

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROSOFT CORPORATION AND AFFIRMED NETWORKS, INC.,
Petitioner,

v.

LEMKO CORPORATION,
Patent Owner.

Case IPR2023-00530
U.S. Patent No. 7,548,763

PATENT OWNER'S PRELIMINARY RESPONSE

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PATENT OWNER'S EXHIBIT LIST

Exhibit	Description
2001	Declaration of Todor Cooklev, Ph.D. in Support of Patent Owner's Preliminary Response
2002	Wikimedia Commons, "File: Lucent 5ESS GSM Mobile Switching Centre.jpg" (May 31, 2006) https://commons.wikimedia.org/wiki/File:Lucent_5ESS_GSM_Mobile_Switching_Centre.jpg (June 27, 2023)
2003	Wikipedia, "Mobile switching centre server" https://en.wikipedia.org/wiki/Mobile_switching_centre_server (June 27, 2023)
2004	Techopedia.com, "What is a Base Station Controller?" (Oct. 19, 2011) https://www.techopedia.com/definition/24191/base-station-controller-bsc
2005	Metin UZAR Blog Post, "Base Station Controller (BSC)" (Sept. 19, 2009) https://razunitem.wordpress.com/2009/09/19/base-station-controllerbsc/
2006	Image of Motorola BSC https://monsite.woopic.com/383/p/Telecommunications/img/684d91850fe954cc28a1cf8fce498804.jpg (June 28, 2023)
2007	Electronics-notes.com, "Cellular / Mobile Backhaul" https://www.electronics-notes.com/articles/connectivity/cellular-mobile-phone/mobile-communications-backhaul-link.php (June 28, 2023)
2008	Network Functions Virtualisation - Introductory White Paper (Oct. 2012) https://portal.etsi.org/NFV/NFV_White_Paper.pdf

Exhibit	Description
2009	Dyton, J., “Lemko solutions keep connectivity alive regardless of the circumstances” (July 16, 2020) https://connectedremag.com/das-in-building-wireless/wireless/lemko-solutions-keep-connectivity-alive-regardless-of-the-circumstances/
2010	Lemko.com, distributed Mobile Architecture™ (dMA™) Overview lemko.com/htm/distributed_mesh_architecture.htm (June 28, 2023)
2011	Lemko.com, Lemko's Fundamental Architecture https://www.lemkocorp.com/solutions/ (June 5, 2023)
2012	The Wayback Machine - InterWAVE, GSM/GPRS Products https://web.archive.org/web/20031204132701/http://iwv.com/gsm_products.html#nib (captured Dec. 4, 2003)
2013	InterWAVE, WAVEXpress GSM Network In-A-Box (NIB) Datasheet (June 2003) https://mirror.unpad.ac.id/orari/library/library-ref-eng/ref-eng-2/physical/wireless/trend-gsm/microgsm/nib_may_03.pdf
2014	InterWAVE, WAVEXchange II Datasheet (Oct. 2002) https://ftp.unpad.ac.id/orari/library/library-ref-eng/ref-eng-2/physical/wireless/trend-gsm/microgsm/wxc_2_oct_02.pdf
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2017	The Wayback Machine – Network-In-A-Box Closeup https://web.archive.org/web/20031205234638/http://iwv.com/nibpop.html (captured Dec. 5, 2003)
2018	Kostic, Z., et al., “Digital Signal Processors in Cellular Radio Communications,” IEEE Communications Mag. (Dec. 2017)
2019	Ahn, J., et al., “Development of the Base Station Controller and Manager in the CDMA Mobile System,” ETRI J. 19(3):141-168 (1997)

Exhibit	Description
2020	Telecom Trainer, “2G (Second Generation of mobile communication technologies)” (Feb. 19, 2023) https://www.telecomtrainer.com/2g-second-generation-of-mobile-communication-technologies/
2021	ETSI GSM Technical Specification, GSM 02.68 (v.5.0.0) (Jan. 1996) https://www.etsi.org/deliver/etsi_gts/02/0268/05.00.00_60/gsmts_0268v050000p.pdf

I. INTRODUCTION

The Board should deny *inter partes* review¹ because Lemko's Distributed Mobile Architecture ("DMA") bears no resemblance to the legacy communications networks disclosed in Waylett and Cope. Lemko's DMA includes a number of DMA servers that communicate with each other over peer-to-peer ("P2P") connections, forming a decentralized network where nodes are able to communicate with each other without relying on a centralized center to manage traffic. While Waylett's "network-in-a-box" ("NIB") packages several components of a legacy communications network installation into a single enclosure, it connects to existing portions of a legacy communications network in the same way as full installations. The NIB is not a DMA server and plays no role in anything resembling the '763 Patent's decentralized "distributed mobile architecture."

One key feature of the inventive DMA server is that it implements core cellular communications functionality in software instead of hardware, a technique

¹ Microsoft Corporation and Affirmed Networks, LLC ("Petitioners") petitioned for *inter partes* review ("IPR") of U.S. Patent No. 7,548,763 (Ex. 1001, the "'763 Patent"), challenging claims 1, 4, 6, 9, and 15 ("the Challenged Claims"). Petitioners assert Waylett (Ex. 1005) in view of Cope (Ex. 1006) against all of the Challenged Claims.

now known as “network functions virtualization (NFV).” Ex. 2009 at 1. Lemko’s network functionality is encoded in software and installed on the DMA server’s “computer readable media,” instead of the bulky, expensive, non-commodity hardware, used in then-conventional networks, such as Waylett. Lemko’s solution is far less expensive than the traditional hardware-based paradigm.

Virtualizing the network functionality also enabled further claimed benefits, like the ability to generate a call detail record (CDR) at the DMA Server (rather than having to rely on a separate access point like in Waylett). Lemko’s DMA Server also stores a program to allow a group call, which is not suggested anywhere in the art. Prior to Lemko’s DMA Server, special services like group calls were provided by the network cores, not at the NIB.

Petitioners contend that Waylett’s NIB resembles the claimed DMA server. *See, e.g.*, Pet. at 10-14. But Waylett’s NIB is based on the conventional paradigm, lacks the required call-management functionality, is not based on peer-to-peer connections, and fails to disclose multiple other limitations discussed below. Cope fails to remedy these deficiencies, and Petitioners do not establish how or why a person of ordinary skill in that art (“POSITA”) would have combined Waylett and Cope without the benefit of hindsight. Indeed, it was not until 2012—seven years after Lemko’s filing—that the telecommunication industry for the first time

published a paper recognizing the need for the decentralized, software-based network of Lemko's Challenged Claims.

II. THE '763 PATENT IS BASED ON LEMKO'S NEW DISTRIBUTED MOBILE ARCHITECTURE

A. Background: Conventional Network Architectures Were Based on a Hierarchical, Hardware Paradigm

In 2005, when Lemko filed the '763 Patent, then-conventional cellular networks were based on circuit-switched networks with a centralized, hierarchical paradigm. All calls were carried from cell towers to regional call centers over expensive backhaul connections. The regional call centers relied on large stacks of servers with custom hardware to manage and route calls for an entire region. In contrast, the cell towers had no functionality for managing and routing calls, since that capacity was located in the regional call centers. There were many drawbacks to this approach, including the need for expensive backhaul to and from regional call centers, even when the two parties to a phone call were in the same area (because the cell towers had no ability to manage or connect calls independent of the regional call centers). Ex. 2001 (Declaration of Todor Cooklev, Ph.D., "Cooklev Decl."), ¶¶ 33-36.

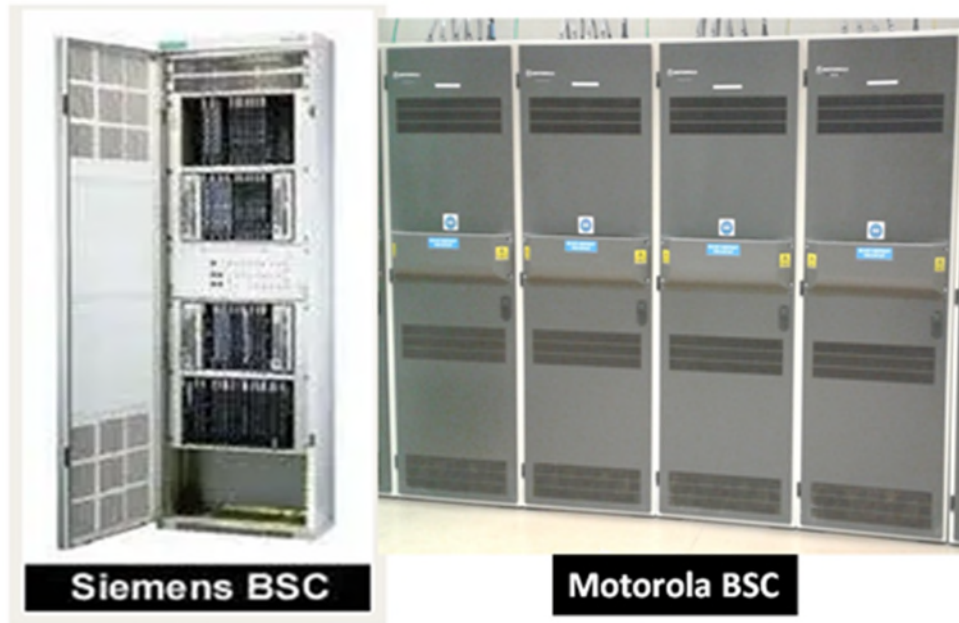
Conventional networks were hierarchical because each cell tower (also known as a "base transceiver station" or "BTS") connects to a single Base Station Controller ("BSC"), which connects to a centralized mobile switching center ("MSC") that

routes calls. See '763 Patent at 1:34-47. Cell towers did not communicate directly with other cell towers, and BSCs did not communicate directly with other BSCs. Cooklev Decl., ¶ 37.

