

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Yong-Sheng Chen
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Appl. Serial No.: 15/685,661
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Title: REMOTE WAKEUP METHOD, CONNECTION SERVER,
AND NETWORKING APPARATUS HAVING SLEEP MODE

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 10,602,448 PURSUANT TO 35 U.S.C. §§311–319, 37 C.F.R. §42**

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LIST OF EXHIBITS

EX1001	U.S. Patent No. 10,602,448 to Luna (“the ’448 patent”)
EX1002	Prosecution History of the ’448 patent (“the Prosecution History”)
EX1003	Declaration and Curriculum Vitae of Vlad Kardashov
EX1004	U.S. Patent Publication No. 2014/0298066 (“Zhang”)
EX1005	U.S. Patent Publication No. 2009/0210519 (“Zill”)
EX1006	U.S. Patent Publication No. 2017/0366753 (“Liu”)
EX1007	RESERVED
EX1008	Certified Translation of Chinese Patent Application No. 201610422371.8 (“Liu Foreign Priority Application”)
EX1009	Chinese Patent Application No. 201610422371.8 (“Liu Foreign Priority Application”)
EX1010	U.S. Patent Publication No. 2015/0074432 (“Winter”)
EX1011	U.S. Patent Publication No. 2010/0262681 (“Chang”)
EX1012	U.S. Patent Publication No. 2016/0234783 (“Xing”)
EX1013	U.S. Patent Publication No. 2014/0129859 (“O’Malley”)
EX1014	U.S. Patent Publication No. 2013/0212413 (“Berndt”)
EX1015	Complaint, <i>ThroughTEK Co. Ltd. v. Reolink Innovation Inc.</i> , Case No. 1:24-cv-00169 (D. Del.), Feb. 8, 2024

- EX1016 Stipulation and Proposed Order to Substitute Party Name,
 ThroughTEK Co. Ltd. v. Reolink Innovation Inc., Case No.
 1:24-cv-00169 (D. Del.), April 13, 2024
- EX1017 Postel, J., "Internet Protocol", STD 5, RFC 791, DOI
 10.17487/RFC0791, September 1981, <<https://www.rfc-editor.org/info/rfc791>>

LISTING OF CLAIMS

Claim Element	Language
[1pre]	A remote wakeup method, comprising:
[1a]	a connection server receiving a wakeup request packet from a first apparatus,
[1a.i]	wherein the wakeup request packet comprises a device identifier of a second apparatus,
[1a.ii]	wherein the first apparatus is connected to the connection server via local area network or internet;
[1b]	the connection server obtaining wakeup information stored in the connection server according to the wakeup request packet,
[1b.i]	wherein the wakeup information stored in the connection server is the same as wakeup information stored in the second apparatus;
[1c]	the connection server generating an apparatus wakeup packet according to the wakeup request packet and the wakeup information,
[1c.i]	wherein the apparatus wakeup packet comprises the device identifier of the second apparatus from the wakeup request packet and the obtained wakeup information;
[1d]	the connection server obtaining a network address corresponding to the second apparatus from a storage unit of the connection server according to the wakeup request packet;
[1e]	the connection server sending the apparatus wakeup packet to the second apparatus based on the network address,
[1e.i]	wherein wakeup feature data is a segment of data of the apparatus wakeup packet and is for determining whether the entire second apparatus be awoken.

[2]	The remote wakeup method according to claim 1, wherein the step of generating the apparatus wakeup packet comprises: combining the wakeup request packet and the wakeup information into an unencrypted packet; and performing an encryption calculation on the unencrypted packet to generate the apparatus wakeup packet.
[3]	The remote wakeup method according to claim 2, wherein one encryption unit of the encryption calculation comprises entire data or partial data of the device identifier and the wakeup information.
[5a]	The remote wakeup method according to claim 2, further comprising: receiving, by the second apparatus, the apparatus wakeup packet;
[5b]	obtaining, by the second apparatus, a wakeup feature data from the apparatus wakeup packet, and the wakeup feature packet comprises entire data or partial data of the device identifier and the wakeup information;
[5c]	comparing the wakeup feature data with a pre-stored feature data, wherein the pre-stored feature data is pre-stored in the second apparatus before the second apparatus sleeps; and
[5d]	when the wakeup feature data is consistent with the pre-stored feature data, waking up the entire second apparatus.
[7]	The remote wakeup method according to claim 1, further comprising: receiving a sleep login packet from the second apparatus; and recording a running state of the second apparatus as a sleep state in the storage unit according to the sleep login packet.
[8]	The remote wakeup method according to claim 7, wherein the sleep login packet has a feature flag, and the feature flag indicates that the running state of the second apparatus is the sleep state.

[9a]	The remote wakeup method according to claim 1, further comprising: receiving a connection request packet from the first apparatus, wherein the connection request packet is used to request for performing communication connection to the second apparatus;
[9b]	determining a running state of the second apparatus according to the connection request packet; and
[9c]	when the running state of the second apparatus is a sleep state, replying to the first apparatus that the second apparatus sleeps.
[10]	The remote wakeup method according to claim 1, wherein the steps of obtaining the wakeup information and the network address comprise: reading the wakeup information and the network address that correspond to the device identifier from a storage unit.
[11pre]	A connection server, comprising:
[11a]	a network module;
[11b]	a storage unit, which stores a network address and wakeup information that correspond to a second apparatus; and
[11c]	a control unit, which
[11c.i]	connects to the network module and storage unit,
[11c.ii]	receives a wakeup request packet from a first apparatus through the network module,
[11c.iii]	obtains the wakeup information stored in the storage unit and the network address stored in the storage unit according to the wakeup request packet,
[11c.iv]	generates an apparatus wakeup packet according to the received wakeup request packet and the obtained wakeup information, and

[11c.v]	sends the generated apparatus wakeup packet to the second apparatus through the network module according to the network address,
[11d]	wherein the wakeup request packet comprises a device identifier of the second apparatus, and
[11e]	the apparatus wakeup packet comprises the device identifier from the wakeup request packet and the obtained wakeup information of the second apparatus,
[11f]	wherein the wakeup information stored in the connection server is the same as wakeup information stored in the second apparatus, and
[11g]	wherein wakeup feature data is a segment of data of the apparatus wakeup packet and is for determining whether the entire second apparatus be awoken.
[12]	The connection server according to claim 11, wherein the control unit combines the wakeup request packet and the wakeup information into one unencrypted packet and performs an encryption calculation on the unencrypted packet to generate an apparatus wakeup packet.
[13]	The connection server according to claim 12, wherein one encryption unit of the encryption calculation comprises entire data or partial data of the device identifier and the wakeup information.
[15]	The connection server according to claim 11, wherein the storage unit further stores a running state of the second apparatus, and the control unit receives a sleep login packet from the second apparatus through the network module and updates the running state of the second apparatus in the storage unit as a sleep state according to the sleep login packet.
[16]	The connection server according to claim 15, wherein the sleep login packet has a feature flag, and the feature flag

	indicates that the running state of the second apparatus is the sleep state.
[17]	The connection server according to claim 11, wherein when the control unit receives a connection request packet used to request for performing communication connection to the second apparatus from the first apparatus through the network module, the control unit determines a running state of the second apparatus according to the connection request packet and when determining that the running state of the second apparatus is a sleep state, replies to the first apparatus that the second apparatus sleeps.
[18]	The connection server according to claim 11, wherein the storage unit records the device identifier and correspondences between the device identifier and the wakeup information and between the network address and the wakeup information.
[19pre]	A networking apparatus having a normal running mode and a sleep mode, comprising:
[19a]	a network module;
[19b]	a storage unit, which stores a device identifier and wakeup information; and
[19c]	a control unit, which
[19c.i]	connects to the network module and storage unit, and
[19c.ii]	before entering the sleep mode, generates a pre-stored feature data according to the device identifier and the wakeup information and stores the pre-stored feature data in the storage unit,
[19d]	wherein the pre-stored feature data comprises entire data or partial data of the device identifier and the wakeup information,

[19e]	wherein: in the normal running mode, the control unit sends a normal login packet through the network module, to provide a network address of the networking apparatus;
[19f]	in the sleep mode, the control unit sleeps, but the network module still keeps running and when receiving an apparatus wakeup packet sent to the network address of the networking apparatus from a connection server and generated by the connection server,
[19g]	compares the pre-stored feature data and a wakeup feature data being a segment of data of the apparatus wakeup packet to determine whether to wake up the entire networking apparatus.
[23]	The networking apparatus having a normal running mode and a sleep mode according to claim 19, wherein the storage unit stores a login data, before entering the sleep mode, the control unit generates, according to the login data and a feature flag, a sleep login packet having the login data, and the feature flag indicates that a running state of the networking apparatus is sleep.
[24]	The networking apparatus having a normal running mode and a sleep mode according to claim 23, wherein the feature flag is located at a header of the sleep login packet.
[25]	The networking apparatus having a normal running mode and a sleep mode according to claim 23, wherein in the sleep mode, the network module periodically sends the sleep login packet to the connection server.

Reolink Innovation Inc. and Shenzhen Reolink Technology Co., Ltd. (collectively, “Petitioners” or “Reolink”) petition for *Inter Partes* Review (“IPR”) of claims 1-3, 5, 7-13, 15-19, and 23-25 (“the Challenged Claims”) of U.S. Patent 10,602,448 (“the ’448 patent”).

I. REQUIREMENTS FOR IPR—37 C.F.R. §42.104

A. Grounds for Standing—37 C.F.R. §42.104(a)

The ’448 patent is available for IPR, and Petitioners are not barred or estopped from requesting IPR.

B. Challenge and Relief Requested—37 C.F.R. §42.104(b)

Petitioners request IPR on Grounds 1-3. An expert declaration from Vlad Kardashov supports all Grounds. EX1003.

Ground	Claims	Basis
1	1, 7-8, 10-11, 15-16, 18-19, 23-25	§102 – Anticipated by Zhang (EX1004)
2	1-3, 5, 7-8, 10-13, 15-16, 18-19, 23-25	§103 – Obvious based on Zhang+Zill (EX1005)
3	1-3, 5, 7-13, 15-18	§103 – Obvious based on Liu (EX1006)+Zhang

Grounds 1-3 rely on publications that qualify as prior art under 35 U.S.C. §102:

Reference	Prior Art Status
Zhang (EX1004)	§102(a)(1)–published 2014

Reference	Prior Art Status
Zill (EX1005)	§102(a)(1)—published 2008
Liu (EX1006)	§102(a)(2)—effective filing June 16, 2016 ¹

II. '448 PATENT SUMMARY

A. Brief Description

The '448 patent provides a remote wakeup method for a network apparatus having a sleep mode. EX1001, Title, Abstract. The patent describes a system comprising a server, a first apparatus (*i.e.*, a requesting apparatus), and a second apparatus (*i.e.*, a sleep-enabled apparatus).² EX1001 at 2:29-42. The “[requesting] apparatus can be provided to use a device identifier of the [sleep-enabled] apparatus to directly initiate a wakeup request (a wakeup request packet) to the remote [sleep-

¹ See EX1008 (priority application translation); §V.C.1 (demonstrating Liu’s earliest effective filing date under 35 U.S.C. §102(d)).

² The '448 patent refers to the device requesting to wake-up a sleeping device as the “first” apparatus, and the sleeping device as the “second” apparatus. EX1001, Cl. 1. Zhang uses the opposite “second”/“first” notation, referring to the device requesting to wake-up a sleeping device as the “second” computer system (or “end user”) and the sleeping device as the “first” computer system (or “sleeping client”). For clarity, this Petition uses “requesting” apparatus/computer as the claimed “first” apparatus, and “sleep-enabled” apparatus/computer as the claimed “second” apparatus.

enabled] apparatus by means of the connection server.” EX1001, 2:33-37. As this Petition demonstrates, such a system was well-known before the ’448 patent’s earliest effective filing date—August 29, 2016 (“the Critical Date”). EX1003, ¶¶29-31.

Fig. 1A shows an example of such a system with “a first apparatus,” “a second apparatus,” and a “server”:

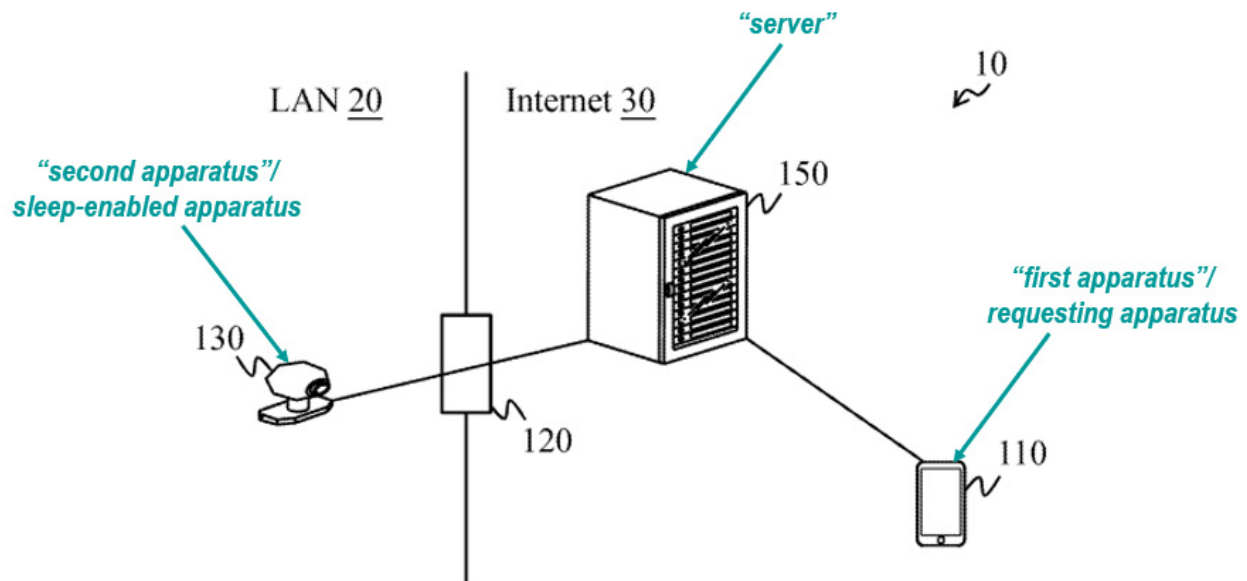


FIG. 1A

EX1001, Fig. 1A (annotated), 3:19-33. The server facilitates remotely waking up the sleep-enabled apparatus. EX1001, 5:11-15; FIG. 5 (illustrating a method for remotely waking up the sleep-enabled apparatus). The server receives a wakeup request packet from the requesting apparatus that includes an identifier (ID) of the sleep-enabled apparatus. EX1001, 5:21-26. The server uses the sleep-enabled apparatus' ID to obtain wakeup information and a network address of the sleep-

enabled apparatus. EX1001, 5:34-37, 6:1-4, 6:34-40. The server generates an apparatus wakeup packet that includes the sleep-enabled apparatus's ID and the wakeup information, which is sent to the sleep-enabled apparatus. EX1001, 5:37-40, 5:41-48 FIG. 7. The network module of sleep-enabled apparatus obtains wakeup feature data from the apparatus wakeup packet and compares it to pre-stored feature data. EX1001, 7:29-37. A result of the comparison determines whether to wake up the sleep-enabled apparatus. EX1001, 6:48-53, 7:29-41.

