UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMERICAN AIRLINES, INC.,

and

SOUTHWEST AIRLINES, CO.,

Petitioners,

v.

INTELLECTUAL VENTURES I, LLC,

Patent Owner

Case No. IPR2025-00786
U.S. Patent No. 7,949,785

PATENT OWNER'S PRELIMINARY RESPONSE

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PATENT OWNER'S EXHIBIT LIST

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EX2008	Declaration of Dr. Guevara Noubir
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EX2010	P. Mockapetris, "Domain names - concepts and facilities", RFC 1034, November 1987, https://doi.org/10.17487/RFC1034.
EX2011	P. Mockapetris, "Domain names - implementation and specification", RFC 1035, November 1987, https://doi.org/10.17487/RFC1035.
EX2012	Y. Rekhter, B. Moskowitz, D. Karrenberg, G. J. de Groot, E. Lear, "Address Allocation for Private Internets", RFC 1918, February 1996. doi:10.17487/RFC1918.
EX2013	Vijay Bollapragada, Mohamed Khalid, Scott Wainner, "IPSec VPN Design", Cisco Press, 2005.

I. INTRODUCTION

Petitioner challenges Claims 1, 30, 35-38, 48, 62, 75, 77, and 78 ("Challenged Claims") of U.S. Patent No. 7,949,785 ("'785 Patent") on two grounds.

- (1) Petitioner challenges independent Claims 1, 30, 38, 48, 62, and 75, and certain dependent claims, as allegedly obvious over US 6,970,941 to Caronni et al. (hereinafter "Caronni-I"), US 7,814,228 to Caronni et al. (hereinafter "Caronni-II") and US 6,766,371 to Hipp et al. (hereinafter "Hipp").
- (2), Petitioner challenges independent Claims 1, 30, 38, 48, 62 and 75, and certain dependent claims, as allegedly obvious over Caronni-I, Caronni-II and Huitema, C., Network Group Request for Comment (RFC): 1383 (hereinafter "RFC-1383")

However, neither ground satisfies the Petitioner's burden of "showing that there is a reasonable likelihood that the Petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314.

The '785 Patent addresses a fundamental networking challenge: enabling secure, direct communication between devices across different physical networks, including those behind firewalls and NAT devices, without requiring wholesale replacement of existing applications or network infrastructure. To solve this problem, the inventors developed the concept of a virtual community network ("VCN")—a private, dynamic network defined by a domain name, managed by a VCN Manager, and capable of returning, in response to a single DNS request, all of the address information needed for two devices to communicate.

The Petition fails to account for this architecture in two independent respects. First, it does not meet Petitioner's burden to identify and explain any material error by the Examiner in allowing the claims after considering Caronni-I and Caronni-II, both of which appear on the face of the '785 Patent. Second, even apart from the lack of examiner error, the asserted combinations in Grounds 1 and 2 fail to disclose or suggest two key limitations: (1) a virtual network "defined by a domain name," and (2) a DNS response to a single query that returns three distinct addresses—the route director address, the address of the destination device, and the virtual address of the destination device. Neither Hipp nor RFC-1383 cures these deficiencies. Moreover, Petitioner offers no non-conclusory, evidence-based rationale for combining the references to arrive at the claimed invention. For these reasons, and as explained below, the Petition does not demonstrate a reasonable likelihood of prevailing, and institution should be denied.

II. SPECIFICATION OF '785 PATENT

The invention claimed in the '785 Patent addresses the technical problem of how to enable secure communication between multiple devices, especially when some or all of the devices are not on the same physical network. EX2008, ¶26. To solve this problem, the '785 Patent teaches how to operate and manage such devices to form dynamic virtual communities defined by domain names. EX2008, ¶¶26-27.

The ‘785 Patent refers to these dynamic virtual communities as “virtual community networks” (VCNs).

A. Background

The ‘785 Patent highlights problems associated with using the Internet for communication that led to the invention of VCNs. As the Internet was being developed, the Internet Protocol (IP) emerged as “the default protocol used by most hosts and to which communication applications are now written.” EX1001, 1:38-40. The IP Protocol made use of IP addresses, 4 byte long numeric strings, to transmit data from a source device to a destination device. *Id.* at 1:40-45. Users, however, often used “ASCII strings called domain names,” rather than the IP addresses themselves, to refer to hosts or other resources, and “[t]he Internet use[d] a Domain Name System (DNS) to convert a domain name to an IP address.” *Id.* at 1:45-50.

While the IP protocol continues to be the default protocol for the Internet, it was running out of addresses. *Id.* at 51-55. Network Address Translation (NAT) was, accordingly, developed to address this problem. *Id.* at 56-57. Using NAT, based on the assumption that not all machines in a network will need to access the Internet at the same time, private networks operated with a smaller number of public IP addresses assigned to NAT devices – in other words, within a private network, only devices actively accessing the Internet would be assigned public IP addresses and all others would be given private addresses. *Id.* at 1:57-2:7. The NAT device itself (also referred to herein as a NAT box) works by intercepting communications from machines on the private network attempting to communicate with devices outside the private network, changing the source machine's private address to a public address, and setting up a table for translating public addresses to private addresses. *Id.* at 2:7-19. However, this only really worked in one direction – "[m]any NAT implementations will not work if the communication is initiated by a host outside of the private network and is directed to a host with a private address in the private network." *Id.* at 2:22-25; EX2008, ¶26.

Accordingly, the problem to be solved by the invention was identified as follows:

> [T]here is a need for a system that provides for local and remote entities to communicate and collaborate using the Internet, can work with existing NAT devices and firewalls, and allows for devices to move to different physical networks.

EX1001, 2:45-48. In developing a network that enables such communication, the '785 Patent additionally identified several goals, including using existing protocols to spare organizations and individuals the expense of replacing all their applications and providing efficient and secure communication by giving devices the ability to have their IP-based applications communicate directly with each other. *Id.* at 2:50-67. Additionally, such a network must be able to handle dynamic IP address assignment, which is critical to enabling devices outside the NAT box to communicate with devices on the other side of the NAT box and/or using different protocols. *Id.* at 4:46-56; EX2008, ¶26.

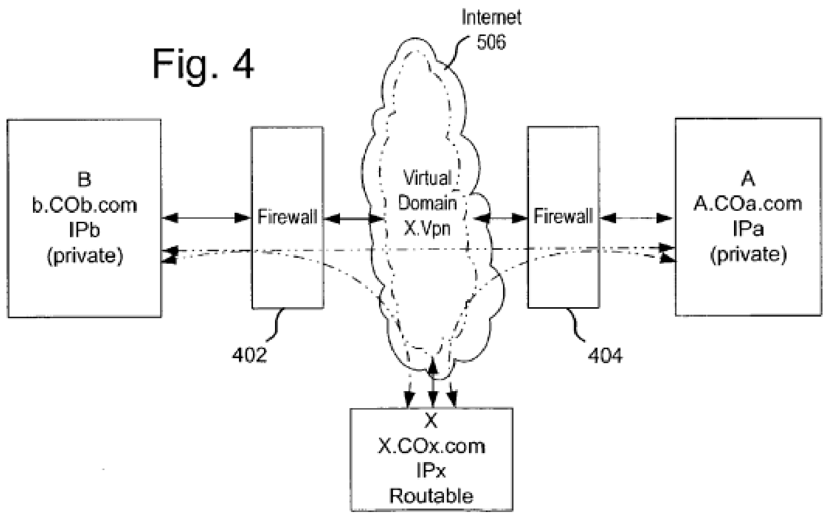
B. Detailed Description

The '785 Patent discloses a VCN, which is described as follows:

> In essence, a VCN is a private dynamic network which acts as a private LAN for computing devices coupled to public networks or private networks. This enables computing devices anywhere in the world to join into private enterprise intranets and communicate with each other. Thus, the invention provides a separate private virtual address realm, seen to each user as a private network while seamlessly crossing public and private network boundaries.

EX1001, 9:1-8.

FIG. 4 (reproduced below) is a block diagram of an implementation of a VCN. In the example VCN shown in FIG. 4, a device B having host name b.COb.com is in a first private domain, a device A having host name A.COa.com is in a second private domain, and both are coupled to the Internet by firewall devices 402 and 404, respectively. The firewalls 402, 404 are configured to implement NAT. A third device X is coupled directly to the Internet. The devices A and B, in private networks, can have dynamic or static IP addresses, and the device C, coupled directly to the public internet, can have a public IP address only. *Id.* at 9:9-17.



The VCN in FIG. 4 is defined by the domain name X.VCN. EX2008, ¶¶27-29; EX1001, 9:18-19 ("In the present invention, a virtual community network (VCN) X.VCN is formed).[1]

> More than simply a virtual private network (VPN), all members of the VCN are accessible as if they were part of a physical local network. The application running on the members of the VCN can accomplish what they would be able to accomplish if they were on the same physical routed network (e.g. all in the same private network).

EX1001, 9:21-26. The dashed lines in FIG. 4 indicate direct communication paths, showing that devices A, B, and X can all make direct connections with each other via communications with the virtual domain. *Id.* at 9:36-41.

A network administrator controls membership to the VCN.

> In general, the administrator defines certain aspects of the VCN and then invites members into the VCN by specifying the domain name for each member. Members then register themselves with a VCN Manager

[1] While FIG. 4 shows the domain name of the VCN as X.Vpn, this appears to be a typographical error as the specification refers to it as X.VCN.

> (not shown in FIG. 4), and notify the Manager via join and leave requests when they are available to participate in the community. Once registered and joined, members can communicate with other members as though connected via a local LAN.

Id. at 9:27-35.

FIG. 5B (reproduced below) is a block diagram of an embodiment of a virtual community showing network elements of a VCN system. As shown in FIG. 5B, the system includes a VCN manager 510, a network route director (NRD) 520, a private route director (PRD) 530, and a number of member agents 565 (on devices M_A, M_B, M_C, M_D, M_E and M_X). While both an NRD and PRD are shown, it is possible for a VCN to include only one, or both, depending on the member devices. The VCN manager 510 and the NRD 520 are directly connected to the Internet. *Id.* at 10:24-27; EX2008, ¶27.