These conventional networks were also hardware-based. The MSCs were housed at large Digital Signal Processor (DSP) equipment server centers, shown in the photograph below, where the MSCs relied on stacks of DSP equipment servers and provided the call processing functionality for the networks, including switching functions, call set-up, call termination, and routing. See Ex. 2002 at 1-3.

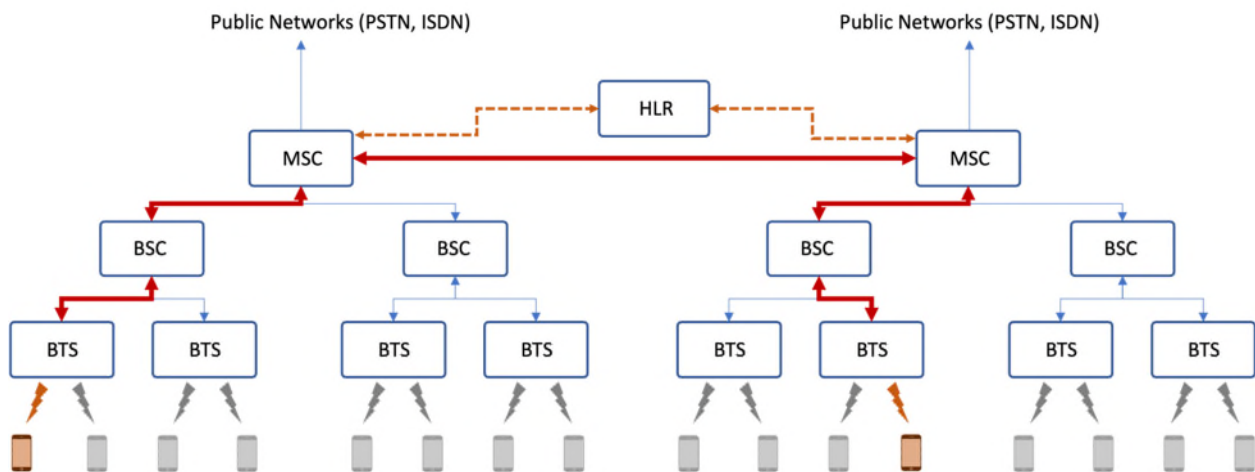


Ex. 2003. The BSC (shown in the photograph below) connected a BTS (cell site) to the MSC through a “backhaul” connection. Ex. 2004; Cooklev Decl., ¶ 38.



Ex. 2005; Ex. 2006; Cooklev Decl., ¶ 39.

The following figure shows the hierarchical structure of these conventional networks.



Cooklev Decl., ¶ 40. In these conventional networks, the backhaul connections were based on T1/E1 communication lines. See Ex. 2007 at 2 (explaining that “E1/T1

systems were widely used in telecommunications when 2G technologies including GSM were being rolled out and deployed.”).²

To place a call between two cell phones or other mobile devices (conventionally called “user equipment” or “UE”) on two different networks, call data are routed from (1) an originating UE, (2) to a BTS, (3) to a BSC, (4) to an MSC, (5) to the MSC for the second network, (6) to a BSC, (7) to a BTS, (8) to the receiving UE. This path is shown in red in the schematic diagram above. The BTS to UE connections are wireless radio connections. The other connections in this path are circuit-switched T1/E1 connections.³ Thus, for two UEs to communicate, the call data are routed to centralized MSCs (stored at centralized server locations) of the public networks using the T1/E1 communication lines. Cooklev Decl., ¶ 41.

² “T1/E1” refers to a telecommunications standard that is either the T1 or E1 digital transmission formats. Both T1 and E1 were developed in the 1960s and provide dedicated connections between two fixed points. Cooklev Decl., ¶ 40 n.1.

³ “Circuit switched” connections establish a dedicated communication path between two devices for the duration of a session. Cooklev Decl., ¶ 41 n.2. In contrast, IP networks transmit data in small packets that travel independently over a network and are dynamically routed.

This hierarchical, hardware paradigm had several drawbacks. Such networks were expensive to deploy because they require large amounts of space, power, and hardware resources to accommodate the stacks of servers. The rigid, hardware-based approach made it difficult to integrate and operate the dedicated hardware appliances. *See* Ex. 2008 at 5 (stating the difficulty in “integrat[ing] and operat[ing] increasingly complex hardware-based appliances.”). In addition, this centralized, hierarchical network structure required all calls to traverse expensive backhaul connections, even when both UEs were connecting to the same BTS or BTSs in close-proximity. Cooklev Decl., ¶ 42.

In 2012, a broad coalition of network operators published a whitepaper detailing these problems. *See* Ex. 2008. Entitled “Network Functions Virtualization” (the “NFV Paper”), the paper proposed a network virtualization approach to address these drawbacks, mirroring the solutions Lemko invented seven years earlier. The NFV Paper’s approach is based on the consolidation of hardware network components onto software:

It involves the implementation of network functions in software that can run on a range of industry standard server hardware, and that can be moved to, or instantiated in, various locations in the network as required, without the need for installation of new equipment.

See id. at 5; Cooklev Decl., ¶ 43.

As shown in the excerpt below, the 2012 NFV Paper contrasted its proposed approach against the “Classical Network Appliance Approach.” Ex. 2008 at 5. The NFV Paper noted many drawbacks of the classical approach, including that it (1) depended on “[f]ragmented non-commodity hardware,” (2) required physical installation of appliances at every site, and (3) its hardware requirements made the networks rigid and inflexible, which constrained innovation. *See id.*

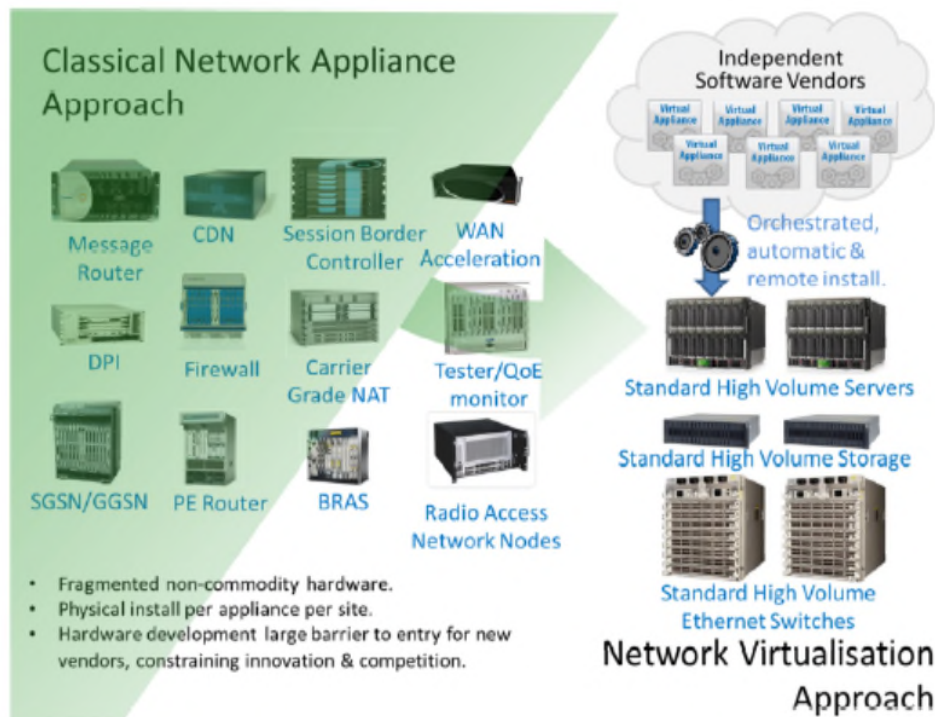


Figure 1: Vision for Network Functions Virtualisation

Id.; Cooklev Decl., ¶¶ 44-45.

