AROUNDS"

199.   I understand that in order to avoid infringement of the '516 patent, Apple may attempt to "design-around" certain features and functionality, or in other words, Apple may attempt to circumvent the '516 patent by performing the same (or comparable) function in an allegedly non-infringing way.

200.   I have seen no such design-around that would allow the Accused Apple Products to be Release 6 compliant with the 3GPP Standard. As explained above, 3GPP creates UMTS communications standards so that all UMTS-capable devices may communicate with each other over a UMTS network, such as AT&T's UMTS network. For Apples products to interoperate in the AT&T network they would need to be 3GPP Release 6 compliant.

201.   As also explained above, AT&T mandates that all devices accessing its network support some set of minimum device requirements. (*See* Exhibit M). For example, AT&T currently mandates that all devices accessing its network support Release 6 signaling and HSUPA. (Exhibit M at ATT000001-1338 at ch. 7; ATT000124). Because the '516 patent describes and claims a Release 6 feature that was adopted into the 3GPP Standard, the Accused Apple Products must support this feature.

X.   TRIAL EXHIBITS

202.   I may rely on visual aids and demonstratives to demonstrate the bases for my opinions. Examples of such visual aids and demonstratives may include, for example, claim charts, patent drawings, excerpts from patent specifications, file histories, interrogatory responses, deposition transcripts and exhibits, as well as charts, diagrams, videos and animated or computer-generated video.

203.   I have not yet prepared any exhibits for use at trial as a summary or support for the opinions expressed in this report, but I expect to do so.

XI.   CONCLUSIONS

204.   I have analyzed each of the Accused Apple Products to determine whether they infringe any of the Asserted Claims.

205.   It is my opinion that each of the Accused Apple Products infringes all the Asserted Claims literally, under the doctrine of equivalents, and indirectly.

206.   It is also my opinion that each of the Accused Apple Products infringes all the Asserted Claims under both parties' proposed constructions.

207.   I reserve the right to adjust or supplement my opinion after I have had the opportunity to review other deposition testimony or in light of additional documents or other discovery that may be brought to my attention. I also reserve the right to adjust or supplement my analysis in light of any critiques or comments on my report and to offer additional opinions and evidence in reply to any opinions advanced by or on behalf of Apple.

208.   I may amend or supplement this report as necessary based on such additional information, or to address any new claim constructions offered by Apple, Samsung, or provided by the Court.

The above report reflects my opinions in this matter.

Date: March 22, 2012

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Tim A. Williams, Ph.D.