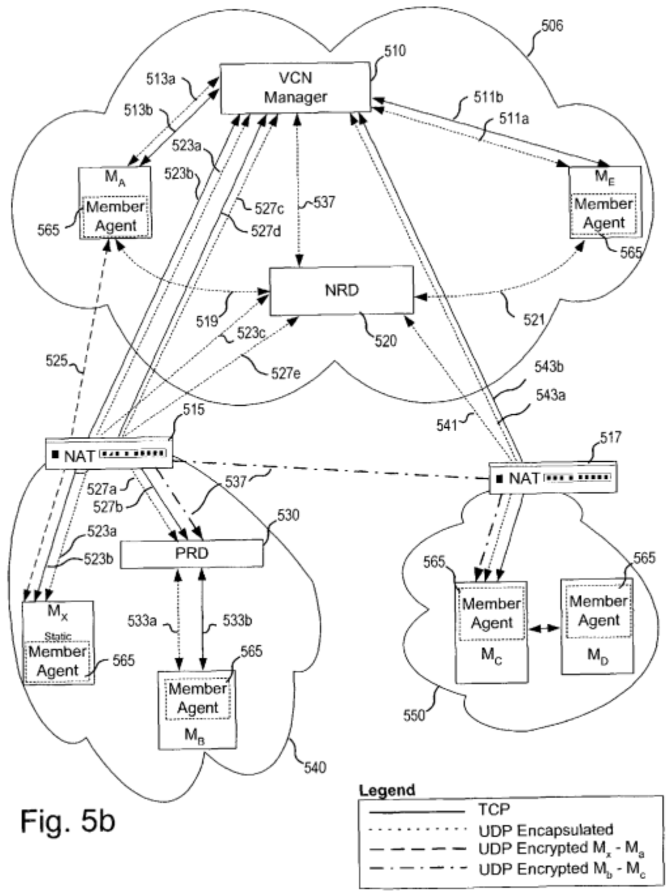


Fig. 5b

The VCN Manager 510 is a central server. It defines the VCN and provides management, connection and security services for the VCN. Each device in the VCN contains client agent software 565 that enables the device to be reached from public and private networks and implements security aspects. EX1001, 10:66-11:8, 11:19-20.

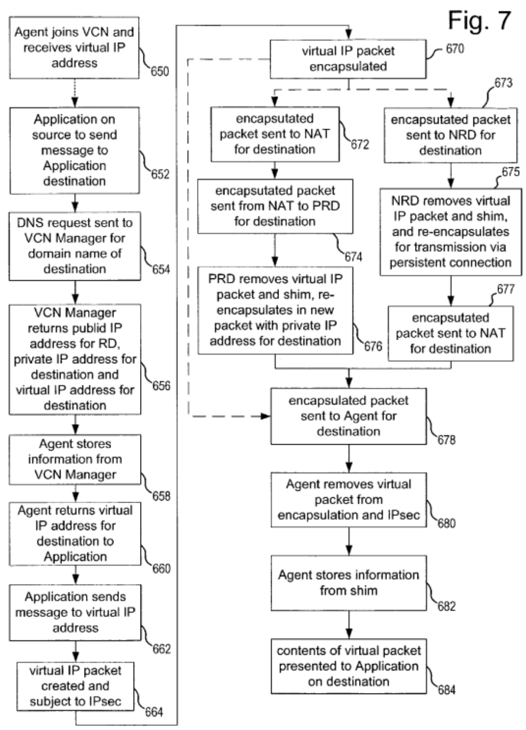
The NRD 520 runs on the public side of the Internet and enables devices to be reached inside private networks from the public network. *Id.* at 11: 9-13. The PRD 530 runs inside a private network, and enables access to devices inside the private network, such as the device M_B in FIG. 5B, to be reached by devices outside the private network. *Id.* at 11:14-17. The route directors facilitate routing UDP encapsulated packets to private address domains (e.g., 540, 550 in FIG. 5B) and can route traffic in and out of private address domains without need for reconfiguration of the firewall. The route directors have public IP addresses or addresses that are re-mapped to public IP addresses. *Id.* at 13:6-9, 51-54.

For packet routing, the protocol stack knows the address of the route director that serves the peer device's realm, the private address of the peer device, or the appropriate NAT address. The member agent 465 of a device that wants to communicate with a peer device obtains the needed information by sending a DNS request to the VCN manager 510. *Id.* at 12:23-26, 14:32-33; EX2008, ¶¶27, 29. In other words, "[t]he Member Agent obtains the information by using the VCN Manager as a DNS authority for DNS lookup operations . . . . The DNS response from the VCN Manager will include the above-identified information in [a] response to the Member Agent." EX1001, 12:26-31; EX2008, ¶29.

Each peer device in the VCN is assigned a virtual address, creating a virtual address realm for the VCN. EX1001, 12:54-55; EX2001, ¶27. "The virtual address realm is the set of addresses that can be used to identify and send communications to other members of the VCN." EX1001, 12:55-57. The virtual address realm is different from a physical address realm since "the physical address realm is actually used to route on a physical network." *Id.* at 12:57-60. In other words, devices in the

VCN are all in the virtual address realm of the VCN but may be in different physical address realms. *Id.* at 12:60-62.

Using such VCN, any member of the VCN can communicate with any other member, regardless of whether they are behind a firewall, NAT box, directly connected to the Internet, in a private network, etc. *Id.* at 13:67-14:4; EX2008, ¶¶26-27. The procedure for such communication is illustrated in the flow diagram of FIG. 7 (reproduced below).



In step 650, the agent for a device joins the VCN and receives a virtual IP address. To do so, it sends a message to the VCN manager 510 and receives the virtual IP address in a return message from the VCN manager. EX1001, 14:10-15; EX2008, ¶29.

When an application on a source device needs to send a message to an application on another (destination) device (step 652), the application on the source device initiates a DNS request using the domain name for the destination device. EX1001, 14:23-27; EX2008, ¶29. The DNS request will be received by the VCN manager 510 (steps 652, 654). EX1001*,* 14:32-34; EX2008, ¶29. In step 656, "the VCN manager 510 returns the public address of the Route Director for the destination, the private address for the destination device and a virtual IP address for the destination device." EX1001*,* 14:35-38; EX2008, ¶29.

By way of example, if M_A is the source device and M_B is the destination device, an application on M_A initiates a DNS request using the domain name for M_B and the VCN manager 510 receives it. EX1001, 14:29-34. The VCN manager 510, having received the DNS request, returns the public IP address for the PRD 530, the private address for $M_{B,}$ and a virtual IP address for M_B. *Id.* at 14:38-40. *This is not a typical use case of DNS* where a single public IP address is resolved from the domain name, but rather a custom use of DNS to enable devices to easily retrieve multiple pieces of address information needed to communicate with another device that is part of the same virtual address realm but may also be part of a different physical address realm and behind a different NAT box. EX2008, ¶30.

By embedding this DNS query and multi-address response mechanism into the virtual network infrastructure, the '785 Patent enables dynamic and scalable address resolution without the need for static routing or manual configuration. This approach stands in contrast to prior art systems, such as those disclosed in Caronni-I or RFC-1383, which either rely on static mappings or fail to return the full set of address information in response to a runtime query. The patent's integration of DNS into the virtual address resolution process is essential to its architecture and central to its claims.

C. Prosecution History of the '785 Patent

The prosecution history of the '785 Patent shows that the claims were allowed only after the Applicant incorporated subject matter from dependent claims 16 and 44, both directed to the DNS request and three-address response, into the independent claims. Following two initial rejections, the Applicant filed an RCE including these dependent claims, which the Examiner identified as containing allowable subject matter. See EX1002, 493-521. The Applicant then amended independent claims 1 and 32, as well as new independent claim 93, to include these features, and canceled claims 16 and 44. Additional independent claims (53, 64, and 80) were later amended to incorporate the same allowable subject matter before allowance. See EX1002, 658-683.

In addition, the Examiner expressly considered both Caronni-I and Caronni-II, which appear on the face of the patent. Specifically, Caronni-I appears on the

Notice of References Cited in the Non-Final Office Action dated September 22, 2006. EX1002, 167.

Notice of References Cited	Application/Control No. 10/403,818	Applicant(s)/Patent Under Reexamination ALKHATIB ET AL.	
	Examiner Douglas B. Blair	Art Unit 2142	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,107,464	09-2006	Shapira et al.	709/200
*	B	US-6,226,751	05-2001	Arrow et al.	726/15
*	C	US-6,970,941	11-2005	Caronni et al.	709/238
*	D	US-7,010,702	03-2006	Bots et al.	726/13
*	E	US-6,701,437	03-2004	Hoke et al.	726/15
*	F	US-6,594,704	07-2003	Birenback et al.	709/238
*	G	US-2004/0148439	07-2004	Harvey et al.	709/249
*	H	US-2003/0041136	02-2003	Cheline et al.	709/223
*	I	US-2003/0041091	02-2003	Cheline et al.	709/200
*	J	US-7,092,390	08-2006	Wan, Albert Chungbor	370/392
*	K	US-6,832,322	12-2004	Boden et al.	726/15
*	L	US-7,107,614	09-2006	Boden et al.	726/15
*	M	US-2002/0133534	09-2002	Forslow, Jan	709/200

Caronni-II appears on the Notice of References Cited in the Non-Office Action dated February 4, 2009. EX1002, 692.

Notice of References Cited	Application/Control No. 10/403,818	Applicant(s)/Patent Under Reexamination ALKHATIB ET AL.	
	Examiner DOUGLAS B. BLAIR	Art Unit 2442	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-7,814,228	10-2010	Caronni et al.	709/245
*	B	US-7,787,428	08-2010	Furukawa et al.	370/338
*	C	US-7,653,747	01-2010	Lucco et al.	709/245
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

In sum, the prosecution history confirms that the allowance of the '785 Patent turned on the incorporation of the DNS request and three-address response limitations, which were originally recited in pending dependent claims 16 and 44, into the independent claims. The Examiner expressly recognized these features as allowable, and all independent claims were ultimately amended to include them before issuance. Both Caronni-I and Caronni-II were fully considered during prosecution and appear on the face of the patent, demonstrating that the Examiner allowed the claims despite having these references before him. This history underscores that the asserted combinations in the Petition rely on the same art already evaluated by the Examiner and still fail to disclose the critical claim elements that led to allowance.

III. CLAIM CONSTRUCTION

The Patent Owner maintains that the Challenged Claims should have their plain and ordinary meaning. However, a determination that a claim term "needs no construction" or has the "plain and ordinary meaning" may be inadequate when a term has more than one "ordinary" meaning or when reliance on a term's "ordinary" meaning does not resolve the parties' dispute." *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). Instead, "[t]he terms used in the claims bear a presumption that they mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art." *Honeywell Int'l, Inc. v. ITC*, 341 F.3d 1332, 1338 (Fed. Cir. 2003). Accordingly, "Properly viewed, the 'ordinary meaning' of a claim term is its meaning to the ordinary artisan after reading the entire patent." *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1358 (Fed. Cir. 2017).