B. Prosecution of the '448 patent

The '448 patent issued March 24, 2020, from U.S. Application 15/685,661 ("the '661 application"), filed August 24, 2017. *See* EX1002, 247-248. During examination, the Office mailed two office actions and an advisory action, which included prior art rejections based upon patent literature not raised in this Petition. *See* EX1002, 69-93, 127-144. In January 2020, the Office initiated an interview in which the parties agreed to proposed claim amendments for entry by Examiner Amendment. EX1002, 15. A Notice of Allowance followed shortly thereafter. Never once did the applicant submit an IDS to cite the known and pertinent remote wakeup methods for a network apparatus. EX1002, 7-14. EX1003, ¶¶32-35.

However, as demonstrated by Grounds 1-3, the '661 application never should have been allowed. *Infra*, §II.C. The Office did not consider the more pertinent prior art relied on in Grounds 1-3, each of which demonstrates that the Challenged

Claims are unpatentable. EX1003, ¶195.

III. LEVEL OF ORDINARY SKILL

A POSITA in the field of the '448 patent would have had a bachelor's degree in electrical engineering and two years of work experience with network and communication technologies. EX1003, ¶¶13-15.

IV. CLAIM CONSTRUCTION

All claim terms should be construed according to the *Phillips* standard. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. Here, given the noticeable overlap between the preferred embodiment of the '448 patent and the prior art/predictable combinations articulated in Grounds 1-3, Petitioners submit that no claim elements need a formal construction for purposes of resolving controversies in this proceeding. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011); EX1003, ¶¶36-38.

V. DETAILED EXPLANATION OF GROUNDS

A. GROUND 1: Zhang anticipates claims 1, 7-8, 10-11, 15-16, 18-19, 23-25

1. Zhang (EX1004)

Like the '448 patent, Zhang is directed to “remotely waking a sleeping computer system.” EX1004, [0036]. For example, Fig. 3 illustrates “a method for securely waking a computer system over a network”:

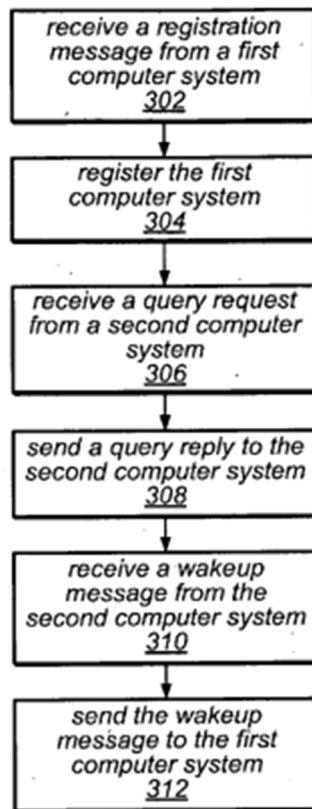


FIG. 3

EX1004, Fig. 3, [0049]; EX1003, ¶39.

Zhang's method starts with the server's receiving a registration message from the sleep-enabled computer. EX1004, [0053]; Fig. 3. The registration message includes "information identifying the [sleep-enabled] computer" including a "user-selected human-readable identification information for the [sleep-enabled] computer," "an IP address of the [sleep-enabled] computer," and a "nonce." EX1004, [0054-0055]. The information in the registration message is stored in Zhang's server. EX1004, [0056]; Fig. 3; EX1003, ¶40.

Zhang's server receives a query request including "the user-selected human-readable ID of the [sleep-enabled] computer" from the requesting computer. EX1004, [0059-0060]; Fig. 3. In response to the query request, the server sends a query reply to the requesting computer. EX1004, [0061]; FIG. 3. The query reply "include[s] some or all of the information received by the server from the [sleep-enabled] computer system in the registration message." EX1004, [0061]. Accordingly, the query reply can include "the user-selected human-readable ID of the [sleep-enabled] computer," "IP address," and "nonce." EX1004, [0054-0055], [0061]. The requesting computer initiates a "wakeup message" using information from the query reply. EX1004, [0062-0066]. The wakeup message is sent to the server which modifies the wakeup message before sending the modified wakeup message to the sleep-enabled computer. EX1004, [0066], [0070]-[0071], [0079]-[0081]; Fig. 3; EX1003, ¶41.

The sleep-enabled computer compares the information in the wakeup message (including at least the nonce and other authentication information) to the original information stored in the sleep-enabled computer. EX1004, [0067]-[0068]. For example, if the nonce in the wakeup message is the same as the original nonce, the network interface controller wakes up the sleep-enabled computer. EX1004, [0068]; EX1003, ¶42.

2. *Application to Challenged Claims*

[1pre]³

Zhang discloses [1pre]. Zhang discloses a “*method for remotely waking a sleeping computer.*”⁴ EX1004, [0036], FIG. 3, Title, Abstract, [0049-0071]. EX1003, ¶47.

[1a]

Zhang discloses [1a]. Zhang describes “a query *request* may be received by the *server.*” EX1004, [0059], [0049-0067], [0073-0078]. “The query *request* may be sent by the *[requesting] computer.*” EX1004, [0059], [0016], [0075], FIG. 4.⁵ Zhang explains that “the query *request* may be initiated by a user ... of the *[requesting] computer system*, as a first step towards *waking* the [sleep-enabled] computer system over the network.” EX1004, [0059-0060]. EX1003, ¶¶48-50.

[1a.i]

Zhang discloses [1a.i]. Zhang discloses that the “query request [*i.e.*, the *wakeup request packet*] may include *identification information for the [sleep-*

³ Petitioners do not concede that the preamble of any claim is limiting.

⁴ All emphases are added unless noted otherwise.

⁵ In Fig. 4, Zhang shows an “end user computer system 406.” EX1004, FIG. 4; [0049]. As discussed in Footnote 2, this Petition refers to this computer system as the “requesting” computer.

enabled] computer.” EX1004, [0059], [0016], [0075-0076], FIG 4⁶. For example, Zhang discloses that query request may include a “user-selected human-readable **ID** of the [sleep-enabled] computer.” EX1004, [0059]; EX1003, ¶51.

[1a.ii]

Zhang discloses [1a.ii]. As discussed in [1a], the *server* receives a query request from *the requesting computer*. Zhang describes the *requesting computer* as being *connected to the server via* “a wide-area network (WAN), such as the *internet*.” EX1004, [0073], [0038], FIG. 4, [0009], [0075-0077], FIG. 3. Zhang also describes the network connecting the server and the requesting computer may include one local area network. EX1004, [0038], FIG. 1. This connection allows the *requesting computer* to communicate with the *server* to send messages including the “query request.” EX1004, FIG. 4, [0059], [0075-0077]; EX1003, ¶52.

[1b]

Zhang discloses [1b]. Zhang describes the server as sending “a query reply” to the requesting computer in response to the query request (e.g., *the wakeup request packet*) that includes “information needed by the [requesting] computer system in

⁶ Zhang’s FIG. 4 shows “sleeping client computer systems 408 and 410.” EX1004, FIG. 4; [0049]. As discussed in Footnote 2, this Petition refers to these computer systems as the “sleep-enabled” computer.

order to generate and send a wakeup message to the [sleep-enabled] computer system.” EX1004, [0061], FIG. 3. This information includes “information received by the server from the [sleep-enabled] computer system in the registration message.”⁷ EX1004, [0061]. Zhang’s registration information includes a “nonce.” EX1004, [0061], [0015], [0055], [0058], [0074]. Registering the sleep-enabled computer at Zhang’s server includes “**storing** some or all of the information included in the registration message from the [sleep-enabled] computer system [(such as the “nonce”/**wakeup information**)] in a memory.”⁸ EX1004, [0056], Claims 7, 15. This information is stored in a memory associated with the server. EX1004 [0043], [0045], [0056], Claims 7, 15; Fig. 2. Accordingly, the server **obtains wakeup**

⁷ Zhang’s sleep-enabled computer first proceeds through an initial “registration” that includes sending certain information to the server, which stores the received information in an associated memory and then retrieves at least part of it to facilitate the wakeup process. *See, e.g.*, EX1004, [0053]-[0056], Fig. 3, 302.

⁸ The content/scope of the “wakeup information” is undefined in the claims. The specification is similarly unhelpful—providing an example in which the server and the sleep-enabled device “both have the wakeup information WM with the same content” without expressing boundaries for such “content.” EX1001, 9:29-31, 9:42-43 (noting “an authorization key” in “some embodiments”). EX1003, ¶56.

information, such as a nonce, *stored in the server according to* the query request (the *wakeup request packet*) in order to send the described query reply to the requesting computer. EX1004, [0061], [0060] (“responding to the query request”), [0064], [0076-0077]; EX1003, ¶¶53-56.

[1b.i]

Zhang discloses [1b.i]. As described in [1b], *the wakeup information* is the “nonce” that is stored at the *server* based on registration message sent from the *sleep-enabled computer*. EX1004, [0061], [0015], [0055], [0058], [0074]. Zhang explains that the “nonce” can be “a random or pseudorandom number, such as a random octet.” EX1004, [0055]. Zhang explains that, as part of the wakeup process, the *sleep-enabled computer* compares the nonce in a received wakeup message (e.g., *the nonce stored at the server*) with an original nonce (the nonce generated at the [sleep-enabled] computer) and “[i]f the comparison indicates that they are the same, the wakeup message may be authenticated.” EX1004, [0068], [0078]. Accordingly, Zhang discloses both the *server* and *the [sleep-enabled] apparatus* as storing the same *wakeup information* in the form of a nonce. EX1004, [0055], [0061], [0068]; EX1003, ¶57.

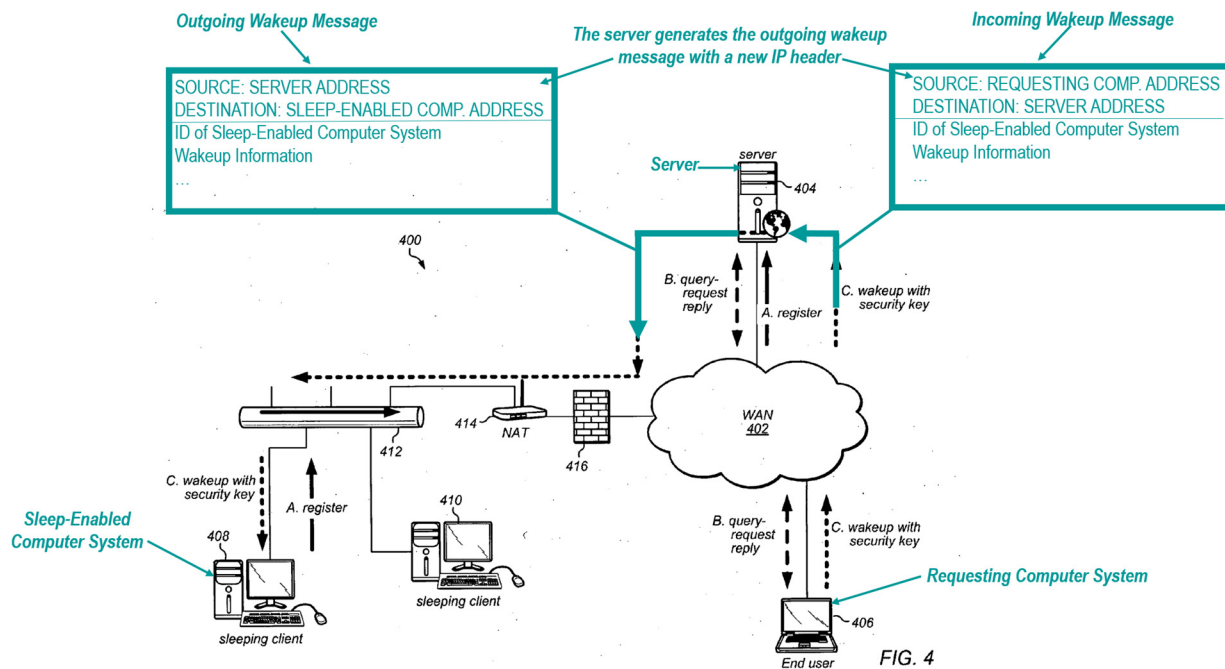
[1c]

Zhang discloses [1c]. Zhang describes a “wakeup message” from the server (the *apparatus wakeup packet*), which is “sent to the [sleep-enabled] computer.”