B. Lemko's Patented DMA Technology Solved the Industry's Long-Felt Need

Lemko's approach was fundamentally different, being based on a software-implemented, decentralized, peer-to-peer network paradigm. Instead of cell towers

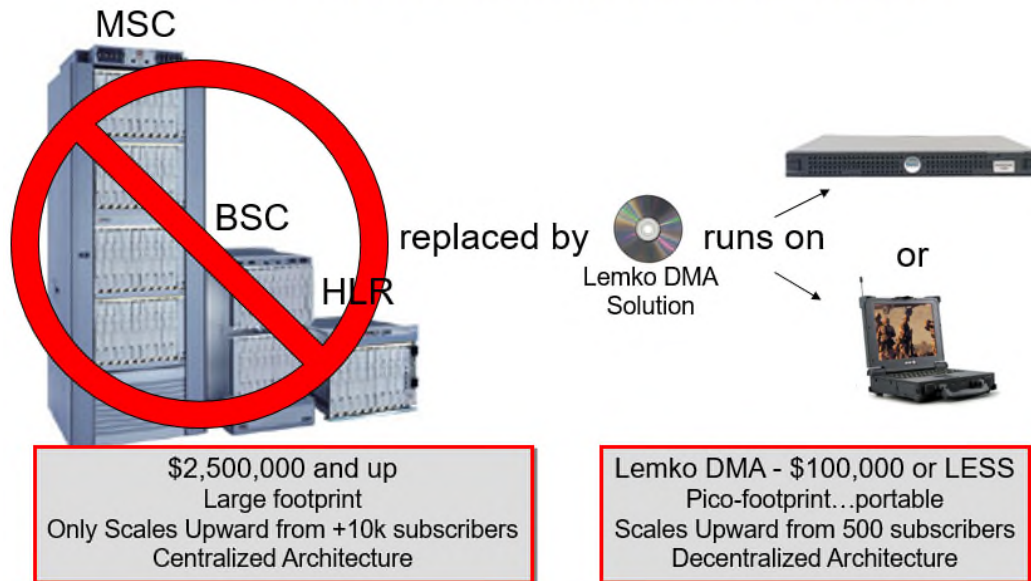
that served only as a conduit to the backhaul leading to and from regional call centers, Lemko's claimed distributed mobile architecture ("DMA") network is based on software-based DMA servers (or DMAS), which are connected to form a peer-to-peer network. Each DMA server has local cellular network management functionality that allows for calls to be connected without the centralized servers of a regional call center. Cooklev Decl., ¶ 46.

Seven years before the industry proposed solutions for its long-felt needs in the NPV Paper, Lemko filed the application that led to the '763 Patent. Lemko had already solved these needs with its innovative distributed mobile architecture (DMA) infrastructure, which creates a virtualized network. Ex. 2009 at 1 ("to enable distributed networks with a database that enables a customer to create a virtualized network with multiple deployments with its Nodes."). Indeed, Lemko "developed Network Functions Virtualization (NFV) before that term was coined" because its "software enables all of core network functions, databases and gateways." *Id.*; Cooklev Decl., ¶ 47.

Specifically, Lemko's DMA implements network functionality, such as MSC, BSC, and home location register ("HLR") functionality, onto a computer-readable medium running on a standard server:



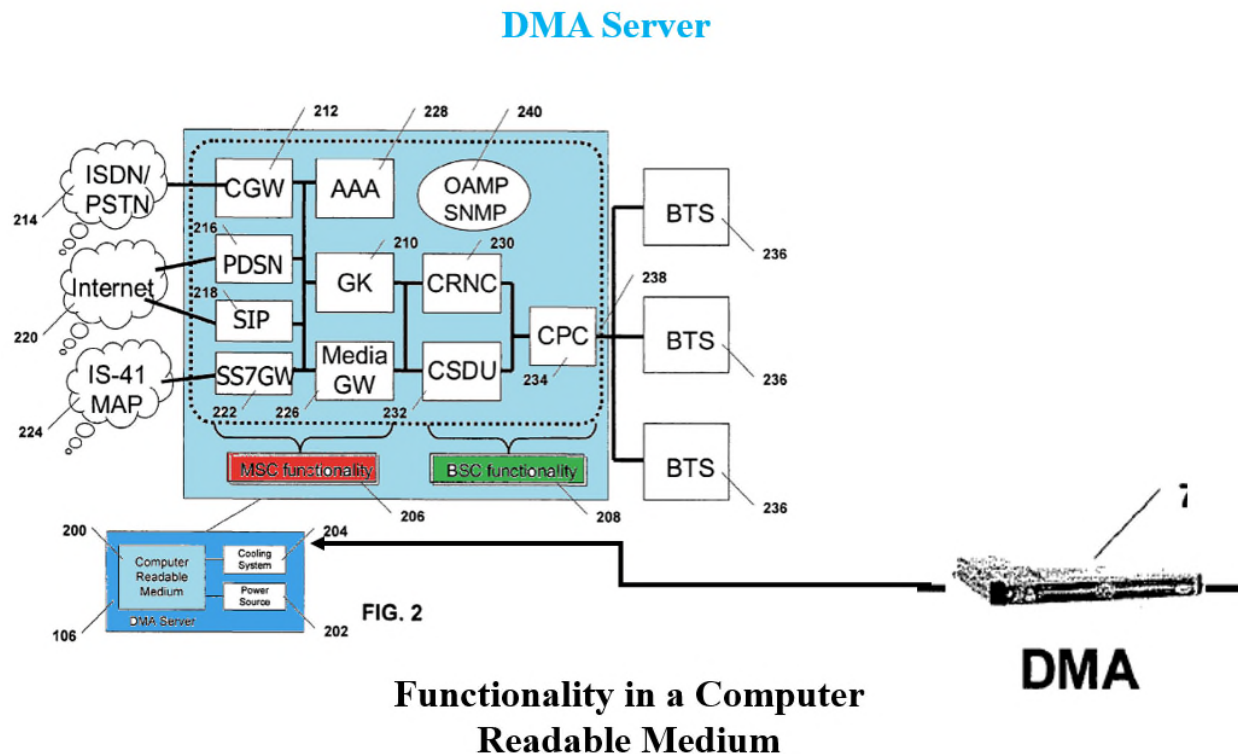
Lemko's DMA – Distributed Mobile Architecture



Lemko's DMA IS a full featured MSC + BSC + HLR running on a PC

Cooklev Decl., ¶ 48 (citing a demonstrative excerpt from Lemko presentation); Ex. 2010 (“[T]he heart of DMA is an all-IP software solution,” including the network functionality of an MSC, BSC, radio network controller (RNC) location registers, and media and data gateways (MSG, GGSN, SGSN); *see also* ’763 Patent at Figs. 2, 7, 9, 11, and 14-16 (depicting the DMA servers of the above figure). Unlike the conventional network architecture, Lemko’s DMA solution implements a virtualized core of network functionality on software running on a standard server to allow “multiple cellular nodes to be linked via IP connections” thereby reducing backhaul via T1/E1 communication lines and eliminating the need for a centralized center or hub. Ex. 2010. Lemko developed multiple product lines based on its inventions. *See* Ex. 2011.

In addition to successfully developing these products, Lemko obtained the '763 Patent (and multiple other patents) to protect various aspects of its novel DMA architecture, providing for complete cellular network functionality embedded in a computer-readable medium. See '763 Patent at Abstract, 4:1-19. Specifically, the '763 Patent specification discloses the DMA server (highlighted in blue) having a computer-readable medium (highlighted in light blue) including both MSC (highlighted in red) and BSC (highlighted in green) network functionality:



Id. at Figs. 2 (annotated), 9, 11, and 14-16 (depicting the DMA server); Cooklev Decl., ¶ 49.

Each DMA server has its own MSC and BSC functionality, including gateways and a cellular radio network controller (CRNC), to allow for a fully functionally virtualized network. Cooklev Decl., ¶ 50 (citing Ex. 2009; Ex. 2010). Figure 1 (reproduced below) illustrates that each DMA server is interconnected with other DMA servers in an Internet Protocol (IP) network via peer-to-peer connections. '763 Patent at 3:34-37 (with reference to figure 1 describing that “each DMA server 106 is interconnected with the other DMA servers 106 via an Internet protocol network” and therefore “there exists peer-to-peer connection”).

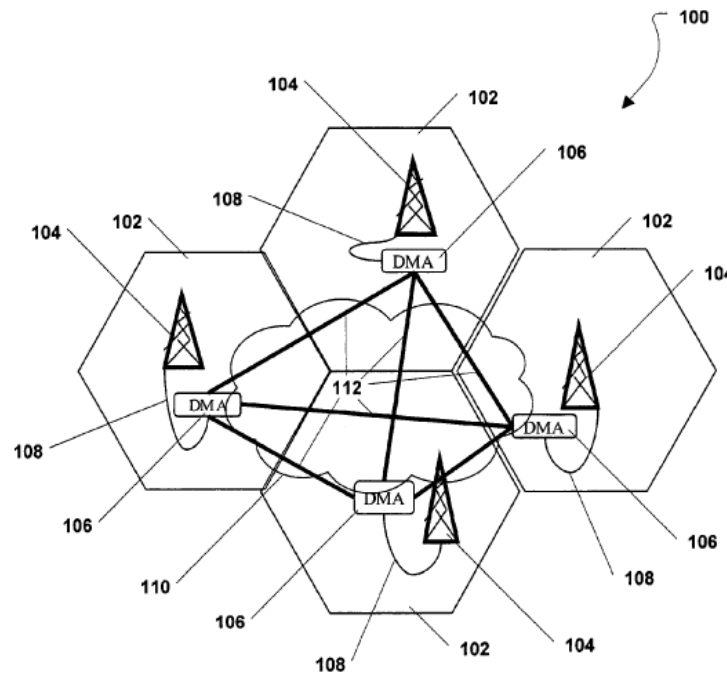
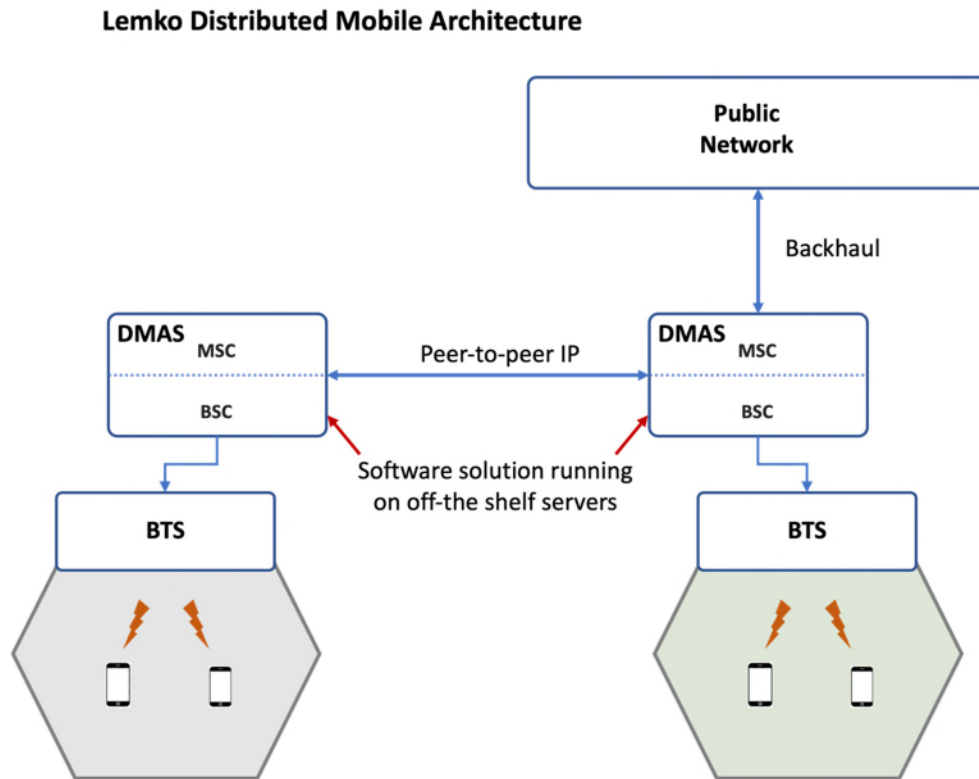