A. "Domain"

In the '785 Patent, "a domain" is used in the DNS sense: a hierarchical naming scope that provides the logical name for a virtual community network (VCN) and for the member hosts within it. The specification states that the VCN's logical name "is a domain name," which may be a fully-qualified domain name (FQDN) or a "virtual domain name," i.e., one the system serves itself rather than the public DNS hierarchy. EX1001, 5-7. The claims likewise tie the community definition to DNS by reciting a virtual network "defined by a domain name having an associated public network address," showing that the domain anchors resolution to a public-facing endpoint (e.g., the manager or route director). In other places, the patent distinguishes between a "public domain name" that identifies the VCN on the public Internet and an internal/virtual domain that the VCN Manager answers authoritatively for member lookups. As described in the '785 Patent, administrators invite members by specifying each member's DNS name and the system uses DNS queries to return the route director's address and peer addressing inside the VCN, confirming that "domain" here is the DNS namespace governing those names and lookups. EX2008, ¶38.

B. "Domain Name"

In this patent, a person of ordinary skill would read "a domain name" in its ordinary networking sense: an ASCII string label used with the Domain Name System (DNS) to resolve to an IP address. The specification explains the Internet "uses ASCII strings called domain names" and that DNS converts a domain name to an IP address, signaling that the inventors are using the conventional DNS meaning. EX1001, 1:47-48. EX2008, ¶37.

C. "Domain Name Server (DNS)"

In this patent, DNS is the standard Internet naming system that translates human-readable domain names into numeric IP addresses. The background explains that the Internet "uses ASCII strings called domain names," and that "the Domain Name System (DNS) … convert[s] a domain name to an IP address." EX1001, 1:48-50. EX2008, ¶36.

Within the claimed system, DNS plays two roles. First, public DNS associates the virtual community's public domain name with a public-facing endpoint. Second, the virtual network manager includes its own DNS server that answers authoritatively for the virtual network; in response to a member's DNS query, it returns not just a single IP, but routing information tailored for the overlay: the route director's address, the target device's address, and that device's virtual (non-routable) network address. This behavior is recited in both the system and method claims. EX2008, ¶36.

IV. REFERENCES RELIED ON IN THE PETITION

A. Declaration of Erez Zadok (EX1011)

Petitioner's Expert Declaration from Dr. Zadok is not a piece of prior art, but it nonetheless is being used in the Petition to fill gaps in the prior art. Dr. Zadok's Expert Declaration should be afforded little, if any, evidentiary weight. As an initial matter, large portions of the declaration simply mirror the Petition with only minimal, insubstantial differences. *Compare* Pet. at 28-29 *with* EX1011, ¶¶351-352 and 356.

Such rote repetition is entitled to little evidentiary weight. As the USPTO has explained in *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15–17

(PTAB Aug. 24, 2022) (precedential), expert testimony that merely restates the Petition's conclusory assertions without offering additional substantive explanation is entitled to "little weight." The Federal Circuit has similarly affirmed that an expert declaration adds no meaningful value where it simply repeats a petitioner's arguments without independent analysis. See *Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321, 1340–41 (Fed. Cir. 2020) (affirming the Board's finding that expert testimony was unpersuasive where it "merely repeated Petitioner's argument, nearly verbatim, without citation to the basis for his testimony").

Here, the Petition's heavy reliance on an expert declaration that mostly parrots the Petition's arguments underscores the weakness of Petitioner's case and supports affording the declaration little weight.

B. Caronni-I (EX1003)

The Petition relies on Caronni-I as its primary reference for both Grounds 1 and 2. Caronni-I is generally directed to a Supernet. EX1003, 4:37-39. FIG. 3 (reproduced below) is a block diagram of a data processing system suitable for the Supernet. The data processing system includes several devices 302-312 connected to the Internet 314. *Id.* at 4:64-66; EX2008, ¶57. "A Supernet's infrastructure uses components from the Internet because devices 302, 304, and 312 contain nodes [316, 318, 320, 322] that together form a Supernet." EX1003, 4:66-5:3. The nodes 316, 318, 320 and 322 run within their respective devices, communicate among each other, and securely use the Supernet's resources. *Id.* at 5:3-7 EX2008, ¶57. "The Supernet also includes an administrative node to administer to the needs of the Supernet." *Id.* at 5:11-13.

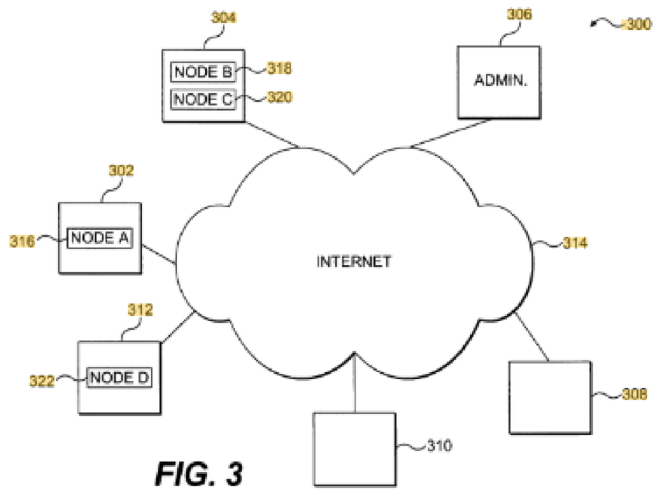


FIG. 3

The Supernet uses its own internal addressing scheme, which is separate from the public addressing scheme used by the Internet 314. EX1003, 6:7-12; EX2008, ¶58. "[W]hen a packet from a Supernet node is sent to another Supernet node, it travels through the public network. To do so, the Supernet performs address translation from the internal addressing scheme to the public addressing scheme and vice versa." EX1003, 6:12-16.

FIG. 5 (reproduced below) provides details of the devices (e.g., device 302 of FIG. 3) and the administrative node 306. As can be seen, both the device 302 and the administrative node 306 include CPUs 510, 512 that are capable of operating in two modes: user mode and kernel mode. EX1003, 6:55-57; EX2008, ¶59.

> When CPU512 executes programs running in user mode, it prevents them from directly manipulating the hardware components, such as video display 518. On the other hand, when CPU 512 executes programs running in kernel mode, it allows them to manipulate the hardware components. Memory 504 also contains a VARPDB 551 and TCP/IP stack 552 that are executed by CPU 512 running in kernel mode.

EX1003, 6:57-64. The administrative node 306 also includes a virtual address resolution protocol daemon (VARPD) 548, which is used for address resolution. The VARPD 548 stores "mappings of the internal Supernet addresses, known as node IDs, to the network addresses recognized by the public-network infrastructure, known as the real addresses." EX1003, 7:5-9; EX2008, ¶60.

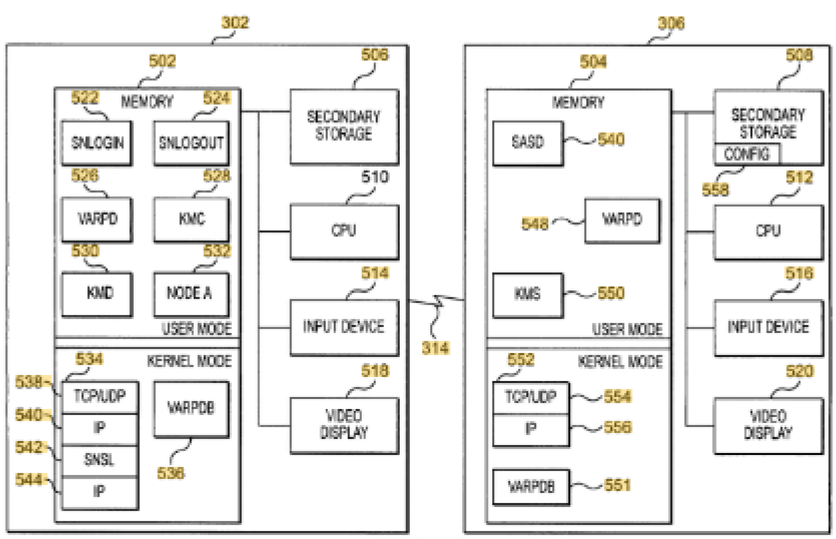


FIG. 5

Address translation from the Supernet IDs to real addresses is done transparently for the nodes. EX1003, 8:34-37; 6:6-7; EX2008, ¶61. When a node in the Supernet wants to send a transmission to another node in the Supernet, the inner IP layer 540 on the device 302 receives a packet originating from node A (in user mode). EX1003, 11:26-28; EX2008, ¶60. "The packet contains virtual source node address 642, virtual destination node address 644, and data 654." *Id.* at 11:29-30.

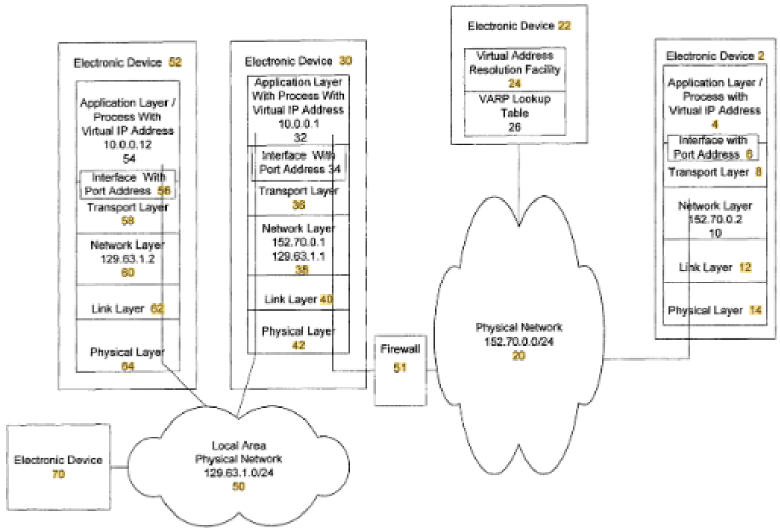
> The packet and Supernet ID are then transmitted to the SNSL layer [542] using the modified socket structure (step 806). The SNSL layer then accesses the VARPDB to obtain the address mapping between virtual source node address 642 and the source real address 614 as well as the virtual destination node address 644 and the destination real address 616 (step 808). . . . When contacted, the VARPD on the local machine contacts the VARPD that acts as the server for the Supernet to obtain the appropriate address mapping.

