UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

YEALINK (USA) NETWORK TECHNOLOGY CO., LTD., and
YEALINK NETWORK TECHNOLOGY CO., LTD.
Petitioners,

v.

BARCO N.V.
Patent Owner.

U.S. Patent No. 11,966,347
IPR2025-00598

DECLARATION OF
KEVIN C. ALMEROTH, PH.D.,
IN SUPPORT OF
PETITIONER'S REPLY

TABLE OF CONTENTS

I, Kevin C. Almeroth Ph.D., declare as follows:

I. INTRODUCTION

1. I previously submitted a declaration (Ex-1002) in support of the Petition for Inter Partes Review of U.S. Patent No. 11,966,347 ("the '347 patent"). I have been asked to submit this Reply Declaration in further support of the Petition and in response to Patent Owner's Response ("POR"), the Declaration of Dr. Michael C. Brogioli (Ex. 2004), and certain deposition testimony given in this proceeding.

2. I am the same Kevin C. Almeroth identified in my prior Declaration (Ex-1002). My qualifications, professional background, and compensation terms remain as stated in that Declaration. I am a Professor Emeritus of Computer Science at the University of California, Santa Barbara. I am a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and a Member of the Association of Computing Machinery (ACM). My research expertise includes computer networks and protocols, wireless networking, multicast communication, large-scale multimedia systems, and mobile applications. My full curriculum vitae was submitted as Exhibit 1003.

3. For my efforts in connection with the preparation of this Reply Declaration, I have been compensated at my usual and customary rate for this type

of consulting activity. My compensation is in no way contingent on the outcome of these or any other proceedings.

4. In preparing this Reply Declaration, I have reviewed all materials identified in my prior Declaration, as well as Patent Owner's Response (Paper 20) ("POR"), the Board's Institution Decision (Paper 12) ("ID"), the Declaration of Dr. Michael C. Brogioli (Ex. 2004), the deposition transcripts of Dr. Michael C. Brogioli (Ex-1050 for the related '972 IPR and Ex-1060 for this proceeding), Petitioner's Reply, and the additional materials identified below.

5. My opinions contained in this Reply Declaration are based on the documents I reviewed, my knowledge and professional judgment, and my appreciation of how a person of ordinary skill in the art ("POSA") would have understood the state of the art, the teachings of the prior art, and the claim terms and specification of the '347 patent at the time of the alleged invention, which I have been asked to assume is around December 17, 2017.

II. ADDITIONAL MATERIALS REVIEWED

6. In addition to the materials identified in my prior Declaration (Ex-1002), I have reviewed the following:

Exhibit	Description
Ex. 2004	Declaration of Dr. Michael C. Brogioli
Ex. 2005	Curriculum Vitae of Dr. Michael C. Brogioli
Ex-1050	December 18, 2025 Deposition Transcript of Dr. Michael C. Brogioli for IPR2025-00491

Exhibit	Description
Ex-1051	Microsoft, "USB device drivers (Windows Drivers)," Microsoft Learn, https://learn.microsoft.com/en-us/windows-hardware/drivers/usbcon/ (accessed Mar. 2026)
Ex-1052	"Universal Serial Bus Specification, Revision 2.0," §§ 5.3, 9.1–9.2, April 27, 2000, http://www.poweredusb.org/pdf/usb20.pdf (accessed Mar. 2026)
Ex-1053	"Virtual Audio Device (Kernel Streaming)," Microsoft Learn, https://learn.microsoft.com/en-us/windows-hardware/drivers/audio/virtual-audio-devices (accessed Mar. 2026)
Ex-1054	"Windows Driver Model (WDM)," Microsoft Learn, https://learn.microsoft.com/en-us/windows-hardware/drivers/kernel/introduction-to-wdm (accessed Mar. 2026)
Ex-1055	"About Multimedia (Audio/Video)," Microsoft Developer Network Archive, https://learn.microsoft.com/en-us/windows/win32/multimedia/about-multimedia (accessed Mar. 2026)
Ex-1056	"Wireless USB Specification, Revision 1.1," Wireless USB Promoter Group, Sept. 2010, https://www.usb.org/document-library/wireless-usb-specification-rev-11 (accessed Mar. 2026)
Ex-1057	Salman A. Baset & Henning Schulzrinne, "An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol," Columbia University, 2006, https://arxiv.org/abs/cs/0412017 (accessed Mar. 2026)
Ex-1058	"Wi-Fi Peer-to-Peer (P2P) Technical Specification, Version 1.7," Wi-Fi Alliance, October 2016
Ex-1059	"Overview of the Media Foundation Architecture," Microsoft Learn, https://learn.microsoft.com/en-us/windows/win32/medfound/about-topologies (accessed Mar. 2026)
Ex-1060	March 11, 2026 Deposition Transcript of Dr. Michael C. Brogioli for IPR2025-00597 and IPR2025-00598
Ex-1061	ClickShare C-5 datasheet