EX1004, [0066]. Specifically, Zhang describes the requesting computer as generating an incoming⁹ “wakeup message” using “the nonce” received by the requesting computer in the “query reply” sent by the server (e.g., based on the query request (*wakeup request packet*)). EX1004, [0062]-[0064]. The requesting computer sends the incoming wakeup message to the server which “modif[ies] or authenticate the wakeup message before sending the [outgoing] wakeup message to the [sleep-enabled] computer.” EX1004, [0066]. EX1003, ¶58.

This modified, outgoing wakeup message (the *apparatus wakeup packet*) is generated by the server, as confirmed by the evidence herein for at least two reasons:

⁹ In this petition, “incoming” and “outgoing” wakeup messages are to be understood from the perspective of the server.



EX1004, FIG. 4 (annotated), [0066], [0070]-[0071], [0079]-[0081]; EX1003, ¶58.

First, Zhang *expressly* discloses that the server can “modify” the wakeup message “before sending the wakeup message to the [sleep-enabled] computer.” EX1004, [0066]. At a minimum, Zhang teaches that the server would “modify” the incoming wakeup message, for example, by adding the IP address of the sleep-enabled computer, which is stored internally at the server, but which was not included in the incoming wakeup message (which instead includes the “human-readable ID” of the sleep-enabled computer in some embodiments). *Infra* [1d], EX1004, [0063] (“may include the user-selected human-readable ID”), [0018], [0054], [0056]. Because the outgoing wakeup message includes information not present in the incoming wakeup message (e.g., the IP address, which is used to

address the message from the server to the sleeping client), the server's modifying the incoming message wakeup message results in the generation of a new packet—the outgoing wakeup message—that includes one or more items of registration information retrieved from the server's memory. EX1003, ¶59.

Second, every message sent from Zhang's server (regardless of whether Zhang's server "modif[ies]" the incoming wakeup message as described in paragraph [0066] or the server "forwards" the incoming wakeup message as described in paragraph [0078]) is disclosed as being sent via one or more IP packets that are generated at the server to include the appropriate IP headers so that the message will be delivered to the correct destination. EX1004, [0080-0082]. FIG. 5 shows an "exemplary message format":

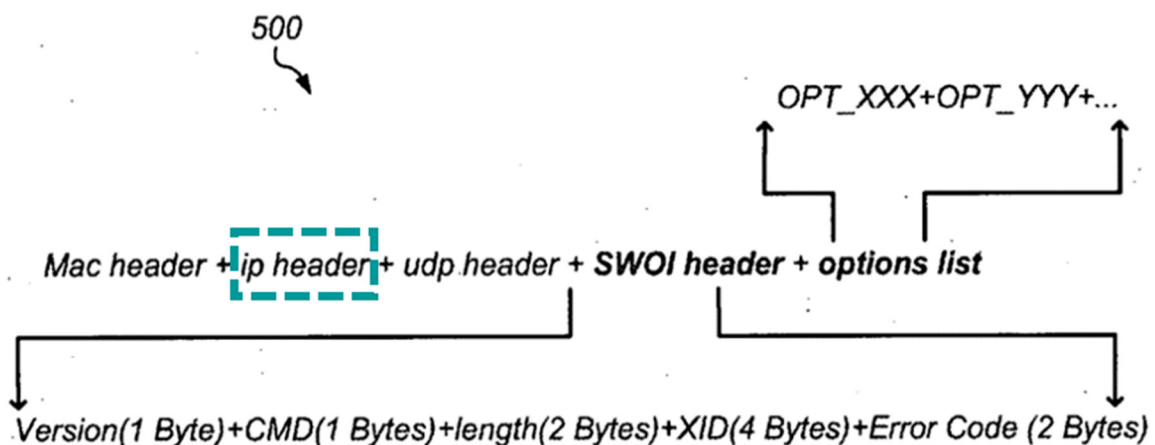


FIG. 5

EX1004, FIG. 5 (annotated), [0079-0082]. For example, the IP header includes a

source address header and the destination address header used to send an IP packet from the server to the sleep-enabled computer system that is different from the source and destination headers used to deliver an IP packet from the requesting computer system to the server. EX1004, FIG. 5 (“ip header”), [0079-0082]. Accordingly, the server generates anew at least one outgoing packet to send the outgoing wakeup message to the sleep-enabled computer (where the sleep-enabled computer is the “destination” of such outgoing packet, and the server is the “source”). EX1004, FIG. 5, [0079-0082]. The generation of the outgoing packet to send the outgoing wakeup message to the sleep-enabled computer is therefore different from the incoming packets with the incoming wakeup message, thereby providing *the apparatus wakeup packet* from the server. EX1003, ¶¶60-61 (citing EX1017 illustrating an example IP header format).

Next, Zhang teaches that the outgoing wakeup message is generated according to the incoming wakeup message, which as previously described, uses information (including the nonce (the *wakeup information*)) obtained in a query reply according to the query request (*the wakeup request packet*). *See supra* [1b]; EX1004, [0061], [0015]”); [0064], [0066]. Accordingly, Zhang’s apparatus wakeup packet is generated by the server “*according to*” the above-described wakeup request packet and the wake wakeup information because it *uses* both information supplied by the query request (wakeup request packet), and the nonce (wakeup information), which

is retrieved by the server from its memory. EX1003, ¶62.

[1c.i]

Zhang discloses [1c.i]. Zhang's outgoing wakeup message (*the apparatus wakeup packet*), as discussed in [1c], can include information from the incoming wakeup message. Zhang explains that the incoming wakeup message includes identification information for the [sleep-enabled] computer and authentication information. EX1004, [0062]. The identification information included in the incoming wakeup message may include the same user-selected human-readable ID of the [sleep-enabled] computer included in the "query request" [i.e., the "wakeup request packet"]. EX1004, [0063]. *Supra* [1a.i]. Zhang further explains that the incoming "wakeup message" is generated using "information received in the query reply" and that the query reply can include the "nonce" and the "user-selected human-readable ID." EX1004, [0061], [0064], [0017], [0064], [0076-0077]; *supra* [1c]. Accordingly, Zhang discloses the outgoing wakeup message (*the apparatus wakeup packet*) includes this information from the incoming wakeup message—the "user-selected human-readable ID of the [sleep-enabled] computer" (*the identifier of the sleep-enabled apparatus*) from the "query request" (*the wakeup request packet*) and the "nonce" (the *obtained wakeup information*). *See e.g.*, EX1004, [0081], [0017], [0064], [0076-0077]; EX1003, ¶63.

[1d]

Zhang discloses [1d]. Zhang discloses the [sleep-enabled] computer sending a registration message to the server that includes “an IP address of the [sleep-enabled] computer” (the *network address*). EX1004, [0054], [0056]. Zhang explains that the sleep-enabled computer was registered at the server by “*storing* some or all of the information included in the registration message from the [sleep-enabled] computer system [(such as the *IP address*)] in a memory.” EX1004, [0056], [0031], [0042-0043]. In this context Zhang’s “memory” is the claimed *storage unit of the server*. See EX1004, [0031], [0042-0043], [0074]. Zhang also explains that “the query reply,” sent in response to the query request (*the wakeup request packet*) “include[s] some or all of the information received by the server from the [sleep-enabled] computer system in the registration message.” EX1004, [0061]. EX1003, ¶64.

Zhang therefore discloses that the query reply can include the IP address of the sleep-enabled computer. EX1004, [0054], [0056], [0061]. For the server to be able to send the IP address of the sleep-enabled computer in a query reply, the server must be able to obtain the IP address from the storage unit of the server. Specifically, Zhang discloses an embodiment in which the “query request” sent by the requesting computer to the server “include[s] just the user-selected human-readable ID [(the *device identifier*)] of the [sleep-enabled] computer,” meaning that only the device

identifier, and nothing else, is transmitted to the server in the query request. EX1004, [0059]. Consequently, because Zhang's server does not receive the IP address ("network address") in the query request, it must retrieve (i.e., "read") the IP address ("network address") from its storage device using an association between the user-selected human-readable ID of the sleep-enabled computer. Moreover, the claim language "*according to*" includes *using* the query reply to obtain the IPR address. Therefore, *the IP address* is obtained for the query reply *according to* the corresponding query request (*the wakeup request packet*). EX1003, ¶65.

[1e]

Zhang discloses [1e]. As discussed in [1c], Zhang discloses the server generating an outgoing wakeup message, which corresponds to the *apparatus wakeup packet*. Zhang also discloses *the network address* as discussed in [1d]. Sending the *apparatus wakeup packet* from the server to the correct sleep-enabled computer would necessarily be based on the network address. EX1003, ¶66.

[1e.i]

Zhang discloses [1e.i]. As discussed, *the apparatus wakeup packet* includes a nonce (*the wakeup information*). *Supra* [1c], [1c.i]. The nonce is thus a *segment of data of the apparatus wakeup packet* and qualifies as the *wakeup feature data*. Zhang discloses comparing the nonce received in the apparatus wakeup packet to "an original nonce," and "[i]f the comparison indicates that they are the same, the

wakeup message may be authenticated and the NIC may *wake up the [sleep-enabled] computer system.*” EX1004, [0068], [0078]; EX1003, ¶67.

Zhang’s explains that waking a computer system includes “returning the computer system to a fully-on state” (i.e., includes having the entire computer system be awoken). EX1004, [0034], [0067]. The nonce (the *wakeup feature data*) is therefore used *for determining whether the entire [sleep-enabled] apparatus be awoken.* EX1003, ¶68; *see* EX1004, [0034], [0067-0068].

[7]

Zhang discloses [7], with Zhang’s registration message as the *sleep login packet.* Zhang discloses that “the NIC of the [sleep-enabled] computer system and the server may maintain an active connection for a pre-determined period of time after the [sleep-enabled] computer system sends the registration message to the server.” EX1004, [0057]. “[T]he server may initiate a timeout timer of a pre-determined length upon receiving the registration message.” EX1004, [0057]. Zhang explains that “the [sleep-enabled] computer system to periodically send a new registration message to the server, in order to maintain the active connection with the server and thereby maintain the capability to receive a wakeup message over the network, *as long as the [sleep-enabled] computer system remains in a sleep mode.*” EX1004, [0057]. Accordingly, Zhang discloses the server as receiving the registration message (the *sleep login packet*) and recording a running state of the

sleep-enabled computer (e.g., that the sleep-enabled computer is in the sleep-mode while at least as long as the “timeout timer” is active) according to the registration message. EX1003, ¶69; EX1004, [0057-0058].

[8]

Zhang discloses [8]. As discussed Zhang discloses the *sleep login packet* with Zhang’s registration message. *Supra* [7]. Zhang explains that the disclosed messages includes a “CMD field” that “indicate[s] a type of [secure wake over internet] message, such as a registration message.” EX1005, [0080]. Accordingly, the CMD field in the registration message is the *feature flag* which indicates that the running state of the sleep-enabled computer is the sleep state because the registration message is received at the server while “the [sleep-enabled] computer system remains in a sleep mode.” EX1004, [0057-0058], [0080]; EX1003, ¶70.

[10]

Zhang discloses [10]. As discussed in [1b] and [1d], Zhang discloses that the sleep-enabled computer is registered at Zhang’s server by “*storing* some or all of the information included in the registration message from the [sleep-enabled] computer system in a memory.” EX1004, [0056]. Zhang also discloses that the registration message can include the “IP address of the [sleep-enabled] computer,” “user-selected human-readable identification,” and the “nonce.” EX1004, [0054-0055]. Zhang discloses that the server includes a “memory medium” (*see* EX1004, [0042-

0043], FIG. 2) which is defined as including “[a]ny of various types of memory devices or storage devices.” EX1004, [0031]. Zhang therefore discloses that the “IP address of the [sleep-enabled] computer” (the *network address*), the “user-selected human-readable identification information” (the *device identifier*), and the “nonce” (the *wakeup information*) are stored at a storage device of the server. EX1003, ¶71; EX1004, [0031], [0042-0043], [0054], [0056], FIG. 2.

Next, Zhang discloses an embodiment in which the “query request” sent by the requesting computer to the server “include[s] *just* the user-selected human-readable ID [(the *device identifier*)] of the [sleep-enabled] computer,” meaning that *only* the device identifier, and nothing else, is transmitted to the server in the query request. EX1004, [0059]. Consequently, because Zhang’s server does not receive all required information in the query request, it must retrieve (*i.e.*, “read”) the nonce (“wakeup information”) and IP address (“network address”) from its storage device using an association between the user-selected human-readable ID of the sleep-enabled computer. EX1003, ¶72.

[11pre]

Zhang discloses [11pre]. Zhang discloses a server for remotely waking up a sleep-enabled computer. *See* EX1004, [0049-0067], [0073-0078], [0042]; *supra* Element [1pre]. EX1003, ¶73.

[11a]

Zhang discloses [11a]. Zhang explains that the “computer system 200,” illustrated in FIG. 2, “may be used to implement one or more of computer systems [“sleeping client”] 104, [“end user”] 106 and/or [**server**] 108”), FIG. 2. The “computer system 200” includes a “a network interface controller (NIC) 206” (*i.e.*, the **network module**). EX1004, [0043], [0067], [0068], [0074], [0078]; *supra* [1a.ii]. EX1003, ¶74.