Id. 11:47-59. Since this is done in kernel mode, the address translation is transparent to the application or user-level process. This is a key aspect to the security of the Caronni-I system. EX1003, 6:6-25, 8:31-37; EX2008, ¶61.

C. Caronni-II (EX1004)

The Petition relies on Caronni-II as a secondary reference for Grounds 1 and 2. Caronni-II, while having one inventor in common with Caronni-I, is directed toward a completely different concept. Caronni-II is largely directed toward systems and methods for enabling communication between devices located behind NAT boxes by using reflecting agents, relay nodes, and administrative servers to discover and share public and private address information. It facilitates NAT traversal by determining a client's public IP address through a reflecting agent and coordinating peer-to-peer or relayed communication paths based on that information. EX1004, 8:1-25. An important distinction between Caronni-I and Caronni-II is that, in Caronni-II, address translation is not transparent to network devices. As explained below, in Caronni-II, the electronic device that hosts the virtual address resolution facility and VARP lookup table is actually part of the public physical network (e.g., the Internet), rather than being part of the private network and only accessed in kernel mode. *Id.* at 4:4-6.

FIG. 1 of Caronni-II (reproduced below) shows a network according to the invention. As shown, the network includes an electronic device 2 that is part of a public physical network 20 (e.g. the Internet). *Id.* at 61-63, 4:27-33. "Also part of the physical network 20 is an electronic device 22 holding a virtual address resolution facility 24." *Id.* at 4:4-6. "The physical network 20 is also interfaced with an electronic device 30 located at the edge of a local area physical network 50 which includes devices addressable using IP addresses in the 129.61.1.0/24 range." *Id.* at 4:17-20. The electronic device 30, at the edge of the local area physical network 50, can be, for example, a proxy server, gateway, or NAT box. *Id.* at 4:20-22. An additional electronic device 52 is also interfaced with the local physical network 50. *Id.* at 4:40-42. Accordingly, the electronic device 52 can be considered to be behind a NAT box. An alternative embodiment is shown in, and described with respect to, FIG. 5, where two devices behind different NAT boxes, but part of the same virtual network, are attempting to communicate with each other. *See id.* at FIG. 5, 8:1-25.



In a departure from the Caronni-I network, Caronni-II suggests a process running on the electronic device 52 registers its virtual address with the virtual address resolution facility 22. *Id.* at 4: 54-56; EX2008, ¶65. "The registration includes an associated real IP address for a physical device to which messages may be sent that are intended for the virtual address." *Id.* at 4:56-58.

"The VARP lookup table 26 may be stored at any location accessible over the network." EX1004, 5:11-13. The VARP lookup table 26 has a two column structure (as shown in FIG. 2). The registered virtual addresses are in the first column and corresponding associations are in the second column. *Id.* at 5:13-15, FIG. 2; EX2008, ¶66. "Each entry in the VARP lookup table 26 will list the registering virtual IP address 90 and associated information including a real IP address 91, a transport protocol designation 92, a port number identification 93 and an Application layer protocol designation 94. The associations are provided at the time the virtual destination address is registered in the virtual network." EX1004, 5:18-24.

For electronic device 52, since it is associated with the edge device 30, the process running on the device 30 may register its virtual address along with the physical address of the edge device 30. Therefore, "[m]essages sent to the virtual destination are resolved using the associated real IP address of the edge device 30." *Id.* at 5:36-38; EX2008, ¶66.

In the embodiment of FIG. 5, where two devices behind different NAT boxes, but part of the same virtual network, are trying to communicate with each other, a reflecting agent is added to the network. EX1004, FIG. 5, 8:1-4; EX2008, ¶67. In such a scenario (i.e., when both the source and destination addresses are behind different NAT boxes), the source device cannot directly address the destination "since the address of the destination may not be routable in the public Internet." EX1004, 8:13-18; EX2008, ¶67. To accommodate such scenarios, an entry for the third party reflecting agent located outside the NAT box may be added to the VARP table. EX1004, 8:17-19; EX2008, ¶67. "Messages that are being sent from the originating virtual address behind a NAT box to a destination that is behind a different NAT box are sent via the reflecting agent intermediary outside the NAT box and reflected to the destination." EX1004, 8:19-23.

D. Hipp (EX1005)

The Petition relies on Hipp as a secondary reference for Ground 1 only. Hipp is directed toward a system for virtualizing network identity by assigning a unique virtual IP address and virtual hostname to each application instance in a distributed computing environment. EX1005, 6:1-4; EX2008, ¶¶72-73. These virtual identifiers remain consistent throughout the lifetime of the application instance, even if the underlying physical host changes. EX1005, 6:4-6; EX2008, ¶¶72-73. The system allows clients to access distributed services using DNS-based or/etc/hosts file resolution of the virtual hostname, which maps to the real network address of the currently active instance, thereby supporting seamless failover, load balancing, and mobility in clustered or virtualized environments. EX1005, 6:16-26; EX2008, ¶¶72-73.

E. RFC-1383 (EX1006)

The Petition relies on RFC-1383 as a secondary reference for Ground 2 only. RFC-1383 describes an experimental method for using DNS to assist IP packet routing, particularly for multi-homed domains and fringe networks not fully integrated into global routing tables. The core idea is to introduce RX DNS records, which are analogous to MX records in mail routing, that associate destination IP address ranges (e.g., via reverse DNS lookups) with preferred gateway IP addresses for packet delivery. EX1006, pp 2-4; EX2008, ¶76. These RX records can then be used by the source host or a nearby relay to determine which gateway to use to reach the destination network, based on cost, availability, or policy. *Id.*

The system described in RFC-1383 can be implemented using a DNS query manager (user-mode process), which queries RX records when a destination is unreachable. A real-time forwarder, implemented in the kernel, uses the RX information to apply source routing (or tunneling) to forward packets via the chosen gateway. RX records are temporarily implemented as TXT records, and return a single gateway IP address and a cost preference. Each record is associated with a single IP address and preference score. *Id.* at pp 11-13; EX2008, ¶¶76-77.

V. Petitioner Has Not Met Its Burden to Establish Obviousness Under 35 U.S.C §103

First, the Petition fails to meet Petitioner's burden to identify and explain a material error made by the Examiner during prosecution. Caronni-I and Caronni-II were expressly before the Examiner, appear on the face of the '785 Patent, and were considered when the claims were allowed. The burden therefore falls on Petitioner to pinpoint how the Examiner materially erred in allowing the claims in light of those references. Petitioner offers no such showing because it could not. The record shows that the DNS-request feature was the reason for allowance, and Petitioner's cited art merely recycles the same Caronni references with cumulative DNS-adjacent concepts that lack this feature.

Second, even setting aside Petitioner's failure to show any examiner error, Grounds 1 and 2 fail on the merits under 35 U.S.C. § 103. In Ground 1, the combination of Caronni-I, Caronni-II, and Hipp does not disclose or suggest two central claim limitations: (1) a virtual network "defined by a domain name," and (2) a DNS response to a single query that returns three distinct addresses—the route director address, the address of the destination device, and the virtual address of the destination device. The asserted art also lacks any non-conclusory, evidence-based rationale for combining these references. Ground 2 fares no better. The substitution of RFC-1383 for Hipp does not cure any of these gaps; RFC-1383 is limited to reverse DNS lookups that return a single gateway address and operates in a wholly different technical context. Because both grounds fail to disclose all claim elements and fail to provide any reasoned motivation to combine with a reasonable expectation of success, the Petition does not demonstrate a reasonable likelihood of prevailing, and institution should be denied in full.

A. Petitioner Has Not Met Its Burden Under *Ecto World* to Demonstrate Material Examiner Error Where the Same Caronni References Were Previously Considered

The Acting Director's precedential decision in *Ecto World, LLC v. RAI Strategic Holdings*, Inc., IPR2024-01280, Paper 13 (PTAB May 19, 2025), clarifies the *Advanced Bionics* / *Becton, Dickinson* framework and squarely places the burden on a petitioner relying on art that was previously presented to the Office, even if merely via Information Disclosure Statement (IDS), to identify and explain a material error by the Office. The Director confirmed that Prong One is satisfied where the asserted references were submitted on an IDS and initialed as considered, and that Prong Two requires an affirmative, articulated showing of material error tied to patentability and makes clear that it is the Petitioner's burden to show the error because the Board will not "scour" other portions of a petition to assemble an argument on the petitioner's behalf.

Applied to this record, *Ecto World* makes clear that the Petitioner has not met its burden. Caronni-I and Caronni-II were expressly before the Examiner during prosecution of the '785 Patent and appear on the face of the patent. That is sufficient to satisfy Prong One. Under *Ecto World*, the onus then shifted to Petitioner to pinpoint how the Office materially erred in allowing the claims in view of those references. Petitioner did not do so. Indeed, Petitioner's § 325(d) discussion is confined to a single paragraph and consists of the assertion that the "specific combinations" now advanced were not considered, combined with the incorrect claim that Caronni-I was not cited during prosecution, when in fact it plainly was (see Petition, 68). *Ecto World* makes clear that such a perfunctory treatment does not meet Prong Two; the petitioner must identify the Office's error and explain why it matters to patentability, and the Board will not attempt to construct that showing from scattered merits arguments.

The '785 prosecution history (see Section II(c)) demonstrates that the DNS-request feature was the reason claims were allowed: the Examiner indicated dependent claims 16 and 44, containing that feature, were allowable, and the independent claims were then amended to include that functionality, and the claims were allowed. The Petition's Grounds rely on Caronni-I/Caronni-II combined with Hipp or RFC-1383, but Hipp's passing reference to resolving a virtual hostname to a virtual IP via preconfigured DNS and RFC-1383's gateway-selection records are, at best, cumulative of the virtual-addressing concepts already in Caronni and still omit the core 'DNS request → three-address response' workflow that the Examiner found patentable. On this record, *Ecto World* requires Petitioner to do more than re-argue the art; it must show that the Examiner overlooked a specific teaching, misapprehended a specific disclosure, or committed a legal error that, if corrected, would change the outcome. Petitioner offers none of that. Instead, Petitioner only provides conclusory statements that a POSITA "would understand" Caronni's internal lookups as akin to DNS and that multiple addresses "would" be returned, which is precisely the sort of inferential backfill *Ecto World* says cannot substitute for a Prong-2 showing of material Office error.

