IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Gregory G. Raleigh, et al.	
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Appl. Serial No.:	14/082,040	
Filing Date:	November 15, 2013	
Title:	DEVICE-ASSISTED SERVICES FOR PROTECTING NETWORK CAPACITY	

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PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT NO. 9,609,544 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42

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EXHIBITS

SAMSUNG-1001	U.S. Patent No. 9,609,544 to Raleigh, et al. ("the '544 Patent")
SAMSUNG-1002	Excerpts from the Prosecution History of the '544 Patent ("the Prosecution History")
SAMSUNG-1003	Declaration and Curriculum Vitae of Dr. Kevin Butler
SAMSUNG-1004	Complaint, *Headwater Research LLC v. Samsung Electronics Co., Ltd. et al.*, 2:22-cv-00422, E.D. Tex., October 26, 2022
SAMSUNG-1005	U.S. Pat. App. Pub. No. 2006/0039354 ("Rao")
SAMSUNG-1006	U.S. Pat. App. Pub. No. 2009/0217065 ("Araujo")
SAMSUNG-1007	U.S. Pat. No. 5,987,611 ("Freund")
SAMSUNG-1008	U.S. Pat. No. 8,381,127 ("Singh")
SAMSUNG-1009	U.S. Pat. App. Pub. No. 2009/0207817 ("Montemurro")
SAMSUNG-1010	U.S. Pat. App. Pub. No. 2006/0039364 ("Wright")
SAMSUNG-1011	Bajaj, et al., IETF RFC 3198, Web Services Policy 1.2 - Framework (WS-Policy), April 25, 2006, downloaded from the internet at https://www.w3.org/Submission/WS-Policy/ on August 29, 2023.
SAMSUNG-1012	Sloman, et. al., "Security and management policy specification." IEEE Network, March/April 2002 pp. 10-19
SAMSUNG-1013	Lu, et. al., "Comparing system level power management policies." IEEE Design & Test of Computers, March/April 2001 pp. 10-19
SAMSUNG-1014	Davie, et al., IETF RFC 3246, An Expedited Forwarding PHB (Per-Hop Behavior), March 2002, downloaded from

	the internet at https://data-tracker.ietf.org/doc/html/rfc3246 on September 5, 2023
SAMSUNG-1015	Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) ("Director's Guidance")
SAMSUNG-1016	Samsung Stipulation letter regarding IPR grounds in District court litigation
SAMSUNG-1017	First Amended Complaint, *Headwater Research LLC v. Samsung Electronics Co., Ltd. et al.*, 2:22-cv-00422, E.D. Tex., November 30, 2022
SAMSUNG-1018	First Amended Docket Control Order, Headwater Research LLC v. Samsung Electronics Co., Ltd. et al., 2:22-cv-00422, E.D. Tex., April 21, 2023
SAMSUNG-1019	Excerpts, The New Penguin Dictionary of Computing, by Dick Pountain, 2001
SAMSUNG-1020	Westerinen, et al., IETF RFC 3198, Terminology for Policy-Based Management, November 2001, downloaded from the internet at https://www.ietf.org/rfc/rfc3198.txt on August 15, 2023.
SAMSUNG-1021	U.S. Pat. No. 7,757,185 ("Paquette")
SAMSUNG-1022	U.S. Pat. No. 7,023,909 ("Adams")
SAMSUNG-1023	U.S. Pat. No. 9,408,070 ("Altbaum")
SAMSUNG-1024	Yavatkar, IETF RFC 2753, A Framework for Policy-based Admission Control, January 2000, downloaded from the internet at https://data-tracker.ietf.org/doc/html/rfc2753 on September 5, 2023
SAMSUNG-1025	U.S. Pat. App. Pub. No. 2008/0080458 ("Cole")
SAMSUNG-1026	U.S. Pat. No. 8,413,172 ("Sng")

CLAIMS

Claim	Identifier	Claim Language
1	[1.1]	A wireless end-user device, comprising:
	[1.2]	a wireless modem to communicate data for network service usage activities between the device and a wireless network;
	[1.3]	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,
	[1.4]	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
	[1.5]	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
	[1.6]	a memory coupled to the processor to provide the processor with the instructions.
2	[2]	The wireless end-user device of claim 1, wherein the processor executing the instructions determines that the first device application is in the foreground of user interaction when the user of the device is directly interacting with that application or perceiving any benefit from that application.
3	[3]	The wireless end-user device of claim 1, wherein the processor executing the instructions determines that the first device application is in the foreground of user interaction based on a state of user interface priority for the application.

Claim	Identifier	Claim Language
4	[4]	The wireless end-user device of claim 1, wherein when the network service usage control policy is applied it disallows the particular network service usage activity, and wherein the processor executes the instruction further to, when it is determined that the particular network access request is disallowed, queue that particular network service usage activity until a power state change occurs.
5	[5]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to: implement the network service usage control policy at least in part via communication with the first device application through an emulated network access API that indicates to the first device application that an available wireless network is unavailable when a dynamic determination applies the network service usage control policy to the particular network service usage activity.
6	[6]	The wireless end-user device of claim 1, wherein the processor further executes the instruction to, for at least a second device application or service, allow network service usage activities without regard to the power control state.
7	[7]	The wireless end-user device of claim 1, wherein the power control state is a power state of the device.
8	[8]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to: execute a router for dynamically managing one or more network capacity controlled services and/or QoS sessions for the wireless end-user device.
9	[9.1]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to:
	[9.2]	execute a router for dynamically managing one or more network capacity controlled services and/or QoS sessions for the wireless end-user device; and

Claim	Identifier	Claim Language
	[9.3]	send network busy state information to a service controller, wherein the service controller provides a policy decision point for management for a plurality of wireless end-user devices in communication with one or more base stations.
10	[10.1]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to:
	[10.2]	execute a router for dynamically managing one or more network capacity controlled services and/or QoS sessions for the wireless end-user device;
	[10.3]	send network busy state information to a service controller, wherein the service controller provides a policy decision point for management for a plurality of wireless end-user devices in communication with one or more base stations; and
	[10.4]	receive router traffic control instructions from the service controller, wherein the service controller provides the router traffic control instructions to assist in dynamically managing network capacity usage for the plurality of wireless end-user devices in communication with the one or more base stations.
11	[11]	The wireless end-user device recited in claim 1, wherein dynamically determining whether to apply the network service usage control policy to the particular network service usage activity is further based on a current wireless network and/or the network service usage control policy is based on a current wireless network.
12	[12]	The wireless end-user device recited in claim 1, wherein dynamically determining whether to apply the network service usage control policy to the particular network service usage activity further includes dynamically assigning a network capacity controlled services priority level to the particular network service usage activity based on a network busy state.
13	[13]	The wireless end-user device recited in claim 1, wherein

Claim	Identifier	Claim Language
		associating includes querying a network element for determining an association of the first device application with the network service usage control policy.
14	[14]	The wireless end-user device recited in claim 1, wherein the network service usage control policy includes one or more of the following: block/allow settings, throttle settings, adaptive throttle settings, QoS class settings, packet error rate, jitter and delay settings, queue settings, and tag settings.
15	[15]	The wireless end-user device recited in claim 1, wherein the network service usage control policy includes traffic control policy filters, the filters comprising a first filter specifying applicability of the policy only when the first device application is not in the foreground of user interaction, and a second filter specifying applicability of the policy only in one or more specific power control states.
16	[16]	The wireless end-user device recited in claim 1, wherein the network service usage control policy includes traffic control policy filters implemented as cascading filters.
17	[17]	The wireless end-user device recited in claim 1, wherein the network service usage control policy includes traffic control policy filters using a network busy state and/or a time of day as an index into a traffic control setting.
18	[18]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to: differentially control the particular network service usage activity based on the network service usage control policy based on a network busy state.
19	[19]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to: differentially control the particular network service usage activity based on the network service usage control policy based on a user input and/or a current wireless network.

Claim	Identifier	Claim Language
20	[20]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to: modify or replace a network stack interface of the wireless end-user device to provide for intercept or discontinuance of network access messaging for implementing traffic control of the particular network service usage activity.
21	[21]	The wireless end-user device recited in claim 1, wherein the processor executes the instructions further to: store a network capacity controlled service list, wherein the network capacity controlled service list is periodically updated based on monitored network service usage activities.
22	[22]	The wireless end-user device of claim 1, wherein the power control state is a power save state of the device.
23	[23]	The wireless end-user device of claim 1, wherein the power control state is a power state of the wireless modem.

Samsung Electronics Co., Ltd. ("Petitioner" or "Samsung") petitions for *Inter Partes* Review ("IPR") of claims 1-23 ("the Challenged Claims") of U.S. Patent No. 9,609,544 ("the '544 Patent").

I. REQUIREMENTS FOR IPR

A. Grounds for Standing

Samsung certifies that the '544 Patent is available for IPR. Samsung is not barred or estopped from requesting this review. Samsung was served with a complaint of infringement of the '544 Patent less than one year ago. SAMSUNG-1004.

B. Challenge and Relief Requested

Samsung requests an IPR of the Challenged Claims on the grounds noted below. Dr. Kevin Butler provides supporting testimony in his declaration (SAMSUNG-1003).

Ground	Claim(s)	Basis
1A	1, 2, 4-8, 12-16, 18, 20, 22-23	§103: Rao, Araujo
1B	2, 17, 19-21	§103: Rao, Araujo, Freund
1C	3	§103: Rao, Araujo, Singh
1D	11	§103: Rao, Araujo, Montemurro
1E	9-10, 13, 18	§103: Rao, Araujo, Wright

The '544 Patent claims priority to a number of provisional applications, the earliest of which was filed 1/28/2009. SAMSUNG-1001, Cover. While Samsung does not concede that 1/28/2009 is the priority date that should be afforded to the '544 Patent, for the purposes of this proceeding, each of the references asserted in this Petition qualifies as prior art under 35 USC §§102(a), (b), or (e) (as shown in the table below) even if the 1/28/2009 date of the provisional application is used as the priority date ("the Critical Date") of the '544 Patent.

Reference	Filing Date	Publication Date
Rao	7/22/2005	6/23/2006
Araujo	2/26/2008	8/27/2009
Freund	5/6/1997	11/16/1999
Singh	2/2/2006	8/2/2007
Montemurro	2/15/2008	9/2/2014
Wright	10/13/2005	2/23/2006

C. Claim Construction

Petitioner submits that no formal claim constructions are necessary because "claim terms need only be construed to the extent necessary to resolve the controversy." *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir.

2011). Petitioner reserves the right to respond to any constructions offered by Patent Owner or adopted by the Board. Petitioner is not conceding that each challenged claim satisfies all statutory requirements, nor is Petitioner waiving any arguments concerning claim scope or grounds that can only be raised in district court. For this petition, Petitioner applies prior art in a manner consistent with Patent Owner's allegations of infringement before the district court.

II. THE '544 PATENT

A. Overview

The '544 Patent is directed to "device-assisted services for protecting network capacity." SAMSUNG-1001, Title. It explains that "a wireless end-user device has a wireless wide-area network (WWAN) modem and supports multiple wireless network types," which can include a WLAN modem, illustrated below. SAMSUNG-1001, Abstract, FIG. 3.

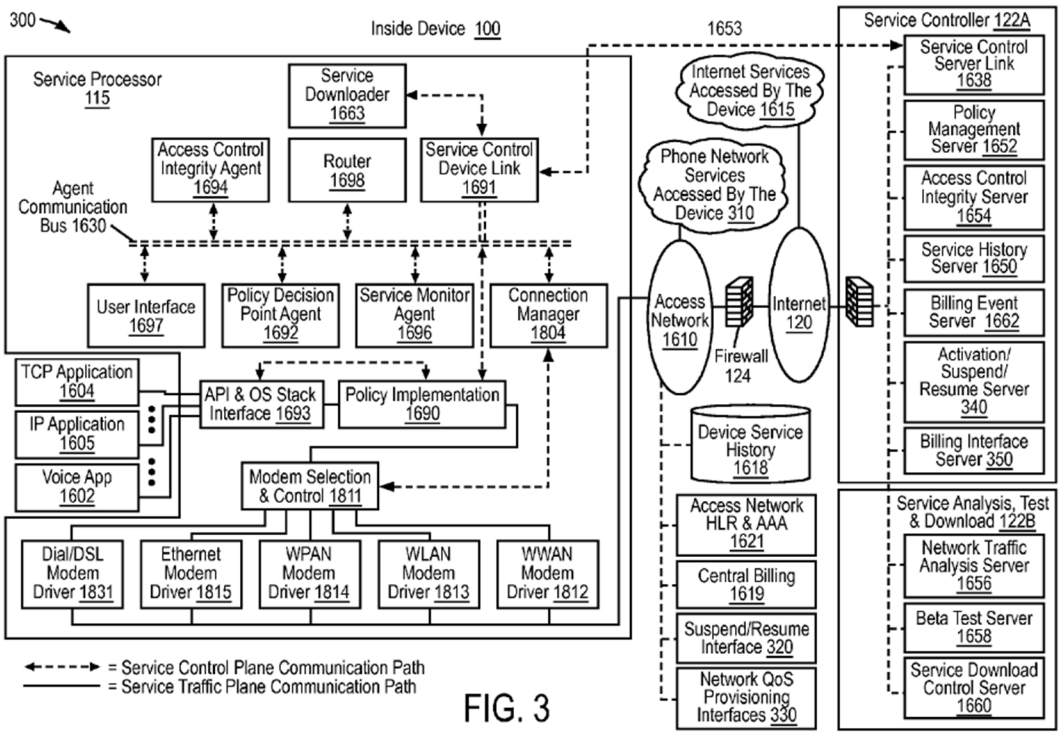


FIG. 3

SAMSUNG-1001, FIG. 3.

To manage capacity increases, the device can "apply a service usage control policy for the network service usage activities to protect network capacity (e.g., reduce network capacity demand)." SAMSUNG-1001, 13:66-14:2; *see also id.*, 5:56-59. The device can "assign[] a priority to a network service usage activity and control[] traffic associated with the network services usage activity based on the assigned priority" and provide a "differentiated and dynamic background services classification ... as a function of network availability state and/or network busy state." *Id.,* 14:25-32. The service usage control policy assists "in network access control of network service usage activities (e.g., deferring some or all of the network capacity demand from these source activities)." *Id.,* 14:32-35. The device

associates "the network service usage activity with a network service usage control policy" based on factors such as "a network busy state," "a time of day," "application behavior," "a power state of device, a device usage state, a time based criteria, availability of alternative networks, and a set of policy rules." *Id.,* 89:15-23. When a policy applies to an access request, the device can apply various well known traffic control techniques. *Id.* 15:48-50.

To enforce the controls, the device includes "a policy implementation driver/agent 1690 (e.g., policy enforcement point driver/agent)" and a Policy Decision Point Agent 1692. SAMSUNG-1001, FIG. 3, 61:26-28. A POSITA[1] would have recognized policy decision points (PDPs) and policy enforcement points (PEPs) as describing components that determine whether a policy applies (PDP), and when the policy applies, enforce the policy decision (PEP). SAMSUNG-1003, ¶[43] (citing SAMSUNG-1010).

B. Prosecution History

The '544 Patent was allowed after one Office action that alleged the claims were: (i) directed to unpatentable subject matter under §101, and (ii) unpatentable over U.S. Patent No. 8,484,658 ("Rados"). SAMSUNG-1002, 668-672. Applicant amended the claims to address §101 and argued that Rados was not prior art by

[1] See SAMSUNG-1003, ¶¶[16]-[17].

claiming priority to a provisional application. *Id.*, 109-117. The claims were subsequently allowed. *Id.*, 76-83.

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. [GROUND 1A] The Rao-Araujo Combination Renders Claims 1, 2, 4-10, 12-16, 18, 20, and 22-23 Obvious

1. Rao-Araujo

(a) Rao[2]

Rao discloses a "remote access architecture" for "peer-to-peer communications and remote access connectivity." SAMSUNG-1005, Abstract. The system (e.g., Figure 1A, below) includes clients 105 (e.g., computing devices 102) that communicate over a network 104 to other devices, such as servers and server farms. *Id.*, [0086]-[0096]; SAMSUNG-1003, ¶[47].

[2] Descriptions of the references and prior art combinations are incorporated into each mapping. All emphasis is added unless otherwise indicated.