FIG. 1

'763 Patent at Fig. 1; *see also id.* at 3:34-37, 5:49-58. The use of these peer-to-peer IP network connections between DMA servers in the same network 100 eliminates or reduces the need to route traffic through a backhaul, as is shown in an expanded and annotated view of Figure 1 below:



Cooklev Decl., ¶ 50. In Lemko's DMA network, and in contrast to the conventional network architectures discussed in the previous section, a call from a first UE to a second UE is routed (1) to a BTS, (2) to a DMA, (3) to a second DMA (by a peer-to-peer IP connection), (4) to a BTS, (5) to the receiving UE.

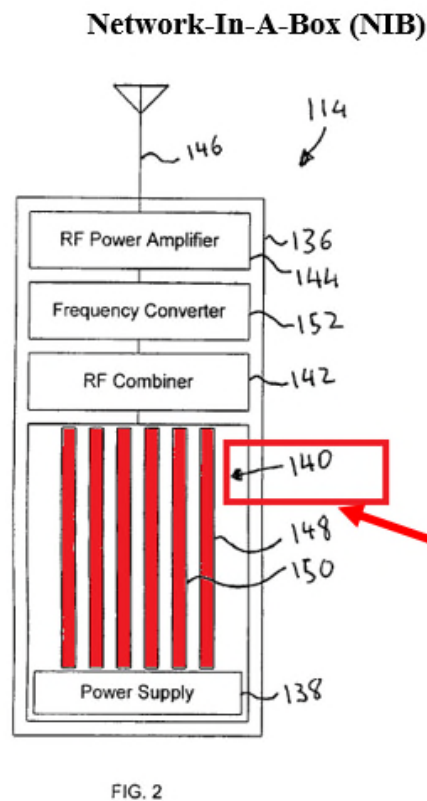
The '763 Patent leverages this flexible and unconventional architecture in multiple ways. For example, the media gateway (226) of a DMA server can be

provided with a call program that allows for greater than three (3) participants to join in a telephone communication handled by one or more DMA servers within a network via a peer-to-peer connection. *See* '763 Patent at 3:3-5, 4:59-64, 7:3-16, Fig. 5. In conventional mobile networks, multi-party calls required the use of multiple MSCs and the connecting backhaul, to the extent they were even possible. *See* § II.A, *supra*; Cooklev Decl., ¶ 51.

Thus, the '763 Patent describes and claims DMA servers including computer readable medium embedded with fully functional network capabilities, such as those conventionally located at a BSC and MSC, along with software allowing for a group call among four or more mobile communication devices on DMA servers via a peer-to-peer connection. *See* '763 Patent at Claim 1; Cooklev Decl., ¶¶ 51-54.

C. The Waylett Reference is Based on the Conventional Network Approach

Waylett is based on the conventional network appliance approach, which depends on a hierarchical network and hardware-based components. Specifically, Waylett is directed to a network-in-a-box (NIB), such as the WaveExpress NIB platform (reproduced below), that located certain hardware-based components in a single enclosure. Waylett at 8:6-10; *id.* at 9:36-42 (explaining that embodiments are based upon WaveExchange or a NIB platform). These hardware-based components are referenced as cards 140 (highlighted in red below):



Cooklev Decl., ¶ 55 (citing Ex. 2017); Waylett at Fig. 2 (annotated); *see also id.* at 8:7-36 (disclosing that the NIB includes a number of cards); *id.* at 9:32-46.

As Petitioners concede, Waylett does not disclose connecting NIBs through peer-to-peer connections. Instead, Waylett's NIBs are "stand-alone" boxes that transfer call data using the standard backhaul circuit-switch T1/E1 communication lines. *See* Waylett at 8:8; Ex. 2014, Ex. 2013 at 1 (disclosing that Waylett's NIB communicates "over E1 or T1 timeslot or Ethernet Port."); Waylett at 7:9-11, 8:33-36 (disclosing the E1 or T1 trunks contained in cards); Cooklev Decl., ¶ 56.

D. The Cope Reference is Related to Conventional Land-Based Telephone Networks

Cope (Ex. 1006) discloses providing IP-based connections between different land-based telephone network service providers (e.g., AT&T and Verizon) in order to communicate Voice Over IP (“VoIP”) telephony traffic between different legacy networks. *See* Cope at 5:51-6:12, Fig. 4 (depicting a public telephone network). These IP connections are “between different service providers [and are] established by mutual agreement for the exchange of IP traffic.” *Id.* at 6:3-6. Cope does not disclose or suggest establishing peer-to-peer IP connections between anything resembling DMA servers within a mobile network, as recited in the ’763 Patent. Nor does Cope suggest substituting peer-to-peer connections in the place of T1/E1 backhaul connections, as suggested in the Petition. Cooklev Decl., ¶¶ 57-58.

III. LEVEL OF ORDINARY SKILL IN THE ART

For the purpose of this preliminary response only, Lemko applies Petitioners’ definition of a person of ordinary skill in the art (“POSITA”) as one with “a bachelor’s degree in electrical engineering, computer engineering, or an equivalent, as well as two years of industry experience related to telecommunications networks . . . Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” Pet. at 3; Cooklev Decl., ¶¶ 18-23.

IV. THE BOARD SHOULD DENY THE PETITION BECAUSE PETITIONERS FAILED TO CONSTRUE THE KEY “DISTRIBUTED MOBILE ARCHITECTURE” TERM

The Board should deny the Petition under 37 C.F.R. § 42.104(b)(3)-(4) because Petitioners did not construe the Challenged Claims or identify “[h]ow the construed claim is unpatentable under the statutory grounds.”

Although the phrase is used well over a hundred times in the specification and recited multiple times in each Challenged Claim, Petitioners do not take a position on the meaning of the term “distributed mobile architecture.” Pet. at 5-6. Petitioners do not argue that the term has any plain and ordinary meaning to a POSITA or attempt to explain what that plain meaning might be. *Id.* Petitioners do not argue that the term has a particular meaning in the context of the ’763 Patent. *Id.* And Petitioners do not argue that the claims require no express construction. *Id.* Yet Petitioners were obligated to take *at least* one of these paths:

6. Claim Construction: If a petitioner believes that a claim term requires an express construction, the petitioner must include a statement identifying a proposed construction of the particular term and where the intrinsic and/or extrinsic evidence supports that meaning. On the other hand, a petitioner may include a statement that the claim terms require no express construction.

Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019) (“CTPG”) at 44.

The Board should deny the Petition because of Petitioners' failure to address the construction of "distributed mobile architecture," given its importance to the Challenged Claims. *Meta Platforms, Inc., v. Almondnet, Inc.*, No. IPR2022-00929, Paper 7 at 16 (P.T.A.B. Oct. 26, 2022) (denying a Petition where Petitioner did not meet its "obligation" to construe a key term and its obviousness grounds did not align with the plain meaning of the term); *Orthopediatrics Corp. v. K2M, Inc.*, No. IPR2018-01547, Paper 9 at 10 (P.T.A.B. Feb. 22, 2019) (denying a Petition where Petitioner declined to construe a term that it "should have known . . . was likely to be at issue in th[e] proceeding").

Petitioner did not meet this basic burden, incorrectly suggesting instead that it has no obligation to construe terms that have not already been construed in district court. Pet. at 5-6. While the Board "will consider any prior claim construction determination in a civil action or ITC proceeding if a federal court or the ITC has previously construed a term of the involved claim using the same standard," the non-existence of such a prior construction does not relieve Petitioner of its burden to construe the claims under 37 C.F.R. § 42.104(b)(3). CTPG at 47, 44-49.