Ecto World specifically instructs panels to apply *Advanced Bionics* through the lens of the *Becton, Dickinson* factors, with particular emphasis on (c), (e), and (f) when assessing Step-2. Factor (c) weighs against institution because the

Examiner had Caronni-I and Caronni-II of record and—especially after the DNS-request feature was introduced—proceeded to allowance, reflecting that those references did not teach the critical limitation. Factor (e) also weighs against institution because the Petition nowhere identifies how the Office erred in evaluating Caronni-I/II vis-à-vis the DNS-request feature. Mischaracterizing Caronni-I as "not cited" underscores, rather than cures, the omission. Factor (f) offers no rescue. *Ecto World* recognized a narrow scenario in which an outsized, thousand-reference IDS combined with an applicant's failure to flag key references could, on remand, weigh against discretionary denial. But that caveat was tied to the volume and flagging context of that record; it does not apply where, as here, the key references were expressly cited **by the Examiner** and appear on the patent's face. Thus, on this record, factors (c), (e), and (f) support denial.

Under *Ecto World*, once Prong One is met, the petition rises or falls on whether it affirmatively demonstrates material examiner error. The Petition relies on the same Caronni references the Examiner considered, adds only cumulative DNS-adjacent material, and then asks the Board to infer the rest from "what a POSITA would understand." That is not the showing *Ecto World* requires; the Board should decline to "scour the record" to manufacture a Step-2 case the Petitioner did not make, and should deny institution.

B. Ground 1: Petitioner Fails to Show Obviousness Because the Asserted Combination of Caronni-I, Caronni-II, and Hipp Does Not Disclose the Claimed Domain-Defined Virtual Network, the Required Three-Address DNS Response, or a Non-Conclusory Motivation to Combine

In Ground 1, the Petition relies on an alleged combination of Caronni-I, Caronni-II and Hipp to render the Challenged Claims as allegedly obvious under 35 U.S.C. § 103. This allegation is deficient for a number of reasons. First, Caronni-I, Caronni-II, and Hipp, either alone or in combination, fail to disclose or suggest a virtual network that is defined by a domain name. Second, Caronni-I, Caronni-II, and Hipp, either alone or in combination, fail to disclose or suggest three addresses returned in response to a single DNS query.

Petitioner's obviousness challenges fail for multiple, independent reasons, each of which is dispositive. First, the cited art, whether considered individually or in combination, does not disclose or suggest a virtual network "defined by a domain name" as required by every challenged independent claim. Caronni-I's "Supernet name" is not a DNS-based domain name in any technical sense, Caronni-II adds nothing to remedy that omission, and Hipp's hostnames relate only to application processes, not to the structural definition of a virtual network.

Second, the asserted references do not disclose or suggest the "three-address response" required by the claims: returning, in response to a single DNS query, (i) a route director address, (ii) the public address of the destination device, and (iii) the virtual address of the destination device. Caronni-I and Caronni-II at most return a single address in non-DNS contexts, and Hipp's DNS disclosure is limited to conventional single-address hostname resolution.

Third, Petitioner's alleged motivations to combine these references are conclusory, circular, and unsupported by evidence. The Petition offers no reasoned "why" for the proposed combinations beyond restating the desired end result, conflates the concepts of "could combine" with "would be motivated to combine," and relies on expert testimony that simply parrots the Petition's assertions without additional support.

Finally, because both prongs of the obviousness inquiry, namely (1) disclosure of all claim elements in the prior art and (2) a reasoned motivation to combine with a reasonable expectation of success, are absent here, Petitioner has failed to meet its burden under 35 U.S.C. § 103. These deficiencies apply not only to independent claim 1, but equally to independent claims 30, 38, 48, 62, and 75, and to dependent claims 35–37, 77, and 78.

1. Caronni-I, Caronni-II, and Hipp, Alone or in Combination, Do Not Disclose or Suggest a Virtual Network that is Defined by a Domain Name

A lynch pin of all of the independent claims of the '785 Patent is a virtual community network (VCN) that is defined by a domain name. More specifically, Claim 1 recites "a virtual network that is defined by a domain name." Claims 30, 48 and 62 recite a similar limitation: “a virtual network that is defined by a domain name having an associate public network address.” Claim 38 recites “a virtual network that is defined by public domain name.” Claim 75 recites “at least one virtual community definition that is defined by a domain name having an associated public network address.”

In the ‘785 Patent, the VCN is defined by the domain name X.VCN, and each of the member devices is assigned a domain name during registration. EX1001, 9:18-19, 28-31. Such member domain names are sub-domains of the domain name X.VCN, which could be, for one example, member1.X.VCN. EX2008, ¶¶28, 80-81. The X.VCN domain name is associated with a public IP address. *Id.* at ¶82. This allows for easy navigation to the VCN by any device regardless of whether it is in a private network or directly connected to the public Internet. *Id.*

In the ‘785 Patent itself, domain names are described as “ASCII strings” that are: (1) used to identify an IP address instead of the numerical IP address and (2) convertible to the IP address by a DNS server. EX1001, 1:45-50; EX2008, ¶83. The use of a domain name to define the virtual network in the ‘785 Patent’s claims provides more than an identifier of the virtual network or even a plain language identification of an IP address – it signifies a hierarchical structure for the virtual network that enables: (1) communications between devices both within and outside of private networks to be intercepted by a virtual network manager for the virtual network and (2) the virtual network manager to thereby provide all of the addresses the source device needs to deliver that communication to the correct destination device, including the address of the correct route director to route the communication, the private address in the virtual network's address realm for the destination device, and the public address of the destination device. EX2008, ¶¶83-84; EX1001, 14:29-38.

The Petition cites a combination of Caronni-I and Hipp for this feature of all of the Independent Claims of the '785 Patent. However, as explained in detail below, neither reference, alone or in any alleged combination, discloses or suggests this claim feature.

a) A Supernet Having a Supernet Name and Supernet IDs (Channels), as Alleged in the Petition, is Not a Virtual Network Defined by a Domain Name

The Petition argues that the Supernet disclosed in Caronni-I is a virtual network. Petition, 32-33. In Caronni-I, a human user (administrator) configures a Supernet by creating a configuration file, which is stored on an administrative node, and which the SASD uses when starting or configuring a Supernet. EX1003, 8:1-3. The configuration file specifies: "(1) the Supernet name, (2) all of the channels in the Supernet, [and] (3) the nodes that communicate over each channel. . . ." *Id.* at 8:3-7. The VARPD stores, in an associated VARPDB, "real IP addresses" for the nodes and Supernet IDs, which reflect unique identifiers for the Supernets. *Id.* at 7:5-

7, 23-25; 11:49-53. The Supernet IDs "indicat[e] the channels over which the process communicates." *Id.* at 11:3-4. When joining a Supernet, a user of a device enters the Supernet name, their user ID, and their password. *Id.* at 9:66-10:2.

A POSITA would recognize that a domain name is a human-readable identifier that corresponds to an IP address. EX2008, ¶¶32,37; EX1001, 1:45-50. It acts as an alias for the IP address, the numerical identifier that computers use to locate and access network resources. EX2008, ¶¶32, 37; EX1001, 1:45-50. Domain names simplify navigation by enabling users to enter a recognizable name, such as example.com (or X.VCN in the '785 Patent), instead of a complex numerical IP address. EX2008, ¶¶31-32; EX1001, 1:45-50. They are organized hierarchically into components separated by dots, such as www.example.com, where "www" is a subdomain, "example" is a second-level domain, and "com" represents the top-level domain name. EX2008, ¶¶31-33. The DNS resolves these domain names into their corresponding IP addresses, facilitating communication between computers and the appropriate servers or devices. EX2008, ¶¶31-33; EX1001, 1:48-50. The same is true for the '785 Patent, where VCN is the top-level domain and "X" is the second-level domain. EX2008, ¶32, 81. Devices in the VCN are also assigned domain names, which could be "member1.X.VCN," which is a sub-domain of X, the second-level domain, and VCN is the top-level domain. EX2008, ¶32, 81; EX1001, 9:18-31.

The Supernet name, in Caronni-I, which is entered by an administrator when creating the configuration file, and by users when joining a Supernet, is just a numerical identifier, and nothing more. EX2008, ¶87; EX1003, 8:1-4. The entry of the Supernet name by a network administrator results in the creation of a configuration file, and not navigation to an IP address associated with the Supernet name. EX2008, ¶87; EX1003, 8:1-4. Similarly, a human user attempting to join a Supernet enters the Supernet name, along with their password. EX1003, 9:66-10:2. When that name is entered, it does not take the user to a specific location within a hierarchical address structure, but rather simply results in verification of the user's credentials to join the Supernet. *Id.* at 10:5-7. More specifically, as stated in Caronni-I itself: "Upon receiving this information, the SNlogin script performs a handshaking with SASD to authenticate this information." *Id.*

The Petition's reliance on Caronni-I fails to demonstrate that it teaches or suggests the use of domain names as part of the virtual network addressing mechanism, as required by the '785 Patent. EX2008, ¶88. When Caronni-I discusses alternative addressing schemes, it refers to non-IP protocols, not domain names. For example, Caronni-I states: "Although the virtual address is described in an IP address scheme, one skilled in the art will appreciate that the virtual address may be any other type addressing scheme, such as an e-mail address, IPX, or IPv6." EX1003 at 7:13–16. Similarly, in the context of its "Email Example," Caronni-I notes that "other addresses (not IP) may be used for delivery within the Supernet. For example, an e-mail address may be used to deliver data in a Supernet. The sender node specifies an e-mail address as the delivery address. When the VARPD is queried… the VARPD provides the real IP address associated with the e-mail address." *Id.* at 7:56–62. In both instances, the addressing mechanisms described ultimately resolve to real IP addresses, not domain names, and are not part of a DNS-based hierarchical structure. EX2008, ¶88. Thus, Caronni-I does not disclose or suggest the use of DNS domain names to define a virtual network or its address realm, as claimed in the '785 Patent.

Caronni-I does not disclose or suggest that the Supernet name is in a domain name format, such as X.VCN, that signifies a hierarchical structure with a top-level domain and sub-domains. Further, Caronni-I does not disclose or suggest that the Supernet name is used to identify an IP address, as in the '785 Patent, or is convertible to the IP address by a DNS server, as in the '785 Patent. Accordingly, the Supernet, having a Supernet name, is not "a virtual network that is defined by a domain name," as recited by Claim 1.

b) The KMS AND VARPD Addresses Described in Caronni-I are Not Associated with the Virtual Network's Domain Name, as Alleged in the Petition

Claims 30, 38, 48, 62 and 75 further require the domain name to be associated with a public address. For this claim limitation, the Petition argues that this limitation is met by the "[v]arious public addresses [] associated *with the Supernet*, such as a KMS address and/or VARPD address," in Caronni-I. Petition, 37. The Petition specifically mentions that the nodes that join the Supernet all have "real IP addresses." *Id*. at 36-37.