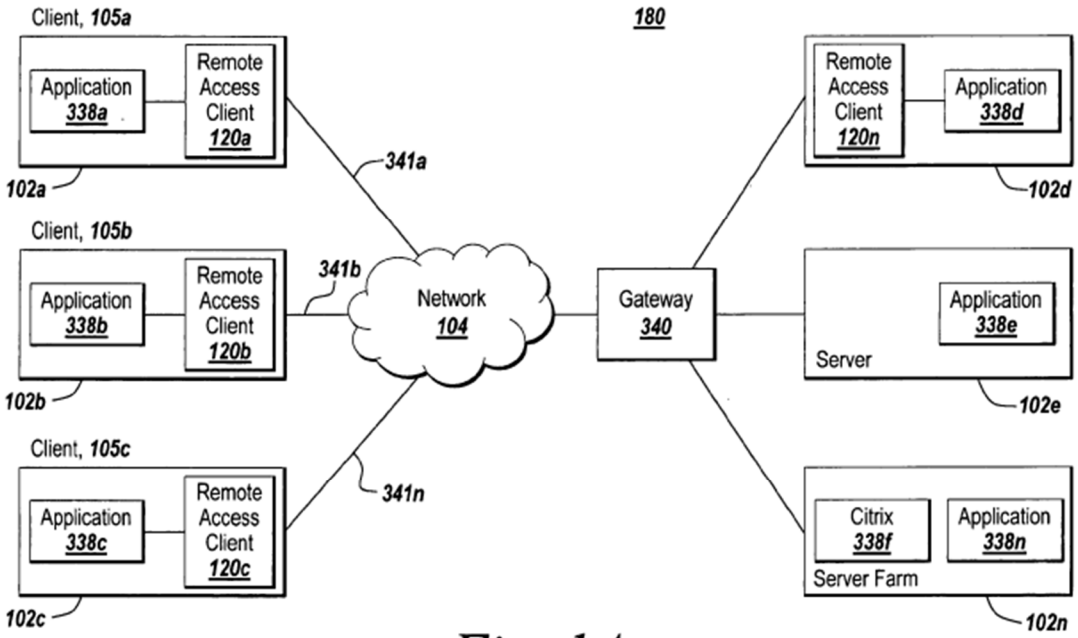


Fig. 1A

SAMSUNG-1005, FIG. 1A

Rao addresses inefficient use of network resources when network communications between devices are "processed in the order generated by the activity of a user and applications of the client," which is not "always desirable" because network packets for background applications may be processed ahead of network packets for foreground applications, resulting in applications suffering from increased latency and reduced quality of voice communication. SAMSUNG-1005, [0003]; SAMSUNG-1003, ¶[49].

Rao addresses these inefficiencies through a prioritization scheme that "pro-

vide[s] application-aware, client-specific prioritization of packet traffic." SAMSUNG-1005, [0003]. The scheme is achieved by augmenting client 105 with remote access client (RAC) 120 that interacts with applications 338 and network stack 310. *Id.*, [0089], [0098]-[0100]; SAMSUNG-1003, ¶[50].

Figure 1C shows an example of a system with a RAC for routing network packets from client 105 to network 104:

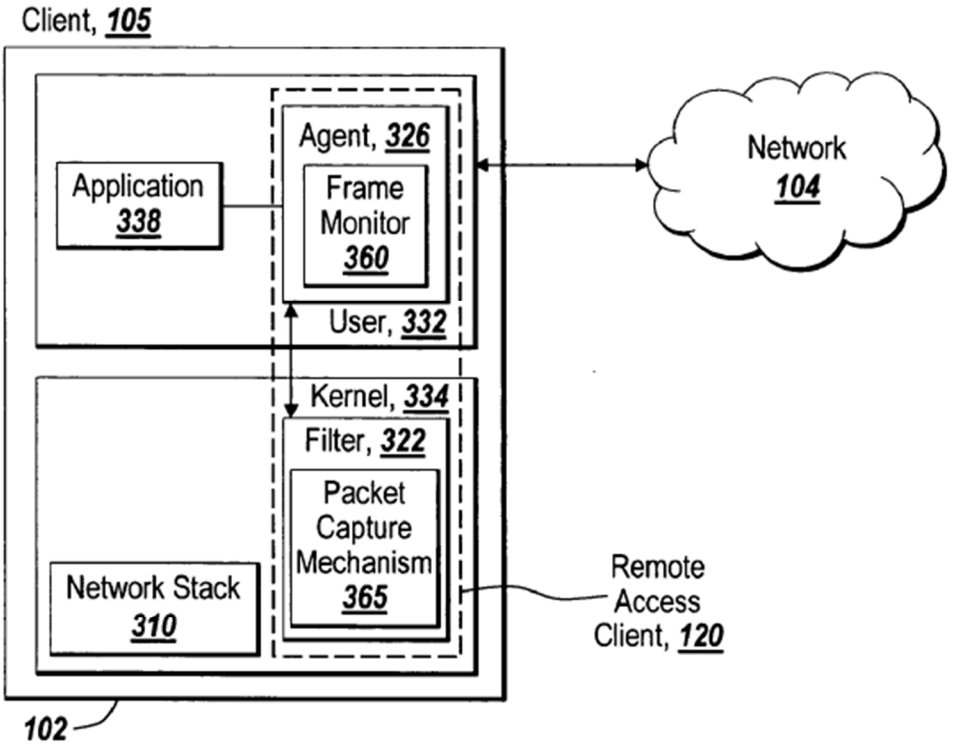


Fig. 1C

SAMSUNG-1005, FIG. 1C

Remote access client includes a filter that uses a "filtering table … to determine what action to take against packets," including "ensur[ing] that unwanted

packets are discarded," "deny[ing] access to particular protocols," and/or "prevent[ing] unauthorized access from remote computers by discarding packets to specified destination addresses." SAMSUNG-1005, [0102]. RAC 120 can include agent 326 with frame monitor 360 that "include[s] policies and logic for applying a policy to a received packet." *Id.*, [0108]. Frame monitor 360 "transmit[s] a packet to a gateway 340 responsive to a policy-based determination made by the frame monitor 360." *Id.* The use of policies in RAC 120 thereby guides efficient use of network resources and enables Rao's system to address the inefficiencies identified within Rao's disclosure. SAMSUNG-1003, ¶[52].

Rao's system further enables intelligent and client-centric "prioritization of application network communications on a client based on the type and/or priority of an application." SAMSUNG-1005, [0179], [0182]-[0184], FIG. 5A. To perform prioritization, Rao's system "appl[ies] a policy to determine a condition of the client 105, or endpoint, at the time of transmission of the packet." *Id.*, [0109]. Frame monitor can "identify an application 338 that generated the packet." *Id.*, [0109]; SAMSUNG-1003, ¶[53].

Figure 5A shows an environment of a client providing client-side application-aware network communication:

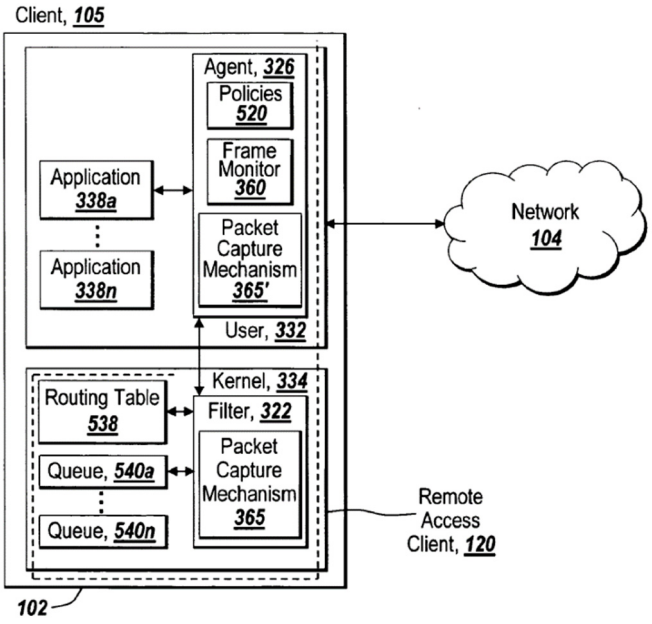


Fig. 5A

SAMSUNG-1005, FIG. 5A

Rao offers non-limiting disclosure relating to policy specification and how its system leverages policies for prioritization. SAMSUNG-1005, [0182] ("any suitable means and/or mechanisms"), [0183]-[0184]; SAMSUNG-1003, ¶[55]. As examples, Rao describes that policies can be specified, e.g., by "type of application," type of "protocols used by the applications," or whether an application is running in the foreground or background. SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[55].

(b) Araujo

Araujo explains that electronic devices such as computers and wireless tele-

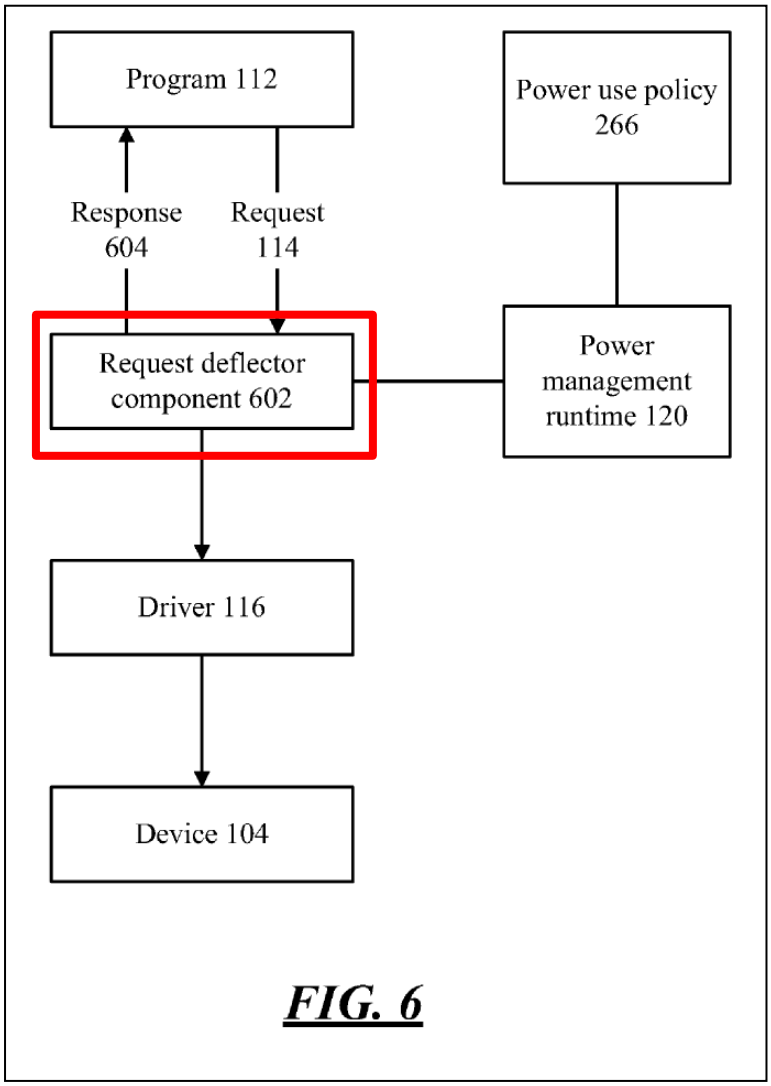
phones "normally employ some type of power management framework." SAMSUNG-1006, [0014]. Such power management schemes "govern the use of energy" because "[b]attery-powered machines have a finite amount of energy stored between charges," so such machines "generally attempt to use the energy in a way that strikes a balance between providing functionality and maintaining longevity of the charge." *Id.*, [0001]; SAMSUNG-1003, ¶[56].

To strike this balance, a machine's "power usage may be managed by a power-management policy," and, "[w]hen a program makes a request that involves use of one of the machine's power-consuming devices, the policy may take into account factors such as the program's status, where the status indicates the program's relative level of justification to consume power." *Id.*, Abstract. For example, "a program may have a status that reflects its worthiness to consume power," such as a "VIP" status that allows it "to consume power in situations where other programs would not be permitted to consume power." *Id.*; SAMSUNG-1003, ¶[57]. In some cases, program activities are permitted without regard to power factors, such as allowing a software update program to perform a software update immediately and "regardless of the power expenditure" when "there is known to be a zero-day attack propagating through the Internet, in which case delaying the update might expose the computer to an attack." SAMSUNG-1006, [0016]; SAMSUNG-1003, ¶[58].

Araujo's system includes a power manager that controls the respective power states of devices and "may cause devices to be turned off, or into a lower power state, based on factors such ... the amount of battery power remaining, or any other factor." SAMSUNG-1006, [0022]. Since Araujo teaches the power states of each component device (e.g., processor, network card, etc.) within a computing device, a POSITA would have recognized that the power state of the computing device ("machine 700" in Araujo) is the aggregate power states of the component devices. *Id.*, [0004], [0056]; SAMSUNG-1003, ¶[59]. Such factors are evaluated by Araujo's power management runtime that "may implement policies that determine when, and under what circumstances" power manager is to turn devices "on or off, or is to place those devices in a different power state." SAMSUNG-1006, [0022]. For brevity, the collective functions of Araujo's power manager and power management runtime is referred to herein as "power policy manager" (PPM).

In some cases, the policy decisions are enforced by a "request deflector component" that is "interposed" between a "program" and a "driver" of a device. SAMSUNG-1006, [0005]. When request deflector component intercepts a request, "it interacts with power management runtime 120 to determine what the ambient policy (e.g., power use policy 266) says about whether the request may be carried out at the expense of power use" and does so "before the request reach[es] a device

driver." *Id.*, Abstract, [0021], [0024], [0050]. Figure 6 (below) shows an example of the "request deflector component":



SAMSUNG-1006, FIG. 6 (annotated)

Araujo contrasts this approach with traditional operation in which interaction between a program and a power policy would be through a driver, and "the program either learns that the device is off, or issue[s] a request that results in the device being turned on," thus allowing policy enforcement even with a device is

powered off. SAMSUNG-1006, [0050]; SAMSUNG-1003, ¶[62].

(c) Combination

A POSITA would have found it obvious to combine a RAC as taught by Rao with a PPM and request deflector component as taught by Araujo to provide a client that better users energy and "strikes a balance between providing functionality and maintaining longevity of the charge." SAMSUNG-1006, [0001]; SAMSUNG-1003, ¶[75].

As discussed in §III.A.1.a, Rao describes policies, which can be specified based on a multitude of factors (e.g., application name, foreground or background execution, etc.), and how its system leverages policies for prioritization. SAMSUNG-1005, [0182]-[0184]; SAMSUNG-1003, ¶[76]. Rao's system controls an application's network access by intercepting network packets, determining packet prioritization based on the application, and selectively communicating packets to the network based on the packet prioritization. SAMSUNG-1005, [0184]-[0195]; SAMSUNG-1003, ¶[76]. These prioritization operations can be performed by one or more "network drivers of a network stack" (e.g., by "customiz[ing], modif[ying] or adapt[ing]" the network drivers "to provide a custom or modified portion of the network stack"). SAMSUNG-1005, [0100]. For example, the Rao system can include a filter to "place, arrange, or coordinate network packets into queues" in support of the priorities," and these queues "may be included in a network driver."

Id., [0143], [0180], [0191]; SAMSUNG-1003, ¶[76].

In implementing such functionality, a POSITA would have perceived opportunities for improving the policy management capabilities already present in Rao to impart additional advantages, such as optimizing power use. SAMSUNG-1003, ¶[77]. A POSITA would have recognized the importance of power management at least because, in mobile devices, applications cannot execute without sufficient power. *Id.*; SAMSUNG-1006, [0001].

Consequently, a POSITA would have looked to policy-based power management, such as taught in Araujo, to serve as one of Rao's "multitude of ways to define client-side application priorities." SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[78]. The resulting Rao-Araujo Device (RAD) would both manage power according to the PPM techniques of Araujo and manage network use according to both Rao's and Araujo's techniques. SAMSUNG-1003, ¶[78].

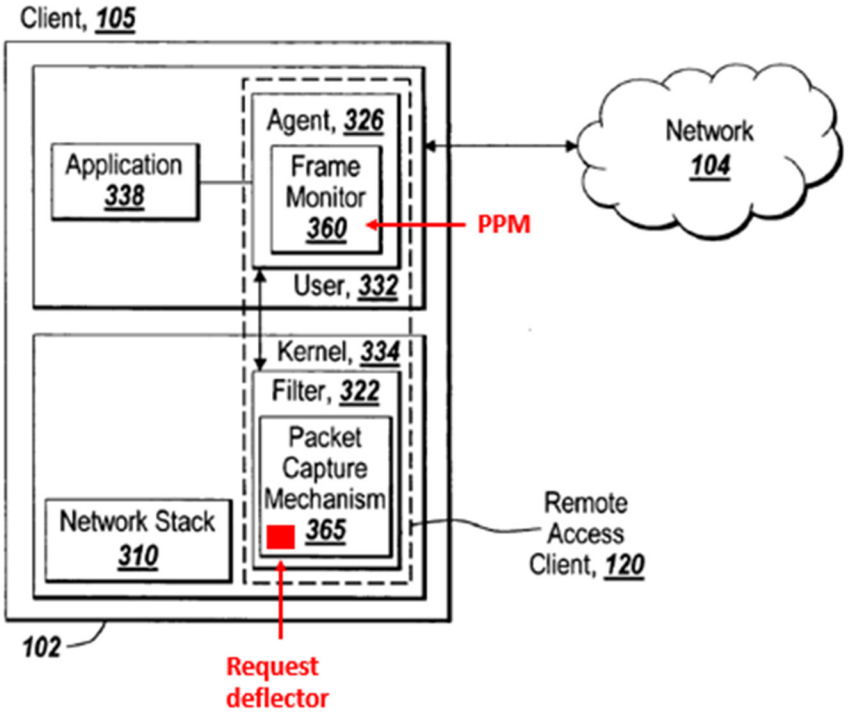
In implementing RAD, a POSITA would have incorporated Araujo's PPM and reflector components in Rao's RAC. SAMSUNG-1003, ¶[79]. The enhanced RAC in RAD would evaluate power-management policies (per Araujo) and network prioritization policies (per Rao and Araujo). SAMSUNG-1003, ¶[79]. For example, RAD would have determined whether an application has a "relative level of justification to consume power," which includes determining whether the application is running in the foreground or background. SAMSUNG-1005, [0182];

SAMSUNG-1006, Abstract; SAMSUNG-1003, ¶[79].