[11b]

Zhang discloses [11b]. As discussed in [1b] and [1d], Zhang discloses that the sleep-enabled computer is registered at the server by “**storing** some or all of the information included in the registration message from the [sleep-enabled] computer system in a memory.” EX1004, [0056], [0074] (“The server may store all of this information,” referring to the registration information received from a sleep-enabled computer). Zhang also discloses that the information provided by the registration message, and stored in the server’s memory, can include the “IP address of the [sleep-enabled] computer” (**the network address**), and the “nonce” (**wakeup information**) for a corresponding sleep-enabled computer. EX1004, [0054-0056]. EX1003, ¶75.

Zhang discloses that the server’s components (e.g., as shown in computer system 200 in FIG. 2) include a “memory medium,” which is defined to include

“[a]ny of various types of memory devices or *storage devices*.” EX1004, [0031], [0042-0043], FIG. 2. Zhang therefore discloses that the “IP address of the [sleep-enabled] computer,” and the “nonce” of a corresponding sleep-enabled computer are stored at a storage device of the server. EX1004, [0031], [0042-0043], [0054], [0056], FIG. 2. EX1003, ¶76.

[11c]

Zhang discloses [11c]. Zhang’s server implemented as the “computer system 200” includes “processor 202,” which was a well-known type of “control unit.” EX1004, [0043], [0051], FIG. 2, [0032], [0044-0045]; EX1003, ¶77.

[11c.i]

Zhang discloses [11c.i]. Zhang’s server implemented as the “computer system 200” discloses that the “processor 202 [the *control unit*] ... may be coupled to [the] memory medium 204” [the *storage unit*] and the “network interface controller (NIC) 206 [the *network module*].” EX1004, [0043], FIG. 2; *supra* [11a], [11b], [11c]; EX1003, ¶78.

[11c.ii]

Zhang discloses [11c.ii]. EX1003, ¶79. *Supra* [1a].

[11c.iii]

Zhang discloses [11c.iii]. EX1003, ¶80. *Supra* [1b], [1d].

[11c.iv]

Zhang discloses [11c.iv]. EX1003, ¶81. *Supra* [1c].

[11c.v]

Zhang discloses [11c.v]. EX1003, ¶82. *Supra* [1e].

[11d]

Zhang discloses [11d]. EX1003, ¶83. *Supra* [1a.i].

[11e]

Zhang discloses [11e]. EX1003, ¶84. *Supra* [1c.i].

[11f]

Zhang discloses [11f]. EX1003, ¶85. *Supra* [1b.i].

[11g]

Zhang discloses [11g]. EX1003, ¶86. *Supra* [1e.i].

[15]

Zhang discloses [15], with Zhang's registration message as the ***sleep login packet***. For example, Zhang discloses that "the NIC of the [sleep-enabled] computer system and the server may maintain an active connection for a pre-determined period of time after the [sleep-enabled] computer system sends the registration message to the server." EX1004, [0057]. Zhang's server would receive the registration message at the control unit from the sleep-enabled computer through the network module. "[T]he server may initiate a timeout timer of a pre-determined length upon receiving the registration message." EX1004, [0057]. Zhang explains that "the [sleep-

enabled] computer system to periodically send a new registration message to the server, in order to maintain the active connection with the server and thereby maintain the capability to receive a wakeup message over the network, as long as the [sleep-enabled] computer system remains in a sleep mode.” EX1004, [0057]. Accordingly, Zhang discloses the server as receiving the registration message (the *sleep login packet*) and storing an updated running state of the sleep-enabled computer (e.g., that the sleep-enabled computer system is in the sleep-mode while at least as long as the “timeout timer” is active) in the storage unit of the server. EX1003, ¶87; EX1004, [0057-0058].

[16]

Zhang discloses [16]. EX1003, ¶88. *Supra* [8].

[18]

Zhang discloses [18]. As discussed in [11.2], Zhang discloses a storage unit, which stores a network address and wakeup information that correspond to a [sleep-enabled] computer. Zhang also discloses that the server stores a “user-selected human-readable identification information for the [sleep-enabled] computer system” at the server. EX1004, [0054-0056]. Zhang discloses that the query reply may only include the user-selected human-readable identification information for the [sleep-enabled] computer system.” EX1004, [0059]. Accordingly, the server must necessarily record a correspondence between “the user-selected human-readable

identification information for the [sleep-enabled] computer” and both of the nonce (*wakeup information*) and the IP address (*network address*). By way of these correspondences the server has recorded a correspondence (such as relationship in a database) between the IP address and the nonce. EX1003, ¶89.

[19pre]

Zhang discloses [1pre]. Zhang discloses a “sleeping client”¹⁰ that has a *sleep mode* and a normal running mode. EX1004, [0040], [0049] [0053], [0066], FIGs. 1, 3; [0074], [0078], [0034] (explaining that “[n]early every computer system includes” a sleep state and a fully-on state); FIG. 4. EX1003, ¶¶90-91.

[19a]

Zhang discloses [19a]. Zhang explains that the computer system 200 illustrated in FIG. 2 is representative of the sleeping client (*e.g.*, computer system 104). EX1004, [0047]. The “computer system 200” includes a “a network interface controller (NIC) 206.” EX1004, [0043], [0050], [0053], [0057-0058], [0067-0068], [0074], [0078]; EX1003, ¶92.

[19b]

Zhang discloses [19b]. Zhang explains that the computer system 200

¹⁰ Zhang explains that the “sleeping client” is sometimes referred to “as the [requesting] computer system.” EX1004, [0049].

illustrated in FIG. 2 is representative of the sleeping client (e.g., requesting computer). EX1004, [0047]. Zhang discloses that the computer system 200 (representative of the sleeping client) includes a “[m]emory [m]edium” which is defined to include “[a]ny of various types of memory devices or *storage devices*.” EX1004, [0031], [0042-0043], FIG. 2; EX1003, ¶93.

Zhang discloses the sleeping client sends a registration message that can include the “user-selected human-readable identification information” (*device identifier*), and the “nonce” (*wakeup information*). EX1004, [0054-0055]. Accordingly, the “sleeping client” must store the “user-selected human-readable identification information” (*device identifier*) and the “nonce” (*wakeup information*) in the “memory medium,” in order to send the registration message. EX1003, ¶94, EX1004, [0031], [0042-0043], [0047], [0054-0055], FIG. 2.

[19c]

Zhang discloses [19c]. As discussed, Zhang explains that the computer system 200 illustrated in FIG. 2 is representative of the sleeping client (e.g., computer system 104). EX1004, [0047]. The computer system 200 “include[s] a processor 202,” also known as a “controller.” EX1004 [0043], FIG. 2, [0053]. EX1003, ¶95.

[19c.i]

Zhang discloses [19c.i]. Zhang explains that the “processor 202 [the

controller] ... may be coupled to a memory medium 204” and to the “network interface controller (NIC) 206.” EX1004, [0043], FIG. 2, [0053]; EX1003, ¶96.

[19c.ii]

Zhang discloses [19c.ii]. Zhang discloses the sleeping client as generating “a pre-configured encrypted nonce” and “an encoded ID,” which together provide the pre-stored feature data. EX1004, [0068], [0074]. More specifically, Zhang discloses “a pre-configured encrypted nonce” that is “generated by the [sleeping client] based on the encryption algorithm.” EX1004, [0068]. Zhang’s “pre-configured encrypted nonce” (*the pre-stored feature data*) is generated according to the “nonce” (*the wakeup information*) by applying an encryption algorithm to the nonce. EX1004, [0068]. Further, Zhang’s sleeping client sends an “encoded ID ... which may be user-selected, *e.g., prior to the sleeping client 408 entering the sleep mode.*” EX1004, [0074]. Zhang’s encoded ID includes an identifier that is encoded at the sleeping client *according to* the user-selected ID in order to encode the user-selected ID. EX1003, ¶97; EX1004, [0074].

Zhang’s “pre-configured encrypted nonce” must be stored in the sleep-client’s storage unit because it is compared with a received “encrypted nonce” as part of the wakeup process. EX1004, [0068]. Additionally, both the “pre-configured encrypted nonce” and the “encoded ID” must be stored at the sleeping client in order to generate a registration message having this information. As discussed, Zhang

expressly discloses generating the “encoded ID” “*prior to the sleeping client 408 entering the sleep mode,*” and the “pre-configured encrypted nonce” also is generated prior to the sleeping client entering the sleep mode. EX1004, [0074], [0054]. Zhang also explains that the “registration message *may* be sent...while the [sleep-enabled] computer system is sleeping.” EX1004, [0053]. Accordingly, Zhang implicitly discloses the registration message being sent prior to the [sleep-enabled] computer system entering the sleep mode, and therefore, the “an encrypted nonce” and “an encoded ID” are generated and stored prior to the [sleep-enabled] computer system entering the sleep mode. EX1003, ¶98.

[19d]

Zhang discloses [19d]. As discussed in [19c.ii], Zhang discloses “a pre-configured encrypted nonce” and “an encoded ID,” which together provide the claimed *pre-stored feature data*. *Supra* [19c.ii]. Zhang’s pre-stored feature data therefore comprises “entire data” of “the user-selected human-readable identification information” (*device identifier*) and the “nonce” (*wakeup information*). *Supra* [19c.ii]; EX1004, [0068] (explaining that the encrypted nonce is generated by encrypting the nonce), [0074] (explaining that the encoded ID is generated with a user selected ID). EX1003, ¶¶99-100.

[19e]

Zhang discloses [19e]. Zhang’s registration message is the claimed *normal*

login packet because it provides the server information necessary for connecting to the sleeping client, namely, “an IP address of the [sleep-enabled] computer” (the *network address of the networking apparatus*). EX1004, [0054] - [0056]; EX1003, ¶101.

Specifically, Zhang explains that the registration message includes “an IP address” in order to provide the sleep-enabled computer’s IP address to the server. EX1004, [0054]. Zhang also explains that the “network interface controller (NIC) 206 coupled to processor 202. NIC 206 may enable the computer system 200 to communicate over a network.” EX1004, [0043]. Accordingly, Zhang discloses sending the registration message from the processor through the network interface controller (“*the network module*”). EX1003, ¶102.

Zhang also explains that the “registration message *may* be sent...while the [sleep-enabled] computer system is sleeping.” EX1004, [0053]. Zhang discloses that the sleep-enabled computer can be in either the sleep mode or “a fully-on state” (*i.e. normal running mode*). EX1004, [0067]. Accordingly, Zhang discloses that the registration message can be sent while the sleep-enabled computer is in the normal running mode because it also “*may* be sent...while the [sleep-enabled] computer system is sleeping.” EX1004, [0053]; EX1003, ¶103.

[19f]

Zhang discloses [19f]. Zhang discloses that the network interface controller

receives a “wakeup message” (*the apparatus wakeup packet*) from server and “authenticate[s] the wakeup message” while the sleep-enabled computer is in “a sleep mode” (e.g., including the processor). EX1004, [0067], [0054] (explaining that the network interface controller (NIC) can be implemented with logic “responsible for maintaining the secure wakeup capability,” and “continue[s] to draw a small amount of power ... even while the computer system is otherwise in a sleep mode”). EX1004, [0053]. For the NIC to receive the wakeup packet from the server in Zhang, the packet must be sent to the network address of the NIC. To “authenticate the wakeup message” (i.e., to determine whether or not the sleep-enabled device should be awoken), the NIC compares the received encrypted nonce to a pre-configured encrypted nonce—i.e., the claimed “*compar[ing] the pre-stored feature data*.” EX1004, [0050], [0053]; EX1003, ¶104.

[19g]

Zhang discloses [19g]. As discussed in [19f], Zhang discloses that the NIC “authenticate[s] the wakeup message” while the sleep-enabled computer system is in “a sleep mode” (i.e., including the processor). EX1003, ¶105.

Zhang discloses “a pre-configured encrypted nonce” and “an encoded ID,” which together provide *the pre-stored feature data*. EX1004, [0068], [0074]; *Supra* [19.c.ii], [19.d]. Similarly, Zhang’s wakeup message, which is sent from the server to the sleep-enabled computer, includes an “encrypted nonce” and “encoded ID,”

which together are a segment of data in Zhang's wakeup message to provide the claimed *wakeup feature data*. EX1004, [0077-0078], [0068]. EX1003, ¶105.

Authenticating the wakeup message in Zhang includes "comparing the received encrypted nonce [a portion of the *wakeup feature data*] to a pre-configured encrypted nonce [a portion of the *pre-stored feature data*]." EX1004, [0068], [0077-0078]; *see supra* [19c.ii], [19d]. Zhang discloses that "[i]f the comparison indicates that they are the same, the wakeup message may be authenticated and the NIC may wakeup the [sleep-enabled] computer system." EX1004 [0068]. Zhang thus discloses comparing a portion of the *wakeup feature data* (the "encrypted nonce") and a portion *the pre-stored feature data* (the "pre-configured encrypted nonce") to *determine whether to wakeup the entire networking apparatus*. EX1003, ¶106.

Element [19.g] does not require that all of the *pre-stored feature data* and the *wakeup feature data* be compared. Accordingly, this limitation is met with the comparison of the "encrypted nonce" and "pre-configured encrypted nonce." However, Zhang also discloses the sleep-enabled device comparing the "encoded ID" in the *wakeup message* with an encoded ID stored at the sleep-enabled computer. Specifically, Zhang discloses the wakeup message as including "the encoded ID of the sleeping client 408," which is identical to an encoded ID stored at the sleep-enabled computer. EX1004, [0074-0077]; *supra* [19c.ii]. As discussed, Zhang discloses authenticating the wakeup message (e.g., EX1004, [0019-0020],

[0064], [0067-0068]) which, in this context, would include comparing the encoded ID and encrypted nonce from the wakeup message (the entire *wakeup feature data*) with the encoded ID and pre-configured encrypted nonce stored at the sleep-enabled computer (the entire *pre-configured encrypted nonce*). EX1003, ¶¶107-108.