While the Petition is correct that the KMS and VARPD of the Supernet, in Caronni-I, have **IP addresses**, the key limitation in the claims is that the public addresses are associated with the ***domain name*** of the virtual network, ***and not just the virtual network as a whole***. This further clarifies the domain name structure explained above – the domain name that defines the virtual network in the claims of the '785 Patent is associated with a public IP address such that, when the domain name X.VCN is invoked, a DNS translation takes place, and the associated public IP address is navigated to, just like when a person enters a domain name like www.example.com into a web browser. EX2008, ¶¶32, 82. To the contrary, the KMS and VARPD addresses are merely IP addresses *for entities associated with the Supernet*, but those IP addresses, themselves, are not associated *with a domain name* of the Supernet. EX1003, 8:1-11. Caronni-I does not disclose or suggest any domain name for the Supernet that, when invoked, navigates to the IP addresses of the VARPD or KMS. Caronni-I is completely silent as to any domain name for the Supernet that places the VARPD and KMS within the hierarchical structure of a domain name (e.g., KMS.X.Supernet). EX2008, ¶¶32, 82. Such a hierarchical structure, or domain name structure, was not contemplated by Caronni-I at all – the term "domain name" or similar does not appear even once in the Caronni-I patent.

The Petition alleges that "the SASD would [moreover?] have an associated public IP address, as the SASD communicates with various Supernet devices." Petition, 37. This argument is, however, mere speculation, and contrary to the actual teachings in Caronni-I. In Caronni-I, the assignment of IP addresses to nodes in the Supernet is completely unrelated to the existence of a domain name defining the Supernet itself (which makes sense because the existence of a domain name defining the Supernet is completely absent from the disclosures in Caronni-I).

There is nothing about the assignment of an IP address to a node, by an ISP, that requires the addresses to have a domain name or even be a member of a domain. In fact, all computers connected to the Internet must have an IP address; however, the vast majority of those computers do not have a domain name, nor are they members of a domain. Accordingly, it cannot just be assumed, as the Petition does, that the fact that the SASD communicates with various Supernet devices means that the SASD has a domain name. As specifically stated in the Petition, the various nodes all have "real IP addresses," which is all that is needed to navigate to them.

Accordingly, the KMS and VARPD IP addresses in Caronni-I are not associated with a domain name of the Supernet, as alleged in the Petition.

c) "A hostname," as Mentioned in Hipp, Is Not a Domain Name that Defines a Virtual Network, Either Alone, or in Combination With Caronni-I

In addition to the various disclosures in Caronni-I that are not domain names, the Petition also argues that "Hipp discloses a domain name (hostname) having an associated public address." Petition, 38. The Petition elaborates that "[a] POSITA would understand the assignment of hostnames and IP addresses to Hipp processes may be applied to the processes of Caronni-I (SASD, VARPD, and KMD) to disclose this limitation." *Id.*

The Petition's reliance on Hipp is misplaced. Hipp describes an application-level virtual network isolation technique designed to enable multiple secure and logically distinct application environments—referred to as Virtual Network Environments (VNEs)—to operate concurrently over the same physical network infrastructure. *See* EX1005, 2:8-16, 3:16-30, 6:1-26; EX2008, ¶¶89-91. However, the nature of the virtual networks disclosed in Hipp is fundamentally different from the domain name-defined VCN recited in the '785 Patent. *See id.*

Hipp explicitly defines a VNE as "a collection of IP addresses." EX1005, 2:8–9; EX2008, ¶¶89-90. The VNE is not defined using domain names or DNS-based resolution, but instead relies on static IP address groupings and subnets. Hipp explains that "the VNE is defined by [a] subnet of addresses contained within the VNE," and gives the example: "all applications within the subnet 10.10.2.0 comprise a VNE," specified by a traditional subnet mask such as 10.10.2.0/**255.255.255.0**, which encompasses addresses 10.10.2.0 through 10.10.2.255 for a Class C Network. EX1005, 3:17–24; EX2008, ¶90. The VNE configuration is determined at application run time and is entirely transparent to the application itself. EX1005, 3:17–20; EX2008, ¶90. There is no use or mention of a hierarchical domain structure or DNS resolution as a mechanism for routing or network definition.

While Hipp does reference the concept of a "Virtual Network Identity," this term does not refer to the definition of the network, but rather to a runtime property of a particular application instance that has already joined a pre-defined VNE. Specifically, Hipp states: "Virtualization of network identity is achieved by assigning a unique virtual IP address and virtual hostname to a group of processes that make up the application instance," and that this identity persists across nodes during execution. EX1005, 6:1–6; EX2008, ¶93. This virtual network identity serves as a persistent identifier for the application instance, not as a structural definition of the virtual network itself. EX2008, ¶93.

Accordingly, while Hipp does suggest that DNS could be pre-configured to resolve the hostname to an IP address (EX1005, 6:21-26), this, by itself, does not mean that the virtual network, or the Supernet in Caronni-I, is "defined by a domain name." More specifically, Hipp expressly states "assigning a unique virtual IP address and virtual hostname to a group of processes that make up the application instance which the instance keeps throughout its execution." EX1005, 6:1-3. Accordingly, in Hipp, the hostname defines *an application process*, and ***not*** a virtual network.

The Petition merely concludes that "[a] POSITA would understand the assignment of hostnames and IP addresses to Hipp processes may be applied to the processes of Caronni-I (e.g., the SASD, VARPD, and KMD)." Petition, 38. However, this does nothing to explain why a POSITA would consider a hostname that defines *an instance of an application* to be the same as a domain name, or even a hostname, that defines *a virtual network*. Accordingly, the Petition fails to meet its burden of showing that a virtual network **that is defined by a domain name** would be obvious to a POSITA from the disclosures of Hipp and Caronni-I.

2. The Alleged Combination of Caronni-I, Caronni-II and Hipp, Does Not Disclose or Suggest Returning Three Addresses in Response to a Single DNS Request/DNS Query, As Required By Claims 1, 30, 38, 48, 62, and 75 of the '785 Patent

While they use different wordings, each of Claims 1, 30, 38, 48, 62 and 75 of the '785 Patent requires a DNS response, to a single DNS query, that returns three required addresses for routing a communication from a source device to a destination device: (1) an address of a route director designated to route the communication to the destination device; (2) a virtual address; and (3) a network address of the destination device itself.

This exemplifies the domain name structure described above with respect to the domain name, X.VCN, that defines the virtual network in the independent claims of the '785 Patent. *See* Section VI.A.1.a *supra*. As explained in the '785 Patent specification, each of the nodes of the X.VCN virtual network has a domain name within the X.VCN hierarchy (e.g. member1.X.VCN), including the route directors and all devices that are a part of the network. EX1001, 9:18-35, 12:23-31. When an application on a source machine intends to initiate communication with an application on a destination device, the source machine sends a DNS request to a VCN manager *using the domain name for the destination device*. *Id.* at 14:33. Using DNS, and the domain name it was provided, the VCN manager can intercept the message intended for the destination device, and, in response to the DNS request, the VCN manger can look up the public address of the route director for the destination, as well as the network and virtual addresses of the destination device, and return them to the requesting source device. *Id.* at 14:34-38; *see* EX2008, ¶¶95-96.

a) The Alleged Combination of Caronni-I and Caronni-II Does Not Disclose or Suggest Returning Three Addresses in Response to a Single Query

For this claim feature, the Petition cites to a purported combination of Caronni-I, Caronni-II, and Hipp. More specifically, the Petition argues that "Caronni-II discloses the address of the reflecting agent is added to the VARP table."

Petition, 54. The Petition then cites to its expert declaration, stating that "[a] POSITA would recognize this addition to the VARP table would provide multiple addresses from a single VARP query." *Id.* Petitioner's expert declaration similarly focuses on Caronni-II's disclosure of adding an address of a reflecting agent to a VARP table to justify the leap that, in the expert's opinion, *the address of the reflecting agent would be returned in response to a VARP query*. EX1011, ¶¶336-337.

Caronni-I teaches a mechanism for providing address translation in a manner that is transparent to the user operation of the nodes. To accomplish this, the administrator, when creating the Supernet, stores a mapping between the virtual addresses and public addresses of the members of the Supernet in the VARPDB. EX1003, 7:3-9; EX2008, ¶98.

When an application on a source device wants to communicate with a destination device, the inner IP layer (IP 540) receives a packet originating from node A. EX1003, 11:26-29; EX2008, ¶99. "The packet contains virtual source node address 642, virtual destination node address, and data 654." EX1003, 11:29-30. The inner IP layer appends the Supernet ID to a socket structure. *Id.* at 11:37-38; EX2008, ¶99. "The packet and Supernet ID are then transmitted to the SNSL layer using the modified socket structure." EX1003, 11:47-48; EX2008, ¶99. "The SNSL layer then accesses the VARPDB to obtain the address mapping between virtual source address

642 and the source real address 614 as well as the virtual destination node address 644 and the destination real address 616....” *Id.* at 11:49-53.

Because *the SNSL layer already has the virtual source and destination node addresses*, it can only be accessing the VARPDB to obtain the physical addresses (using the virtual addresses it already has to look them up). EX2008, ¶¶100-101 Accordingly, when the SNSL layer queries the VARPDB in kernel mode, it only receives the real public IP address of the destination node, not the virtual address, it already has. *Id.* Since this address translation is performed in kernel mode only, the source node is able to continue communicating using <u>only the virtual addresses</u>, completely unaware that those addresses are being translated into real addresses for actual delivery. EX2008, ¶¶100-101; EX1003, 6:6-25, 8:31-37.

The Petition also cites a different embodiment of Caronni-I where a web-client requests, when it requests a packet from a web server, the virtual address of the web server from a computer system. Petition, 57. However, there is no disclosure or suggestion that the computer system is a network administrator.

In any event, in both embodiments of Caronni-I, only one address is returned in response to a query: either the physical address (in the SNSL embodiment) or the virtual address (in the web-server embodiment). Further, in the web-server embodiment, the web client is requesting a packet, not sending one, so a POSITA would not consider combining these embodiments to retrieve both addresses because

Caronni-I clearly contemplated using only one or the other. Since the SNSL in the SNSL embodiment already has the virtual address of the destination device, it would not, in any event, need the virtual address.

Accordingly, Caronni-I does not disclose or suggest sending a response, to a single query, that includes both the virtual and physical addresses of a device.