Further, from Rao and Araujo, a POSITA would have understood and found obvious that policy enforcement in RAD may be based on application state (foreground/background) and power state (battery/plugged-in). SAMSUNG-1005, [0182]; SAMSUNG-1006, [0004], [0011]. 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. SAMSUNG-1006, [0022]; SAMSUNG-1003, ¶[80]. 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). SAMSUNG-1003, ¶[80]. 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. SAMSUNG-1006, [0022]; SAMSUNG-1003, ¶[80]. 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). SAMSUNG-1003, ¶[80]. 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. SAMSUNG-1006, [0022]; SAMSUNG-1003, ¶[80]. 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. SAMSUNG-1003, ¶[80]. 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. SAMSUNG-1006, [0005]; SAMSUNG-1003, ¶[80]. From these examples, and as Rao describes, a POSITA "will recognize and appreciate the multitude of ways to define client-side application priorities." SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[80].

A POSITA would have expected success integrating a PPM and deflector components as taught by Araujo into a RAC as taught by Rao. SAMSUNG-1003, ¶[81]. An illustration of RAD is shown below.



Rao-Araujo Device (RAD)

Since Araujo's request deflector is "interposed between the program and the device driver" and Rao's filter "may include a packet capturing mechanism 365, and the filter 322 and/or packet capturing mechanism 365 may comprise a network driver," RAD's request deflector would reside in the filter interposed between the other packet capture components and network device driver that provides traffic to the network stack, as shown in the figure above. SAMSUNG-1005, [0101], FIG. 3 (annotated); SAMSUNG-1006, [0005]; SAMSUNG-1003, ¶[82].

The combination would have required only routine programming knowledge well within the skill of a POSITA prior to the Critical Date. SAMSUNG-1003, ¶[83]. Indeed, the change would have amounted to nothing more than the use of a

known technique to improve similar devices—in each instance a smart phone equipped with network interfaces—in a similar way, and combining prior art elements according to known methods to yield the predictable results described above. *KSR v. Teleflex*, 550 U.S. 398, 417 (2007); SAMSUNG-1003, ¶[83]. For example, both Rao's and Araujo's devices include interfaces between a processor that executes the described functions and network devices that provide communication functions. SAMSUNG-1005, FIGS. 1D-1E, [0118]-[0119], [0121]-[0122], [0125], [0128]-[0130]; SAMSUNG-1006, Figure 2, [0034]-[0035]. A POSITA would have known that such processors commonly run applications such as Rao's RAC and Araujo's deflector component. SAMSUNG-1005, [0114]; SAMSUNG-1006, [0036]; SAMSUNG-1003, ¶[83]. Therefore, the combination of the techniques of Araujo into the techniques of Rao in RAD would require only routine programming knowledge. SAMSUNG-1003, ¶[83].

2. Analysis

[1.1]

To the extent the preamble is deemed limiting, RAD (*see* §III.A.1) renders it obvious. SAMSUNG-1005, [0086], [0030]; SAMSUNG-1006, [0014]; SAMSUNG-1003, ¶¶[84]-[85]. Rao teaches a client that is a wireless end-user device, as shown in Fig. 1A:

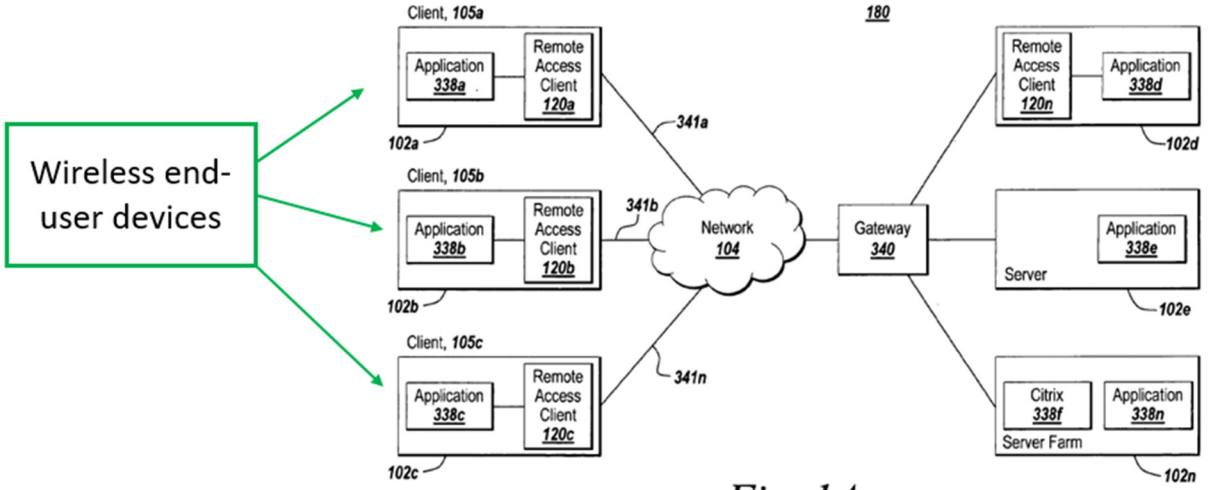


Fig. 1A

SAMSUNG-1005, FIG. 1A (annotated)

Rao explains that the environment includes multiple computing devices 102a-102c (or "clients 105a-105c") connected to a network via one or more network connections. SAMSUNG-1005, [0086]. The computing device "can be any workstation, ..., **handheld computer, mobile telephone**, any other computer, or other form of computing or telecommunications device that is capable of communication and that has sufficient processor power and memory capacity to perform the operations described herein." *Id.*, [0130]; SAMSUNG-1003, ¶[85]. Likewise, Araujo teaches that electronic devices include wireless telephones and "normally employ some type of power management framework." SAMSUNG-1006, [0014]. A POSITA would have known that a wireless telephone is a wireless end-user device. SAMSUNG-1003, ¶[85].

[1.2]

RAD renders [1.2] obvious. SAMSUNG-1005, [0172], [0198]; SAMSUNG-1003, ¶¶[86]-[88].

Specifically, in Rao, a computing device includes a network interface, which can comprise a "**wireless network adapter**, a "**modem** or any other device suitable for interfacing the computing device 102 to any type of network capable of communication." SAMSUNG-1005, [0125]. Rao also teaches that the network interface of its device "interface[s] to … wireless connections." SAMSUNG-1005, [0125]. Moreover, Rao's device may be implemented as a "smart phone," which a POSITA would have understood and found obvious includes a wireless modem. SAMSUNG-1005, [0198]; SAMSUNG-1003, ¶[87] (citing SAMSUNG-1025).

[1.3]

RAD renders [1.3] obvious. SAMSUNG-1005, [0118]-[0119], [0182],[0187]; SAMSUNG-1003, ¶¶[89]-[94]; §III.A.1.c.

RAD renders obvious a processor that executes instructions. SAMSUNG-1003, ¶[90]; §III.A.1.c. For example, Fig. 1D of Rao shows a processor ("CPU 121") to execute instructions. SAMSUNG-1005, Fig. 1D.

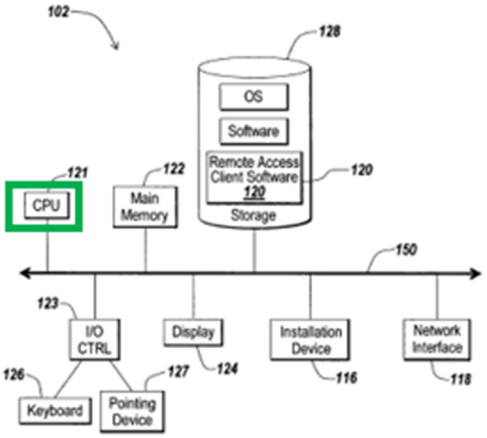


Fig. 1D

SAMSUNG-1005, FIG. 1D (annotated)

Rao describes that "each computing device 102 includes a central processing unit 102, and a main memory unit 104." *Id.*, [0118]. A POSITA would have understood and found it obvious that the processor in RAD executes instructions since Rao teaches a processor as "any logic circuitry that responds to and processes instructions fetched from the main memory unit 104." SAMSUNG-1005, [0119]; SAMSUNG-1003, ¶[91]. Moreover, processors were conventional features of mobile devices by the Critical Date. SAMSUNG-1003, ¶[91].

Rao further teaches applying policies when network service usage activity of a first device application occurs when the first device application is not in the foreground of user interaction. SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[92].

Rao teaches that "policies 520 define prioritization based on whether an application is running in the foreground or the background of the client 105." SAMSUNG-1005, [0182]. A POSITA would have understood and found obvious that reference to applications "not in the foreground" includes, for example, applications in the background and thereby are subject to policies 520. SAMSUNG-1003, ¶[92].

Rao also teaches associating network service usage activity of an application with a network service usage control policy. SAMSUNG-1005, [0182]-[0187]; SAMSUNG-1003, ¶[93]. For example, Rao teaches policies "for specifying client-side prioritization of network communications related to **applications**." SAMSUNG-1005, [0182]. Rao further teaches that the RAC "determines the association of network packets with applications" to "determine priorities and apply any priority based policies" and "can associate network traffic with applications" by any suitable mechanisms. *Id.*, [0187].

A POSITA would have known that, since Rao's policies can define prioritization based on whether an application is running in the foreground or the background of the client, the RAC determines the association of network packets with applications to determine priorities, then applies priority-based policies. SAMSUNG-1003, ¶[94]. RAD thereby renders obvious associating network service us-

age activity, on behalf of a first application, and that occurs when the first application is not in the foreground of user interaction, with a network service usage control policy. SAMSUNG-1005, [0182], [0187]; SAMSUNG-1003, ¶[94].

[1.4]

RAD renders [1.4] obvious. SAMSUNG-1005, [0182], [0184]; SAMSUNG-1003, ¶¶[95]-[97]

As described in §III.A.1.a., Rao provides non-limiting disclosure of applying policies, which a POSITA would have understood and found obvious to involve setting an application state. SAMSUNG-1003, ¶[96]. As one example, Rao explains that policies "define prioritization based on **whether an application is running in the foreground or the background** of the client 105." SAMSUNG-1005, [0182]. Rao further teaches the agent use characteristics of the application "such as running in the foreground or background, to indicate priority for a network packet of the application." *Id.*, [0189]. In this example, a POSITA would have understood and found obvious that applying a policy to prioritize network packets for application involves setting an application's state (e.g., foreground, background) to permit the evaluation of policies that rely on the application state. SAMSUNG-1003, ¶[96]. Additionally, Rao's policies "may be specified conditionally" based on application state ("if one application 338a is running"). SAMSUNG-1005,

[0182]. A POSITA would have similarly understood and found obvious that policy depends on application state ("is running"), and thus, use of the policy includes setting an application state so the policy may be applied. SAMSUNG-1003, ¶[96].

Rao further teaches packet interception techniques, which a POSITA would have understood and found obvious to include associating applications with network service activities. SAMSUNG-1003, ¶[97]. Rao's client intercepts network packets "associated with an application" and "a priority for the intercepted and queued network packet is determined based on the type and/or priority of the application." SAMSUNG-1005, [0184]. A POSITA would have recognized that, in RAD, intercepted packets are examples of network service activities, and thus, the interception of packets that are then prioritized based on application state indicates that applications (which have application states, e.g., foreground, background) are associated with network service activities. SAMSUNG-1003, ¶[97].

[1.5]

RAD renders [1.5] obvious. SAMSUNG-1005, [0182]; SAMSUNG-1006, [0004], [0011], [0022], [0025], [0028]; SAMSUNG-1003, ¶¶[98]-[101].

For example, Rao teaches policy evaluation based on application state, such that "prioritization [is] based on whether an application is running in the foreground or the background." SAMSUNG-1005, [0182]. A POSITA would have recognized "foreground" and "background" as examples of application states.

SAMSUNG-1003, ¶[99].

Araujo teaches that "devices may have various power states" such as on, off and a processor's clock speed and "a justification to change a device from one power state to another may be based on at least one factor other than the mere fact that a request to use the device has been made." SAMSUNG-1006, [0004], [0025]. Araujo further teaches that the "current power state of a device may be a factor in determining whether the power state will be changed." *Id.*, [0028]. A POSITA would have recognized that Araujo's disclosure that the "power state of a device" is a power control state and a "factor in determining whether the power state will be changed" renders obvious that the power control state is used to determine whether to apply a policy regulating network service usage. SAMSUNG-1003, ¶[100].

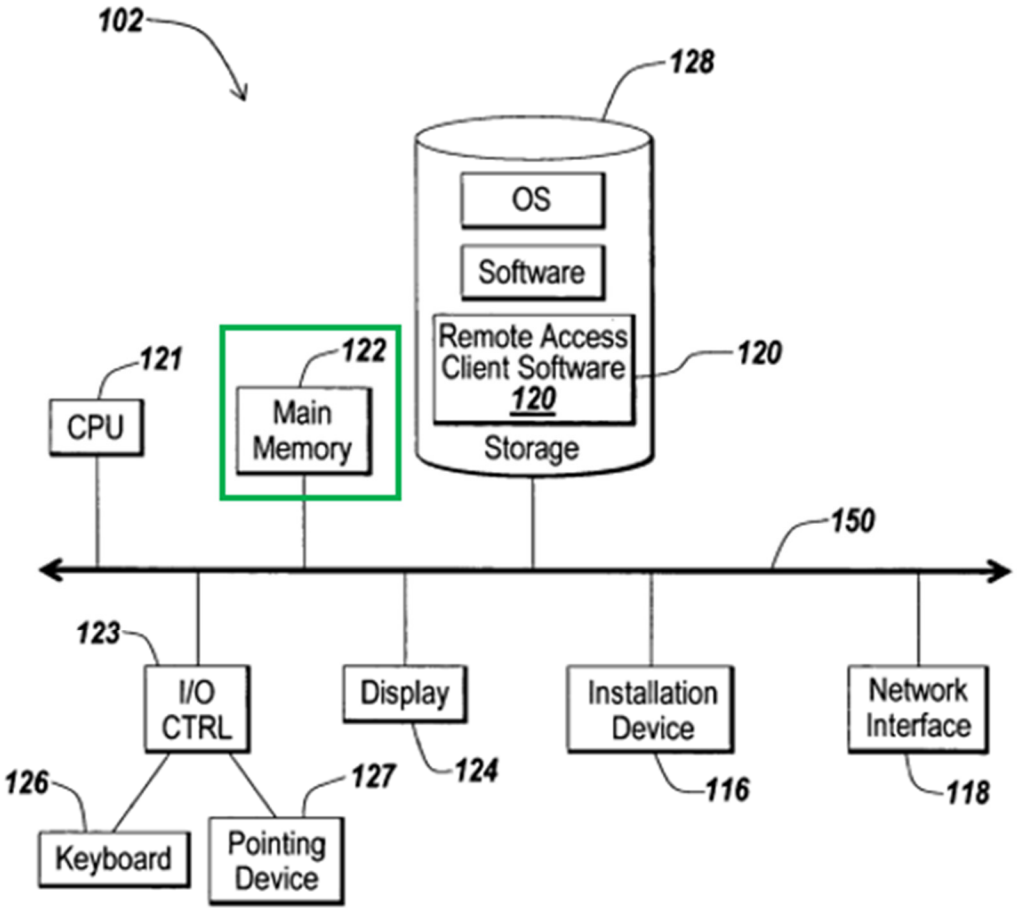
As described in §III.A.1.c, a POSITA would have understood and found obvious that policy enforcement in RAD may be based on application state (foreground/background) and device power state (battery/plugged-in), and thus, RAD renders obvious dynamically determining whether to apply the network service 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). SAMSUNG-1005, [0182]; SAMSUNG-1006, [0004],

[0011]; §III.A.1.c; SAMSUNG-1003, ¶[101] (describing the RAD's policy enforcement). Beyond these particular examples, a POSITA would have recognized and appreciated "the multitude of ways to define client-side application priorities." SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[101].

[1.6]

RAD renders [1.6] obvious. SAMSUNG-1005, [0119]-[0120], FIG. 1D; SAMSUNG-1003, ¶¶[102]-[105].

For example, Rao's Figure 1D shows a main memory 122:



SAMSUNG-1005, FIG. 1D (annotatated)

Rao further teaches that the processor (CPU) "is any logic circuitry that responds to and processes instructions fetched from the main memory unit 104" and "the processor 100 communicates with main memory 104 via a system bus." SAMSUNG-1005, [0119]-[0120]. A POSITA would have recognized that Rao's system bus couples the processor to the memory, and the memory provides instructions fetched by the processor. SAMSUNG-1003, ¶[105].

[2]

RAD renders [2] obvious. SAMSUNG-1005, [0003], [0179]-[0180], [0182]-[0183], [0188]; SAMSUNG-1003, ¶¶[106]-[108].

Rao teaches determining whether an application is in the foreground or background e.g., "the policies 520 define prioritization based on whether an application is running in the foreground or the background of the client." SAMSUNG-1005, [0182]; *see also id.*, [0188]. Examples of Rao's applications include VoIP, email, collaboration, etc. SAMSUNG-1005, [0179].