7. I also reviewed any other materials I refer to in this Reply Declaration in support of my opinions.

III. SUMMARY OF OPINIONS

8. Having reviewed Patent Owner's Response and the Declaration of Dr. Brogioli, my opinions as expressed in my original Declaration (Ex-1002) remain unchanged. In this Reply Declaration, I focus on providing responsive technical explanations regarding the specific issues raised by Dr. Brogioli and Patent Owner. In particular, I address: (a) why software functionality does not change when copied from one storage medium to another; (b) why drivers are an inherent part of how operating systems interact with devices, including virtual devices, and why the prior art necessarily involves drivers even where the word is not expressly used; (c) why Beel discloses bidirectional data flow, including transmission from the base unit to the peripheral device, and video data processing in the base unit; (d) why the prior art teaches endpoints, including fixed or configurable endpoints of functional devices exposed on the first peripheral device; (e) why Dinka's disclosures about computer-based VoIP would not have discouraged a POSA from applying those teachings; (f) how Van de Laar's flexible dockee architecture operates, including the interchangeability of primary and secondary dockee roles; (g) why Kaplan's "walled garden" does not prohibit combination with Van de Laar; and (h) specific concerns I have about the reliability of Dr. Brogioli's technical opinions.

IV. SOFTWARE FUNCTIONALITY IS INDEPENDENT OF STORAGE MEDIUM

9. A recurring theme in Dr. Brogioli's declaration is the contention that features Beel describes in its peripheral-device embodiments "cannot be attributed" to Beel's third and fourth embodiments, which do not require a peripheral device. Ex. 2004, ¶101. In my view, this position reflects a fundamental misunderstanding of how software works.

10. Beel's fourth embodiment is described as "similar to the third embodiment, with as only difference that the software is copied on the client operating device." Ex-1005, ¶247. The key phrase here is "only difference." As someone who has spent decades researching, building, and teaching about software systems, I can say with confidence that the behavior of a software program is determined by its code, not by whether those instructions were loaded from a USB stick, downloaded from a network, or pre-installed on a hard drive. This is one of the most basic principles of computer science. A word processing application does not lose the ability to format text because it was installed from a download rather than a disc. A video codec does not stop encoding video because its executable was copied from one directory to another.

11. When Beel says the "only difference" is the location of the software, a POSA would read that as an express statement that every capability the software had

in prior embodiments, *e.g.*, virtual device presentation, screen scraping, encoding, communication with the base node, is preserved. To conclude otherwise would require believing that the act of copying a program from a USB stick to a laptop's internal storage somehow strips that program of its functionality. I am not aware of any principle of computer science, operating system design, or software engineering that would support such a conclusion, particularly in the context of how Beel describes the functionality. See, e.g., "USB device drivers (Windows Drivers)," Microsoft Learn (documenting that operating systems load and execute drivers in the same manner regardless of the installation source).