[23]

Zhang discloses [23]. Zhang discloses that “the [sleep-enabled] computer system may be configured by a user (e.g., prior to entering the sleep mode) to have an identification name and/or number selected by that user.” EX1004, [0054]. The “identification name and/or number” is the *login data* and is stored in the sleep-enabled computer device “prior to entering the sleep mode.” The controller generates a “registration message” that includes the user selected “identification name and/or number.” EX1004, [0054]. Zhang discloses that the registration message also includes the claimed *feature flag* that *indicates that a running state of the networking apparatus is sleep*. Specifically, Zhang explains that the disclosed messages includes a “CMD field” that “indicate[s] a type of [secure wake over internet] message, such as a registration message.” EX1005, [0080]. Accordingly, the CMD field in the registration message is the *feature flag* which indicates that the running state of the sleep-enabled computer is the sleep state because the registration message is received at the server while “the [sleep-enabled] computer system remains in a sleep mode.” EX1004, [0057-0058], [0080]; EX1003,

¶109.

[24]

Zhang discloses [19g]. As discussed, Zhang’s “registration message” is the *sleep login packet* and the “CMD field” in the registration message is the *feature flag*. *Supra* [23]. Zhang explains that the “CMD field” is an example of a “‘secure wake over internet’ (‘SWOI’) header.” EX1004, [0080]. The “CMD field” thus is a header of the “registration message.” EX1003, ¶110.

[25]

Zhang discloses [19g]. Zhang discloses that it is “desirable for the [sleep-enabled] computer to *periodically* send a new registration message [(*the sleep login packet*)] to the server, in order to maintain the active connection with the server and thereby maintain the capability to receive a wakeup message over the network, *as long as the [sleep-enabled] computer system remains in a sleep mode.*” EX1003, ¶111.

B. GROUND 2: The Zhang-Zill combination would have rendered obvious claims 1-3, 5, 7-8, 10-13, 15-16, 18-19, 23-25

Ground 2 provides an additional basis to find challenged claims unpatentable as being obvious. Specifically, Zill suggests benefits for using the connection server to generate an apparatus wakeup packet as outlined in [1c], [11c.iv], and [19f]. EX1003, ¶¶112-119.

1. *Zill (EX1005)*

Zill, like Zhang, is directed to remotely waking computer systems. EX1005, [0015]-[0016]. For example, Fig. 6 depicts a “communication process 600 for remote wakeup of a target host”:

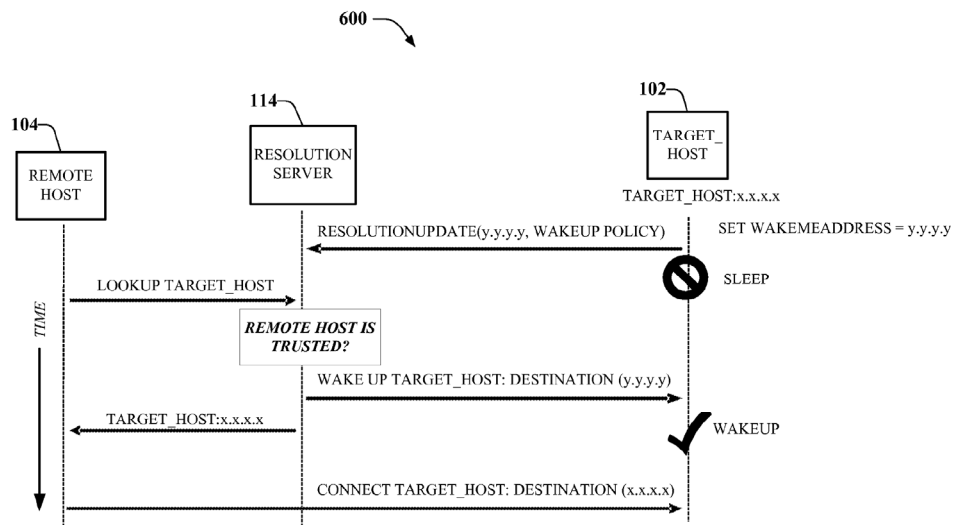


FIG. 6

EX1005, Fig. 6, [0106]. The “resolution server 114 facilitates remotely waking target host 102” in response to “a name resolution request.” EX1005, [0108]-[0109]. When the resolution server receives a “name resolution request from an authorized host” (e.g., (“remote host 104”), the resolution server sends “a packet to target host 102 via a wakemeaddress associated with the target host 102” to wake up the “target host 102.” EX1005, [0109]-[0110]. Zill explains that this method advantageously allows the “resolution server” to facilitate “remote wake up of target host for all

legacy remote hosts.” EX1005, [0111]. EX1003, ¶43.

2. *The Zhang-Zill Combination*

Again, Zhang taught a method for waking up the remote device (e.g., a sleep-enabled computer) that includes steps in which the server sends a query reply to a requesting computing to provide information needed for the requesting computer to generate a wakeup message at the requesting computer. EX1004, [0061]-[0062]. For multiple reasons articulated below, a POSITA would have been motivated to implement Zhang in a predictable manner that employs Zill’s suggestion for generating the wakeup packets at a server to achieve known benefits. EX1003, ¶¶112-119.

First, a POSITA would have been motivated to implement Zhang in a predictable manner that employs Zill’s suggestion because generating the wakeup message at the server would allow the sever to facilitate “remote wake up of [a] target host for all legacy remote hosts.” EX1005, [0111]. In Zhang, generating a wakeup message at the requesting computing computer requires the requesting computer system to operate the required software and hardware to securely process the query reply and generate the wakeup message. EX1004, [0061]-[0062], [0064]-[0065], [0077]. This would often require the requesting computer to operate the complex security software (e.g., including encryption software) to safely handle the sensitive information in the query reply and wakeup message. EX1004 [0077]

(explaining that in order to generate a wakeup message the requesting computer system encrypts the nonce “using the encrypt algorithm”). Consequently, some requesting computer systems (e.g., “legacy remote hosts”) might not have the required software or hardware capability to execute the required software in order to securely generate the wakeup message. EX1005, [0111]; EX1004, [0077]. A POSITA would have been motivated to instead generate the wakeup message at the server, as suggested by Zill to advantageously accommodate more types of requesting computers. EX1003, ¶113.

Second, a POSITA would have been motivated to implement Zhang in a predictable manner that employs Zill’s suggestion so as to improve the security for waking up the sleep-enabled computer. As outlined in both Zhang and Zill, it is important that the techniques used to wakeup sleep-enabled computers are secure. EX1004, [0036] (“[s]ecurity should then also be a primary consideration”); EX1005, [0040], [0111]. Generating the wakeup message at the server improves the security for waking up a sleep-enabled computer because servers would have been able to operate better security features for managing the most sensitive information regarding the sleep-enabled computer and are better protected against physical network based attacks as compared to such information being managed, passed, or stored at an end-user computer. EX1003, ¶¶114-115.

Third, a POSITA would have been motivated to implement Zhang in a

predictable manner that employs Zill's suggestion (the wakeup message is generated by the server rather than by a requesting computer) so as to advantageously reduce the quantity of messages containing sensitive information (*e.g.*, by eliminating authentication nonce and other sensitive content from Zhang's query reply messages and Zhang's incoming wakeup messages to the server), thereby reducing the number of opportunities for the packets to be intercepted by a malicious actor. This known benefit was particularly true for use with mobile devices, which generally connect to various network access points with varying levels of security. EX1003, ¶116.

Fourth, it would have been more efficient to generate the wakeup message at the server (as suggested by Zill) because the server can include optimized hardware to efficiently complete tasks. EX1003, ¶117. It is also more efficient, in terms of bandwidth usage as well as usage of computational and power resources, to send fewer messages between the server the requesting computer. *Id.* In addition, when Zhang's requesting computer performs operations for receiving a query reply, generating a wakeup message, and sending the wakeup message uses additional computational and power resources in comparison to server-based wakeup message generation. This is particularly advantageous in the case of mobile devices with limited available battery power. *Id.*

Finally, both Zhang and Zill are directed to remotely waking up sleep-enabled computer systems, and in this context, a POSITA would have possessed ample skill

to successfully implement the combination, among other reasons, because making the combination would simply require combining familiar elements according to known methods to yield predictable results. Considering the predictable electrical/network and software components involved in the combination, and the advanced state of the art at the time, a POSITA would have reasonably expected success achieving the combination before the priority date of the '448 patent (August 29, 2016). EX1003, ¶¶118-119 (explaining that “it was well known that, in server-client implemented methods, steps performed at a client computer could predictably be implemented at the server” and citing corroborating exhibits EX1011, EX1012, EX1014).

3. *Application to Challenged Claims*

Ground 2 has substantial overlap with Ground 1 because, in the Zhang-Zill combination, Zhang teaches nearly all claim elements for the same reasons identified in Ground 1 above. For the independent claims, Ground 2 addresses elements [1c], [11c.iv], [19f] below because the predictable Zhang-Zill combination employs Zill's suggestion for the wakeup message to be generated by the server, and for dependent claims 7-8, 10, 15-16, 18, and 23-25, the analysis of Zhang's teaching applied to those claim elements is identical for both Ground 1 and Ground 2 (it is not repeated for purposes of eliminating redundancy). EX1003, ¶120. Additionally, Ground 2 addresses further dependent claims 2-3, 5, and 12-13 because the Zhang-Zill

combination also achieves those claim elements.

[1c]

The Zhang-Zill combination satisfies [1c]. The Zhang-Zill combination incorporates Zill's teachings for the claimed *connection server generating an apparatus wakeup packet*. *Supra* §V.B.2. Zill teaches a "resolution server 114" (the *connection server*), which "remotely [awakens] target host 102" by generating and sending "a packet to target host 102 via the wakemeaddress associated with the target host 102." EX1005, [0109-0110]. As discussed, Zill explains that is advantageous for the server to manage the sending of the packet to the target host because it allows the "resolution server" to facilitate "remote wake up of target host for all legacy remote hosts." EX1005, [0111]; *Supra* §V.B.2. Accordingly, for the multiple reasons articulated above, it would have been obvious for a POSITA to modify Zhang in view of Zill such that *the connection server generates* the wakeup message (the *apparatus wakeup packet*). EX1003, ¶121.

Zhang discloses that the requesting computer system generates a "wakeup message" (the *apparatus wakeup packet*) using information provided in a query reply and compiled *according to the* query request (the *wakeup request packet*). EX1004, [0017], [0061], [0064], [0076]. Zhang's query reply includes a *nonce* (the *wakeup information*). EX1004, [0017], [0061], [0066], [0076]. Accordingly, Zhang discloses generating the claimed *apparatus wakeup packet* (Zhang's

“wakeup message”) *according to the wakeup request packet* (Zhang’s “query request”) *and the wakeup information* (Zhang’s ‘nonce’). For the reasons articulated above, the Zhang-Zill combination would generate the *apparatus wakeup packet* at the server instead of at a requesting computer. EX1003, ¶122.

[2]

The Zhang-Zill combination satisfies [2]. As discussed in [1.c], the Zhang-Zill combination incorporates Zill’s teachings for the *connection server generating an apparatus wakeup packet*. Zhang discloses that the query request as the *wakeup request packet* and that the “query request may include just the user-selected human-readable ID of the [sleep-enabled] computer.” EX1004, [0059]; [0075] (explaining that the “query request may simply include the encoded ID of the sleeping client 408.”). Zhang also discloses that the wakeup message (e.g., the outgoing wakeup message) includes “the user-selected human-readable ID of the [sleep-enabled] computer” and “the nonce.” EX1004, [0063-0064]. The Zhang-Zill combination thus discloses the server as *combining* the query request (the *wakeup request packet*) including the user-selected human-readable ID of the sleep-enabled computer and the nonce (the *wakeup information*) as part of the step of generating the *wakeup message*. EX1003, ¶123.

A POSITA would have understood that, in order to combine Zhang’s wakeup message with the nonce, the query message predictably would have been

unencrypted (e.g., either as received or after being decrypted at the server) to allow the server to process the query request and obtain the correct wakeup information (e.g., the nonce corresponding to the user-selected human-readable ID of the sleep-enabled computer system). Zhang also discloses that the wakeup messages are “encrypted, for an additional layer of security.” EX1004, [0013]. Zhang thus teaches *performing and encryption calculation* on the wakeup message that includes the combined user-selected human-readable ID and nonce to generate the outgoing wakeup message. EX1003, ¶124.

[3]

The Zhang-Zill combination satisfies [2]. As discussed in [2], the Zhang-Zill combination teaches performing an encryption calculation on a combination of Zhang’s query request and nonce. *Supra* [2]. Accordingly, *one encryption unit of the encryption calculation comprises entire data or partial data of* Zhang’s “user-selected human-readable ID” (*device identifier*) and nonce (*wakeup information*). EX1003, ¶125.

[5a]

The Zhang-Zill combination satisfies [5a]. Zhang discloses the sleep-enabled computer system receives the outgoing wakeup message (the *apparatus wakeup packet*) EX1004, [0066-0068], [0078]. EX1003, ¶126.

[5b]

The Zhang-Zill combination satisfies [5b].¹¹ As discussed, Zhang discloses the wakeup message includes a nonce as at least a portion of the *wakeup feature data*. *Supra* [1e.i]. The wakeup feature data also includes Zhang’s “user-selected human-readable ID of the [sleep-enabled] computer” corresponding to the claimed *device identifier*. *Supra* §V.A.2, [1.c.i], [1e.i].¹² Zhang discloses that the sleep-enabled computer compares the nonce (a portion of the *wakeup feature data*) to an original nonce. EX1004, [0068]. Zhang therefore discloses that the sleep-enabled computer obtains the nonce (a portion of the *wakeup feature data*) and “user-selected human-readable ID of the [sleep-enabled] computer” (the claimed *device identifier*) from the wakeup message (the *apparatus wakeup packet*) to authenticate “the wakeup message.” EX1004, [0062-0064], [0068], [0019-0020], [0077-0078].