Rao further teaches that some foreground applications are in active use, e.g., explaining that, "although **an application is running in the foreground and currently in active use by the user**, a network packet generated or received for an application running in the background may be processed ahead of a network packet generated or received for the application running in the foreground." SAMSUNG-

1005, [0003]. Thus, Rao teaches that active use by the user indicates that the application is running in the foreground of user interaction.[3] SAMSUNG-1003, ¶[108].

[4]

RAD renders [4] obvious. SAMSUNG-1005, [0192], [0194]; SAMSUNG-1006, [0039]; SAMSUNG-1003, ¶¶[109]-[110].

For example, Araujo teaches "various example actions that may be performed if the power state change is not allowable under the policy" such as disallowing and queuing "a program's request to be processed at some later time." SAMSUNG-1006, [0038]-[0039]. Rao similarly teaches queuing requests, explaining that "network packets for an application" are placed in a queue associated with the application and communicated "according to the determined priorities for the network packets." SAMSUNG-1005, [0192], [0194]. Araujo provides an example where, if a program requests to use a device (e.g., network card) that is turned off, and the power management policy does not allow the device to be turned on at the time of the request, the request may be queued. SAMSUNG-1006, [0039]. Later, "the power management policy allows the device to be turned on," and "the program's request may be dequeued and processed." *Id.* Since Araujo

[3] The converse is not necessarily true. SAMSUNG-1003, ¶[108].

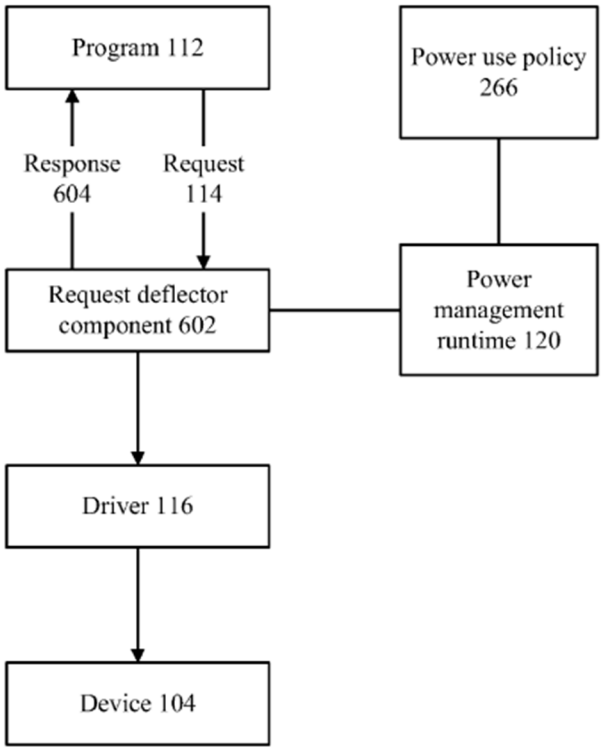
lists a network card as an example of a device that can be turned off, a POSITA would have understood that Araujo's teachings apply to network service usage activity. SAMSUNG-1003, ¶[110]; *see* §III.A.1.c. It would have been obvious to a POSITA that RAD adds to queues (as Rao and Araujo teach) requests to were disallowed until a power state change occurred (as Araujo teaches). SAMSUNG-1003, ¶[110].

[5]

RAD renders [5] obvious. SAMSUNG-1006, FIG. 6, [0048]; SAMSUNG-1003, ¶¶[111]-[118].

According to plain meaning, the term "emulated network access API" may be satisfied by an API that emulates network access. SAMSUNG-1003, ¶[112]. In this context, a POSITA would have understood "emulate" to mean "the process by which one system or device mimics the operation of another." SAMSUNG-1003, ¶[112] (citing SAMSUNG-1019).

Araujo teaches and/or renders obvious an "emulated network API," under its plain meaning, as shown in Araujo FIG. 6 (below). SAMSUNG-1003, ¶[113].



SAMSUNG-1006, FIG. 6.

Araujo explains that "a component may be interposed between the program and the device driver to deflect requests based on power management policy," which Araujo calls a request deflector. SAMSUNG-1006, [0048], [0050]. A POSITA would have recognized that the request deflector provides an emulated API, as it accepts requests and provides responses, as illustrated in FIG. 6. SAMSUNG-1006, FIG. 6; SAMSUNG-1003, ¶[114].

Araujo teaches that the "driver is able to inform a program that use of a device is denied because the device is off." SAMSUNG-1006, [0048]. Araujo further explains that "the existence of a rich power management policy means that a

program might be denied use of a device for power-related reasons that are separate from the question of whether the device is powered on or off at the time of the request," and the "existence of a component between the program and the driver helps to decouple the question of whether a device is on or off from the question of whether a program is allowed to use the device under the ambient power management policy." *Id.*

Therefore, a POSITA would have understood or found obvious that Araujo explains that there will be cases where the device is powered on ("decouple the question of whether a device is on or off"), and therefore the network is available, but the application is still denied access because of a power management policy ("whether a program is allowed to use the device under the ambient power management policy"). *Id.*; SAMSUNG-1003, ¶[117].

Thus, RAD renders obvious a processor that executes instructions to implement a network service usage control policy at least in part via communication with the first device application through an emulated network access API that indicates to the first device application (program 112 in FIG. 6) that an available wireless network (device is powered on) is unavailable (program is denied access) when a dynamic determination applies the network service usage control policy (power management policy) to the particular network service usage activity. SAMSUNG-1006, [0048]; SAMSUNG-1003, ¶[118].

[6]

RAD renders [6] obvious. SAMSUNG-1005, [0182]-[0183], [0187], [0189], [0194]-[0195]; SAMSUNG-1006, [0016], [0039], [0043]; SAMSUNG-1003, ¶¶[119]-[123].

As discussed for [1.4], Rao prioritizes network traffic for applications based on policy specifications by assigning packets from the applications to priority-based queues. *See* SAMSUNG-1005, [0182]-[0183], [0187], [0189]. For example, Rao teaches that the RAC may have policies "for specifying client-side prioritization of network communications related to applications." *Id.*, [0182]. Rao's teachings apply to multiple applications, such as VoIP, email, collaboration, etc. *Id.*, [0179]; SAMSUNG-1003, ¶[120]. In Rao, communicating "network packets from the queue" is typically "based on the respective priorities of the applications," although Rao also "considers other network factors in determining what network packets to communicate from what queue." SAMSUNG-1005, [0194]-[0195]. A POSITA would have recognized that communicating network packets is an example of network service usage activity, and that Rao considers factors such as application priority when allowing network service usage activity, but allows (or disallows) such network service usage activity for applications without regard to power control state. SAMSUNG-1003, ¶[120].

Moreover, Araujo teaches applying policies with and without regard to

power control state. SAMSUNG-1006, [0016], [0039], [0043]; SAMSUNG-1003, ¶[121].

First, as described in §§III.A.1.b-c, Araujo teaches applying policies based on power control state. *See, e.g.,* SAMSUNG-1006, [0039], [0043]; SAMSUNG-1003, ¶[122]; §§III.A.1.b-c, For example, Araujo provides an example in which "a program requests to use a device that is turned off ... and the power management policy does not allow the device to be turned on at the time of the request, [so] the request may be queued." SAMSUNG-1006, [0039].

Next, Araujo teaches that network services can be allowed without regard to power state. SAMSUNG-1003, ¶[123]. For example, Araujo explains that "security conditions may be such that there is a reason to perform the software update at that moment regardless of the power expenditure," such as "if there is known to be a zero-day attack propagating through the Internet, in which case delaying the update might expose the computer to an attack." SAMSUNG-1006, [0016]. A POSITA would have recognized that a software update application (or service) performs such software updates. SAMSUNG-1003, ¶[123]. Therefore, a POSITA would have recognized that Araujo teaches allowing or disallowing network service usage activities with regard to the power control state for most applications, and allowing network service usage activity without regard to power control state for a limited set of applications, such as allowing a software updater to perform

network service usage activity when "delaying the update might expose the computer to an attack." SAMSUNG-1006, [0016]; SAMSUNG-1003, ¶[123].

[7]

RAD renders [7] obvious. SAMSUNG-1006, [0014], [0022], [0030], [0032], [0057]; SAMSUNG-1003, ¶¶[124]-[125].

For example, Araujo teaches that a "machine may comprise various devices" and each of these devices may have various power states such as "on," "off," monitor brightness level, and processor clock speed. SAMSUNG-1006, [0004], [0019]. As explained in §III.A.1.c, a POSITA would have understood that the power control state of the device ("machine" in Araujo) is the aggregate state of the devices comprising the machine. §III.A.1.b; SAMSUNG-1003, ¶[125]. In addition, Araujo teaches that the machine itself can have power states, such as battery level and whether it is plugged in. SAMSUNG-1006, [0014]; SAMSUNG-1003, ¶[125]; *see, also,* SAMSUNG-1006, [0022], [0030], [0032], [0057]. Therefore, Araujo teaches that the power state can be the power state of the device (machine). SAMSUNG-1003, ¶[125].

[8]

RAD renders [8] obvious. SAMSUNG-1005, [0038], [0180], [0184]; SAMSUNG-1001, 25:32-35, 25:50-51; SAMSUNG-1003, ¶¶[126]-[129].

RAD includes a processor that executes instructions for managing capacity-

controlled services for the device, e.g., by using priority queues. SAMSUNG-1005, [0038], [0180], [0184]; SAMSUNG-1001, 25:32-35, 25:50-51; SAMSUNG-1003, ¶[127]. For example, Rao teaches client-based QoS using priority queues, and specifically, a client that prioritizes "network communications of the client associated with an application of the client." SAMSUNG-1003, ¶[127]; SAMSUNG-1005, [0038]. To control capacity, Rao teaches that the client intercepts network packets "associated with an application" on the client, and "the network packets are stored to a queue." SAMSUNG-1005, [0184]. The queues can be "organized by levels of priority, such as high, medium, low, or numerically such as priority 1 . . . 10." *Id.*, [0180]. Further, "a priority for the intercepted and queued network packet is determined based on the type and/or priority of the application" and "the network packets are communicated according to the determined priority." *Id*., [0184]. As a result, Rao can exercise capacity control, e.g., by prioritizing real-time data application ahead of other applications, such as non-real-time data applications. *Id.*, [0184].

RAD also renders this claim obvious since Rao's client performs capacity-control as described in the '544 Patent, i.e., using a "QoS router." SAMSUNG-1003, ¶[128]; SAMSUNG-1001, 25:32-35, 25:50-51. As described in the '544 Patent, once a "set of logical QoS channels is thus established, the service processor

(e.g., **QoS router** agent/function) routes the traffic associated with each QoS service activity to the appropriate RAB" and "the **QoS router** prioritizes traffic on the device." SAMSUNG-1001, 25:32-35, 25:50-51. A POSITA would have known that capacity control was commonly implemented using the priority queues described in Rao, where higher-priority packets are placed in higher-priority queues, and traffic from the higher-priority queues are given preferential access to the network. SAMSUNG-1003, ¶[128] (citing SAMSUNG-1014).

Thus, RAD renders obvious "a router for dynamically managing ... capacity controlled services for the wireless end-user device." SAMSUNG-1003, ¶[129].

[12]

RAD renders [12] obvious. SAMSUNG-1005, [0182], [0194]-[0195]; SAMSUNG-1003, ¶¶[130]-[133].

Rao includes two complementary teachings regarding assigning priority to a network service. SAMSUNG-1003, ¶[131]. First, in Rao, network packets are assigned to a priority-based queue based on factors such as the name of the application, the protocol, whether an application is running in the foreground or background, etc. SAMSUNG-1005, [0182]. The "network packets are communicated from queues ... according to the determined priorities for the network packets." SAMSUNG-1005, [0194]. Thus, Rao teaches a classic priority-based queuing mechanism. SAMSUNG-1003, ¶[131].

Second, Rao teaches techniques that consider "other network factors in determining what network packets to communicate from what queue," e.g., the RAC "may receive an indication of ***network congestion***, such as receiving a window size of zero for a TCP connection related to an application." SAMSUNG-1005, [0195]; SAMSUNG-1003, ¶[132].

A POSITA would have known that the actual priority level assigned to a network packet is determined not by the queue to which a packet is assigned, but the order in which it is transmitted from a queue. SAMSUNG-1003, ¶[133]. As explained in Rao, the actual priority level (as determined by send order) considers network congestion, which a POSITA would have understood to include busy state. SAMSUNG-1005, [0195]; SAMSUNG-1003, ¶[133]. Therefore, a POSITA would have understood Rao to teach assigning a network capacity-controlled services priority level (the order in which packets are transmitted) based on a network busy state (network congestion). SAMSUNG-1003, ¶[133].

[13]

RAD renders [13] obvious. SAMSUNG-1005, [0182]-[0183]; SAMSUNG-1003, ¶¶[134]-[135].

Rao teaches that policies "may be ... downloaded via a gateway." SAMSUNG-1005, [0183]. A POSITA would have known that a gateway is a network element, and downloading content (e.g., a policy) commonly occurred in response

to a query. SAMSUNG-1003, ¶[135]. Rao further teaches that policies are associated with applications (e.g., a first device application). SAMSUNG-1005, [0182]. Therefore, a POSITA would have recognized that Rao teaches querying a network element to determine an association of a policy with an application. SAMSUNG-1003, ¶[135].

[14]

RAD renders [14] obvious. SAMSUNG-1005, [0038], [0180], [0182], [0184], [0195]; SAMSUNG-1006, [0038], [0040]; SAMSUNG-1003, ¶¶[136]-[139].

As described above, a POSITA would have known that QoS was commonly implemented using priority queuing, where higher-priority packets are placed in higher-priority queues, and traffic from the higher-priority queues are typically given preferential access to the network. SAMSUNG-1003, ¶[137]. Rao teaches that the client may have policies "for specifying client-side prioritization of network communications related to applications." SAMSUNG-1005, [0182]. Rao further explains that the client intercepts one or more network packets "associated with an application" and "the network packets are stored to a queue" where the "priority for the intercepted and queued network packet is determined based on the type and/or priority of the application." SAMSUNG-1005, [0184]. The packets are then "communicated according to the determined priority." *Id.*

Rao teaches client-based QoS using priority queues, and specifically, a client that prioritizes network communication "associated with an application of the client." SAMSUNG-1003, ¶[138]; SAMSUNG-1005, [0038]. Rao further teaches that a client "prioritize[s] network communications of the client associated with an application" by "determin[ing] that the queued ... network packets [are] associated with a first application of the client" and "indicat[ingI priority for the ... packets." SAMSUNG-1005, [0038]. The client then places the determined "packets ahead of at least one network packet in the queue associated with a second application of the client" and "provides the prioritized one or more network packets for communications via a network stack of the client." *Id.* Rao's queues "may be organized by levels of priority, such as high, medium, low, or numerically such as priority 1 . . . 10." *Id.*, [0180]. A POSITA would have recognized such prioritized queues as QoS classes and thus Rao teaches network service usage control policies that include QoS class settings. SAMSUNG-1003, ¶[138].

Rao further teaches that network service usage control policy can include packet error rate, queue settings and throttling. SAMSUNG-1005, [0195], SAMSUNG-1003, ¶[139]. For example, regarding packet error rates, Rao teaches "the RAC 120 may recognize a high number of retransmits to a particular destination." SAMSUNG-1005, [0195]. Regarding queue settings, Rao teaches, "the remote access client 120 may receive an indication of network congestion, such as receiving

a window size of zero for a TCP connection related to an application." *Id.* A POSITA would have known that a window size is a queue setting. SAMSUNG-1003, ¶[139]. Regarding throttling, Rao teaches, the client "may throttle back or not communicate network packets." SAMSUNG-1005, [0195]. In addition, Araujo teaches that when "a power state change is not allowable under the policy," one action "is to block the request," which a POSITA would have recognized as a block/allow setting. SAMSUNG-1006, [0038], [0040] SAMSUNG-1003, ¶[139].

[15]

A POSITA would have understood that a filter was a common mechanism for determining whether a group of policies should be applied or "filtered out" from consideration and therefore RAD renders [15] obvious. SAMSUNG-1005, [0182], [0184]; SAMSUNG-1003, ¶¶[140]-[144].

Rao teaches a first filter specifying applicability of the policy only when the first device application is not in the foreground of user interaction. SAMSUNG-1005, [0182]; SAMSUNG-1006, [0028], [0039]; SAMSUNG-1003, ¶[141]. For example, Rao teaches policy control filters that apply when an application is in the background (i.e., not in the foreground), stating that the client may apply policies "for specifying client-side prioritization of network communications related to applications" which can be "based on whether an application is running in the foreground or the background of the client." SAMSUNG-1005, [0182]. Based on the

determination, "the network packets are stored to a queue" and a priority for the "queued network packet is determined based on the … priority of the application." SAMSUNG-1005, [0184].

Araujo teaches a second filter specifying applicability of the policy only in one or more specific power control states. SAMSUNG-1006, [0028]; SAMSUNG-1003, ¶[142]. For example, in Araujo, the "current power state of a device may be a factor in determining whether the power state will be changed," e.g., because "a device may use a considerable amount of power to turn from off to on." SAMSUNG-1006, [0028]. Araujo further teaches that, "if a program requests to use a device that is turned off ... and the power management policy does not allow the device to be turned on at the time of the request, the request may be queued so that it can be serviced at some later." *Id.*, [0039]. A POSITA would have recognized that queuing network traffic is an example of network service usage control. SAMSUNG-1003, ¶[142].