12. During his deposition, Dr. Brogioli did not offer any technical reason why the software would behave differently when stored on the processing device. Ex-1050. Indeed, in his more recent deposition in this proceeding, Dr. Brogioli confirmed that in Beel's third embodiment, "the execution of the software would ultimately be the execution of instructions on the Intel processor in the...Windows laptop." Ex-1060, 49:15-20. When asked whether the instructions "would be executed on the processor of the processing device," he answered: "As far as I recall, that sounds correct." Ex-1060, 49:21-50:1. He also acknowledged that in the fourth embodiment, there is "no plug-and-play port such as the USB port...required on the client operating device." Ex-1060, 45:6-46:1. These admissions confirm that the software executes on the processing device regardless of its original storage location.

Dr. Brogioli's written position is not rooted in engineering analysis but in a textual argument about how Beel's specification is organized. I do not find that argument technically persuasive, particularly because the prior art renders obvious running the same software on the processing device irrespective of where it is stored.

V. HOW OPERATING SYSTEMS INTERACT WITH DEVICES: THE ROLE OF DRIVERS

13. Dr. Brogioli opines that "operating a simulated peripheral does not necessarily require using a driver." Ex. 2004, ¶175. Patent Owner similarly argues that "neither the Petition, nor Dr. Almeroth, mention the word driver" in arguing the relevant limitation for Ground 2. POR at 39. I want to address this directly because it touches on a foundational aspect of computer architecture that I believe Dr. Brogioli has gotten wrong. Notably, when confronted with this opinion during his deposition, Dr. Brogioli could not "identify any real-world operating systems where a simulated peripheral is presented to an application without any driver involvement." Ex-1060, 149:18-150:1. He also admitted he has "no opinion" on whether operating systems present devices to applications without using drivers. Ex-1060, 78:1-12, 149:14-150:1.

14. In every major operating system I have worked with or studied, such as Windows, macOS, Linux, and others, the interaction between application software and hardware (or virtualized hardware) is mediated by drivers. This is not an optional

design choice; it is how major modern operating systems are architected. The operating system kernel does not allow application software to access devices directly. Instead, application software communicates with a driver, and the driver communicates with the device (or, in the case of a virtual device, simulates the device's responses). This layered model is thoroughly documented in publicly available materials such as the Windows Driver Model (WDM) documentation on Microsoft Learn, which describes how all device interactions in Windows pass through a layered driver stack. Dr. Brogioli himself confirmed that pre-installed generic drivers for WiFi interfaces were well-known at Beel's priority date and that "the person of skill in the art would be aware of the use of these types of drivers." Ex-1060, 63:5-65:19.

15. When Van de Laar describes a "simulated webcam" that "would appear to the dockee as if it were a normal peripheral" (Ex-1007, ¶54), a POSA would understand that this appearance is achieved through a driver on the dockee's operating system. That is the only mechanism by which a device, real or virtual, can "appear" to the operating system and to applications. The word "driver" does not need to appear in Van de Laar for a POSA to understand this, any more than a patent describing a car needs to mention "internal combustion" for a POSA to understand how the engine works. It is a basic fact of the technology.

16. The same analysis applies to Christison's disclosure. When Christison describes wired USB devices appearing to a host computer "as if [they were] attached" (Ex-1011, 6:25-26), this presentation to the host involves the host's USB driver stack. As documented in the Universal Serial Bus Specification, Revision 2.0, §§ 9.1-9.2, whenever any USB device is presented to a host, the host enumerates the device and loads the appropriate driver. This happens automatically, whether the device is physically wired or presented remotely through a wireless hub.