Rather than managing all calls at a single centralized MSC, like conventional systems, the '763 Patent discloses a "distributed mobile architecture" where call management is distributed among the various DMA servers that make up a DMA network:

Within the **distributed** and associative telecommunications system 100 the controlling logic can be **distributed and decentralized**. Moreover, the wireless coverage provided by the disclosed system 100 is self-healing and redundant. In other words, due to the interconnectivity via the IP network 110, if one or more of the DMA servers 106 loses powers, fails, or is otherwise inoperable, **telephony traffic handled by the inoperable DMA server 106 can re-routed to one of the remaining operable DMA servers 106**. Additionally, user data stored in a database, e.g., a home locator resource (HLR) or a visitor locator resource (VLR), can be **distributed equally and fully among all of the DMA servers 106**. It can also be appreciated that new cellular coverage sites can be easily added to the system 100 as the demand for users increases. Specifically, a DMA server can be deployed as described below, connected to an antenna, connected to the IP network, and activated to provided cellular coverage in a new area.

'763 Patent at 3:51-67 (emphasis added). In the '763 Patent's DMA network, the controlling logic, and the data for routing calls, are distributed among individual DMA servers, which are connected to every other DMA server in the DMA network using a peer-to-peer connection. *Id.* at 3:57-62; *see also id.* at Claim 1.

"[B]ecause the Petition does not address the scope or meaning of '[distributed mobile architecture],' the Petition does not explain why" Waylett's NIBs "would fall within the scope" of the DMA Network. *Samsung Elec. Co. v. Blaze Mobile, Inc.*,

No. IPR2021-01571, Paper 15 at 14 (P.T.A.B. Apr. 4, 2022); 37 C.F.R. § 42.104(b)(4).

As explained in detail below, they do not. There is nothing “distributed” about Waylett’s “stand-alone” hardware-based NIBs (Waylett 8:8), and Petitioners cannot show that Waylett’s NIBs are DMA servers having a computer readable medium embedded with network functionality as required by the Challenged Claims. Pet. at 10-14 (alleging that Waylett’s stand-alone hardware-based NIB satisfies a DMA server having a computer readable medium embedded with network functionality). Petitioners’ tack of equating Waylett’s NIBs as DMA servers—without ever establishing what “Distributed Mobile Architecture” mean to a POSITA in the context of the ’763 Patent or how the art satisfies those meanings—falls far short of its dual burdens under 37 C.F.R. § 42.104(b)(3)-(4).

V. THE CHALLENGED CLAIMS ARE PATENTABLE

Petitioners fail to show that Waylett in view of Cope renders obvious the Challenged Claims. Waylett in view of Cope does not teach or suggest at least the following limitations of the Challenged Claims:

- (1) first and second DMA servers comprising computer readable medium embedded with MSC and BSC modules;
- (2) a first call detail record (CDR) generation program embedded in the computer readable medium of the first DMA server;

- (3) first and second DMA servers using peer-to-peer connections for telephony traffic; and
- (4) the second DMA server including a program to allow a group call embedded in the computer readable medium.

Each of these missing limitations provides an independent basis for patentability of the '763 Patent. Patent Owner respectfully requests that the Board deny institution.

A. Waylett Does Not Teach or Suggest the First and Second “DMA Servers” With First and Second “Computer Readable Medium” Having MSC, BSC, and CDR Functionality

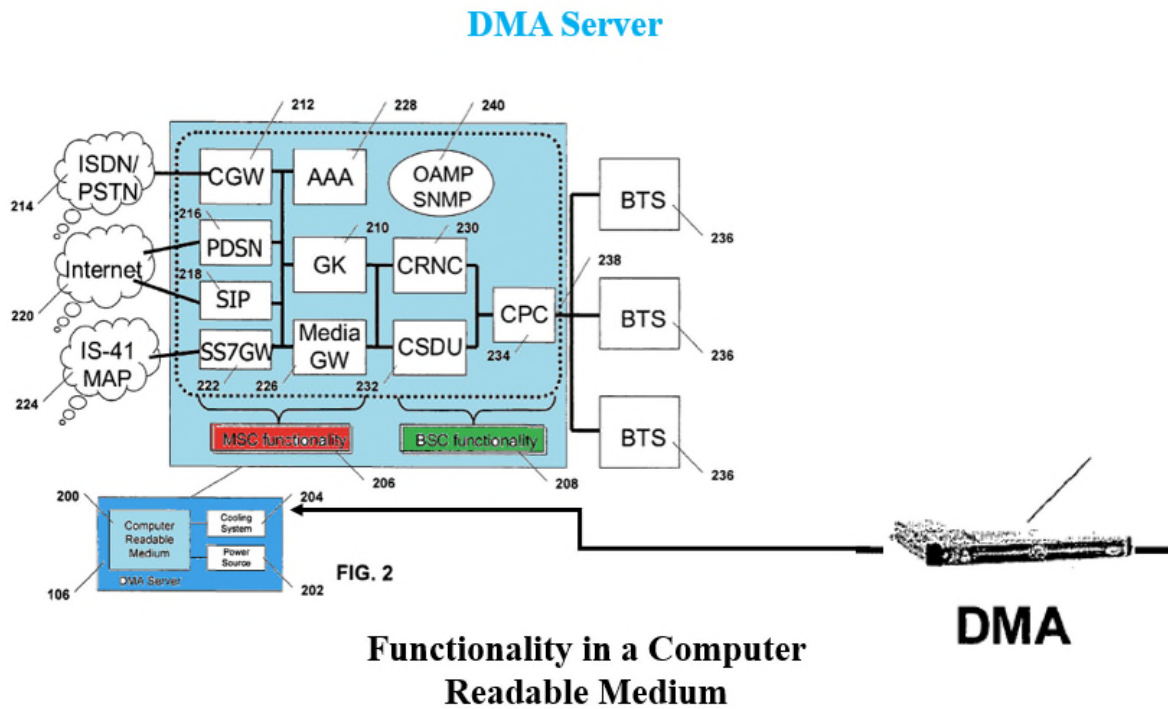
1. The Challenged Claims Require Software-Based MSC, BSC, and CDR Functionality

Each Challenged Claim requires that the first and second DMA servers include computer readable media having MSC, BSC, and call detail record (“CDR”) functionality. Waylett does not disclose such computer readable media (and Petitioners do not contend that Cope remedies this shortcoming). Instead, Waylett is based on the conventional, hardware-implemented paradigm. Cooklev Decl., ¶ 60.

The “computer readable medium” limitation requires a storage device that contains software-based functionality, unlike hardware-based implementations. The Federal Circuit instructs that computer readable medium claims refer to “a disk, hard drive, or other data storage device” that “contain[s] instructions for a computer

program to perform a particular process.” *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011). Accordingly, the Challenged Claims require that the DMAS’ computer readable medium store software modules that implement its MSC, BSC, and CDR generation functionalities. See ’763 Patent at Claim 1; Cooklev Decl., ¶ 61.

The specification confirms the claimed computer readable medium stores software modules because the MSC (red) and BSC (green) are embedded within the computer readable medium (light blue) of DMA server (dark blue):



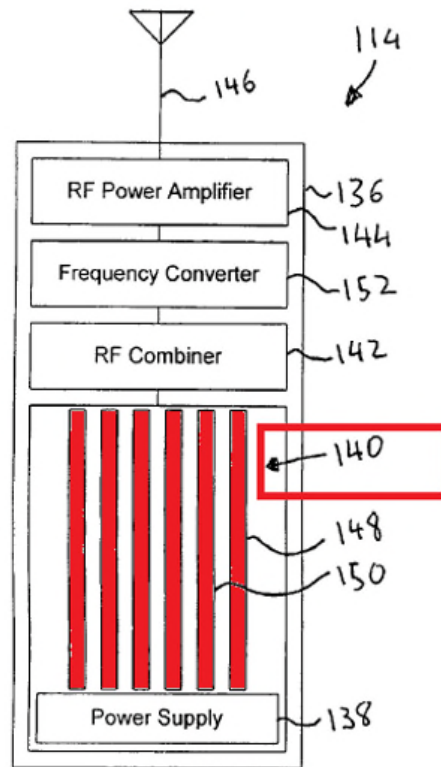
Id. at Figs. 2 (annotated with color and addition of DMAS), 9, 11, and 14-16; see also *id.* at 4:14-17; Cooklev Decl., ¶ 62.

Lemko explicitly distinguished its software-based implementation from conventional hardware-based MSC, BSC, and CDR components, such as network cards located in centralized MSCs. *See* '763 Patent at Cover, 1:34-47 (noting the high cost of providing a centralized, mobile switching center); *Chicago Bd. Options Exch., Inc. v. Int'l Sec. Exch., LLC*, 677 F.3d 1361, 1372 (Fed. Cir. 2012) (where a patent repeatedly notes the “inadequacies” and “deficiencies” of a traditional methodology and proposes a remedy for the perceived deficiencies, it “reasonably may be viewed as a disavowal of that subject matter from the scope of the Patent’s claims.”). Thus, the Challenged Claims require MSC, BSC, and CDR functionality implemented as software, not through hardware, such as network cards. Cooklev Decl., ¶ 63.

2. Waylett’s Hardware-Based NIB Does Not Include the Claimed Computer Readable Medium and Embedded Functionality

Waylett’s NIB does not include a computer readable medium with embedded MSC, BSC, and CDR functionality. *See* '763 Patent at Claim 1. Instead, Waylett’s NIB operates based on the classic, hardware-based network-appliance approach, with the various network functions being implemented using network cards 140 (shown in red below), not software. *See* Waylett at 8:7-32, 9:65-67, Fig. 2; *see also* 2013 at 1; Cooklev Decl., ¶ 64.