A POSITA would have found it obvious for the RAD to include both filters to account for a variety of traffic control policies that can be applied to optimize device operation. SAMSUNG-1003, ¶[143]. For example, a first filter would state that that packets from applications not in the foreground are added to a lower priority queue, while a second filter would state that in a low power state (e.g., low bat-

tery and not plugged in), packets in a lower priority queue are held instead of transmitted. *Id.* Since the first filter applies regardless of power state, and the second filter applies regardless of why a packet was added to a low priority queue, a POSITA would have recognized that both filters are complementary and beneficial. *Id.*

Therefore, RAD renders obvious a filter specifying applicability of the policy (e.g., traffic queuing) only when the first device application is in the background (i.e., not in the foreground), and a second filter specifying applicability of the policy based on power control state (e.g., network card is powered on or off). SAMSUNG-1003, ¶[144].

[16]

RAD renders [16] obvious. SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶¶[145]-[146].

As discussed for [1.5], RAD renders obvious traffic control policy filters. *See* discussion of [1.5]. Moreover, Rao teaches that "the policies 520 may be specified hierarchically to account for multiple applications ... that may be executed on the client." SAMSUNG-1005, [0182]. A POSITA would have recognized that, in a hierarchical rules structure, rules cascade from higher levels of the hierarchy to lower levels. SAMSUNG-1003, ¶[146]. It would have been obvious to a POSITA to specify the traffic control policy filters of RAD hierarchically to "account for

multiple applications ... that may be executed on the client." *Id.*; SAMSUNG-1005, [0182].

[18]

RADS renders [18] obvious. SAMSUNG-1005, [0182], [0189], [0194], [0195]; SAMSUNG-1003, ¶¶[147]-[148].

Rao teaches determining whether a policy applies to particular usage activity based on different factors (e.g., foreground/background, application name) and using policies when assigning packets (usage activities) to priority-based queues. SAMSUNG-1005, [0182], [0189]. Rao further teaches using priority of the queues when controlling network service use activity (sending packets from queue). *Id.*, [0194] ("the network packets are communicated from the queues 540a-540n according to the determined priorities for the network packets"). In addition, Rao teaches techniques that "consider[] other network factors in determining what network packets to communicate from what queue." *Id.*, [0195] ("indication of network congestion, such as receiving a window size of zero for a TCP connection related to an application"). A POSITA would have understood that a network that is congested is a network in a busy state. SAMSUNG-1003, ¶[148]. A POSITA would have further understood that determining from which queue a packet is selected to transmit over the network is an example of differentially controlling the

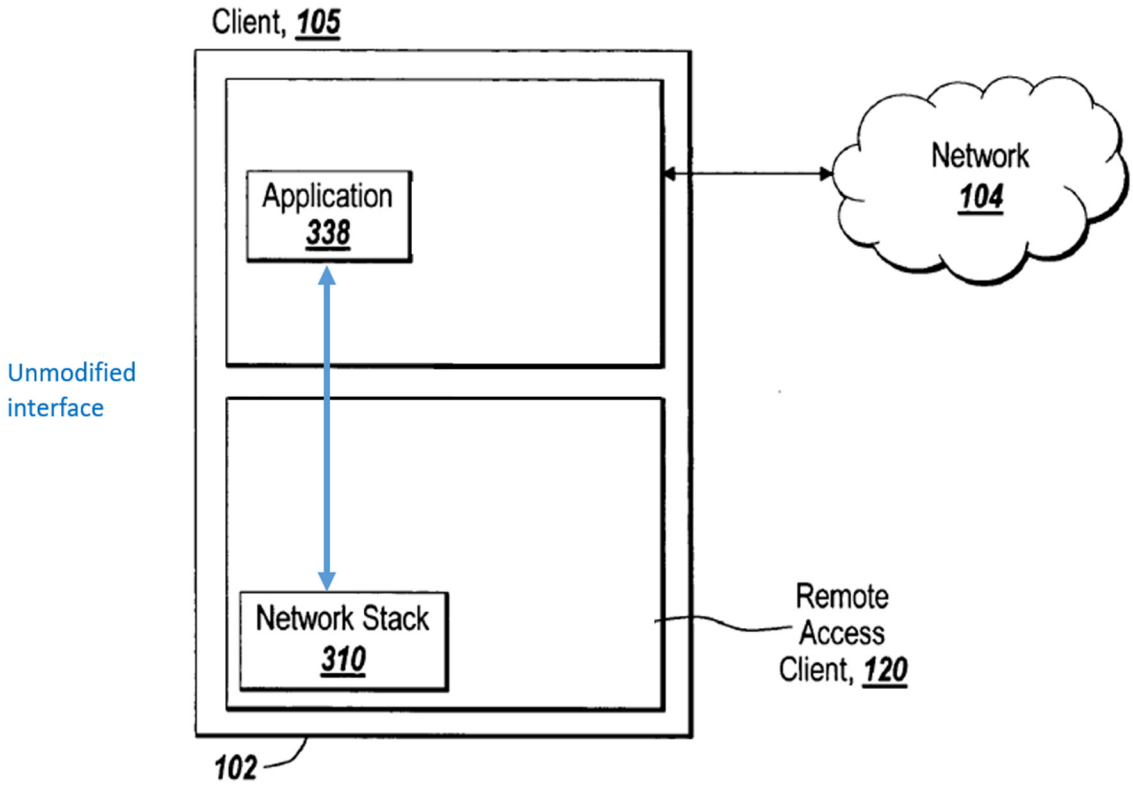
network service usage. *Id*. Therefore, Rao teaches differentially controlling network service usage activity based on a network busy state. *Id*.

[20]

RAD renders [20] obvious. SAMSUNG-1005, [0080], [0099], FIGS. 1C, 3A; SAMSUNG-1003, ¶¶[149]-[155].

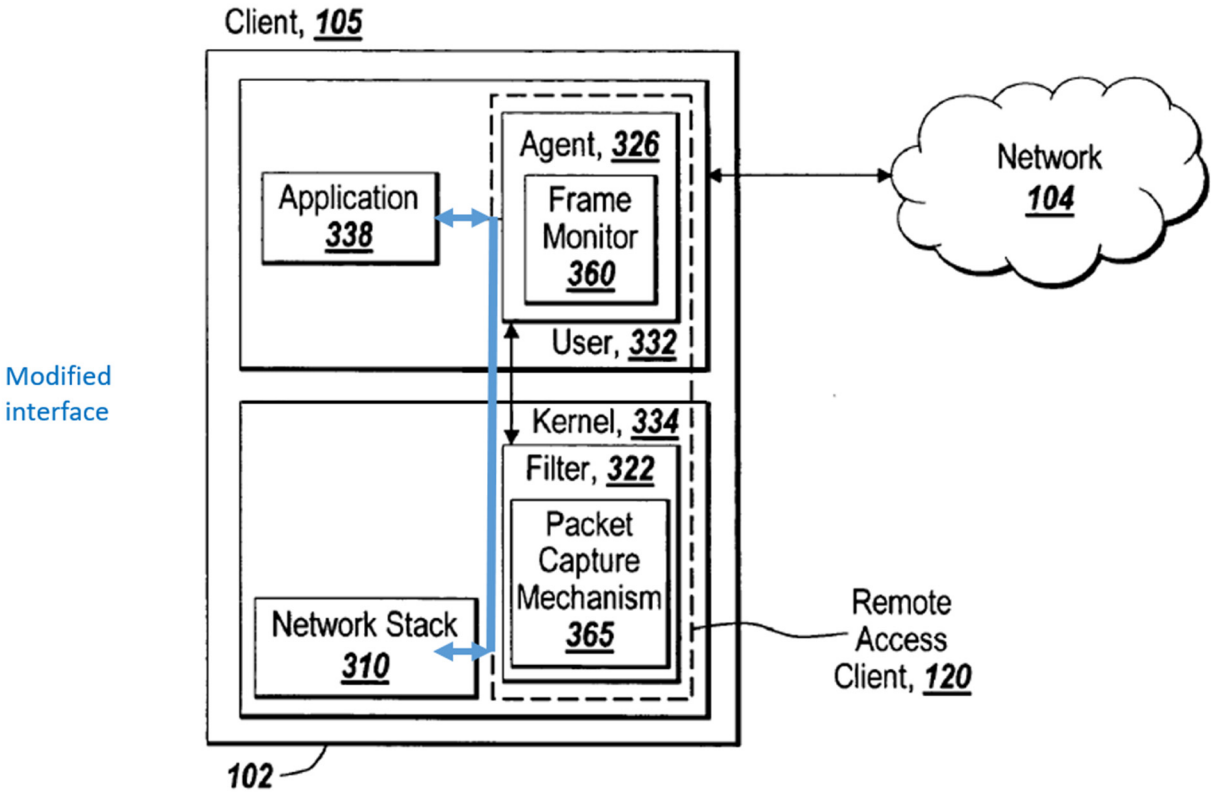
For example, Rao teaches that "[t]he remote access client transparently **intercepts** network communications associated with applications executing on the client, detects that the network communication is associated with an application, and **determines priorities for the network communications** based on a priority for the application." SAMSUNG-1005, [0080]. A POSITA would have recognized that "determining priorities of network communication" as "implementing traffic control." SAMSUNG-1003, ¶[150].

Rao's RAC modifies the network stack interface because Rao teaches inserting the RAC between the network stack 310 and the application 338. SAMSUNG-1003, ¶[151]. A POSITA would have recognized that an unmodified network stack interface would exist between applications and the network stack, as illustrated below. *Id.*



SAMSUNG-1005, Fig. 1C (excerpted, annotated in blue); SAMSUNG-1003, ¶[151].

Rao's modified network stack interface is illustrated below.



SAMSUNG-1005, Fig. 1C (annotated in blue)

Rao further illustrates the modified stack interface in FIG. 3A (below).

SAMSUNG-1003, ¶[152].

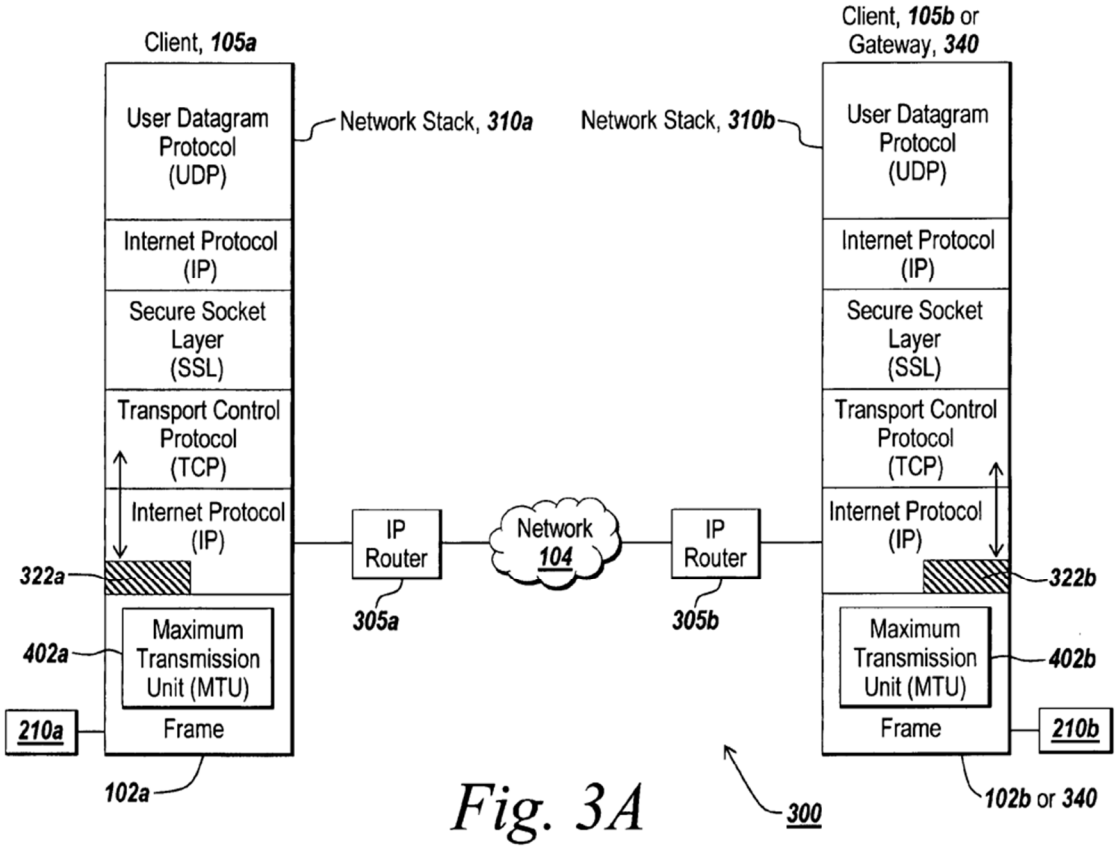


Fig. 3A

SAMSUNG-1005, Fig. 3A

Rao's 322a and 322b are the filter modifications to the network stack interface. SAMSUNG-1005, [0099], Fig. 3A; SAMSUNG-1003, ¶[155].

[22]

RAD renders [22] obvious. SAMSUNG-1006, [0004]; SAMSUNG-1003, ¶¶[156]-[157].

As described in reference to [7], Araujo teaches that a "machine may comprise various devices" and each of these devices may have various power states"

such as "on," "off," monitor brightness level and processor clock speed. SAMSUNG-1006, [0004]; §III.A.1.b. As explained in §III.A.1.c, a POSITA would have understood that the power control state of the device ("machine" in Araujo) is the aggregate state of the devices comprising the machine. §III.A.1.b; SAMSUNG-1003, ¶[157]. Therefore, Araujo teaches that the power control state can be the power save state of the device (machine). SAMSUNG-1003, ¶[157].

[23]

RAD renders [23] obvious. SAMSUMSUNG-1005, [0095]; SAMSUNG-1006, [0019], [0039]; SAMSUNG-1003, ¶¶[158]-[164].

As described above, RAD includes a wireless modem. *See* §III.A.1.c; SAMSUMSUNG-1005, [0095] (indicating the client can connect to a network using a wireless connection). A POSITA would have known the wireless modem used to connect RAD to a "wireless connection" is an example of a device as Araujo teaches. SAMSUNG-1005, [0095]; SAMSUNG-1003, ¶[159] (citing SAMSUNG-1022 and SAMSUNG-1023).

Araujo teaches that some "devices may be able to assume an intermediate power usage between fully-on and fully-off," and that "[o]n and off are examples of power states, as are any kind of discrete or continuous intermediate states." SAMSUNG-1006, [0019]. Araujo further teaches that power states of a device (e.g., wireless modem) can be used in policies, giving an example in which "a

program requests to use a device that is turned off ... and the power management policy does not allow the device to be turned on at the time of the request, the request may be queued so that it can be serviced at some later." SAMSUNG-1006, [0039]; SAMSUNG-1003, ¶[163]. Therefore, a POSITA would have understood that, in RAD, the power control state can be the power state of RAD's wireless modem.

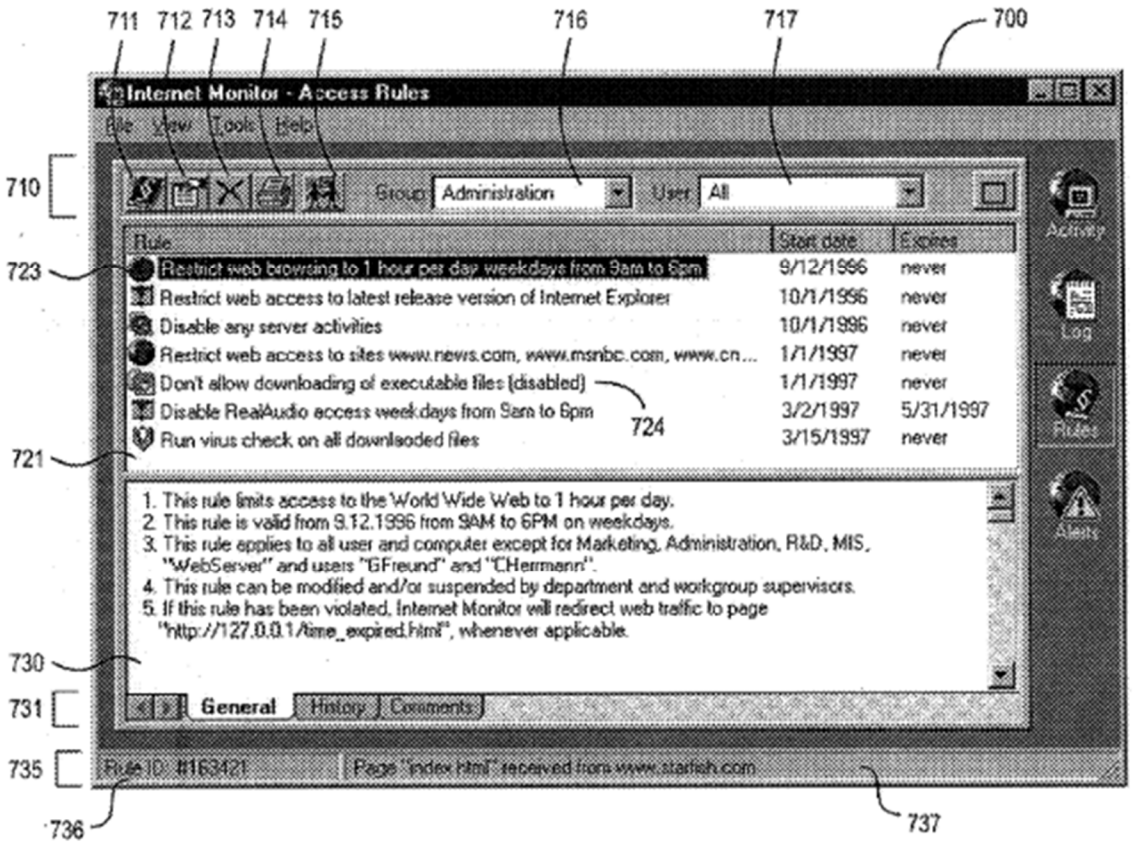
B. [GROUND 1B] The Rao-Araujo-Freund Combination Renders Claims 2, 17, and 19-21 Obvious

1. Rao-Araujo-Freund

(a) Freund

Freund describes "set[ting] access rules for the entire LAN for one or more workgroups or individual users, a client-based filter application (installed at each client), and a central supervisor application that maintains the access rules for the client based filter." SAMSUNG-1007, 3:62-67; SAMSUNG-1003, ¶[63]. The access rules can relate to time, application access, URL access, and protocols, for example. SAMSING-1007, 4:8-19. To apply the rules, in some cases, Freund classifies whether an application is interacting with the user in the device user interface foreground. *Id.*, 10:16-20. Freund addresses challenges, including "hording[sic] available network bandwidth through use of bandwidth-intensive applications (e.g., real-time audio programs)." *Id.*, 2:12-14.