17. I want to provide additional technical context regarding why Christison's system involves drivers on the host computer, beyond what I stated above. In the USB standard architecture, when any device (physical or virtual, wired or wireless) is connected to a host, the host controller initiates an enumeration process. Ex-1011, 1:40-50, 2:63-67, 3:25-32, 3:55-65, 6:25-30, 6:63-67. During enumeration, the host reads the device's descriptors, including the device descriptor (which identifies the device class), the configuration descriptor, and the endpoint descriptors. *Id*. Based on this information, the operating system's Plug and Play manager loads the appropriate driver. This process is mandatory and automatic; there is no pathway in the USB architecture for a device to communicate with application software without going through this driver layer. Microsoft's documentation on USB endpoints explains that "[e]ndpoint is hardware on the device" and a "pipe is software on the host side," and that "[a] pipe talks to an endpoint on a device." Ex-

1010. The pipe is a software abstraction through which applications communicate with the device and is created when the driver configures the endpoint. Without a driver, there is no pipe, and without a pipe, there is no communication. When Christison describes presenting wired USB devices as "native" wireless USB devices (Ex-1011, 6:25-26), a POSA would have understood that this presentation occurs through exactly this mechanism: the host's USB driver stack enumerates the device, loads the appropriate class driver (or a custom driver), and creates the pipes through which data flows. Dr. Brogioli's suggestion that virtual device presentation can occur without driver involvement ignores this fundamental aspect of USB architecture.

18. The '347 patent itself acknowledges this reality. It states that "a driver is standard for the operating system and can drive a standard class of peripheral devices." Ex-1001, 8:53-9:3. In my view, this confirms what any POSA would already know: drivers are part of the standard operating system infrastructure for device interaction.

VI. BEEL DISCLOSES BIDIRECTIONAL DATA FLOW AND VIDEO DATA PROCESSING IN THE BASE UNIT

19. Patent Owner contends that Beel describes only communications from the peripheral device to the base unit. POR, 14-17. Dr. Brogioli similarly opines that Beel is directed to a system that communicates data from the peripheral device to a

base node, not the reverse. Ex. 2004, ¶¶74, 101-107. From a technical standpoint, I find these arguments difficult to reconcile with what Beel actually describes.

20. Beel expressly discloses bidirectional communication. The peripheral device includes "a third software code portion for receiving media content from the network and for displaying the media content on the display." Ex-1005, ¶71. The Board found this disclosure "consistent with Petitioner's assertions (and contrary to Patent Owner's)," describing "a processing device with a display, a peripheral device connected to the processing device, the peripheral device receiving media content from a network, and displaying the media content on the display of the processing device." ID, 16-17. Patent Owner has offered no new evidence disturbing this finding.

21. Beel also discloses "microphone or microphones 38 that can be used to transfer audio, e.g. to the processing devices 31." Ex-1005, ¶120. The microphones are functional devices connected to the base node. For audio data from those microphones to reach the processing devices, it must pass through the base node's wireless connection, establishing a bidirectional path from functional devices through the base node to processing devices. Beel's description of the base node having a "transceiver" (Ex-1005, ¶129) confirms this; a transceiver, by definition, both transmits and receives.

22. Regarding video data processing in the base unit, Beel describes cameras 39, 40, 41 and whiteboard 45 coupled to base node 36, which is "a processing device, e.g. a host computer adapted to receive user selected arbitrary media content." Ex-1005, ¶¶119-120, 123. The Board found that "other optional equipment, e.g., cameras, would supply video data to be transferred via base node 36 to the processing devices." ID, 18. Beel's base node software includes code for "receiving, decrypting and decoding incoming arbitrary media content" and "encoding" video data. Ex-1005, ¶¶155, 320. A POSA would recognize that this constitutes video data flowing into the base unit and being processed therein, exactly as the claims require.

23. Dr. Brogioli's testimony further undermines Patent Owner's position. He speculated that Beel's microphone "may be" directly connected to the processing device rather than through the base node—an interpretation Beel does not support. Ex-1060, 21:24-23:25. He also conceded that Beel's peripheral device software is "for receiving media content from the network" but admitted this was "a bit unclear" to him. Ex-1060, 117:11-118:6. A POSA would not find this unclear. Beel's text expressly states the peripheral device includes software "for receiving media content from the network and for displaying the media content on the display." Ex-1005, ¶71. The only technically coherent reading is that the peripheral device receives media content, including content originating from functional devices through the

base node, and displays it on the processing device. Even if one were to read Beel narrowly on this point, Dinka's bidirectional communication architecture provides the missing piece. Dinka's system encodes, decodes, and (de)multiplexes data in both directions. Ex-1006, Abstract, 8:7-51, 9:32-50. In the combination, data from functional devices connected to the base unit would flow to the processing device through the bidirectional communication channel, exactly as the claims describe.