¹¹ The terms “wakeup feature data” and “wakeup feature packet” each lacks antecedent basis. The Petition treats these terms as meaning the same thing, namely, the “wakeup feature data” originally introduced in [1e.i].

¹² Zhang’s outgoing wakeup message includes a “nonce” and “user-selected human-readable ID of the [sleep-enabled] computer,” which together are a segment of data in Zhang’s wakeup message to provide the claimed *wakeup feature data*. EX1004, [0062-0063], [0077-0078], [0068]; *Supra* §V.A.2, [1e.i].

The “user-selected human-readable ID of the [sleep-enabled] computer” and nonce (the *wakeup feature data*) includes *entire data of the device identifier and the wakeup information*. EX1003, ¶¶127-130.

[5c]

The Zhang-Zill combination satisfies [5c]. As discussed, Zhang discloses the “user-selected human-readable ID” and nonce together are the *wakeup feature data*. *Supra* [5b]. The sleep-enabled computer compares the encrypted nonce to a pre-configured encrypted nonce. EX1004, [0068]. Zhang explains that the original nonce is “randomly generated by the [sleep-enabled computer].” EX1004, [0074], [0055], [0068]. Zhang also discloses that “the [sleep-enabled] computer system may be configured by a user (e.g., *prior to entering the sleep mode*) to have an identification name and/or number selected by that user.” EX1004, [0054]. Accordingly, Zhang teaches the sleep-enabled computer must therefore store “user-selected human-readable ID” and the original nonce (the *pre-stored feature data*) before entering sleep mode. EX1004, [0068]. EX1003, ¶¶131-132.

[5d]

The Zhang-Zill combination satisfies [5c]. Zhang discloses comparing the received nonce to an “original nonce” and “[i]f the comparison indicates that they are the same, the wakeup message may be authenticated and the NIC may wake up the [sleep-enabled] computer.” EX1004, [0068]; [0034], [0067] (explaining that

“[a]fter waking, the [sleep-enabled] computer system may be in a fully-on state”). The “user-selected human-readable ID” in Zhang’s wakeup message is the same as the wakeup message configured at the sleep-enabled computer. EX1004, [0054], [0063], [0056], [0059], [0065]. Accordingly, Zhang discloses *waking up the entire [sleep-enabled] apparatus* when the *wakeup feature data* (i.e., the “nonce” and “user-selected human-readable ID” from the wakeup message) is consistent with *the pre-stored feature data* (i.e., the “original nonce” and “user-selected human-readable ID” stored at the sleep-enabled computer). EX1003, ¶133.

[11c.iv]

The Zhang-Zill combination satisfies [11c.iv]. EX1003, ¶134. *Supra* §V.B.3, [1c].

[12]

The Zhang-Zill combination satisfies [12]. EX1003, ¶135. *Supra* [2].

[13]

The Zhang-Zill combination satisfies [13]. EX1003, ¶136. *Supra* [3].

[19f]

As discussed, Zhang discloses “*in the sleep mode, the control unit sleeps, but the network module still keeps running and when receiving an apparatus wakeup packet sent to the network address of the networking apparatus from a connection server.*” *Supra* §V.A.2, [19f]. Also as discussed, Zill teaches the “*apparatus*

wakeup packet... generated by the connection server,” and thus the Zhang-Zill combination would provide this element for the reasons articulated above. *Supra* §V.B.3, [1c]; EX1003, ¶137.

C. GROUND 3: The Liu-Zhang combination would have rendered obvious claims 1-3, 5, 7-13, and 15-18

1. *Liu (EX1006)*

i. Liu has an effective filing date of June 15, 2016

Liu claims the benefit of Chinese Patent Application No. 201610422371.8 (“the ’371.8 Application”; EX1009) (certified translation filed as EX1008), which was filed June 15, 2016—months before the Critical Date of the ’448 patent. Liu qualifies under §102(a)(2) as prior art to the ’448 patent based on its foreign priority date. *Dynamic Drinkware, LLC v. National Geographics, Inc.*, 800 F.3d 1375 (Fed. Cir. 2015). In accordance with *Dynamic Drinkware*, the ’371.8 Application provides clear and unambiguous support for at least independent claim 1 of Liu. EX1003, ¶¶44-45. The following table identifies exemplary support in the ’371.8 Application for each limitation of Liu’s claim 1:

<u>Liu (EX1006) (Claim 1)</u>	<u>Exemplary Support in Priority Application (EX1008)</u>
An Internet Protocol (IP) camera control method, comprising:	EX1008, Title, [0001], [0005-0006], [0013], [0026], [0043], [0059], [0093], FIGs. 2, 4, 5, 7, claim 1

receiving, by an IP camera, a standby instruction from a server;	EX1008, [0054], FIGs. . 2, 4, 7, claim 1.
switching, by the IP camera, from a working state to a standby state, wherein the IP camera and the client are connected to the server respectively;	EX1008, [0051], [0055-0058], FIGs. . 2, 4, 7, claim 1
constructing, by the IP camera, a heartbeat packet;	EX1008, [0069], [0073], [0081] FIGs. 4, 7, claim 2
sending, by the IP camera, the heartbeat packet to the server at a first preset frequency to make the IP camera maintain a heartbeat connection to the server.	EX1008, [0078-0081], FIGs. 4, 7, claim 2.

The testimony evidence (EX1003, ¶¶44-45) confirms this fact.

Even beyond the above-identified support in the '371.8 Application for Liu's claims, the evidence confirms that Liu's teachings cited herein against the '448 patent were similarly taught in the '371.8 Application. *Infra*, Ground 3 below (citing to Liu (EX1006) and then corresponding portions of the '371.8 Application (EX1008)); *Ex Parte Mann*, No. 2015-003571, 2016 WL 7487271, at *5-6 (PTAB Dec. 21, 2016). Liu accordingly qualifies as prior art to the '448 patent.

ii. Liu (EX1006)

Liu is directed to remotely waking up “an IP camera.” EX1006, [0094]; EX1008, [0093]. For example, Fig. 7 illustrates “a signaling interaction diagram of

an IP camera control method” for waking up “an IP camera:

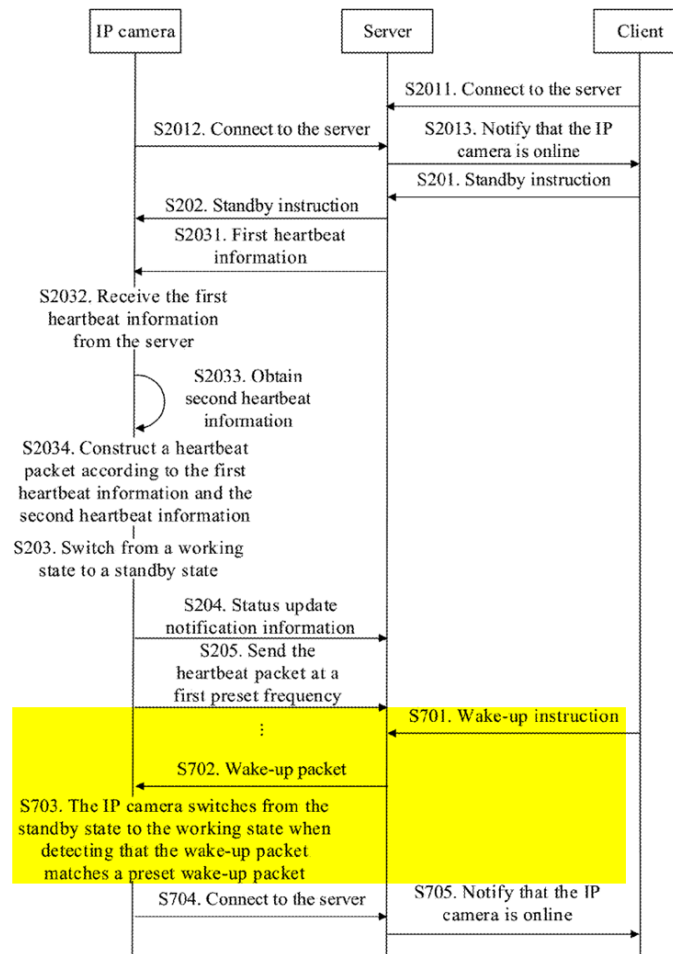


FIG. 7

EX1006, FIG. 7 (highlighted), [0094-0102]; EX1008, FIG. 7, [0093-0101]. The server receives “a wake-up instruction” that “includes the port number and the communication address of the IP camera to be woken up.” EX1006, [0095-0097], FIG. 7; EX1008, [0094-0096], FIG. 7. The server sends “a wake-up packet to the IP camera” where “[t]he wake-up packet is pre-agreed between the server and the IP camera.” EX1006, [0098-0100], FIG. 7; EX1008, [0097-0099], FIG. 7. In response,

“[t]he IP camera switches from the standby state to the working state when [the IP camera] detect[s] that the wake-up packet from the server matches a preset wake-up packet.” EX1006, [0098-0102], FIG. 7; EX1008, [0097-0101], FIG. 7. EX1003, ¶46.

2. *The Liu-Zhang Combination*

For multiple reasons articulated below, a POSITA would have been motivated to implement Liu’s systems and method for remotely waking up an IP camera in a predictable manner that employs Zhang’s suggestions for using a secure wakeup message. EX1004 [0009], [0014], [0053]. Specifically, Zhang describes an incoming wakeup message¹³ that includes “the user-selected human-readable ID of the [sleep-enabled] computer and a user-selected pre-shared password.” EX1004, [0065]. Zhang’s server authenticates the incoming wakeup message using the password. EX1004, [0019], [0066]. After authenticating Zhang’s incoming wakeup message, Zhang’s server modifies this wakeup message (e.g., generates a modified wakeup message) and sends the modified wakeup message to the sleep-enabled computer (*i.e.*, Liu’s IP camera). EX1004, [0066]; EX1006, [0098-0100]; EX1008, [0097-0099]. This resulting combination would implement Zhang’s suggestions for a secure wakeup message, which is modified at the server to include Liu’s wake-up

¹³ See Footnote 9.

packet, thereby adding a layer of security to Liu. The following reasons, independently and together, support the Zhang-Zill Combination. EX1003, ¶138.

First, a POSITA would have been motivated to implement Liu in a predictable manner that employs Zhang’s suggestions (for using a secure wakeup message) so as to advantageously improve the security for the systems and methods disclosed by Liu. As explained in Zhang, many remote wakeup solutions “provide no security” including techniques where “anyone could wake up a sleeping computing device if the IP address or MAC address is known.” EX1004, [0007], [0012] (explaining that in such systems “it may be possible for anyone to wake up a sleeping computer system given basic information (e.g., the IP address)” including instances where the sleeping computer system is woken up “maliciously, such as by a hacker”), [0071]. Liu is an example of an unsecured system that allows anyone to send the server a wake-up instruction with correct port number and communication address, to wake up the IP camera. EX1006, [0095-0102]; EX1008, [0094-0101]. Zhang explains that the disclosed wakeup message provides a “provision of security.” EX1004, [0012-0013]. For example, Zhang’s wakeup message can be authenticated by “one or both of a wakeup server and the sleeping computer system itself.” EX1004, [0013]. Accordingly, to advantageously provide an additional “provision of security,” a POSITA would have been motivated to modify Liu’s systems and methods to implement the secure wakeup messages taught by Zhang.

EX1003, ¶139.

Second, utilizing Zhang’s suggested improvement for the incoming wakeup message, including a “user selected human-readable ID” of the sleep-enabled computer, would have predictably improved the user experience of Liu’s method for waking up an IP camera. For example, Zhang explains, in the context of Zhang’s query request, that it would be preferable for the user to request waking up a sleep-enabled computer using only “a user selected human-readable ID” because it would be “presumably easier to remember.” EX1004, [0059]. In the context of Liu, it would be preferable that the user enter a “user selected human-readable ID” to a client device so the client device can generate and send the incoming wakeup instruction¹⁴ with the “user selected human-readable ID” to the server because it would be easier for the user to remember the “user selected human-readable ID” as compared to an IP address. EX1003, ¶140.

Finally, both Liu and Zhang are directed to remotely waking up sleep-enabled devices, and in that context, a POSITA would have possessed ample skill to successfully implement the combination, among other reasons, because making the combination would simply require combining familiar elements according to known methods to yield predictable results. And considering the predictable

¹⁴ See Footnote 9.

electrical/network and software components involved in the combination and the relatively advanced state of the art at the time, a POSITA would have reasonably expected success achieving the combination before the Critical Date of the ' 448 patent. EX1003, ¶141.

3. *Application to Challenged Claims*

[1pre]

Liu discloses [1pre]. Liu discloses a method for remotely waking up a camera. EX1006, [0094], FIG. 7; EX1008, [0093]. EX1003, ¶142.

[1a]

The Liu-Zhang combination discloses [1a]. As discussed, the Liu-Zhang combination incorporates Zhang's teachings for a wakeup message that is sent from a requesting computer to the server. EX1004, [0062], [0065]; *supra* §V.C.2. EX1003, ¶143.

[1a.i]

The Liu-Zhang combination satisfies [1a.i]. As discussed, the Liu-Zhang combination incorporates Zhang's teachings for a secure wakeup message to add security to Liu's "wake-up instruction." *Supra* §V.C.2. To achieve that, Zhang teaches that its "wakeup message" (the *wakeup request packet*) includes "the user-selected human-readable ID of the [sleep-enabled] computer [the *device identifier*] and a user-selected pre-shared password." EX1004, [0063], [0065], [0077-0078].