To enable configuration of such rules, Freund includes "a preferred user interface or 'wizard' dialogs for configuring rules" that "provides a 'view' of rules governing operation of the Internet access monitor, displaying all of the rules which are available for a current configuration" and "allows the user to create a new rule," "edit an existing rule," and "delete a rule." SAMSUNG-1007, 24:1624. SAMSUNG-1003, ¶[64]. An example of such a user interface (UI) panel is shown in Figure 7A (below).



SAMSUNG-1007, FIG. 7A.

Freund further teaches that policies can be loaded from a network element, called a "supervisor," explaining that "the Supervisor filters rules appropriate for the client ... and transmits them to the Client Monitor." SAMSUNG-1007, 28:14-18.

(b) Combination

Rao, Araujo and Freund describe using policies/rules to control network traffic. For example, as described above, Rao "may apply a policy to determine a condition of the client ... at the time of transmission of the packet." SAMSUNG-1005, [0109]. The frame monitor can also "identify an application 338 that generated the packet." *Id*. Further, the frame monitor "may make a policy-based determination to transmit the packet to the gateway 340 responsive to the identified application 338." *Id.* Rao explains such "policies 520 may be specified by any suitable means and/or mechanisms," including "the name of the application, and "whether an application is running in the foreground or the background of the client." *Id.*, [0182]. Rao notes that "[o]ne ordinarily skilled in the art will recognize and appreciate the multitude of ways to define client-side application priorities." *Id.* Araujo provides a similar example where "the power management policy does not allow the device to be turned on at the time of the request," and "the request may be queued so that it can be serviced at some later," e.g., "if at some later time the

power management policy allows the device to be turned on, then the program's request may be dequeued and processed." SAMSUNG-1006, [0039].

A POSITA would have recognized that the network traffic control policies of Freund are additional examples of client-side policies, similar to those contemplated by Rao and Araujo. SAMSUNG-1003, ¶[166]. For example, Freund include access rules that "can include criteria such as total time a user can be connected to the Internet," "time a user can interactively use the Internet (e.g., per day, week, month, or the like), a list of applications ... that a user can or cannot use in order to access the Internet," etc. SAMSUNG-1007, 4:9-19. A POSITA would have recognized that Freund's policy examples are among the "multitude of ways to define client-side application priorities" explained in Rao. SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[166].

Rao further teaches that policies "may be configurable by a user by any suitable means and/or mechanism ... such as a user interface, graphical or otherwise, design and constructed for configuring or specifying the policies." SAMSUNG-1005, [0183]. For details on the user interface (UI), a POSITA would have looked to references such as Freund, which shows "bitmap screenshots illustrating a preferred user interface or 'wizard' dialog for configuring rules" including a preferred interface that "provides a 'view' of rules governing operation of the Internet access monitor." SAMSUNG-1007, 6:47-49, 24:17-20, FIGS. 7A-K; SAMSUNG-1003,

¶[167]. As described above, such a UI "allows the user to create a new rule," "edit an existing rule," and "delete a rule." SAMSUNG-1007, 24:22-24.

Rao explains that policies "may be accessible by the agent," "configured into the agent" or "loaded by the agent," e.g., policies "may be provided by or downloaded via the gateway 340." SAMSUNG-1005, [0183]. For implementation details relating to obtaining the policies, a POSITA would have looked to references such as Freund. SAMSUNG-1003, ¶[168]. As described above, Freund teaches an example of policies being loaded by an agent: "the Supervisor filters rules appropriate for the client ... and transmits them to the Client Monitor." SAMSUNG-1007, 28:14-18.

Because both Rao and Freund teach using policies/rules to control network traffic, including defining and loading policies/rules, it would have been obvious to a POSITA to combine Rao's and Araujo's teachings with Freund's teachings to achieve the benefits of Freund's user interface for configuring rules and for more detailed enumeration of network traffic control policies not explicitly described in Rao. SAMSUNG-1003, ¶[169].

In operation, the resulting Rao-Araujo-Freund Device (RAFD) would use the combined policies of Rao, Araujo and Freund to determine whether a network request was permitted, and when a request was permitted, use Rao's and Araujo's traffic queuing policies to determine when, and in what order, network packets

were delivered. SAMSUNG-1005, [0182]-[0183]; SAMSUNG-1007, 4:9-19; SAMSUNG-1006, Abstract, [0003], [0039]-[0040]; SAMSUNG-1003, ¶[170]. For example, a POSITA would have recognized or found obvious a RAFD policy in which network traffic is permitted only if a user had not exceeded a configured Internet access limit (e.g., 30 minutes) and the application is permitted to access the Internet (per Freund), an application is in the foreground (per Rao) giving it "VIP" status (per Araujo) and the power state of the device is plugged-in or the battery is above a threshold charging level (per Araujo). SAMSUNG-1005, [0182]; SAMSUNG-1006, [0022]; SAMSUNG-1007, Abstract; SAMSUNG-1003, ¶[170].

Additionally, policies governing the operation of RAFD can be configured with the UI techniques of Freund and/or loaded from a network element using the techniques of Rao and Freund. SAMSUNG-1006, [0062]; SAMSUNG-1005, [0182]-[0183]; SAMSUNG-1007, 24:22-24; SAMSUNG-1003, ¶[171].

A POSITA would have expected success in creating a combination, which would have required only routine programming knowledge well within the skill of a POSITA before the Critical Date. *Id.* Indeed, the change would have amounted to nothing more than the use of a known technique to improve similar mobile devices in a similar way, including combining similar types of policies, and combining prior art elements according to known methods to yield the predictable results

described above. *Id.*; *KSR*, 550 U.S. at 417. RAFD's processor would be configured to perform the operations discussed in this Ground. SAMSUNG-1003, ¶[172]; s*ee also* §III.A.1.c.

2. Analysis

[2]

RAFD renders [2] obvious. SAMSUNG-1007, 10:16-24, 10:40-44; SAMSUNG-1003, ¶¶[173]-[174].

As described in §III.B.1.b, Freund teaches "monitoring of time spent by an employee for 'actively' interacting with the Internet," noting that "[a]ctive use occurs when a user directly interacts with an Internet application (e.g., Web browser) while that application accesses the Internet." SAMSUNG-1007, 10:16-24. A POSITA would have known that directly interacting with a Web browser occurs when the Web browser is in the UI foreground. SAMSUNG-1003, ¶[174]. Freund explains that an application "can be examined for determining whether it is 'active' by determining whether the application receives 'focus' and/or receives user input (e.g., mouse clicks or keystrokes)." SAMSUNG-1007, 10:40-44. A POSITA would have known that mouse clicks and keystrokes are instances of direct interaction with an application. SAMSUNG-1003, ¶[174]. Freund differentiates mouse/keyboard use from "background use which occurs when an application or

process executing in the background (i.e., does not have 'focus') accesses the Internet, such as a mail client which intermittently polls an Internet-based mail server." SAMSUNG-1007, 10:20-24. Thus, Freund teaches determining that the first device application is in the foreground of user interaction when the user of the device is directly interacting with that application. SAMSUNG-1007, 10:40-44; SAMSUNG-1003, ¶[174].

[17]

RAFD renders [17] obvious. SAMSUNG-1005, [0195]; SAMSUNG-1007, 10:13-17, 30:51-57; SAMSUNG-1003, ¶¶[175]-[177].

Rao's client manages network communication prioritization per application in accordance with policies for the client and "**in further view of any network statistics and other factors occurring on the network**." SAMSUNG-1005, [0195]. The RAC "may receive an indication of **network congestion**, such as receiving a window size of zero for a TCP connection related to an application." *Id*. A POSITA would have recognized that "network busy state" is an example of a network statistic contemplated by Rao and is specifically indicated by "network congestion" measured by Rao. SAMSUNG-1003, ¶[176].

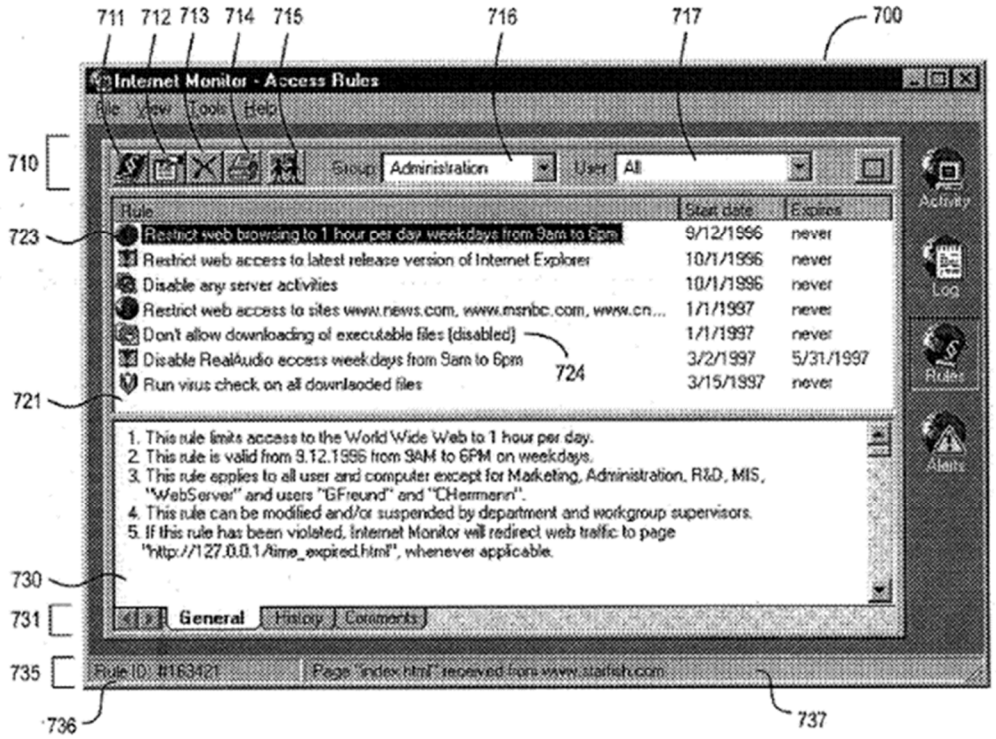
In addition, Freund teaches that access rules can specify "**time of day** when the rule should be applied (for example from 9am to 5pm)." SAMSUNG-1007,

10:13-17. Like Rao, Freund teaches network busy state, stating that "if the Supervisor determines that congestion exists for Internet access," "it notifies the Client Monitors of temporary access restrictions." *Id.*, 30:51-57; SAMSUNG-1003, ¶[177]. In response, "depending on the specific rules in force," the client monitors can Delay Internet access for non-critical Applications or Protocols." SAMSUNG-1007, 30:51-60.

[19]

RAFD renders [19] obvious. SAMSUNG-1007, FIGS. 7A-7K, 24:16-20, 25:1-13; SAMSUNG-1003, ¶¶[178]-[180].

Freund Figures 7A-7K illustrate an example of user input (into a user interface) used for differentially controlling network service usage activity based on a policy. SAMSUNG-1007, FIGS. 7A-7K; SAMSUNG-1003, ¶[179]. For example, Freund FIG. 7A (below) shows an interface providing "a 'view' of rules governing operation of the Internet access monitor." SAMSUNG-1007, 24:16-20.



Further, "FIGS. 7A-K illustrate a preferred user interface or 'wizard' dialogs for configuring rules." *Id.* The policies (rules) can be associated with applications using the dialog, which "asks the user what kind or type of new rule should be created," where "any given rule is a combination of access rights granted on the basis of available applications, permitted time limits, permitted user activities," etc., and the user can select limitations. *Id.,* 25:1-13. A POSITA would have recognized that the network service usage control policies specified in Freund's wizard dialog are based on a user input to the wizard dialog. SAMSUNG-1003, ¶[180].

[20]

RAFD renders [20] obvious. SAMSUNG-1007, 15:22-24, 15:28-33; SAMSUNG-1003, ¶¶[181]-[182].

In addition to Rao's teachings, Freund's client "includes a client-side monitor—data acquistion[sic] module 440—which 'hooks into' the communication driver." §III.B.1.b; SAMSUNG-1007, 15:22-24. For "Windows Winsock communication driver, for example, a process can hook in-to the driver using Winsock VxD extensions." SAMSUNG-1007, 15:24-26. The modified interface can then "intercept the communications for determining whether the request is permitted under the rules," and "when a request for access is received from an application, the monitor first verifies that, according to the rules in place, such an application is permitted to access the Internet." *Id.*, 15:28-33. A POSITA would have recognized that Freund's client-side monitor modifies a network stack interface (hooks into the driver) to provide for network access messaging for implementing traffic control of network service usage activity. SAMSUNG-1003, ¶[182].

[21]

RAFD renders [21] obvious. SAMSUNG-1005, [0116], [0182]-[0183]; SAMSUNG-1007, 4:8-14, 4:62-63, 30:12-16, 10:45-50; SAMSUNG-1003, ¶¶[183]-[187].

First, RAFD stores a network capacity-controlled service list. SAMSUNG-1003, ¶[184]. For example, Rao teaches that policies are used to specify "client-

side prioritization of network communications related to applications," and the policies "may be specified by the name of the application, "the type of application," etc. SAMSUNG-1005, [0182]. A POSITA would have known that an application can run as a service,[4] and since policies are used to prioritize network communication of applications (e.g., the client may have policies for specifying "client-side prioritization of network communications related to applications"), the applications are network capacity controlled applications (services). SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[184].

Rao further explains that policies comprise any format and/or language for specifying a policy, such as an XML file. *Id.,* [0183]. A POSITA would have recognized the XML is a list format, and the list of application-related policies are a network capacity controlled service list, so RAD stores a network capacity controlled service list. SAMSUNG-1003, ¶[185].

[4] Rao illustrated the functional equivalence, explaining the agent, frame monitor, the filter, and packet capture mechanism "may comprise an **application**, module, **service**, computer program, software component, **web service**, web component, library, function, process, task, thread, or any other type and/or form of executable instruction which is designed to and capable of executing the functionality of the present invention as described herein." SAMSUNG-1005, [0116].

Freund explains that access rules can include "a list of applications ... that a user can or cannot use in order to access the Internet," among others. SAMSUNG-1007, 4:8-14. A POSITA would have recognized that the RAFD, which includes Freund's access rules, would include Freund's list of network capacity controlled services (applications), which includes the network capacity controlled services to which the access rules apply. SAMSUNG-1003, ¶[186].

RAFD further updates the list based on monitored network service usage activities. SAMSUNG-1003, ¶[187]. For example, Freund teaches that "the Client Monitor maintains a list of active Applications" with "various fields to track activities and a global activity record." SAMSUNG-1007, 30:12-16. A POSITA would have recognized that one such field is the amount of time an application has accessed the internet, as such data are used to enforce access limits. SAMSUNG-1003, ¶[187]. For example, Freund teaches "monitoring the total time particular applications access the Internet," which is done "on a per application basis," and such data are used to evaluate and enforce time limitations. SAMSUNG-1007, 10:45-50, 4:62-63. A POSITA would have recognized that to enforce the time limitations, the aggregate access time would be stored in the "various fields to track activities." SAMSUNG-1007, 30:12-16; SAMSUNG-1003, ¶[187]. Since these fields are updated based on monitored activities (Internet access) the list is updated based on those monitored activities. SAMSUNG-1003, ¶[187].

C. [GROUND 1C] The Rao-Araujo-Singh Combination Renders Claim 3 Obvious

1. Rao-Araujo-Singh

(a) Singh

Singh relates to "displaying windows on a graphical user interface based on relative priorities." SAMSUNG-1008, Abstract. Singh explains that computing devices allow multiple applications to operate concurrently, but an issue with "simultaneous display of multiple windows is the arrangement of the windows on the GUI" is that "[t]he display area of the graphical user interface available to windows is limited." *Id.,* 1:20-25, 1:36-40. Thus, "it is desirable to position, size, and/or configure the windows on the GUI in order to maximize the benefit of the display area of the GUI for the user." *Id.,* 1:40-42.