Waylett's NIB



Cooklev Decl., ¶ 64 (Waylett at Fig 2 (annotated) (disclosing that the NIB depends on a number of cards). Waylett's NIB platform with network cards is depicted below:



Ex. 2012. Accordingly, Waylett does not disclose embedding MSC, BSC, or CDR functionalities into a computer readable medium because, like traditional networks systems, those functions are implemented in hardware. Cooklev Decl., ¶¶ 64-65.

3. Waylett Does Not Inherently Disclose the Claimed Computer Readable Medium and Embedded Functionality

Waylett also does not inherently disclose the claimed computer readable medium. Petitioners contend that because Waylett's NIB uses some software it "necessarily" includes claimed computer readable medium with MSC, BSC, and CDR functionality. Pet. at 13. "Inherency, however, may not be established by

probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991) (quoting *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981)); *see also Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002) (“Inheren[cy] ... requires that the missing descriptive material is ‘necessarily present,’ not merely probably or possibly present, in the prior art.” (quoting *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999))). Here, Petitioners fail to show that software for implementing MSC, BSC, and CDR functionality is necessarily embedded in the NIB.

To the contrary, consistent with the then-conventional hardware-based paradigm, Waylett’s MSC and BSC are implemented in hardware network cards, not in software. *See* Waylett at 8:7-36, Fig. 2; Ex. 2013. Therefore, Waylett does not inherently disclose software-based MSC, BSC, or CLR functionality embedded in a computer readable medium because a POSITA would have understood from Waylett’s disclosure that the relevant functionality was provided with hardware, not software. Cooklev Decl., ¶¶ 66-67.

4. It Would Not Have Been Obvious to Modify Waylett to Include a Computer Readable Medium With the Required Functionality

It would not have been obvious to a POSITA to modify Waylett to implement MSC, BSC, and CLR functionality in a computer readable medium. Petitioners do

not provide any evidence supporting how Waylett's hardware-based components would (or even could be) be consolidated on software and work as intended. Thus, Petitioners' fail to provide the requisite "evidence-supported account of the contemplated workings of the [modification]." *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). This is an independent basis to reject the Petition. Petitioners also fail to show that a POSITA would have been motivated to make the implementation from hardware to software and have a reasonable expectation of success in doing so.

First, Petitioners fail to provide a motivation to modify Waylett to implement its MSC and BSC as software. Petitioners simply assert that such a modification would have been "an obvious variation of implementing known components in the prior art" and that it would be cost-effective and easier to implement these functions in software than in hardware. Pet. at 13-14. But this *post-hoc* and conclusory rationale is only "straightforward in hindsight," given that the industry did not realize until the 2012 paper (7 years after Lemko filed the '763 Patent) the benefits of switching to a software-based approach. See, e.g., *Leo Pharm. Prods., Ltd. v. Rea*, 726 F.3d 1346, 1353, 1355 (Fed. Cir. 2013) (reversing the Board's obviousness determination because the Board's motivation finding was only "straightforward in hindsight" given that the art had not recognized the problem the inventors solved).

Petitioners do not provide any evidence that a POSITA would have been motivated to do so *at the time of the invention*.

To the contrary, at the time of the invention, the conventional network architecture used hardware-based components. *See* § II.A, *supra*. Specifically, these conventional MSCs and BSCs were implemented using custom-built cards with DSPs and custom Application Specific Integrated Circuits (ASICs). Cooklev Decl., ¶ 69 (citing Ex. 2018 (discussing digital signal processors that support real-time application constraints); Ex. 2019 at 148 (discussing the DSPs used for processing); Ex. 2020 (discussing the use of digital signal processing for 2G networks); Ex. 2013 (Waylett's NIBs containing multiple DSP boards for communication)). MSCs and BSCs often have high processing loads and tight real-time requirements for performing jobs within dedicated time windows. Cooklev Decl., ¶ 69 (citing Ex. 2018). Accordingly, the conventional MSCs and BSCs depended on DSPs and ASICs to support real-time processing, with hardware accelerators, pins to trigger interrupts to the processor, high-throughput communications interfaces, and a Real-Time Operating System (RTOS), to facilitate the ability of the chip to complete processing jobs within the dedicated time window. Cooklev Decl., ¶¶ 68-69.

The industry did not recognize the solution of implementing this functionality with a decentralized, software-based approach until 2012, with the publication of the

NFV paper, seven years after Lemko. *See* Ex. 2008 at 5, 10-12 (identifying challenges of a software-based approach using industry-standard servers in light of performance degradation and compatibility issues with existing legacy networks). The NFV paper, for example, specifically called for a collaborative effort to come up with solutions for implementing network functionality in software that can run on industry-standard servers. Ex. 2008 at 5. Lemko's claimed DMA infrastructure offered just a solution, "as software enables all of core network functions, databases and gateways." Cooklev Decl., ¶ 70 (citing Ex. 2009 at 1; '763 Patent at 4:14-31, Fig. 2).

Second, Petitioners fail to establish that a POSITA would have had a reasonable expectation of success in consolidating MSC and BSC hardware network components onto computer readable medium running on industry-standard servers at the time of the invention. Pet. at 13-14 (alleging "applying this known technique . . . would result in similar improvements"). Just the opposite was the case, with the only known MSC and BSC implementation at the time of the claimed invention depending on hardware-based techniques as discussed above, there was no known technique for a software-based implementation. *See* Ex. 2008 at 5, 10-12; Cooklev Decl., ¶ 71. In this regard, Petitioner's inaccurate and conclusory statement that this was a "known technique" that "would result in similar improvement" (*see* Pet. at 13-14) cannot carry Petitioners' burden to establish a reasonable expectation of success.

In re Magnum Oil Tools Int'l, Ltd., 829 F.3d 1364, 1380 (Fed. Cir. 2016) (a petitioner's burden of proving obviousness cannot be satisfied by employing "mere conclusory statements").

Petitioners' obviousness theory is, therefore, pure hindsight because it does not provide an explanation for how or why a POSITA would have implemented the hardware-based network functionality on software. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) ("Although the *KSR* test is flexible, the Board 'must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.'" (citation omitted)).

Petitioners' expert, Mr. Proctor, does not cure these deficiencies. He simply concludes it would have been obvious to migrate this conventional hardware functionality into software. Ex. 1003 at ¶¶ 106-107. Mr. Proctor does not cite any evidence identifying then-known techniques for replacing cards and DSP circuitry with software. Such "conclusory generalizations" are legally insufficient to constitute substantial evidence of obviousness. *DSS Tech. Mgmt., Inc. v. Apple Inc.*, 885 F.3d 1367, 1377 (Fed. Cir. 2018) (citation omitted); Cooklev Decl., ¶ 72.

B. Waylett Does Not Disclose a “First Call Detail Record (CDR) Generation Program Embedded in the First Computer Readable Medium”

Each of the Challenged Claims requires that the DMAS include in its computer readable medium software for generating Call Detail Records (“CDR”). *See* ’763 Patent at Claim 1. CDRs capture information on calls made on telephone systems, including the party originating the call, the recipient of the call, the date and time of the call, and the duration of the call. Cooklev Decl., ¶¶ 73-74. Part of the invention of the Challenged Claims was moving the MSC and CDR functionality to the DMAS to enable the formation of the decentralized DMA network where calls could be managed locally instead of at centralized MSCs. ’763 Patent at 4:1-31, 11:14-32, Fig. 2, Claim 1 (claiming a “first [/second]DMA server comprising:” *inter alia* “a first [/second] computer readable medium” with “a first [/second] call detail record (CDR) generation program embedded in the first [/second] computer readable medium”).

Waylett does not disclose locating CDR generating functionality at the NIB (let alone in a computer readable medium at the NIB). Cooklev Decl., ¶ 75. Petitioners assert that the RADIUS server located in the NIB (which Petitioners contend is a DMAS) generates CDRs. *See* Pet. at 16, 21. In Waylett, the RADIUS server “receives,” but does not “generate” CDRs. The CDRs are generated at access points:

The RADIUS server 312 receives accounting packets or *call detail records (CDRs) generated by the different access points 228A, 228B, 228C*, and forwards these accounting packets to a billing server (not shown) through a RADIUS proxy interface (not shown) to bill telecommunications charges to the appropriate parties.