Regarding Caronni-II, it teaches an electronic device that includes a virtual address resolution facility, which is "software used to register, store, and resolve virtual address information for processes and applications executing on the virtual network work." EX1004, 4:6-9. A virtual address resolution protocol (VARP) lookup table stores the virtual addresses, and those stored addresses are used "to resolve the virtual address into the real IP address of the physical device to which messages may be sent." *Id.* at 4:14-16. Like Caronni-I, address resolution in Caronni-II only returns the real IP address of the device or an associated edge device from the virtual address, and not the virtual address itself, which the source device already has. EX2008, ¶¶103-104.

Therefore, while the VARP lookup Table in Caronni-II stores the real IP address of a reflecting agent, both Caronni-I and Caronni-II rely on the virtual address of the destination device for address resolution, and only return the physical address in response to a query. EX1002, 11:49-53; EX1003, 4:14-16; EX2008, ¶¶103-104. Accordingly, in any combination of these references, at best, only the address of the reflecting agent and the real IP address of the destination could be returned. EX2008, ¶¶103-104. Hipp is only cited for its tangential disclosure of DNS, and not for any disclosure of returning either a physical address, a virtual address, or both, in response to a query. Therefore, there is no combination of Caronni-I, Caronni-II and Hipp that results in all three required addresses being returned in response to a query.

b) The Alleged Combination of Caronni-I, Caronni-II and Hipp Does Not Disclose or Suggest Use of a DNS Request to Resolve a Virtual Address, a Public Address and a Route Director Address as in the Claims of the '785 Patent.

Claim 1 recites a node issuing a DNS request to an administrative node, which returns the reflecting agent address, public address, and private address of a destination device. This mechanism requires the use of DNS to return multiple address types in a single query, a feature that none of the cited references discloses or suggests, either alone or in combination. Petitioner's assertion that this claim limitation is disclosed or rendered obvious by a combination of Caronni-I, Caronni-II and Hipp is legally and factually unsupported.

Caronni-II describes a NAT traversal system in which client nodes discover and exchange address mappings through interactions with reflecting agents and coordination servers, using custom signaling mechanisms. This architecture involves application-layer message exchanges, not DNS queries. EX1003, 5:36-41, 6:54-64. There is no disclosure of a DNS-based request/response system that returns all three addresses required by the ‘785 patent. Likewise, Caronni-I teaches a kernel-mode virtual address resolution mechanism (VARPD). It resolves a virtual address to a real address (typically just one), and never returns multiple address types or exposes the resolution process to the application layer. EX1002, 8:55-64, 9:47-54; EX2008, ¶106.

To address this fundamental deficiency, Petitioner appears to rely on Hipp to gap-fill by invoking its disclosure of DNS. However, Hipp simply describes conventional DNS hostname resolution, in which a hostname is mapped to a single IP address (*see* EX1005, 6:20-26). It does not teach or suggest using DNS to return multiple distinct addresses (such as public, private, and intermediary) for a destination node. Nor does it address NAT traversal, reflecting agents, or coordination servers. The DNS implementation in Hipp is used in the traditional sense, for resolving the address of a service instance, and it does not disclose returning multiple endpoint identifiers or performing role-aware routing decisions based on different address types. *See* EX2008, ¶106.

Accordingly, Hipp does not cure the deficiencies of the Caronni-I and Caronni-II patents. None of the three references, whether alone or in combination, discloses or suggests the specific DNS-based address resolution mechanism claimed in the ‘785 Patent.

3. Petitioner's Alleged Motivations to Combine Caronni-I, Caronni-II, and Hipp Are Conclusory, Circular, and Unsupported by Evidence

Both Grounds 1 and 2 hinge on the proposed combination of Caronni-I and Caronni-II, yet the Petition offers little more than conclusory assertions in support of this alleged motivation. The "totality" of Petitioner's reasoning appears in a single paragraph (Pet. 28–29) that merely strings together high-level statements: that Caronni-II "naturally extends" Caronni-I because they share an inventor; that Caronni-II "introduces" a reflecting agent; that the two references have "analogous components" with "overlapping technical objectives"; and that their integration would purportedly "address NAT-to-NAT communication challenges" and "fulfill a well-documented industry need for scalable hybrid networks." None of these statements is supported with record evidence. The "industry need" allegation is cited only to ¶403 of Petitioner's expert declaration (EX1011), which contains no such discussion, and there is no identification or substantiation of any specific "NAT-to-NAT" challenge known to a POSITA.

a) Mere Similarity of Field or Components Is Not Enough

Petitioner's "analogous components" theory is, in substance, nothing more than an argument that the references reside in the same general field. That is legally insufficient. The Federal Circuit has made clear that the mere fact that two references address similar subject matter does not, without more, establish a reason to combine.

See *Securus Techs., Inc. v. Glob. TelLink Corp*., 701 F. App'x 971, 976–77 (Fed. Cir. 2017); *Microsoft Corp. v. Enfish, LLC*, 662 F. App'x 981, 990 (Fed. Cir. 2016). The Board has likewise rejected same-field, beneficial-combination rationales. *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9 at 10-13 (PTAB Oct. 16, 2018) (informative). Petitioner's assertion that Caronni-I and Caronni-II share "analogous components" is "simply too conclusory" to meet its burden. *Securus Techs*., 701 F. App'x at 976.

b) The Petition Never Explains "Why"

Stripped of its rhetoric, Petitioner's position boils down to a tautology: a POSITA would have combined Caronni-I and Caronni-II to achieve the combination of features disclosed in Caronni-I and Caronni-II. That circular reasoning explains what the combination is, not why a skilled artisan would have pursued it. The law demands the latter. See *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc*., 694 F.3d 1312, 1328 (Fed. Cir. 2012) ("by combining these two things you could do something new" does not establish a reason to combine); *TriVascular, Inc. v. Samuels,* 812 F.3d 1056, 1066 (Fed. Cir. 2016) (requiring "explanation as to how or why the references would be combined"). The absence of a cogent "why" is dispositive.

c) Reasonable Expectation of Success Is Not a Substitute

Petitioner's fallback argument that a POSITA would have had a "reasonable expectation of success" due to the "complementary nature" of the patents confuses two distinct requirements. The obviousness inquiry asks whether a POSITA would have been motivated to combine, not whether they could have successfully done so. *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020); In*Touch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014). A reasonable expectation of success cannot fill the gap left by an absent motivation to combine.

d) The Same Defects Undermine the Alleged Motivation to Add Hipp

Ground 1's further combination of Caronni-I/II with Hipp suffers from the same defect: it offers only a circular statement that a POSITA would have been motivated to combine in order to arrive at a combination that contains the claimed features. Petitioner describes Hipp's DNS-based hostname resolution as "complement[ing]" the Caronni systems and enabling DNS to return a virtual IP address, a real IP address, and a reflecting agent address. But this is simply a restatement of the claim feature, not a reason why a skilled artisan would have made the combination in the first place. As with the Caronni-I/II combination, the Petition conflates "could combine" with "would be motivated to combine," and provides no non-conclusory, evidence-based rationale.

Dr. Zadok's testimony (EX1011, ¶367) repeats these same assertions, and his lone departure—stating that a POSITA "could use DNS services" to determine a virtual destination node address—misses the legal point entirely. The obviousness standard turns on what a POSITA would have been motivated to do, not on what they could do.

e) Petitioner Has Not Met Its Burden Of Establishing Why A POSITA Would Combine The Cited References

In sum, the Petition's motivations to combine (whether for Caronni-I with Caronni-II, or for adding Hipp to that pairing) are conclusory, circular, and unsupported by evidence. They fail to satisfy the legal requirement that a petitioner articulate a specific, reasoned basis, grounded in the record, for why a skilled artisan would have pursued the proposed combinations. These deficiencies weigh heavily against institution.

4. The Challenged Claims are Not Obvious over the Alleged Combination of Caronni-I, Caronni-II and Hipp

For all of the reasons detailed above, Petitioner has not carried its burden under 35 U.S.C. § 103 to establish that Challenged Claims would have been obvious over the alleged combination of Caronni-I, Caronni-II, and Hipp. The asserted combination falls short in two fundamental respects.

First, the record makes clear that none of the cited references, either individually or in the proposed combination, discloses or suggests a virtual network that is "defined by a domain name" as required by every challenged independent claim. The '785 Patent's use of a DNS-based domain name is not a mere label or identifier. It establishes a hierarchical structure that supports routing and address resolution both within and across private networks, allowing the virtual network manager to intercept communications and return all necessary addresses in a single DNS response. Caronni-I's "Supernet name" is not a domain name in any DNS sense; it is simply a configuration parameter that does not correspond to a public IP address, cannot be resolved by DNS, and is not part of a hierarchical naming scheme. Caronni-II adds nothing to remedy this omission. Hipp, in turn, addresses only hostnames assigned to application processes—not domain names that define a virtual network. Petitioner's suggestion that these disparate disclosures could be combined to yield the claimed DNS-defined network is wholly conclusory and depends on impermissible hindsight reconstruction.

Second, Petitioner has failed to show that the cited art discloses or suggests returning three distinct addresses, namely the route director address, the public address of the destination, and the virtual address of the destination, in response to a single DNS query. This "three-address response" is a central aspect of the claimed invention, enabling efficient, role-aware routing and address resolution through a single DNS transaction. Neither Caronni-I nor Caronni-II teaches returning more than one address type in a single query, much less doing so via DNS. At best, these references disclose resolving a virtual address to a real address, typically in kernel mode, with the virtual address already known to the resolver. Hipp's DNS disclosure is limited to conventional single-address hostname resolution and does not contemplate returning multiple addresses of different types or using DNS for NAT traversal or route director selection. Even in combination, these references do not yield the claimed DNS-based multi-address resolution mechanism.

Petitioner's reliance on broad assertions that a POSITA "would understand" the references to be analogous to DNS-based operation is no substitute for actual disclosure or a reasoned motivation to combine with a reasonable expectation of success. As the Federal Circuit has made clear, conclusory statements cannot satisfy the petitioner's burden, and it is not the Board's role to reconstruct missing elements from scattered citations or generalized expert opinion. On this record, Petitioner has failed to identify, in any of the cited references, the specific teachings necessary to meet these core claim limitations, and has not provided any coherent rationale grounded in the art that would bridge these fundamental gaps without resorting to impermissible hindsight.

Because both prongs of the obviousness inquiry, namely (1) the presence of all claim limitations in the prior art and (2) a reasoned motivation to combine with a reasonable expectation of success, are absent here, Ground 1 fails as a matter of law.

