

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

HEADWATER RESEARCH LLC,
Patent Owner.

Case IPR2023-01360
Patent 9,609,544 B2

PATENT OWNER'S PRELIMINARY RESPONSE

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I. INTRODUCTION

The Board should deny institution of *inter partes* review (“IPR”) of U.S. Patent No. 9,609,544 (“the ’544 Patent”).

The Petition fails to show that a POSITA would have been motivated to combine Rao with Araujo. The Petition’s proposed combination involves queuing network packets (and thus consuming battery power) when the battery of a mobile device is already low, even though those packets will not be transmitted until after the battery has been charged (and will possibly *never* be transmitted). In other words, the Petition’s proposed combination involves **consuming** (already-low) battery power to **not** transmit packets to deplete the battery faster, in hopes that the user will begin to charge the device before the device runs out of power completely. The Petition does not identify (or even allege) any benefit to depleting battery power to store packets for transmission at some indeterminate time, and thus cannot establish motivation to combine. The same deficiency applies to the Petition’s theory for each challenged claim (each of which relies on the same proposed combination). Accordingly, the Petition cannot show unpatentability for any challenged claim, and institution should be denied.

II. OVERVIEW OF THE ’544 PATENT

At a high level, the ’544 Patent is generally directed to using a network usage policy to control network activity based on whether an application is classified as

interacting with the user in the foreground and a power control state. More specifically, the only independent claim (Claim 1) recites:

[1pre] A wireless end-user device, comprising:

[1a] a wireless modem to communicate data for network service usage activities between the device and a wireless network;

[1b] a processor that executes instructions to associate network service usage activity, on behalf of a first device application, and that occurs when the first device application is not in the foreground of user interaction, with a network service usage control policy,

[1d] set an application state indicating whether the first device application, associated with a particular network service usage activity, is in the foreground of user interaction, and

[1f] dynamically determine whether to apply the network service usage control policy to the particular network service usage activity, based on the application state and based on a power control state; and

[1g] a memory coupled to the processor to provide the processor with the instructions.

For instance, the '544 Patent describes “dynamically” determining whether to apply a “network service usage control policy” to a “network service usage activity” based on “a power state of device” and “an application behavior.” Ex. 1001, 89:12-23.

III. LEVEL OF ORDINARY SKILL IN THE ART

The Petition proposes that a POSITA in the field of the '544 Patent “would have had (1) at least a bachelor’s degree in computer science, electrical engineering, or a related field, and (2) three to five years of experience with networking, power consumption of networked computing devices, and/or wireless digital communications systems. More education, e.g., a doctorate in an academic area emphasizing electrical engineering, computer engineering, computer science, or a related technical field, would compensate for fewer years of work experience.” *See* Pet. 5 (citing Ex. 1003 ¶¶16-17). For purposes of this preliminary response, Patent Owner does not challenge that definition.

IV. CLAIM CONSTRUCTION

The Petition states that “no formal claim constructions are necessary.” *Id.* at 2-3. For purposes of this preliminary response, Patent Owner agrees that no formal claim construction is necessary.

V. THE PETITION FAILS TO SHOW A REASONABLE LIKELIHOOD OF UNPATENTABILITY FOR ANY CHALLENGED CLAIM

Limitation [1.5] recites “dynamically determine whether to apply the network service usage policy to the particular network service usage activity, based on the application state and based on a power control state.”

The Petition’s analysis of this limitation is disjointed and confusing. Even though the Petition is relying on a *combination* of Rao with Araujo that modifies the

way Rao operates,¹ most of the Petition’s discussion of limitation [1.5] merely summarizes what Rao and Araujo teach individually without alleging that either reference itself discloses or renders obvious limitation [1.5]. *See* Pet. 25-26 (second and third paragraphs of the Petition’s [1.5] analysis, discussing what “Rao teaches” and “Araujo teaches”).

Beyond these two paragraphs, the Petition has only a single sentence alleging that “[a]s described in §III.A.1.c, a POSITA would have understood and found obvious that... RAD [Rao-Araujo Device] renders obvious dynamically determining whether to apply the network service usage control policy to network service usage activity of an application, based on the application state (foreground/background) and based on a power control state (e.g., power state of a device).” Pet. 26.² However, this sentence merely incorporates by reference §III.A.1.c (regarding the combination

¹ *See* Pet. 6 (alleging that “The Rao-Araujo Combination” renders challenged claims obvious); *id.* 19-28 (alleging that the Rao-Araujo Device or “RAD” renders each limitation of Claim 1 obvious, not either of Rao or Araujo standing alone); *id.* 14-19 (describing numerous modifications to Rao in view of Araujo to arrive at the proposed RAD combination).