EX1003, ¶144.

[1a.ii]

Liu discloses [1a.ii]. Liu discloses “a terminal, such as a mobile client, (the *requesting apparatus*) that is connected to “a cloud-end *server* ... to perform remote access control...using a mobile network.” EX1006, [0042], FIG. 1, FIG. 7; EX1008, [0041], FIG. 1, FIG. 7. A POSITA would have understood that these disclosures as teachings of the *[requesting] apparatus being connected to the server via ... [the] internet*. EX1003, ¶145.

[1b]

The Liu-Zhang combination satisfies [1b]. Liu’s server “searches, *according to* the port number and the communication address of the IP camera to be woken up, for the wake-up packet [(the *wakeup information*)]for waking up the IP camera.” EX1006 [0099]; EX1008, [0098]. In the Liu-Zhang combination, the server would search its associated memory, in which the wakeup information was previously stored (i.e., *stored in the connection server*) for the wake-up packet just as Zhang’s server stores, and subsequently searches it as needed. EX1004 [0015], [0018], [0043], Fig. 2, Claims 7, 9, 12, 15. EX1003, ¶146.

Liu further explains that the server receives the port number and communication address from a received wakeup instruction. EX1006, [0099]; EX1008, [0098]. As discussed, the Liu-Zhang combination, incorporates Zhang’s

incoming wakeup message, which includes identification information for the [sleep-enabled] computer in lieu of the communication address in Liu's "wakeup instruction." *Supra* §V.C.2. In view of this combination, a POSITA would have understood that the server searches according to the identification information for the sleep-enabled computer in the wakeup message (i.e. *the wakeup request packet*) to obtain the wake-up packet [(the *wakeup information*)]. EX1003, ¶147.

[1b.i]

Liu discloses [1b.i]. Liu discloses that the IP camera has "a preset wake-up packet" and that the IP camera "switches from the standby state to the working state when the wake-up packet received by the IP camera matches a preset wake-up packet." EX1006, [0099]; EX1008, [0098]. Accordingly, the wake-up packet obtained by the server and sent to the IP camera is the same as the wakeup information stored in the IP camera. EX1003, ¶148.

[1c]

The Liu-Zhang combination satisfies [1c]. As discussed the Liu-Zhang combination, incorporates Zhang's teachings for a modified "wakeup message." Specifically, Zhang teaches that the "server may modify or authenticate the wakeup message before sending the wakeup message to the [sleep-enabled] computer." EX1004, [0066]. In view of Liu's teachings, modifying the wakeup message would include obtaining a "wake-up packet" (as discussed *supra* [1b]) in order to modify

(i.e., generate) a wakeup message that includes Liu’s “*wake-up packet*.” EX1004, [0066]; 1006; [0098-0100]; 1008, [0097-0099]. Accordingly, the modified wakeup message is generated according to the incoming wakeup message and the obtained “*wake-up packet*.” EX1003, ¶149; EX1004, [0066]; 1006; [0098-0100]; EX1008, [0097]-[0099].

[1c.i]

The Liu-Zhang combination satisfies [1c.i]. The Liu-Zhang combination incorporates Zhang’s teachings for a modified wakeup message (i.e., ***the apparatus wakeup packet***). *Supra* §V.C.2. As discussed the incoming/pre-modified wakeup message includes identification information for the [sleep-enabled] computer (i.e., ***the device identifier***). *Supra* [1a.i]. As discussed in [1c], in this combination the incoming modified wakeup message is modified to add Liu’s “wake-up packet.” *Supra* [1c]. Accordingly, the modified wakeup message includes ***the device identifier*** from the incoming/pre-modified wakeup message and the obtained “wake-up packet” (i.e., ***wakeup information***). EX1003, ¶150.

[1d]

The Liu-Zhang combination satisfies [1d.i]. The Liu-Zhang combination incorporates, Zhang’s modified wakeup message as the claimed ***the wakeup request packet***. *Supra* §V.C.2. Zhang discloses that an incoming wakeup request includes “identification information for the [sleep-enabled] computer system and

authentication information.” EX1004, [0062], [0063], [0065], [0077-0078]. As discussed in [1c], Zhang teaches sending a modified wakeup message to *the sleep-enabled apparatus*. A POSITA would have understood that the server must obtain *a network address corresponding to the [sleep-enabled] apparatus from a storage unit of the connection server* in order for the server to modify and send a modified wakeup packet to *the sleep-enabled apparatus*.” In particular, such modification of the packet would be required in the Liu-Zhang combination in the case where Zhang’s incoming wakeup does not include a network address, but instead includes “user-selected human-readable ID of the [sleep-enabled computer].” See EX1004, 0065. Thus, the server would predictably obtain the IP address from its memory to send the modified wakeup message. EX1003, ¶151.

Zhang also expressly teaches [1.d]. Specifically, Zhang discloses the [sleep-enabled] computer sending a registration message to the server that includes “an IP address of the [sleep-enabled] computer system” (the *network address*). EX1004, [0054], [0056]. Zhang explains that the sleep-enabled computer system was registered at the server by “*storing* some or all of the information included in the registration message from the [sleep-enabled] computer system [(such as the *IP address*)] in a memory.” EX1004, [0056]. In this context Zhang’s “memory” is the *storage unit of the server*. Zhang also describes an incoming “wakeup message” that is modified at the server and sent to the sleep-enabled computer. EX1004,

[0066]. The wakeup message is described in Zhang as including a “user-selected human-readable ID.” EX1004, [0065]. As such, a POSITA would have predictably configured the server to obtain the stored IP address of the sleep-enabled computer according to the incoming wakeup message. EX1003, ¶152.

A POSITA would have been motivated to Incorporate Zhang’s teachings for the server managing the IP address of the sleep-enabled computer (*e.g.*, IP camera) as outlined above. Zhang’s server manages the IP address for the sleep-enabled computer system by periodically receiving registration messages including a current IP address of the sleep-enabled computer from the network interface controller (“NIC”) of the sleep-enabled computer. EX1004, [0011], [0022], [0058]. This allows Zhang’s server to maintain an active connection with the NIC. EX1004, [0058]. Utilizing Zhang’s teachings for the server’s maintain a connection with the IP camera to allow Liu’s system to function in additional network environments including environments where the IP camera undergoes network address translation (NAT). EX1004, [0006], [0010]. As Zhang explains in some such environments, systems like Liu’s “may be unable to receive a wake command unless proper demilitarized zone (DMZ)/port forwarding and static address resolution protocol (ARP) are set at the NAT router.” EX1004, [0006], [0010]. Accordingly, a POSITA would have been motivated to incorporate Zhang’s teachings for “*the connection server obtaining a network address corresponding to the [sleep-enabled]*

apparatus from a storage unit of the connection server according to the wakeup request packet.” EX1003, ¶153.

[1e]

The Liu-Zhang combination satisfies [1e]. The Liu-Zhang combination incorporates Zhang’s modified wakeup message, which is sent to the sleep-enabled computer. EX1004, [0066-0067], [0078]. A POSITA would have understood that sending the apparatus wakeup packet from the server to the correct sleep-enabled computer would have been based on the network address. EX1003, ¶154.

[1e.i]

The Liu-Zhang combination satisfies [1e.i]. Liu’s wake-up packet is the *wakeup feature data*. As discussed, the combination incorporates Zhang’s modified wakeup message with Liu’s wake-up packet, as the *apparatus wakeup packet*. *Supra* §V.C.3, [1c], [1c.i]. Liu’s wake-up packet is therefore a segment of data of the modified wakeup message. Liu teaches that “[t]he IP camera switches from the standby state to the working state when the IP camera detects that the wake-up packet from the server matches a preset wake-up packet.” EX1006 [0099]; EX1008, [0098]. Liu describes a process for switching from the standby state to the working state by “power[ing] on each module of the IP camera. EX1006 [0102]; EX1008, [0101]. Accordingly, Liu teaches that the wake-up packet is used for *determining whether the entire [sleep-enabled] apparatus be awoken*. EX1003, ¶155.

[2]

The Liu-Zhang combination satisfies [2]. Liu's wake-up packet is the *wakeup feature data*. As discussed, the combination incorporates Zhang's teachings of a modified wakeup message that is generated by adding (e.g., combining) Liu's wake-up packet with Zhang's incoming wakeup message. *Supra* [1c]. A POSITA would have understood that, in order to combine Liu's wake-up packet with Zhang's incoming wakeup message, the incoming wakeup message would be unencrypted (e.g., either as received or after being decrypted at the server) to allow the server to process the information and obtain the correct wakeup information (e.g., the wake-up packet corresponding to the ID of the sleep-enabled computer). Zhang also suggests the wakeup messages can be "encrypted, for an additional layer of security." EX1004, [0013]. A POSITA would have been motivated to perform an encryption calculation on the combined incoming wakeup message and the wake-up packet in order to generate the modified wakeup message to provide an additional layer of security. EX1003, ¶156.

[3]

The Liu-Zhang combination satisfies [3]. As discussed in [2], the Liu-Zhang combination teaches performing an encryption calculation on a combination of Zhang's wakeup message and Liu's wake-up packet. *Supra* [2]. Zhang's wakeup message includes a "user-selected human-readable ID." EX1004 [0065].

Accordingly, *one encryption unit of the encryption calculation comprises entire data or partial data of* Zhang’s “user-selected human-readable ID” (*device identifier*) and Liu’s “wake-up packet” (*wakeup information*). EX1003, ¶157.

[5a]

The Liu-Zhang combination satisfies [5a], by incorporating Zhang’s modified wake up message, which is received at Liu’s IP camera, as discussed in [1e]. *Supra* §V.C.2. EX1003, ¶158.

[5b]

The Liu-Zhang combination satisfies [5b] in that Liu incorporates Zhang’s modified wakeup message as the *apparatus wakeup packet*, and Zhang’s modified wakeup message includes Liu’s wakeup packet as the *wakeup information*. *Supra* [1e], [5a], §V.C.2. As discussed in [1e.i], in the Liu-Zhang combination Liu’s wake-up packet is the *wakeup feature data*. *Supra* [1e.i]. The *wakeup feature data* can also include the “identification information” (i.e., *the device identifier*) for the sleep-enabled computer. *Supra* [1.c.i], [1.e.i].¹⁵ EX1003, ¶¶159-161.

Liu discloses that the “IP camera switches from the standby state to the working state when the IP camera detects that the wake-up packet from the server matches a preset wake-up packet.” EX1006, [0101]; EX1008, [0100]. A POSITA

¹⁵ See also footnote 12.

would have understood that the IP camera would obtain wakeup feature data including the “user-selected human-readable ID of the [sleep-enabled] computer” and Liu’s wake-up packet from Zhang’s wakeup message in order to compare the wake-up packet from the server with a preset wake-up packet. EX1003, ¶162.

[5c]

The Liu-Zhang combination satisfies [5c]. As discussed, the *wakeup feature data* includes Liu’s wakeup packet and Zhang’s “user-selected human-readable ID.” *Supra* [5b]. Liu discloses that “IP camera switches from the standby state to the working state when the IP camera detects that the wake-up packet from the server matches a preset wake-up packet.” EX1006, [0101]; EX1008, [0100]. Liu explains that “[t]he wake-up packet is pre-agreed between the server and the IP camera” and a “manufacturer may define the wake-up packet pre-agreed between the server and the IP camera in order to adapt to interconnection between different servers and IP cameras.” EX1006, [0101]; EX1008, [0100]. Liu thus discloses that the preset wake-up packet (*i.e., the pre-stored feature data*) is stored in *in the [sleep-enabled] apparatus before the [sleep-enabled] apparatus sleeps*, for example, by a manufacturer well before the IP camera is set to a standby or sleep mode. EX1003, ¶163.

Similarly, Zhang teaches that “the [sleep-enabled] computer may be configured by a user (e.g., *prior to entering the sleep mode*) to have an identification

name and/or number selected by that user.” EX1004, [0054]. Accordingly, the Liu-Zhang combination teaches the IP camera must therefore store Zhang’s “user-selected human-readable ID” and Liu’s wakeup-packet (the *pre-stored feature data*) before entering sleep mode. EX1004, [0068]. EX1003, 164.

[5d]

The Liu-Zhang combination satisfies [5d]. Liu discloses that “[t]he IP camera switches from the standby state to the working state when the IP camera detects that the wake-up packet [(i.e., *wakeup feature data*)] from the server matches a preset wake-up packet [(i.e., *pre-stored feature data*)].” EX1006, [0101], EX1008, [0100]; *Supra* [1e.i]. Similarly, the “user-selected human-readable ID” in Zhang’s wakeup message is the same as the wakeup message configured at the sleep-enabled computer. EX1004, [0054], [0063], [0056], [0059], [0065]. EX1003, ¶165.

Accordingly, the Liu-Zhang combination teaches *waking up the entire [sleep-enabled] apparatus* when the *wakeup feature data* (i.e., Liu’s “wake-up packet” and Zhang’s “user-selected human-readable ID” from the wakeup message) is consistent with *the pre-stored feature data* (i.e., Liu’s preset wake-up packet and the “user-selected human-readable ID” stored at the IP camera). EX1003, ¶166.

[7]

Liu discloses [7]. Liu discloses that “the server receives the status update notification information [(the *sleep login packet*)] from the IP camera such that when

the status of the IP camera changes, the server can update and maintain [(e.g. *record*)] the status of the IP camera in time.” EX1006, [0078], EX1008, [0077]. Liu discloses that the status of the IP camera can include “a working state” and a “standby state” (e.g., a sleep state). EX1006, [0075], EX1008, [0074]. Liu thus discloses, the server *receiving* “status update notification information” (i.e., a *sleep login packet*) from the IP camera (i.e., *the [sleep-enabled] apparatus*) and recording the status information as a sleep state in the storage unit according to the “status update notification information.” EX1003, ¶167.