5. The Other Independent as well as the Dependent Claims Are Not Obvious for the Same Reasons

Independent Claims 30, 38, 48, 62, and 75 share the same relevant features as Claim 1 and are not obvious over Caronni-I, Caronni-II, and Hipp for the same reasons. Dependent Claims 35–37, 77, and 78 likewise are not obvious because they depend from Claims 30 and 75, which themselves are not obvious over the same combination.

C. Ground 2 – Claims 1, 30, 35-38, 48, 62, 75, 77 and 78 Are Not Obvious Over Caronni-I, Caronni-II and RFC-1383 Pursuant To 35 U.S.C. § 103

The arguments in the Petition regarding Ground 2 are identical to the arguments made regarding Ground 1, except for the substitution of RFC-1383 for Hipp regarding the disclosure of DNS. Accordingly, the various combinations of Caronni-I and Caronni-II addressed above are not addressed again here. Instead, this section addresses only the differences between Hipp and RFC-1383, neither of which, alone or in combination with Caronni-I and Caronni-II, discloses or suggests the DNS-related features of the '785 Patent Claims.

1. RFC-1383 Fails to Cure the Deficiencies of Caronni-I and Caronni-II and Does Not Disclose DNS-Based Multi-Address Resolution

In Ground 2, Petitioner replaces Hipp with RFC-1383 in an effort to remedy the lack of disclosure, in Caronni-I and Caronni-II, for the DNS-based three-address resolution required by the Claims of the '785 patent. However, RFC-1383 suffers from the same core deficiencies as Hipp: it fails to disclose or suggest a virtual network that is defined by a domain name and a response to a DNS request that returns three distinct addresses—specifically, the network address, virtual address, and route director address—for a destination device, as required by the Claims of the '785 Patent.

With respect to the domain name, and DNS-related features of the '785 Patent claims, RFC-1383 does not disclose or suggest a virtual network defined by a domain name, and therefore fails to remedy the fundamental deficiencies of Caronni-I and Caronni-II with respect to Claims 1, 30, 38, 48, 62, and 75 of the '785 Patent. While RFC-1383 utilizes DNS, its purpose is limited to mapping one IP address to another, specifically through reverse DNS lookup in the in-addr.arpa domain to obtain the IP address of a gateway capable of reaching a target IP address. In other words, given an IP address, RFC-1383 provides a mechanism to retrieve the IP address of a gateway, not to define or resolve a virtual network by domain name. EX2008, ¶109.

As described in RFC-1383, the proposed scheme is applied to a routing domain "D" with multiple networks, subnetworks, and hosts, connected to the

Internet via dual-homed gateways. *Id.* at ¶110; EX1006, Pages 2-3. These gateways have both internal and Internet-facing addresses, retain internal routing information, and use DNS in-addr.arpa records (with a network-level equivalent of MX records, termed "RX records") to map an internal host address to the Internet address of a gateway. *Id.* An Internet router can then query the DNS using the reverse-mapped address, obtain the RX record, and forward the packet toward the appropriate gateway using source routing. This process is illustrated in the example record *.27.32.192.in-addr.arpa → RX, 10, 10.0.0.7, which simply states that for all hosts with IP addresses beginning with 192.32.27, the gateway at 10.0.0.7 may be used. *Id.*

Critically, RFC-1383 makes no use of a domain name to define a virtual network and contains no disclosure of returning multiple addresses, such as a network real IP address, a virtual address, and a route director address, in response to a single query. The queries it describes are made for IP address patterns (e.g., *.27.32.192.in-addr.arpa), and the responses identify a single gateway IP address. EX2008, ¶113. This is fundamentally different from the DNS-based, hierarchical, three-address resolution system claimed in the '785 Patent.

With respect to three addresses returned in response to a single query, RFC-1383 proposes an experimental routing mechanism in which custom RX DNS records are used to identify a gateway IP address for reaching otherwise unadvertised or fringe networks. EX1006, p 11; EX2008, ¶113. These RX records are functionally similar to MX records used in email routing and return a single gateway address with a cost-based preference value. *Id.* at pp 2-4, 11-12; EX2008, ¶113. The document discusses DNS-based lookup of RX records as a method for source or edge routers to identify an appropriate ingress point into a disconnected or multi-homed domain. *Id.* at pp 11-13; EX2008, ¶113. However, each RX record returns only one IP address—not multiple addresses of different types. EX1006, pp 11-13; EX2008, ¶113. The system is designed to support routing into unreachable domains, not to facilitate peer-to-peer communication using a DNS response that includes multiple address types. EX1006, pp 11-13; EX2008, ¶113.

The Caronni-I and Caronni-II patents similarly do not disclose this claimed DNS-based resolution behavior. The Caronni-II patent describes an application-layer NAT traversal mechanism using reflecting agents and coordination nodes but does not use DNS to retrieve multiple address types. EX1003, 8:1-39; EX2008, ¶114. The Caronni-I patent performs transparent address resolution in the kernel via a VARPD, resolving a virtual address to a single real address; it does not expose multiple addresses to the querying node and does not utilize DNS. EX1002, 8:34-37; 6:6-7; EX2008, ¶114. Neither patent teaches or suggests that a single DNS request to an administrative node would return the three address types required by Claim 1. EX2008, ¶114.

RFC-1383 does not cure these gaps. EX2008, ¶115. It lacks any disclosure of a DNS query that returns a route director address, a network address, and a virtual address together, and there is no basis provided to combine RFC-1383 with the Caronni-I and Caronni-II patents to arrive at the claimed invention. EX2008, ¶115. The references operate in fundamentally different contexts—RFC-1383 in routing to unadvertised domains via gateways, the Caronni-II patent in NAT traversal via coordination servers, and the Caronni-I patent in virtual address resolution via kernel-based logic. EX2008, ¶115; EX1002, 8:34-37; 6:6-7; EX1003, 8:1-39; EX1006, pp 11-13. A POSITA would not have been motivated to combine these disparate systems in a way that results in the single-query, three address DNS response recited in the '785 Patent Claims. EX2008, ¶115. Any such combination reflects an improper hindsight reconstruction of the claimed invention, not an obvious solution grounded in the prior art. EX2008, ¶115.

Accordingly, RFC-1383 does not make up for the deficiencies of the Caronni-I and Caronni-II patents.

2. Petitioner Has Not Met Its Burden to Show Obviousness in Ground 2, and RFC-1383 Fails to Cure the Deficiencies of Caronni-I and Caronni-II

For the reasons set forth above, Petitioner has not met its burden under 35 U.S.C. § 103 to establish that Challenged Claims would have been obvious over

Caronni-I, Caronni-II, and RFC-1383. The substitution of RFC-1383 for Hipp does nothing to cure the core deficiencies identified in Ground 1.

RFC-1383 does not disclose or suggest a virtual network "defined by a domain name" as required by every challenged independent claim. Its use of DNS is limited to reverse lookups in the in-addr.arpa domain for the purpose of identifying a single gateway IP address, not for defining or resolving a virtual network through hierarchical domain naming. Nor does RFC-1383 disclose or suggest returning three distinct addresses, namely a route director address, a network address, and a virtual address, in response to a single DNS query. Instead, it describes returning a single gateway address via custom RX records, a fundamentally different operation from the claimed three address DNS resolution.

Like Caronni-I and Caronni-II, RFC-1383 operates in an entirely different technical context. RFC-1383 addresses routing into otherwise unreachable networks using gateway selection, Caronni-II addresses NAT traversal through reflecting agents and coordination nodes, and Caronni-I addresses kernel-mode virtual address resolution. Nothing in the record provides a reasoned, evidence-based rationale for why a POSITA would have been motivated to combine these disparate systems in a way that would yield the claimed DNS-based, single-query, three address resolution mechanism. Any such combination would be an exercise in impermissible hindsight, attempting to reconstruct the claimed invention using the patent's claim elements as a checklist rather than the teachings from the prior art.

Accordingly, RFC-1383 fails to cure the shortcomings of Caronni-I and Caronni-II, and Ground 2, like Ground 1, should be rejected in its entirety.

3. The Other Independent As Well As the Dependent Claims Are Not Obvious for the Same Reasons

Independent Claims 30, 38, 48, 62, and 75 share the same pertinent features as Claim 1 and are not obvious over Caronni-I, Caronni-II, and Hipp for the same reasons discussed for Claim 1. Likewise, Dependent Claims 35–37, 77, and 78, which depend from Claims 30 and 75 respectively, are not obvious over Caronni-I, Caronni-II, and RFC-1383 because their base claims are not.

VI. CONCLUSION

For the reasons set forth above, the Petition fails to demonstrate a reasonable likelihood of prevailing as to any Challenged Claim. Petitioner has not met its threshold burden to identify and explain a material error made by the Examiner in allowing the '785 Patent, particularly where Caronni-I and Caronni-II were expressly before the Office, appear on the face of the patent, and were considered during prosecution. The record confirms that the DNS-request feature was the basis for allowance, yet the Petition re-packages the same Caronni references of record with cumulative, DNS-adjacent concepts that still omit that critical limitation.

Even apart from this fundamental deficiency, Grounds 1 and 2 fail under 35 U.S.C. § 103. The asserted combinations do not disclose or suggest the two core limitations central to every independent claim: (1) a virtual network "defined by a domain name," and (2) a DNS response to a single query returning three distinct addresses—the route director address, the public address of the destination device, and the virtual address of the destination device. Neither Hipp nor RFC-1383 cures these gaps, and Petitioner offers no non-conclusory, evidence-based rationale for combining the cited references to arrive at the claimed invention.

On this record, the Petition relies on cumulative art, lacks the disclosures necessary to meet the claim limitations, fails to establish a motivation to combine, and does not provide any coherent explanation grounded in the prior art that would bridge the identified gaps without resorting to hindsight. Because Petitioner has not carried its burden, institution should be denied.

Respectfully submitted,

Dated: August 11, 2025 By: /Brandon R. Theiss/

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CERTIFICATE OF COMPLIANCE WITH WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this Patent Owner Preliminary Response complies with the type-volume limits of 37 C.F.R. § 42.24(b)(1) because it contains 13,538 words, excluding the parts of this Patent Owner's Preliminary Response that are exempted by 37 C.F.R. § 42.24(a), according to the word processing system used to prepare this Patent Owner's Preliminary Response.

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a copy of the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE** was served via email (as consented to by counsel) on August 11, 2025 to lead and backup counsel of record for Petitioners as follows:

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