² The Petition includes an additional sentence that states that “a POSITA would have recognized and appreciated ‘the multitude of ways to define client-side application priorities,’” but does not explain how this supposed “multitude of ways” has anything to do with the claim language at issue. *See* Pet. 27.

of Rao with Araujo) and does not include any independent theory regarding how limitation [1.5] is met. The Petition thus must show that the combination proposed in §III.A.1.c would have been obvious to prevail with respect to limitation [1.5].

The Petition, however, fails to establish the obviousness of the combination proposed in §III.A.1.c. Specifically, that combination involves the following implementation of policy enforcement, in which the RAD passes requests to the device driver and queues packets for transmission even when in a low power state:

As one example, when a request to transmit network packets arrives, a POSITA would have recognized that RAD enforces a particular policy (i) when an application is in the foreground (per Rao) giving it “VIP” status (per Araujo and based on the foreground application state of Rao), and (ii) when the power state of the device indicates the battery is above a threshold charging level. ***In such cases, RAD would permit the transmission*** (since the battery is sufficiently charged) and place the packets in a high-priority queue (for the “VIP” application). In another example, a POSITA would have recognized that RAD enforces a different policy (i) when an application is in the background (per Rao) not giving it “VIP” status (per Araujo and based on the background application state of Rao), and (ii) when the power state of the device indicates the battery is above a threshold charging level. ***In such cases, RAD would permit the transmission*** (since the battery is sufficiently charged) and place the packets in a lower-priority queue (for the non-VIP application). In yet another example, *a POSITA would have recognized that RAD enforces a different policy (i) when an application*

*is in the foreground (per Rao) giving it “VIP” status (per Araujo and based on the background application state of Rao), and (ii) when the power state of the device indicates the battery is below a threshold charging level. **In such cases, RAD would place the packets in a high-priority queue (for the “VIP” application) but would hold the transmission until a more favorable power state existed.*** In yet another example, e.g., when an application is running in the background and the power level is low, RAD can enforce a policy that results in RAD’s request deflector *preventing the request from being passed to the device driver, not queuing the packet and further conserving power.*

Pet. 16-17 (internal citations omitted).³

As shown above, the Petition alleges that in order to meet limitation [1.5], the proposed Rau-Araujo combination would involve (a) permitting transmission of *all* packets when the battery is *above* a threshold charging level, and (b) not transmitting *any* packets (regardless of the associated application’s foreground/background status) when the battery is *below* a threshold charging level. However, in the latter scenario, to arrive at the requirement in [1.5] that that policy application is based on “application state,” the Petition specifies that packets associated with foreground applications will be placed “in a high-priority queue” and be held there indefinitely “until a more favorable power state existed.” Pet. 17.

³ All emphasis added unless otherwise noted.

The Petition fails to motivate this combination, which lacks reasoned analysis and evidentiary support. The Petition identifies no plausible benefit or other motivation to place packets “in a high-priority queue... until a more favorable power state existed” at some indeterminate future time period, even though the Petition acknowledges that this proposed queuing has the disadvantage of passing the transmission request to the device driver and consuming additional power (during a period of time when the battery power of the device is *already* low). *See* Pet. 17 (contrasting “plac[ing] the packets in a high-priority queue” with “not queuing the packet,” and explaining that not queuing the packet “further conserve[es] power” because “the request [is not] passed to the device driver”).

For instance, the Petition does not even *allege* that queuing packets indefinitely “until a more favorable power state existed” would have been seen as desirable by a POSITA. For example, it is apparent that in a mobile device with a low battery, the system will not know *when* the device will be plugged in such that “a more favorable power state” will exist. Thus, the amount of time packets would need to be queued would be entirely indeterminate and would often be on the order of hours. There is no evidence that queueing network packets for transmission at some indeterminate future time (which may not even arrive before the packets time out or become “stale,” or before the battery is depleted entirely) would be seen as desirable when the device is already at low power. For example, as the Petition

acknowledges, queuing packets would require power consumption by the network driver, which would need to (i) convert data for transmission by the application into packets suitable for transmission over the network and (ii) remain powered on to preserve and store the network packets in the high-priority queue. *See* Pet. 17 (contrasting “plac[ing] the packets in a high-priority queue” with “not queuing the packet,” and explaining that not queuing the packet “further conserv[es] power” because “the request [is not] passed to the device driver”).

A simple common sense example, out of numerous candidate examples, shows why a POSITA would *not* be motivated to pursue the proposed combination, and would find it detrimental even if it were happened upon. Consider the real-world example of a trusted application on a smartphone that is uploading HDR videos recorded by the phone. The app starts uploading and is then moved to the background of the user experience. Any phone user, and thus any POSITA, knows that it is common to have many such videos being uploaded at points in time, and in this example there is a modest number of modest size videos: four 90 second videos, which in HDR format, which is common, would each be roughly 500 megabytes in size, for a total size of approximately two gigabytes. Under the Petition’s proposed combination, those videos would be processed into tens of thousands to hundreds of thousands of network packets (depending on the maximum packet size setting for the device network communications), and the network packets would be queued

somewhere in the phone network stack until some future point in time, thus consuming CPU battery power and capacity and memory battery power and capacity. Furthermore, should the user delete the videos, or the device be turned off or run out of battery power prior to the future point time when the conditions are met for transmitting the stored network packets, all of the stored network packets would be lost. Given the Petition's stated motivation to save battery power, a POSITA would see this proposed combination as clearly detrimental, and not at all obvious.