[8]

Liu teaches [8]. A POSITA would have understood that the “status update notification information” would include a field to indicate the running state of claimed “*[sleep-enabled] apparatus*” to the server. This field would include a feature flag (e.g., a predefined byte) to indicate that the “*[sleep-enabled] apparatus*” is in the sleep state. EX1003, ¶168.

[9]

The Liu-Zhang combination renders claim 9 obvious by incorporating Zhang’s suggestion for a query request and query reply. Zhang discloses the requesting computer sending a query request to the server to receive a query reply with information needed by requesting computer in order to generate a wakeup message. EX1004, [0061]. For example, the query reply can include “user-selected

human-readable ID of the [sleep-enabled] computer.” EX1004, [0061]. Moreover, this information indicates that the sleep-enabled computer is asleep by providing information required to wake up the sleep-enabled computer. Multiple different reasons would have motivated a POSITA to incorporate Zhang’s suggestion into Liu’s method. EX1003, ¶169.

First, Zhang’s query request and query reply provide useful information to the client device. For example, a user would be interested in determining a current status of devices, such as whether an IP camera is an awake mode or a sleep mode. Zhang’s query request and query reply would advantageously allow a user to obtain this information without waking up or pinging the IP camera. EX1003, ¶170.

Second, both Liu and Zhang are directed to remotely waking up sleep-enabled devices, and in this context, a POSITA would have possessed ample skill to successfully implement the combination, among other reasons, because making the combination would simply require combining familiar elements according to known methods to yield predictable results. Considering the predictable electrical/network and software components involved in the combination and the relatively advanced state of the art at the time, a POSITA would have reasonably expected success achieving the combination before the Critical Date of the ’448 patent. EX1003, ¶171.

[9a]

The Liu-Zhang combination satisfies [9a]. Zhang teaches “a query request may be received by the server.” EX1004, [0059]. Zhang explains that “the query request may be initiated by a user (e.g., a user of both the sleep-enabled computer system and [requesting] computer system) of the [requesting] computer system, as a first step towards waking the [sleep-enabled] computer system over the network.” *Id.* Zhang’s query request thus is the claimed ***connection request packet*** and is used ***to request for performing communication connection to the [sleep-enabled] apparatus***. EX1003, ¶172.

[9b]

The Liu-Zhang combination satisfies [9b]. Zhang teaches that the server sends a “query reply” to the requesting computer. EX1004, [0061]. Zhang explains that “[t]he query reply may include information needed by the [requesting] computer system in order to generate and send a wakeup message to the [sleep-enabled] computer.” *Id.* Zhang thus discloses that the server determines ***a running state of the [sleep-enabled] apparatus according to the connection request packet***, by determining that the sleep-enabled computer is asleep in order to generate a query reply that is used to wake up the sleep-enabled computer according to the query request. EX1003, ¶173; EX1004, [0061].

[9c]

The Liu-Zhang combination satisfies [9a]. As discussed in [9b], Zhang teaches the server sending a “query reply” in reply to the requesting computer with “information needed by the [requesting] computer system in order to generate and send a wakeup message to the [sleep-enabled] computer.” *Supra* [9b]; EX1004, [0061]. Accordingly, Zhang’s “query reply” is sent when the running state of the [sleep-enabled] computer is a sleep state. EX1004, [0061]. Zhang’s query reply indicates to the requesting computer that the [sleep-enabled] apparatus is asleep because the “query reply” includes “information needed by the [requesting] computer system in order to generate and send a wakeup message.” EX1004, [0061]; EX1003, ¶174.

[10]

The Liu-Zhang combination satisfies [5d]. Liu’s server “searches, according to the port number and the communication address of the IP camera to be woken up, for the wake-up packet [(the *wakeup information*)] for waking up the IP camera.” EX1006, [0099]; EX1008, [0098]. Liu explains that the server receives the port number and communication address from a received wakeup instruction. *Id.* As discussed, the Liu-Zhang combination, incorporates Zhang’s incoming wakeup message which includes a “user-selected human-readable ID” for the [sleep-enabled] computer in lieu of the communication address in Liu’s “wakeup

instruction.” *Supra* §V.C.2. As discussed in [1d], the Liu-Zhang combination teaches *the connection server obtaining a network address corresponding to the [sleep-enabled] apparatus from a storage unit of the connection server according to the wakeup request packet*. EX1003, ¶175.

Consequently, a POSITA would have understood that Liu’s wake-up packet (i.e. *wakeup information*) and Zhang’s IP address (i.e. *network address*) correspond to “the user-selected human-readable ID” in a data structure stored at the server to allow the server to search for the wake-up packet and the IP address with the information included in the incoming wakeup message. A POSITA would also have understood that this information must be stored in the server to allow for the server to obtain this information in response to receiving Zhang’s incoming wakeup message (i.e., wakeup request packet). EX1003, ¶176.

[11pre]

Liu discloses [11pre]. Liu discloses a server. EX1006, [0042], [0094-0107], FIGs. 1, 7; EX1008, [0041], [0093-106], FIGs. 1, 7. EX1003, ¶177.

[11a]

Liu discloses [11a]. Liu disclose “a receiving module” and a “sending module” which collectively are the *network module*. EX1006, [0119], [0126] (disclosing that “the receiving module 901 is further configured to receive a wake-up instruction from the client), [0127] (discloses that “[t]he sending module 902 is

further configured to send a wake-up packet to the IP camera); EX1008, [0118], [0125-0126]; EX1003, ¶178.

[11b]

The Liu-Zhang combination satisfies [11b]. As discussed in [10], the Liu-Zhang combination teaches the server reading the wakeup information and the network address that correspond to the device identifier from a storage unit. *Supra* [10]. Accordingly, the IP address (network address) and wake-up packet (wakeup information) correspond to a [sleep-enabled] apparatus. EX1003, ¶179.

[11c] and [11c.i]

The Liu-Zhang combination satisfies [11c] and [11c.i]. A POSITA would have understood that Liu's server must include a control unit (e.g., a processing unit) that is connected to the network module and storage unit in order for these components to operate as discussed in Liu. *See* EX1006, [0042]; EX1008, [0041]. Moreover, such an arrangement would be obvious and well known to a POSITA. In fact, Zhang discloses such a server. *Supra* §V.A.3, [1c], [1c.i]. EX1003, ¶180.

[11c.ii]

The Liu-Zhang combination satisfies [11c.ii]. EX1003, ¶181. *Supra* [1a].

[11c.iii]

The Liu-Zhang combination satisfies [11c.iii]. EX1003, ¶182. *Supra* [1b], [1d].

[11c.iv]

The Liu-Zhang combination satisfies [11c.iv]. EX1003, ¶183. *Supra* [1c].

[11c.v]

The Liu-Zhang combination satisfies [11c.v]. EX1003, ¶184. *Supra* [1e].

[11d]

The Liu-Zhang combination satisfies [11d]. EX1003, ¶185. *Supra* [1a.i].

[11e]

The Liu-Zhang combination satisfies [11e]. EX1003, ¶186. *Supra* [1c.i].

[11f]

The Liu-Zhang combination satisfies [11f]. EX1003, ¶187. *Supra* [1b.i].

[11g]

The Liu-Zhang combination satisfies [11g]. EX1003, ¶188. *Supra* [1e.i].

[12]

The Liu-Zhang combination satisfies [12]. EX1003, ¶189. *Supra* [2].

[13]

The Liu-Zhang combination satisfies [13]. EX1003, ¶190. *Supra* [3].

[15]

The Liu-Zhang combination satisfies [15]. EX1003, ¶191. *Supra* [7].

[16]

The Liu-Zhang combination satisfies [16]. EX1003, ¶192. *Supra* [8].

[17]

The Liu-Zhang combination satisfies [17]. EX1003, ¶193. *Supra* [9], [9a-9c]

[18]

The Liu-Zhang combination satisfies [18]. As discussed, the Liu-Zhang combination discloses storing an IP address of the camera, a wake-up packet for the camera, such that the server can obtain this information by searching according to identification information for the [sleep-enabled] computer. *Supra* [1b], [1d], [11b]. Accordingly, a POSITA would understand that the server would record a correspondence between “the user-selected human-readable identification information for the [sleep-enabled] computer” (*device identifier*) the “wake-up packet” (*wakeup information*) and the IP address (*network address*), for example, by storing this information in a data structure in a database. By way of these correspondences the server has recorded a correspondence (such as relationship in a database) between each of the device identifier, the network address, and the wakeup information. EX1003, ¶194.

VI. DISCRETIONARY DENIAL IS NOT JUSTIFIED

A. The Petition’s New Prior Art and Errors Made During Prosecution Warrant Institution—35 U.S.C. § 325(d)

This Petition does *not* present a situation where “the same or substantially the same prior art or arguments” were previously presented. 35 U.S.C. § 325(d); *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-

01469, Paper 6 (Feb. 13, 2020). Indeed, there is no indication from the file history that Zhang, Zill, or Liu were previously presented to the Office during prosecution of the '448 patent. Nor does the file history reveal consideration by the Office of any of the prior art combinations from Grounds 1-3 of this Petition. To the extent Grounds 1-3 rely on prior art that was considered during prosecution (which they do not), it was error to allow the '448 patent over this art—particularly in view of the compelling merits presented by each of these grounds.

**B. The Fintiv Factors Weigh in Favor of Institution—35
U.S.C. § 314(a)**

Essentially all of the *Fintiv* factors weigh against exercising discretionary denial. The related litigation is in its infancy.

*Factor 1: Whether a Stay Exists or Is Likely to Be Granted if a
Proceeding Is Instituted*

No motion to stay has been filed at this time, and therefore, this factor is neutral.

*Factor 2: Proximity of the Court's Trial Date to the Board's
Projected Statutory Deadline*

Even though Patent Owner filed its Complaint (EX1015) against Reolink on the '448 patent on February 8, 2024 in the District of Delaware (1:24-cv-00169), Reolink's initial motion to dismiss is still pending. No Answer to the Complaint has been filed; no scheduling order/trial date has been established. The Board's final decision will surely precede the not-yet-scheduled jury trial. This should be

dispositive—the timing undercuts the fundamental premise for a *Fintiv* denial. Indeed, this conclusion is corroborated by the fact that the current median-time-to-trial in Delaware is 38.0 months—indicating a jury trial date long after any final decision in this IPR. See https://www.uscourts.gov/sites/default/files/fcms_na_distprofile1231.2023_0.pdf, 14. Factor 2 weighs heavily against exercising discretion to deny.

Factor 3: Investment in the Parallel Proceeding by the Court and Parties

Neither Patent Owner nor Reolink has invested in *Markman* briefing, substantive fact discovery, expert discovery, summary judgment motions, or pre-trial preparations. Again, Reolink diligently filed this Petition *before* receiving preliminary infringement contentions from Patent Owner and even *before* submitting an Answer to the initial Complaint. As such, the investment “in the []lawsuit, particularly as related to any validity issues, has not been substantial.” *Illumina, Inc. v. Ravgen, Inc.*, IPR2021-01271, Paper 12, 27 (January 26, 2022). Factor 3 weighs heavily against exercising discretion to deny.

Factor 4: Overlap between Issues Raised in the Petition and in the Parallel Proceeding

Again, Reolink diligently filed this Petition *before* receiving preliminary infringement contentions from Patent Owner, so it follows that there are no invalidity contentions in the Reolink litigation at this time. For this reason, the

overlap of issues cannot be fully assessed, and Patent Owner cannot point to any evidence to the contrary. Factor 4 is neutral.

Factor 5: Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party

Petitioners are the defendants in the Reolink lawsuit. EX1015, EX1016. Because the Board's final decision here will likely precede the date for Reolink's jury trial "by many months," this factor "weighs against discretionary denial." *Illumina*, at 30.

Factor 6: Other Circumstances that Impact the Board's Exercise of Discretion, Including the Merits

The PTAB's guidance plainly states that, "where the PTAB determines that the information presented at the institution stage presents a compelling, unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*." See Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, 4-5 (June 21, 2022) ("Guidance Memo"). That is the scenario here. Indeed, in each of Grounds 1-3, "the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence"—the very definition of "[c]ompelling, meritorious challenges" set forth by the Director. See Guidance Memo, 4. Factor 6 weighs heavily in favor of institution.

VII. PAYMENT OF FEES – 37 C.F.R. §42.103

Petitioners authorize the Patent and Trademark Office to charge Deposit Account No. 06-1050.

VIII. MANDATORY NOTICES UNDER 37 C.F.R §42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. §42.8(b)(1)

Reolink Innovation Inc. and Shenzhen Reolink Technology Co., Ltd. (“Reolink”) are the Petitioners and real parties-in-interest. No other party had access or control over this Petition, and no other party provided funding for this Petition.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

Petitioners are not aware of any disclaimers, reexamination certificates, or other petitions for IPR of the ’448 patent. The ’448 patent is the subject of civil action captioned *ThroughTEK Co. Ltd. v. Reolink Innovation Inc.*, Case No. 1:24-cv-00169 (D. Del.), Document 1 (Complaint), February 8, 2024. *See* EX1015.

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Reolink provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR52472-0008IP1@fr.com.

Respectfully submitted,

Dated: July 19, 2024

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,811 words, which is fewer than the 14,000 allowed under 37 CFR § 42.24.

Dated: July 19, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on July 19, 2024, a complete and entire copy of this Petition for *Inter Partes* Review, Power of Attorney, and all supporting exhibits were provided via Federal Express, to the Patent Owner by serving the correspondence address of record as follows:

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