Waylett at 14:16-22 (emphasis added). These access points are separate and distinct from the NIB:

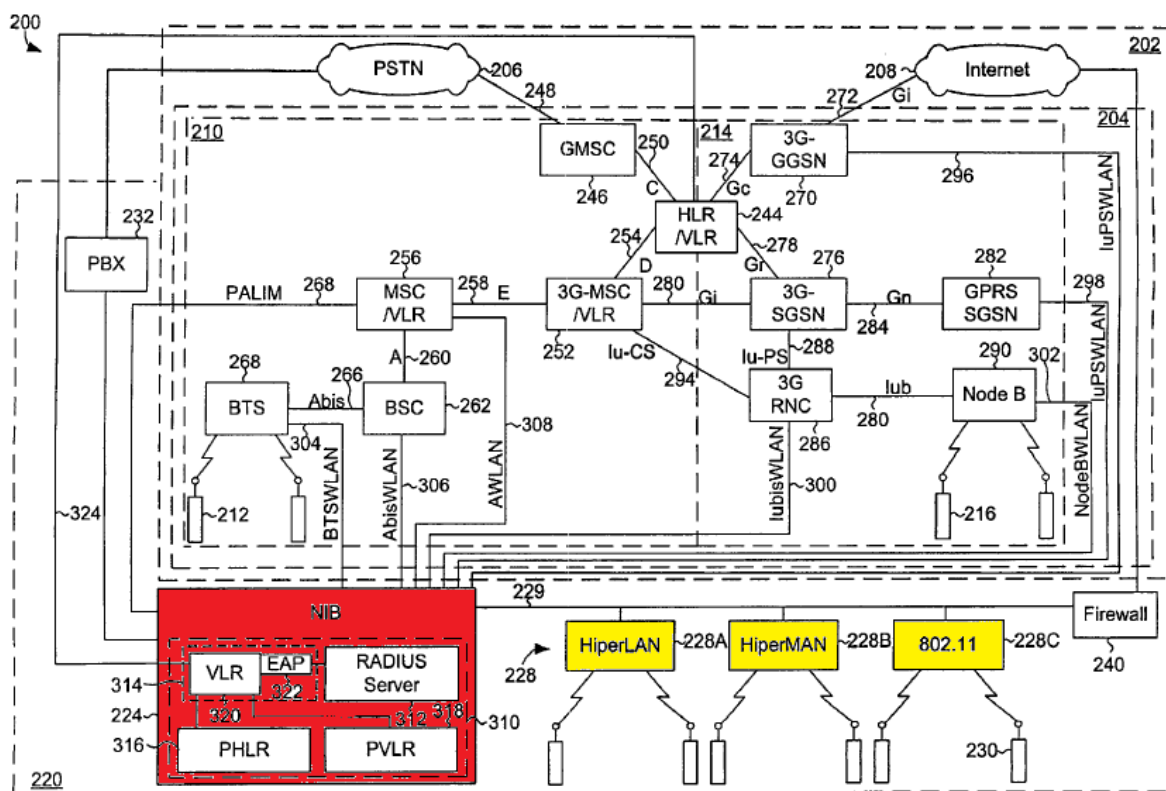


FIG. 6

Id. at Fig. 6 (annotated, illustrating that the access points (228A, 228B, and 228C, annotated in yellow) are separate and distinct from the NIB (224, annotated in red));

Cooklev Decl., ¶ 75.

Waylett, therefore, does not disclose a “first call detail record (CDR) **generation** program embedded in the first computer readable medium” of the DMA or a “second call detail record (CDR) generation program embedded in the second computer readable medium,” as is required by each of the Challenged Claims because Waylett’s NIB does not generate CDRs, let alone using a program embedded in computer-readable medium. Cooklev Decl., ¶ 76.

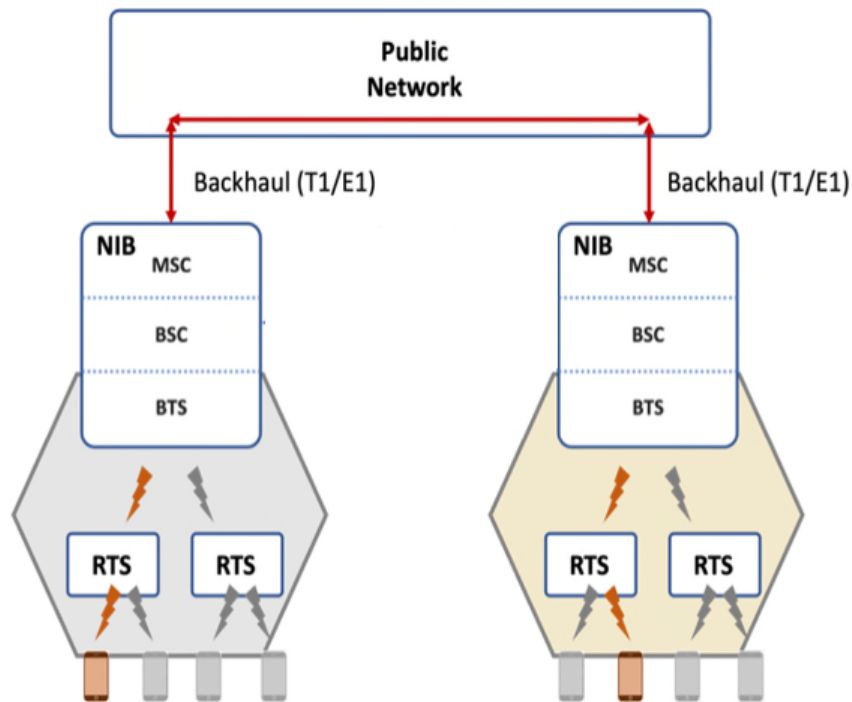
C. It Would Not Have Been Obvious to Modify Waylett with Cope’s P2P IP Connections to Arrive at the “Peer-to-Peer Connection for Telephony Traffic”

Each of the Challenged Claims requires that “telephony traffic received at the first wireless transceiver of the first distributed mobile architecture server is transmitted from the first distributed mobile architecture server to the second distributed mobile architecture server ***via a peer-to-peer connection.***” ’763 Patent at Claim 1 (emphasis added). Neither Waylett nor Cope shows the use of such peer-to-peer connections to connect DMAS, nor do Petitioners show how and why, absent hindsight and use of the ’763 Patent as a roadmap, a POSITA would have been motivated to modify Waylett with Cope’s alleged teaching of peer-to-peer IP connections and have a reasonable expectation of success in doing so. Cooklev Decl., ¶ 77.

Petitioners concede that Waylett does not disclose transmitting telephony traffic over a peer-to-peer connection. See Pet. at 24 (“Waylett does not, however,

expressly disclose that such a transmission of telephony traffic occurs over a ‘*peer-to-peer connection.*’”). As such, Petitioners resort to Cope to assert that “[a] skilled artisan would have been ***motivated to incorporate Cope’s P2P connections*** in the system of Waylett.” Pet. at 28 (emphasis added). In so doing, Petitioners contend that because “peer-to-peer IP connections were known and conventional” it would have been “nothing more than the simple substitution of one known element . . . for another.” Pet. at 29-30. But Petitioners do not and cannot support this conclusory contention. Cooklev Decl., ¶ 78.

Waylett describes a private network formed by multiple hardware-based NIBs. Like traditional, centralized MSCs, the NIBs are connected with conventional T1/E1 communication backhaul links that carry voice and data communications. Waylett also discloses connecting NIBs via a private wide area network (PWAN) for non-telephony functions, such as “distributing HLR registration and authentication loads.” Waylett at 17:10-12; *see also* Ex. 2013 at 1 (disclosing the T1/E1 ports for communication); Waylett at 7:9-11, 9:65-10:6, 17:7-17, Fig. 11. This setup is illustrated below:



Cooklev Decl., ¶ 79 (citing Waylett at Fig. 11 (annotated)); Ex. 2014, Ex. 2013 at 1 (disclosing that the NIB has “all E1 or all T1” ports for voice and data communication); Waylett at 7:9-11. Accordingly, all calls from a first NIB are connected to the public network and the public network routes the calls to the second NIB through T1/E1 connections. See Cooklev Decl., ¶ 79.

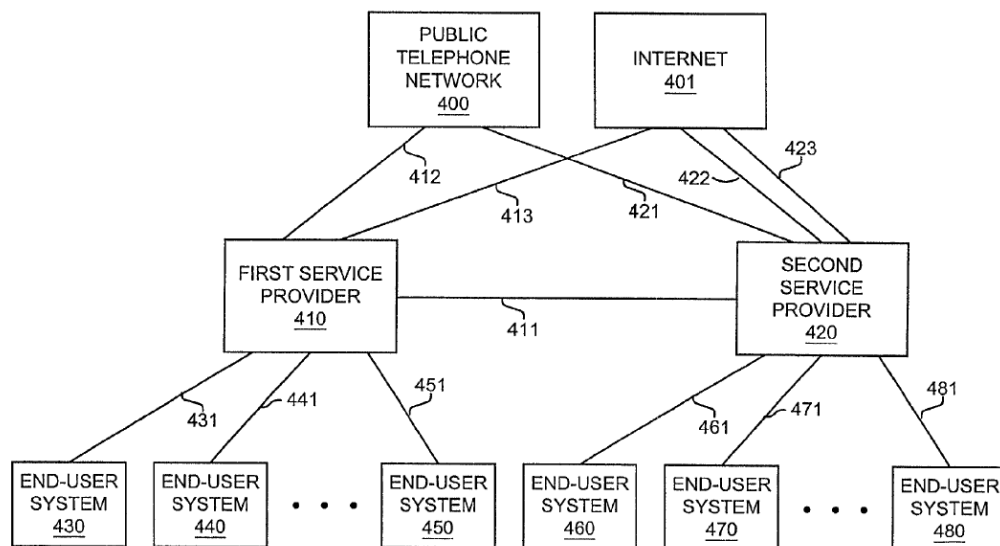
As shown above, the call path from one UE under the first NIB coverage to another UE under the second NIB coverage goes from the first NIB, over T1/E1 backhaul, to a public network, over T1/E1 backhaul to a second NIB, to the recipient UE. Other than the radio connection between the UE and the NIB, all of these connections are T1/E1. Circuit-switched, dedicated T1/E1 connections were used

by industry for such connections because they provided dedicated, reliable, fixed bandwidth connections between known points (such as between a NIB and a public telephone network). Cooklev Decl., ¶ 80. As Petitioners acknowledge, these were not peer-to-peer connections between NIBs (which Petitioners contend are DMA servers).