24. Patent Owner argues that the prior art does not teach video data being "interpreted and/or encoded in the base unit" (claims 2, 13) or that the base unit is configured to "enhance, mix, multiplex, and/or encrypt" first video data (claims 3, 14). POR at 24-25. Dr. Brogioli similarly takes the position that the prior art does not adequately disclose these video processing operations. Ex. 2004, ¶¶110-112.

25. In my field, we draw a clear distinction between data transport and data transformation. Data transport refers to moving data from one point to another, *e.g.*, over a network, across a bus, through a cable. At most of the lower layers of the protocol stack, including the transport layer, "data is data." The communication medium transmits bits without regard to whether those bits represent audio, video, or anything else. That is what I meant during my deposition, and it is a standard concept in networking and telecommunications.

26. Data transformation is different. It refers to the processing operations applied to data before or after transport, such as encoding, decoding, compression,

decompression, encryption, decryption, mixing, compositing. These operations are fundamentally type-specific. A video codec like H.264 exploits spatial and temporal redundancy in image frames; it uses motion estimation, discrete cosine transforms, and inter-frame prediction. An audio codec like Ogg/Vorbis or Opus operates in the frequency domain, using psychoacoustic models to discard audio information that human hearing cannot perceive. These are completely different algorithms solving completely different problems, each tailored to the characteristics of the data type they process. You cannot meaningfully apply a video codec to audio data or vice versa.

27. Beel expressly uses type-specific processing operations. For video, Beel describes: "The video signal is then encoded in a video encoder 3, packetized in a video packetizer 4." Ex-1005, ¶320. For audio, Beel describes: "Audio is...optionally encoded into for instance Ogg/Vorbis." Ex-1005, ¶314. The fact that Beel routes video data through a video encoder and audio data through an audio codec demonstrates that video data is "interpreted and/or encoded" in the system, exactly as claims 2 and 13 require. Dr. Brogioli confirmed this understanding during his deposition, acknowledging that Beel's "video encoder can encode video data using a video codec, and audio data using an audio codec" and that "a client PC...could run an audio encoder" to "encode a .wav file to mp3." Ex-1060, 77:4-25. The Windows multimedia architecture works the same way: as documented in

Microsoft's documentation, the operating system maintains separate processing pipelines and codecs for audio and video data, with distinct codec chains for each type. Exs-1055 -1059.

28. Dinka similarly employs a dedicated "voice engine" for encoding speech signals (Ex-1006, 9:32-42) and separate video codecs for visual data (Ex-1006, 9:45-50). This is consistent with how Skype itself operated during the relevant time period. As documented in Baset & Schulzrinne, "An Analysis of the Skype Peer-to-Peer Internet Telephony Protocol," Skype employed codecs such as iSAC and iLBC for audio data and VP7/H.264 for video data. Ex-1057. The use of different codecs for different data types was standard practice in unified communications systems well before 2017.

29. Dr. Brogioli argues that "while different types of data can be encoded differently, they can also be encoded the same way." Ex. 2004, ¶111. While it is theoretically possible to apply a generic compression algorithm (such as the ones used in the "gzip" utility) to any data stream, that is not how multimedia systems work, and it is not what the prior art teaches. In practice, multimedia systems use type-specific codecs because generic compression cannot achieve the compression ratios, latency requirements, or perceptual quality needed for real-time audio and video communication. A POSA would understand this distinction immediately. Significantly, during his deposition, Dr. Brogioli himself confirmed that Beel

teaches compression and scaling operations for bandwidth management, testifying that Beel describes situations where "you may want to compress the media content that's being sent to them or scale it" and that this involves "changing a resolution." Ex-1050, 91:12-94:2. This admission undercuts his written opinion that the prior art does not teach the video processing operations required by the claims.