Furthermore, any phone user, and thus any POSITA, would know that there can be dozens of apps running in the background of the user experience on a mobile phone, and under the Petition's theory, these trusted apps running in the background would each be allowed to send data to the network stack and compel the device driver to packetize and queue the data, causing even more packet processing, CPU battery power and capacity, and memory battery power and capacity, to be consumed. Meanwhile, no packets would actually be transmitted as a result of all of these consumed resources unless and until the user charges the battery before it is depleted. The above example illustrates just how contrived and undesirable the proposed combination would have been.

Queuing (but not transmitting) packets would also interfere with application flow; because the application would not be informed that its data for transmission has been passed to the driver but not actually transmitted over the network, the

application would be more likely to continue attempting to transmit data over the network, thus wasting CPU, memory, and battery resources and requiring more queuing of network packets by the network driver. Furthermore, the application would need to keep track of what data had been queued for transmission, and if and when the associated network packets ultimately timed out, the application would have to determine what data had not been transmitted over the network and would then need to re-request transmission of that data. The Petition (and the corresponding expert declaration) entirely ignore the difficulties with this approach, none of which are solved by the teachings of either Araujo or Rao.⁴

⁴ Rao teaches queuing network packets on only a short-term basis, only if and during the time that other, higher-priority network packets are being transmitted, or while a pre-existing, disrupted network connection is being reestablished, and thus does not have the problems of queuing network packets for an indeterminate period of time. *See, e.g.*, Ex. 1005 (Rao) ¶[0045] (discussing “releas[ing] the held network packet upon communication of the one or more network packets... ahead of the held network packet”); *id.* at ¶[0081] (“[T]he network communications are queued during the network disruption and transmitted once the network is available.”). And while Araujo teaches “queue[ing] a program’s request to be processed at some later time,” that queue is referring to a queue for a request to access the device in the first place, not a queue for individual network packets within the network stack. *See* Ex. 1006 (Araujo) ¶[0039] (referencing what happens when “a program requests to use a device that is turned off... and the power management policy does not allow the

Indeed, the Petition *admits* that queuing the packet “until a more favorable power state existed” is power-inefficient, compared to simply “not queuing the packet and *further conserving power*.” Pet. 17. All the inefficiencies described above (that do not provide any discernable or even alleged benefit), could be avoided by simply *not* taking the application state into account as the Petition alleges, and not queuing any network packets for transmission when the battery is low, thereby “further conserving power.” *See id.*

The expert declaration accompanying the Petition also does not cure the flaws of the Petition. The Petition cites only to paragraph 80 of the expert declaration in support of the purported obviousness of consuming already-low battery power to queue network packets indefinitely, for potential future transmission. *See* Pet. 17 (citing Ex. 1003 ¶80). But that paragraph includes only a single sentence alleging that queuing the packets without actually transmitting them would be advantageous, arguing that “[s]uch behavior is advantageous since, when battery power is lower, the transmission can cause the battery to drain completely, disabling the device.” Ex. 1003 ¶80. But that is only an advantage to *not transmitting* the packets, not an

device to be turned on at the time of the request”). Indeed, Araujo confirms that consuming battery power to queue network packets would be problematic, because any request that is queued “could stay in a queue *indefinitely* while waiting to be processed.” *Id.*

advantage to *queuing* packets indefinitely. Indeed, that same declaration acknowledged that “[e]ven passing data to a driver [such as would be required by the proposed queuing] can consume power, so in certain circumstances, blocking such interactions further conservers power.” *Id.* Accordingly, both the Petition and the corresponding expert declaration fail to allege any benefit to queueing packets when the battery is low, as the Petition’s combination would require.

At bottom, the Petition’s motivation to combine theory is contrived and lacks reasoned analysis and evidentiary support. Because the Petition fails to motivate its proposed combination, on which its theory for limitation [1.5] relies, the Petition fails to set forth a prima facie case of invalidity of Claim 1 (or any other challenged claims, each of which depend from Claim 1).

VI. CONCLUSION

Patent Owner respectfully requests that the Board deny institution for the reasons set forth above.

Date: January 4, 2024

Respectfully submitted,

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CERTIFICATION REGARDING WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), Patent Owner certifies that there are 2,812 words in the paper excluding the portions exempted under 37 C.F.R. §42.24(a)(1).

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e)(1))

The undersigned hereby certifies that the above document was served on January 4, 2024, by filing this document through the Patent Trial and Appeal Case Tracking System as well as delivering a copy via electronic mail upon the following attorneys of record for the Petitioner:

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