Consequently, Singh teaches using the "relative priorities" of windows for arranging the windows on the GUI. *Id.,* Abstract; SAMSUNG-1003, ¶[67]. A "higher priority window may cover a lower priority portion of a lower priority window to provide for a simultaneous viewing of the higher priority window and a higher priority portion of the lower priority window." SAMSUNG-1008, Abstract. The "priorities assigned to each of the windows may be set by the user, the computer system, or by both the user and the computer system." *Id.,* 4:52-55.

(b) Combination

Rao describes scenarios where an "application is running in the foreground and currently in active use by the user, a network packet generated or received for an application running in the background may be processed ahead of a network packet generated or received for the application running in the foreground." SAMSUNG-1005, [0003]. This is undesirable because "network packets for [background] applications may be processed ahead of the real-time network packets of [a foreground] VoIP telephone call thereby increasing the latency and reducing the quality of the voice communication." *Id.* To prevent background traffic from interfering with foreground traffic, Rao teaches policies that "define prioritization based on whether an application is running in the foreground or the background of the client" and "the network packets are communicated according to the determined priority." *Id.*, [0182], [0184]; SAMSUNG-1003, ¶[188].

A POSITA would have recognized that, in cases where multiple windows are displayed simultaneously (e.g., with the highest-priority window having "focus" and covering portions of lower-priority windows), it could be challenging for Rao's device to determine which application running in the foreground to prioritize. SAMSUNG-1003, ¶[189]. In such cases, multiple windows are in the foreground but partially displayed and one window has the focus (and thus should have the highest priority). *Id.* (describing an example of multiple application windows simultaneously executing).

Therefore, a POSITA would have recognized and appreciated "the multitude of ways to define client-side application priorities" and further recognized that the window priority of Singh represents such an example. SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[190]. As one example, a POSITA would have recognized or found obvious a RAD policy in which network traffic is permitted only if an application is displaying the highest priority window (per Rao as clarified by Singh) giving it "VIP" status (per Araujo) and the power state of the device is plugged-in or the battery is above a threshold charging level. SAMSUNG-1006, [0022]; SAMSUNG-1008, Abstract, 4:52-55; SAMSUNG-1003, ¶[190].

In operation, the processor of the Rao-Araujo-Singh Device (RASD) would use Rao's and Araujo's policy-based network traffic management techniques as clarified by Singh to use networking resources efficiently. SAMSUNG-1007, Abstract; SAMSUNG-1005, [0182]-[0183]; SAMSUNG-1008, 4:52-55, Abstract; SAMSUNG-1003, ¶[191].

A POSITA would have expected success in creating a combination, which would have required only routine programming knowledge well within the skill of a POSITA before the Critical Date. SAMSUNG-1003, ¶[192]. Indeed, the change would have amounted to nothing more than the use of a known technique to improve similar mobile devices in a similar way and combining prior art elements according to known methods to yield the predictable results described above. *Id.*;

KSR, 550 U.S. at 417. RASD's processor would be configured to perform the operations discussed in this Ground. SAMSUNG-1003, ¶[192]; s*ee also* §III.A.1.c.

2. Analysis

[3]

RASD renders [3] obvious. SAMSUNG-1008, 9:33-35; SAMSUNG-1003, ¶¶[193]-[194].

For example, Singh teaches that "when a user interacts with a window, the window becomes the highest priority window." SAMSUNG-1008, 9:33-35. A POSITA would have known that users interact with foreground windows, and in Singh, users only interact with the highest priority window (as any interaction causes the window to be assigned the highest priority). SAMSUNG-1003, ¶[194] (citing SAMSUNG-1021). Therefore, a POSITA would have known to determine that the end-user application is interacting with the user in the UI foreground based on a state of user interface priority, i.e., the highest priority. SAMSUNG-1003, ¶[194] .

D. [GROUND 1D] The Rao-Araujo-Montemurro Combination renders claim 11 obvious

1. Rao-Araujo-Montemurro

(a) Montemurro

Montemurro describes communication devices "capable of at least two communication modes," e.g., WLAN and WWAN, that "can be configured to optimize

communications using a policy-based mechanism to configure connections and routes." SAMSUNG-1009, Abstract. A "rules engine evaluates its policies on a state change (e.g. network availability, time of day, etc.) to configure a routing table" and "provides an appropriate connection to an application for its respective communications." *Id.* Policies can be responsive to various factors (e.g., bandwidth, cost, time of day, application type, etc.). *Id.* "Rules engine 206A configures the communication operations with a set of rules/policies." *Id.*, [0029].

Montemurro describes a "natural language example of a policy" where "the MP3 download application 204D runs on the lowest cost network" available. *Id.*, [0029]. In another example, "the CRM application ... only synchronizes the sales contact database (e.g. 120B) over a WLAN network." *Id.*

Figure 2 (below) shows a device configured with Montemurro's system. *Id.*, [0025]-[0037].

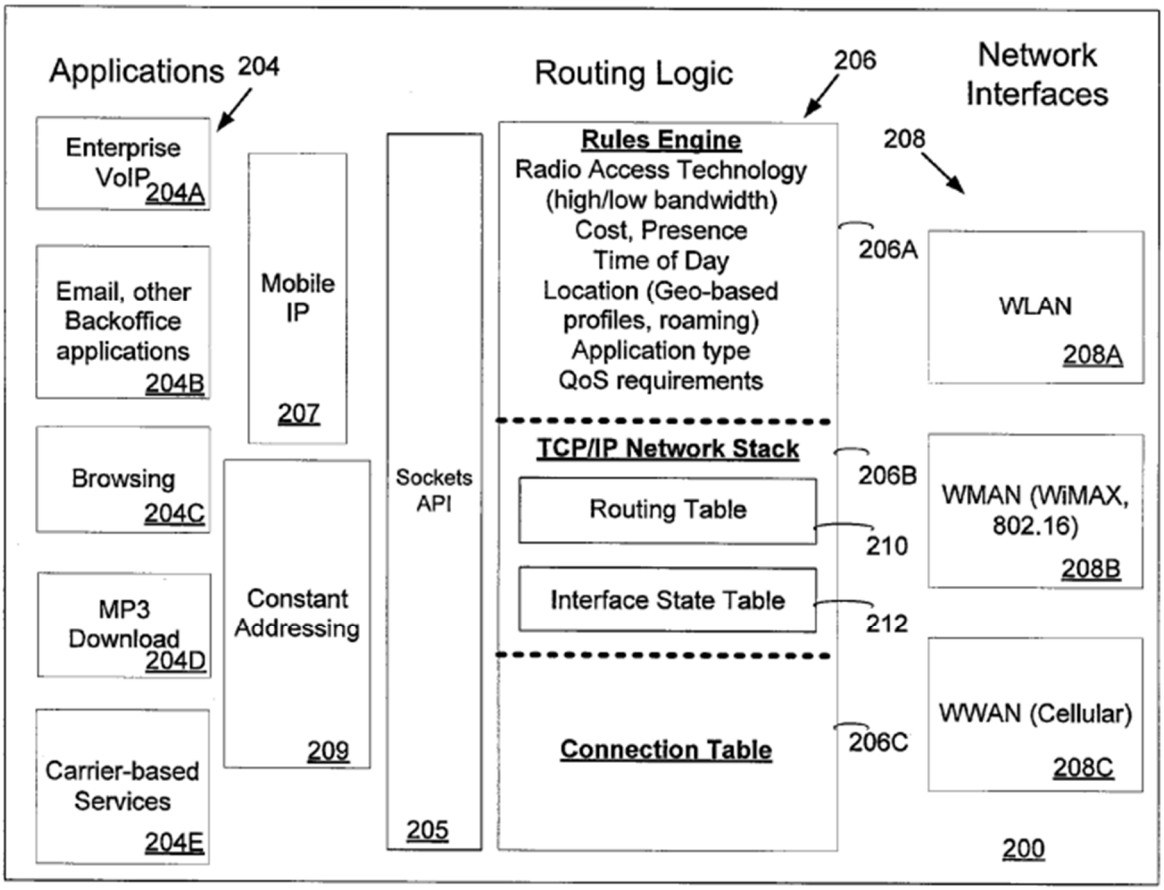


Figure 2

SAMSUNG-1009, FIG. 2

Various applications can benefit from network selection techniques, including VoIP, email, and MP3 downloading applications. *Id.*, [0025]-[0037].

(b) Combination

As described above, in RAD, the device would use Rao's and Araujo's techniques to manage access to networks, considering various criteria, such as application priority and power factors. *See* §III.A.1. However, a POSITA would have recognized that, in some circumstances, further efficiency would have been gained

by assigning different networks to different applications, such as the examples from Montemurro, where "the MP3 download application 204D runs on the lowest cost network … available" and "the CRM application ... only synchronizes the sales contact database ... over a WLAN network." SAMSUNG-1009, [0029]; SAMSUNG-1003, ¶[195]. Thus, to improve the operation of RAD and further improve efficiency, a POSITA would have looked to teachings of other references, such as Montemurro. SAMSUNG-1003, ¶[195].

In operation, the resulting Rao-Araujo-Montemurro Device (RAMD) would use the techniques of Montemurro to select a network appropriate for an application), then use Rao's and Araujo's techniques to manage device resources, such as network access and power. *See* §III.A.1.c; SAMSUNG-1003, ¶[196]. As applications such as VoIP and email began executing on RAMD, Montemurro's "rules engine evaluates its policies to select a network appropriate for the particular application. *Id.*; SAMSUNG-1009, Abstract. On the selected networks, RAMD would use Rao's and Araujo's techniques to prioritize network traffic. *See* §III.A.1; SAMSUNG-1003, ¶[196]. In one example, if VoIP and MP3 download were both assigned to the WLAN, the techniques of Rao would prioritize the real-time traffic of the VoIP over the download. SAMSUNG-1005, [0003], [0179]-[0184]; SAMSUNG-1003, ¶[196].

RAMD's processor would be configured to perform the operations in [11]

for at least the reasons described above. SAMSUNG-1003, ¶[197]; *see also* §III.A.1.c.

Combining Rao, Araujo and Montemurro would have involved (1) combining prior art elements according to known methods to yield predictable results; and (2) use of known techniques to improve similar devices (methods, or products) in the same way. SAMSUNG-1003, ¶[198]; *see* MPEP §2143. The combination would have amounted to nothing more than the use of a known technique to improve similar smart phone devices equipped with network interfaces in a similar way and combining prior art elements according to known methods to yield the predictable results described above. *KSR*, 550 U.S. at 417; SAMSUNG-1003, ¶[198].

2. Analysis

[11]

RAMD renders [11] obvious. SAMSUNG-1009, [0011], [0013], [0029]; SAMSUNG-1005, [0119], [0095]; SAMSUNG-1003, SAMSUNG-1003, ¶¶[199]-[202].

RAMD includes a network interface that enables connectivity to different types of networks, including those involving roaming and non-roaming cellular networks. SAMSUNG-1005, [0095], [0125]; SAMSUNG-1009, [0011], [0013],

[0029]. A POSITA would have recognized that when RAMD is roaming (i.e., connected to a cellular network of a provider other than the carrier providing contracted service to the device), RAMD can be connected to any network that supplies roaming cellular service. SAMSUNG-1003, ¶[200]. Therefore, absent any additional information about the network, RAMD cannot identify a particular current wireless network. *Id.* However, when RAMD is not roaming, the device is connected to the particular cellular network contracted to provide service to RAMD. *Id.*.

As discussed in §III.D.1.a., to account for different connection types, Montemurro leverages a rules engine that "configures the communication operations with a set of rules/policies that could include various factors such as…network roaming." SAMSUNG-1009, [0029]. A POSITA would have understood and found obvious that if rules applied by the rules engine of RAMD include factors such as network roaming, then certain rules specify actions to be taken when RAMD is currently connected to a roaming network, and other rules specify actions to be taken when the RAMD is currently connected to a contracted (i.e., non-roaming) cellular network. SAMSUNG-1003, ¶[201]. For example, a policy applied by RAMD may specify that a large transfer is permitted to occur on the non-roaming network, but not on a roaming network. SAMSUNG-1003, ¶[201]. Indeed, Montemurro indicates that the CRM application "only synchronizes the sales

contact database" over a WLAN network." SAMSUNG-1009, [0029]; SAMSUNG, 1003, ¶[201]. From this disclosure, a POSITA would have recognized that RAMD would have used policies to regulate certain file transfers (e.g., database synchronization) so that they can only occur over a preferred network (e.g., non-roaming network). SAMSUNG-1003, ¶[201].

Therefore, a POSITA would have understood or found obvious that Montemurro teaches determining whether to apply the network service usage control policy to the particular network service usage activity is further based on a current wireless network (e.g., applying only to the contracted carrier). SAMSUNG-1003, ¶[202].

E. [GROUND 1E] Rao-Araujo-Wright renders claims 9-10, 13 and 18 obvious

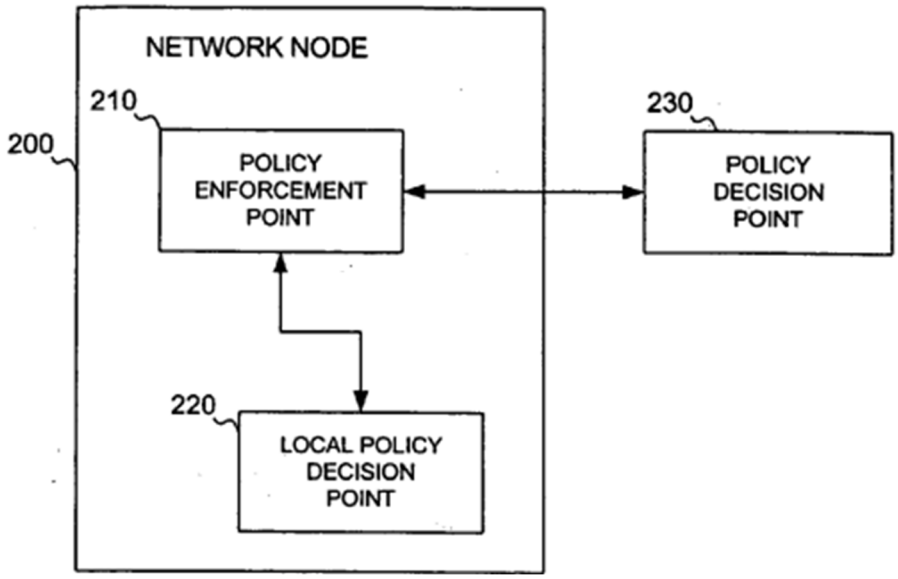
1. Rao-Araujo-Wright

(a) Wright

Wright describes policy-based management of a multiprotocol label switching (MPLS) system using a Policy Decision Point (PDP) and Policy Enforcement Point (PEP). SAMSUNG-1010, Abstract, [0020]. A POSITA would have known that a PDP is a component that makes policy decisions, and a PEP is a component that enforces the PDP's decision. SAMSUNG-1003, ¶[72] (citing SAMSUNG-1024).

Wright explains that "MPLS can support explicit traffic engineering via a

number of specifications that allow [Labelled Switch Paths (LSPs)] to be managed based on" QoS and other constraints. *Id.*, [0019]. Wright's system architecture is illustrated in FIG. 2 (below) where a network node can include a PEP and a Local Policy Decision Point ("LPDP"). SAMSUNG-1010, [0022].

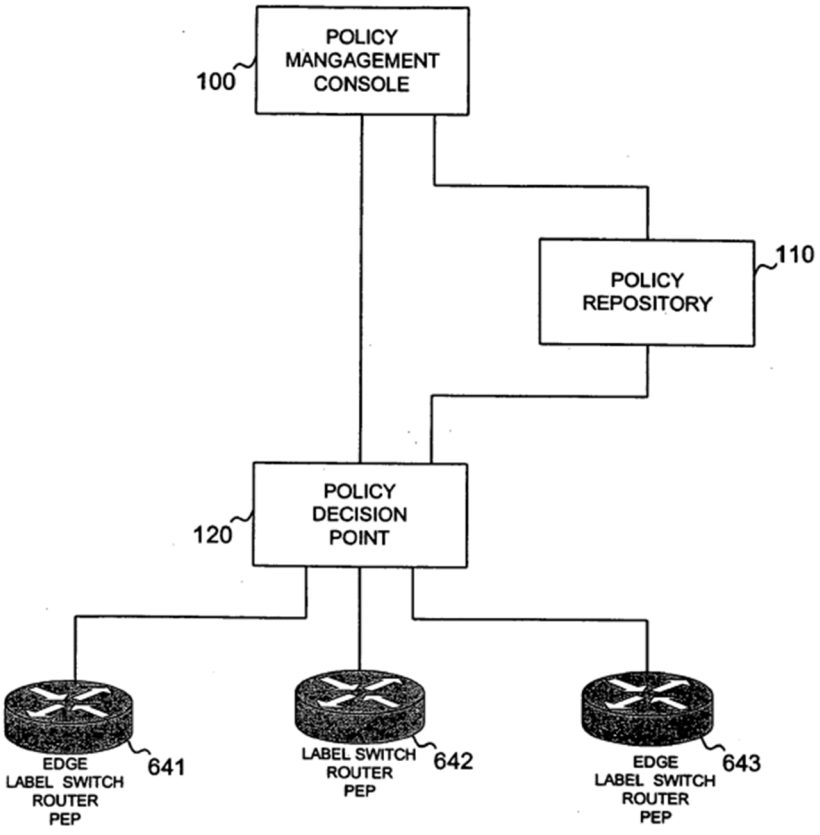


SAMSUNG-1010, FIG. 2.