30. I also note that during prosecution of this patent family, Barco itself described similar processing limitations as referring to operations "related to the functional data of the functional device, e.g., the images for a camera, the audio data for a microphone, etc., in which the transformations can include encoding/decoding, mixing, (de)multiplexing." Ex-1004, 1038. This description—which encompasses encoding, mixing, and multiplexing—matches precisely the operations recited in claims 2-3 and 13-14 of the '347 patent and what Beel and Dinka disclose.

31. I want to explain why the claims requiring video data to be "interpreted and/or encoded" and "enhanced, mixed, multiplexed, and/or encrypted" are satisfied by the prior art from a systems architecture perspective. In multimedia processing pipelines, the selection of a codec is determined by the data type. This is not merely a matter of choosing different software modules, it reflects fundamentally different mathematical and algorithmic approaches to data compression. Video codecs like H.264 operate on frames as two-dimensional arrays of pixels, exploiting spatial correlation (adjacent pixels tend to have similar values) and temporal correlation

(successive frames tend to be similar). They use techniques such as block-based motion compensation, discrete cosine transforms on 8x8 or 16x16 pixel blocks, and variable-length entropy coding optimized for image statistics. Audio codecs like Ogg/Vorbis or AAC, by contrast, transform the signal into the frequency domain using modified discrete cosine transforms, then apply psychoacoustic models to determine which frequency components can be discarded without perceptible quality loss. The perceptual models for audio are based entirely on human hearing characteristics—critical bands, temporal masking, simultaneous masking—concepts that have no analog in video processing. A POSA would understand that applying a video codec to an audio stream would produce meaningless output, and vice versa. The reason Beel and Dinka route video through video codecs and audio through audio codecs is not incidental, it is the only technically coherent approach. These operations constitute "interpreting" and "encoding" video data as the claims require, and Beel's auto-composing of multiple media streams constitutes "mixing" and "multiplexing" as claims 3 and 14 require.

VII. THE PRIOR ART TEACHES ENDPOINTS

32. Patent Owner argues that Beel does not disclose endpoints because it does not use that word. POR, 21-23. Dr. Brogioli similarly takes the position that the combination of Beel, Dinka, and Christison does not teach "at least one fixed or configurable endpoint of the functional device is exposed on the first peripheral

device." Ex. 2004, ¶¶73, 96-100. In my view, this formalistic argument ignores technical reality and is contradicted by Dr. Brogioli's own testimony.

33. The '347 patent itself admits that Figure 4—identical to Beel's Figure 11—depicts "vendor specific endpoints and a number of standard endpoints and can be interpreted or understood as a custom Driver, a default OS driver and/or a host application as has been described with reference to FIG. 4 do screen sharing and audio." Ex-1001, 18:4-9; compare Ex-1001, FIG. 4 with Ex-1005, FIG. 11. Patent Owner cannot disclaim its own specification. Its attempt to distinguish these figures by arguing that "none of components identified in Figure 4 are labeled as an endpoint" (POR, 22) ignores that the '347 patent's text expressly identifies the components as endpoints.

34. Dr. Brogioli's formalistic position that Beel does not teach endpoints because it does not use the word reflects flawed reasoning. He testified that if references did not use the word "endpoint," then they did not disclose endpoints. Ex-1060, 106:14-15, 107:2-3, 109:4-5. When asked whether the prior art must use the word "endpoint" to disclose one, he could only say that a reference "could describe such things, maybe with a different choice of words." Ex-1060, 109:10-15. Yet he conceded that "there are endpoints associated with the USB spec for a mass storage device" and that Beel's Figure 11 includes "mass storage device 12." Ex-1060, 95:14-98:1. He maintained that Beel's mass storage device is not an endpoint while

conceding the identical component in the '347 patent may be. Ex-1060, 107:25-108:14.