Notably, Cope discloses carrying traditional telephony data from the UEs to service providers using connection links, such as T1/E1 connections. Cope at 6:13-21, Fig. 4. Only native IP data (*e.g.*, VoIP calls) are routed over Cope's IP network between different service providers. *Id.* at Abstract, 2:15-28, 4:37-39 (describing "telephony signals for the telephone and IP packets for the IP interface."). Accordingly, Cope does not suggest replacing these types of communications lines with peer-to-peer IP connections, which is the apparent basis for Petitioner's allegation that replacing Waylett's backhaul connections with peer-to-peer connections would have been obvious. *See* Pet. at 29-30; Ex. 2014, Ex. 2013 (disclosing that the NIB is an "all E1 or all T1" ports for voice and data communication); Cooklev Decl., ¶ 81. Petitioners, therefore fail to explain how Cope's peer-to-peer IP connection between two different service providers (*e.g.*, AT&T and Verizon) was an "old element" that could be merely "rearranged and combined" with Waylett's T1/E1 connections to allow peer-to-peer telephony traffic between NIBs. *See Samsung Elecs. Co. v. Netlist, Inc.*, No. IPR2022-00063, Paper

53 at 35 (P.T.A.B. May 3, 2023) (upholding patentability because the petitioner failed to “identif[y] any ‘old element’” where “each element is purportedly taught, in some manner, by one of the references, and the elements are merely rearranged and combined.”) (citations omitted).

Cope also does not show peer-to-peer connections between anything resembling DMA servers. Instead, as discussed in Section II.D, *supra*, Cope is limited to peer-to-peer IP connections between different service providers “that is established by mutual agreement for the exchange of IP traffic.” Cope at 6:5-6; *see also id.* at 5:51-6, Fig. 4. Specifically, Cope describes that a first service provider (*e.g.*, AT&T) routes IP packets to a second service provider (*e.g.*, Verizon) over a P2P IP connection:



Id. at Fig. 4; *see also id.* at 5:51-6:6:12, Fig. 4. Cope, like Waylett, is still based on a hierarchical network paradigm, and does not show a decentralized, distributed peer-to-peer network, where DMA servers within a network connect as peers to avoid the need to traverse centralized MSCs, as is shown in the '763 Patent. *See* '763 Patent at Fig. 1 (depicting DMAs within a network communicating via peer-to-peer), Fig. 2 (depicting the MSC functionality embedded in the computer readable medium); Cooklev Decl., ¶ 82.

Without the benefit of hindsight from Lemko's '763 Patent (or the industry's belated 2012 NPV Paper), a POSITA would not have had any motivation to combine Waylett and Cope to yield a system with P2P interconnected DMAS. Petitioners rely on Cope's statement that "peer-peer connections allow for 'far more efficient' routing of IP traffic through an internet gateway and over the internet to other service providers." Pet. at 28 (quoting Waylett at 3:17-20). But this reasoning misunderstands the point of Cope. Cope discloses replacing an existing IP connection, established over the public Internet, with another type of IP connection, which it calls peer-to-peer between two different service providers. Cope at 3:56-64, Fig. 4. Cope does not disclose or suggest replacing the traditional T1/E1 backhaul with a peer-to-peer IP connection, let alone creating an entirely new network architecture with peer-to-peer connections between BTSs or BSCs, let alone

between network elements bearing any resemblance to Lemko's DMA servers. Cooklev Decl., ¶ 83.

Petitioners also note that Waylett and Cope are both focused on expanding networks in rural areas. Pet. at 29. But even if there is some overlap in goal, as discussed above, there is no "evidence that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner cited." *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). Here, Waylett identifies the expanding rural networks problem but solves it with its hardware-based NIB approach using T1/E1 connections. See Cooklev Decl., ¶ 84 (citing Waylett at 1:60-65, 8:7-36). Because Waylett solves the problem in its own way, Petitioners' alleged rationale for substituting with a P2P IP connection is circular as it defines the problem in terms of its solution, revealing the improper use of hindsight. *Monarch Knitting Mach. Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881 (Fed. Cir. 1998) ("defining the problem in terms of the solution reveals improper hindsight in the selection of the prior art relevant to obviousness.") (citation omitted).

D. Waylett Does Not Disclose a "Program to Allow a Group Call" That is "Embedded in the Second Computer Readable Medium"

A further reason Waylett (alone or in combination with Cope) cannot render obvious the Challenged Claims is that Waylett does not disclose a "program to allow

a group call” which is “embedded in the second computer readable medium.”
Cooklev Decl., ¶ 85 (quoting '763 Patent at Claim 1).

First, as discussed in Section V.A, Waylett does not disclose a computer readable medium, which requires software implementation. There is no disclosure of **software** in the NIB for allowing group calls. Cooklev Decl., ¶ 86.

Second, Waylett does not teach any functionality within the NIB (software or hardware based) for allowing group calls. Petitioners cite Waylett's disclosure of a voice group call service (VGCS) for user equipment. Pet. at 22. However, Waylett does not disclose that the program to allow a group call is located at the NIB. Nor do Petitioners identify any evidence that a POSITA would find such a requirement inherent in Waylett's disclosure. Instead, such functionality (voice group call service (VGCS)) is provided at the network core (*e.g.*, of a GSM core network) for execution:

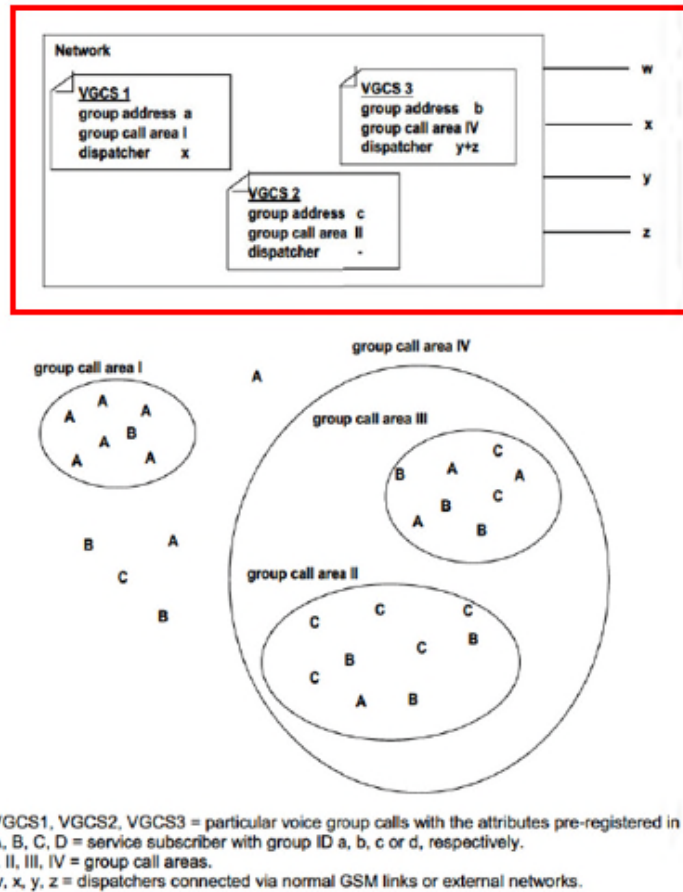


Figure 1: Logical concept of the VGCS

Ex. 1009 at 10 (annotated); Ex. 2021 at 11 (same), *id.* at 7 (describing a “network operator” as an “[e]ntity which provides the network operating elements and resources for the execution of the VGCS”), *id.* at 12 (“The VGCS shall be *automatically initiated by the network* when a service subscriber or dispatcher dials a particular short code or address at call set-up”) (emphasis added); Cooklev Decl., ¶ 87.

There is nothing in Waylett (or Cope) even suggesting that group-call functionality would have deviated from the then-conventional approach of locating

the group call functionality at the network core as shown above. Thus, Petitioners fail to show that Waylett's NIB explicitly or inherently discloses a "program to allow a group call" which is "embedded in the second computer readable medium" located at the DMA server. Cooklev Decl., ¶ 88.

VI. CONCLUSION

For all of these reasons, Patent Owner requests that the Board deny institution of *inter partes* review of the Challenged Claims of the '763 Patent.

Respectfully submitted,

Dated: June 30, 2023

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CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

The undersigned hereby certifies that the portions of the above-captioned **PATENT OWNER'S PRELIMINARY RESPONSE** specified in 37 C.F.R. § 42.24 has 7,126 words in compliance with the 14,000 word limit set forth in 37 C.F.R. § 42.24(b)(1). This word count was prepared using the Microsoft Word word-processing system used to prepare this paper.

Dated: June 30, 2023

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CERTIFICATE OF SERVICE

The undersigned certifies, in accordance with 37 C.F.R. § 42.6(e), and pursuant to agreement by the parties that filing with the Board through the Patent Trial and Appeal Case Tracking System (P-TACTS) constitutes electronic service, that service was made on the Petitioners as detailed below.

<i>Date of service</i>	June 30, 2023
<i>Manner of service</i>	Electronic Filing (mhopkins@winston.com bshelton@winston.com; mrueckheim@winston.com; Winston-MSFT-Lemko-IPR@winston.com)
<i>Documents served</i>	PATENT OWNER'S PRELIMINARY RESPONSE
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