The PEP can use the LPDP to reach a partial decision locally, and the partial decision and the original policy request next can be sent to a PDP that renders a final decision. *Id.* Wright's "policy management system can include feedback" from a PEP to a PDP, including information such as "changes in dynamic state of network resources, link failures and congestion, statistics related to installed policy, etc." *Id.*, [0023]. "[I]nformation supplied by the PEPs may be used by the PDP to make future policy-based decisions or make changes to current decisions

regardless of the implemented policy management model." *Id.* "In policy outsourcing, events can occur at the PEPs 130 and require a policy-based decision, and the PEP 130 can request the decision from the PDP 120." *Id.*, [0021].

Wright's PDP provides policy decisions for multiple PEPs, as shown in FIG. 6 (below):



SAMSUNG-1010, FIG. 6

(b) Combination

As described above, RAD would use Rao's and Araujo's policy-based management techniques to manage access to networks, considering various criteria, such as quality of service, application priority and power factors. *See* §III.A.1. In

RAD, such policy decisions are made locally by RAD through the frame monitor and PPM, which serve as the device's LPDP, and enforced by RAD Packet Capture Mechanism (including a request deflector), which serves as RAD's PEP. *Id.*; SAMSUNG-1003, ¶[203].

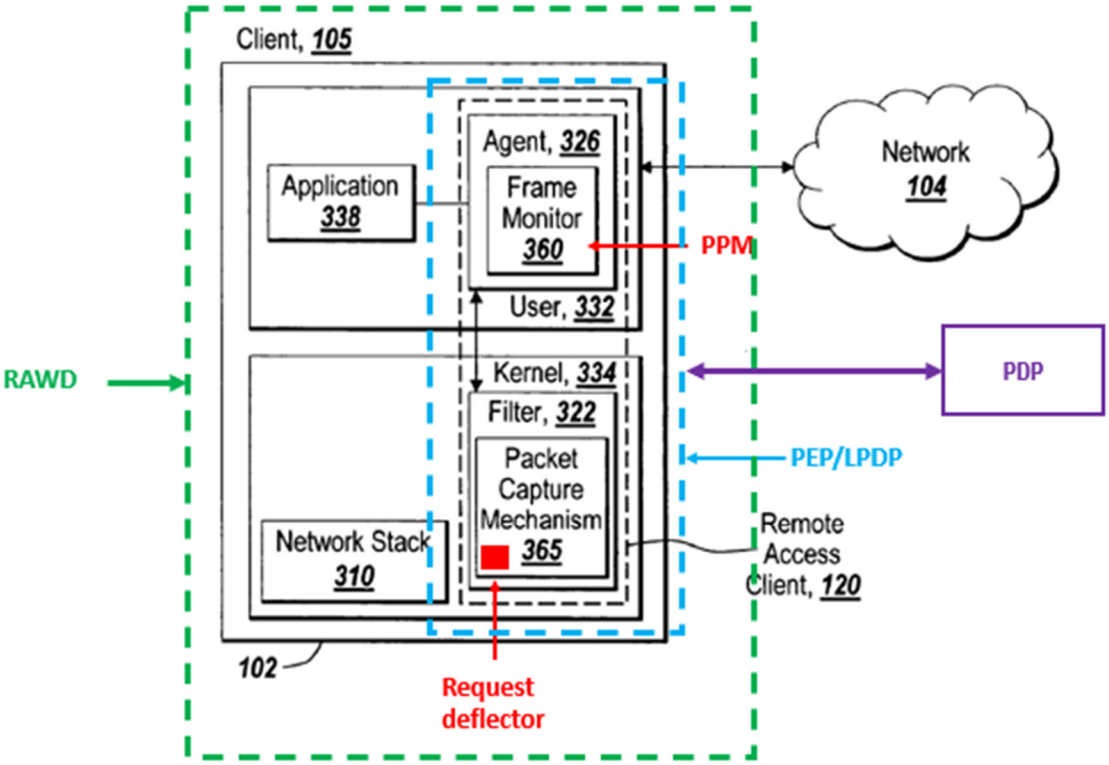
However, a POSITA would have recognized that constraining policy decision to factors known locally at the device limits the effectiveness of global network management techniques such as policy-based traffic engineering. SAMSUNG-1003, ¶[204]. To address this limitation, Wright's approach, which can include policy systems related to "policy-based load balancing in traffic-engineered MPLS networks and traffic engineering of load distribution," also includes "feedback from a PEP ... to a PDP." SAMSUNG-1010, [0023], [0065]. Providing data from multiple PEPs to a PDP enables the PDP to make policy determinations based on network-wide factors, which can achieve network-wide efficiencies. SAMSUNG-1003, ¶[204].

One example is traffic shaping, which is a form of traffic engineering that can be used to manage the allocation of bandwidth, and requires a more global view of network use. SAMSUNG-1003, ¶[205]. In such systems, statistics from throughout a network are collected and used to achieve the traffic engineering goals, which benefit all network users, including mobile devices with RAD. SAMSUNG-1003, ¶[205]. Thus, to improve the operation of RAD by further improving

network efficiency, a POSITA would have looked to teachings of other references, such as Wright. SAMSUNG-1003, ¶[205].

In operation, the resulting Rao-Araujo-Wright System (RAWS) would use Rao's and Araujo's techniques to manage the resources of the Rao-Araujo-Wright Device (RAWD), such as network access and power. SAMSUNG-1003, ¶[206]. To enable more efficient use of global network resources, RAWD would provide network statistics to a PDP, enabling policy decisions to be outsourced to the PDP. SAMSUNG-1010, [0021]; §III.E.1.a; SAMSUNG-1003, ¶[206].

In RAWS, illustrated below, the RAC 120 of RAWD acts as the PEP/LPDP and is enhanced by the techniques of Wright to provide data to a PDP, a separate component of RAWS that makes policy decisions based on a broader view of network state. SAMSUNG-1003, ¶[207]. RAWS's PDP would serve multiple devices, although only one is shown below. SAMSUNG-1003, ¶[207]; SAMSUNG-1010, FIG. 6; *see also* §III.E.1.a.



Combining Rao, Araujo, and Wright would have involved (1) combining prior art elements according to known methods to yield predictable results; and (2) use of known techniques to improve similar devices (methods, or products) in the same way. SAMSUNG-1003, ¶[208]; *see* MPEP §2143. The combination would have amounted to nothing more than the use of a known technique (introducing a PDP) and combining prior art elements according to known methods to yield the predictable results described above. *KSR*, 550 U.S. at 417; SAMSUNG-1003, ¶[208]. RAWS's processor would be configured to perform the operations described in this Ground for at least the reasons described above. SAMSUNG-1003, ¶[208]; *see* §III.A.1.c.

2. Analysis

[9.1]

See §III.A.2, element [1.3].

[9.2]

See §III.A.2, element [8].

[9.3]

RAWS renders [9.3] obvious. SAMSUNG-1020 [0021], [0023], FIG. 6; SAMSUNG-1003, ¶¶[211]-[215].

As described in §§III.E.1.a-b, Wright teaches that policy decisions can be "outsourced" to a policy decision point (PDP), which is a service controller. SAMSUNG-1020 [0021]; SAMSUNG-1003, ¶[212].

Further, as described above, RAWD sends data, including network busy state information to RAWS's service controller (PDP). SAMSUNG-1003, ¶[213]; *see* §III.E.1.a. For example, Wright explains that the PEP provides feedback to the PDP such as "changes in dynamic state of network resources, link failures and congestion, statistics related to installed policy, etc." SAMSUNG-1010, [0023]. A POSITA would have recognized that congestion is a network busy state. SAMSUNG-1003, ¶[213]. In addition, the PDP (service controller) provides PDP function (policy decisions) for multiple devices. SAMSUNG-1010, FIG. 6; SAMSUNG-1003, ¶[213]; *see* §III.E.1.b.

In addition, a POSITA would have known that wireless mobile devices such as RAWD are in communication with base stations, and the base stations provide access to the Internet. SAMSUNG-1003, ¶[214] (citing SAMSUNG-1009).

Therefore, RAWS renders obvious sending network busy state information (congestion indications) to a service controller (PDP) that provides a policy decision point for multiple devices that are in communication with base stations. SAMSUNG-1003, ¶[215].

[10.1]

See §III.A.2, element [1.3].

[10.2]

See §III.A.2, element [9.2]

[10.3]

See §III.A.2, element [9.3]

[10.4]

RAWS renders [10.4] obvious. SAMSUNG-1005, [0182]; SAMSUNG-1020, [0021], FIG. 6; SAMSUNG-1003, ¶¶[219]-[221].

As described above, RAWS's PDP provides router traffic control instructions to the PEP in RAWD. SAMSUNG-1003, ¶[220]; *see* [9.3], §§III.E.1.a-b. For example, Wright explains that policy decisions can be "outsourced" to a policy decision point (PDP), which is a service controller. SAMSUNG-1020 [0021]. A POSITA would have known that when a policy decision is outsourced to a PDP,

the PDP evaluates the policies to determine applicable actions. SAMSUNG-1003, ¶[220]. For example, as explained in Rao, the policy decision can result in "client-side prioritization of network communications related to applications". SAMSUNG-1005, [0182]. A POSITA would have recognized that network prioritization is a router traffic control instruction. SAMSUNG-1003, ¶[220].

As further described above, RAWS's PDP manages network capacity for multiple devices. SAMSUNG-1010, FIG. 6; SAMSUNG-1003, ¶[221]; *see* §§III.E.1.a-b. In addition, as described in [9.3], a POSITA would have known that wireless mobile devices such as RAWD are in communication with base stations, the base stations provide access to the Internet. SAMSUNG-1003, ¶[221] (citing SAMSUNG-1009).

[13]

RAWD renders [13] obvious. SAMSUNG-1005, [0182]; SAMSUNG-1010, [0021]; SAMSUNG-1003, ¶¶[222]-[224].

Wright teaches that policy decisions can be made by a PDP in response to a query from a PEP. SAMSUNG-1010, [0021]; §§III.E.1.a-b. A POSITA would have recognized that a PDP is a network element. SAMSUNG-1003, ¶[223].

Further, as explained in Rao, policies "may be specified by the name of the application" and/or "the type of application," thus associating an application with a particular policy. SAMSUNG-1005, [0182]; SAMSUNG-1003, ¶[224]. A

POSITA would have known that since policy evaluation can be outsourced to a network element serving as a PDP (per Wright), and policies can be specified based on the application (per Rao), in RAWS, outsourcing the policy decision includes querying a network element (PDP) for an association of an application and a policy, enabling the PDP to make the policy decision. SAMSUNG-1005, [0182]; SAMSUNG-1010, [0021]; SAMSUNG-1003, ¶[224].

[18]

RAWS renders [18] obvious. SAMSUNG-1005, [0182], [0184]; SAMSUNG-1010, [0023]; SAMSUNG-1003, ¶¶[225]-[226].

Rao describes policies that are used to differentially control network usage, e.g., through priority queuing. SAMSUNG-1005, [0182], [0184] ("based on the type and/or priority of the application"); SAMSUNG-1003, ¶[226]; *see also* §III.A.2 (discussion of [18]). Wright further describes policies that are dependent on various factors and that the policy management system can include feedback from a PEP to a PDP, which can include "changes in dynamic state of network resources, link failures and congestion." *Id.*, [0023]. A POSITA would have recognized "congestion" as a "busy state." SAMSUNG-1003, ¶[226]. Wright further explains that the PDP can use this information to "make changes to current policy decisions." SAMSUNG-1010, [0023]. Thus, a POSITA would have recognized that Wright teaches policies that are based on busy state. SAMSUNG-1003,

¶[226]. Therefore, RAWS renders obvious differentially controlling the particular network service usage activity (through Rao's priority queuing) based on the network service usage control policy based on a network busy state (as Wright teaches). SAMSUNG-1003, ¶[226].

IV. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. Discretionary Denial under §325(d) is Not Warranted

Discretionary denial under the Board's §325(d) *Advanced Bionics* analysis is not warranted. *See Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 8-9 (PTAB Feb. 13, 2020) (precedential) ("*Advanced Bionics"*).

None of the prior art advanced in this Petition were previously before the Office. While relatives of Rao and Araujo (WO 2006/012610A2 ("Rao-2") and U.S. Patent No. 8,082,459 ("Araujo-2")) were cited on the face of the '544 Patent, there is no evidence that the Office substantively considered these references among the 11 page of references listed in the '544 Patent. *See, generally,* SAMSUNG-1002. Moreover, the same or substantially the same arguments were not previously presented to the Office. *Id.* In fact, the Examiner cited only one reference (Rados) and subsequently allowed the application. *Id.*, 115-116.

To the extent it is argued that the same or substantially the same art or arguments were previously presented to the Office, the second prong is not met. *Advanced Bionics*, 8-10. Although Rao-2 and Araujo-2 were cited on the face of the '544 Patent, none of Rao, Araujo, Rao-2, Araujo-2, or the obviousness of the Challenged Claims in view of those references was ever addressed during prosecution. As highlighted in Grounds 1A-1E, the Examiner clearly did not appreciate Rao's or Araujo's disclosures and how those references in combination with other prior art references not previously before the Office (Freund, Singh, Montemurro, and Wright) render the Challenged Claims obvious. Moreover, Petitioner has shown a reasonable likelihood that it would prevail that at least one of the Challenged Claims is unpatentable over the applied art based on the current record. *Supra* §§III.A-E; *see Tokyo Ohka Kogyo Co., Ltd. v. Fujifilm Elec. Materials U.S.A., Inc.*, PGR2022-00010, Paper 9, 8-9 (PTAB June 6, 2022). Thus, Petitioner has demonstrated material error by the Office, and discretionary denial is not warranted.

B. Discretionary Denial under §314(a) is not Merited in view of Petitioner's *Sotera* Stipulation

In *Apple Inc. v. Fintiv, Inc.*, the Board enumerated six factors to determine whether a petition should be discretionarily denied institution under §314(a). IPR2020-00019, Paper 11 at 2-3 (PTAB "precedential" Mar. 20, 2020) ("*Fintiv*"). In June 2022, the USPTO issued updated discretionary denial guidance in view of the *Fintiv* factors and expressly noted that ***the PTAB will not discretionarily deny***

institution if Petitioner presents a Sotera stipulation. SAMSUNG-1015, 3, 7-8. Here, Petitioner has eliminated any risk of duplicated effort by voluntarily presenting a *Sotera* stipulation to Patent Owner. SAMSUNG-1016; *Sotera Wireless, Inc. v. Masimo Corp.,* Case IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020). For at least this reason, the Board should not discretionarily deny this petition.

Although the Board need not address additional *Fintiv* factor considerations in light of Samsung's Sotera stipulation, indeed, the *Fintiv* factors do not favor denial.

Factor 1 is neutral because neither party has requested a stay in co-pending litigation.

Factor 2 is neutral because the Court's trial date is speculative at this point and subject to change. The Board will likely issue its Final Written Decision around February 2025, approximately six months after the currently scheduled trial date (August 5, 2024). SAMSUNG-1018, 1. However, as the Board and Director have previously recognized, "scheduled trial dates are unreliable and often change." SAMSUNG-1015, 8.

Factor 3 also favors institution because Petitioner has diligently filed this Petition months ahead of the one-year time bar, while the EDTX Litigation is still in its early stages. Beyond exchanging preliminary infringement/invalidity contentions, the parties and the District Court have yet to expend significant resources on

invalidity. SAMSUNG-1018, 5.

Factor 4 also favors institution because Petitioner has provided a *Sotera* stipulation. SAMSUNG-1016.

Factor 5: The parties in the parallel EDTX litigation are the same.

Factor 6 favors institution because the merits of this Petition are compelling, as described herein.

V. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Petitioner authorizes charge of fees to Deposit Account 06-1050.

VI. 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)

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, "Samsung") are the real parties-in-interest.

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

The '544 Patent is the subject of a civil action, *Headwater Research LLC v. Samsung Electronics Co., Ltd. et al.*, 2:22-cv-00422, E.D. Tex., filed October 26, 2022. SAMSUNG-1004; SAMSUNG-10. Samsung and Headwater are also involved in case nos. 2:22-cv-00467 and 2:23-cv-00103, also in E.D. Tex.

Samsung is not aware of any other disclaimers, reexamination certificates, or IPR petitions addressing the '544 patent.

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

Petitioner 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 IPR39843-0160IP1@fr.com (referencing No. 39843-0160IP1 and cc'ing PTABInbound@fr.com, axf-ptab@fr.com, jjm@fr.com, rchowdhury@fr.com and jjh@fr.com).

Respectfully submitted,

Dated September 11, 2023

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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 13,981 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated September 11, 2023

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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 September 11, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided by Federal Express, to the Patent Owner, by serving the correspondence address of record as follows:

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