35. From a technical perspective, USB devices include endpoints; they cannot function without them. As documented in the Universal Serial Bus Specification, Revision 2.0, every USB device must have at least Endpoint 0 (the default control endpoint) and typically includes additional endpoints for data transfer. Ex-1052, §§5.3, 9.1-9.2; Ex-1002, ¶158. Beel's Figure 11 illustrates a peripheral device acting as a composite device with mass storage device 12, USB audio device 14, and USB HID device 13. Ex-1005, FIG. 11. Each of these is a USB device class that includes endpoints—mass storage devices use bulk endpoints, audio devices use isochronous endpoints, and HID devices use interrupt endpoints. A POSA would not need Beel to recite the word "endpoint" to understand that Beel's USB devices include endpoints. This is fundamental to how USB devices operate.

36. Dr. Brogioli contends that Dinka "teaches away" from using laptops for VoIP because Dinka "discourages use of laptops to host the virtual meeting and instead advocates for participating in packet-based communication from a television or set-top box." Ex. 2004, ¶¶79-86. Based on my experience in this field, I disagree.

37. Dinka itself discloses a system built around "a plurality of computer terminals 102" participating in VoIP calls. Ex-1006, 5:45-48. It describes each terminal as being "installed with a communication client application 110" enabling

"VoIP calls according to peer-to-peer principles." Ex-1006, 6:7-8, 6:23-26. And it acknowledges that VoIP is "most commonly accessed using a personal computer." Ex-1006, 2:1-4. In my view, a reference that describes, in detail, a system for computer-based VoIP communication cannot reasonably be understood as discouraging that very approach.

38. What Dinka actually discusses is a practical observation that some users may find it cumbersome to install and configure VoIP software on a laptop. Ex-1006, 2:4-8. I can confirm from personal experience that this was a common observation during the relevant time period; it was one reason why videoconferencing equipment manufacturers developed simplified interfaces. But noting a practical inconvenience is very different from saying the technology does not work or should not be used. By 2017, Skype had hundreds of millions of users running the application on personal computers. See Baset & Schulzrinne (documenting Skype's widespread PC-based deployment). I personally used Skype and similar VoIP applications on my laptop regularly during this time period, as did many of my colleagues in academia and industry. The notion that a POSA would have read Dinka and concluded that laptop-based VoIP was disfavored or should be avoided does not comport with reality.

39. Dr. Brogioli's testimony during his deposition is relevant here. When asked whether Dinka contemplates a plurality of computer terminals communicating

via Skype, Dr. Brogioli stated he did not "recall discussing that in my declaration" and had "no opinion" beyond what was in his declaration. Ex-1050, 85:1-19. When asked whether Dinka is limited to communication between a computer terminal and television sets, he again stated he did "not recall talking about that aspect of Dinka." Ex-1050, 86:5-91:9 . In his more recent deposition, when confronted with Dinka's disclosure of "a plurality of computer terminals 102" connected for VoIP communication (Ex-1006, 5:45-46, FIG. 1), Dr. Brogioli acknowledged Dinka "talks about...computers connected...over a packet-based computer network such as the internet" for voice and video calls. Ex-1060, 98:3-21. He also admitted that he does not "recall specifically that Dinka is making the statement that a VoIP call would be nonfunctional between two laptops." Ex-1060, 99:14-17.

VIII. A POSA WOULD HAVE FOUND IT OBVIOUS TO COMBINE THE PRIOR ART REFERENCES

A. Beel, Dinka, and Christison (Ground 1)

40. Dr. Brogioli opines that "a POSITA would not be motivated to combine Beel, Dinka, Christison." Ex. 2004, ¶72. In my view, the combination would have been straightforward for a POSA, and I want to explain why from a technical perspective.

41. Beel and Dinka address the same fundamental engineering problem: enabling multimedia communication between participants using networked devices

equipped with cameras, microphones, and displays. Beel focuses on the meeting-room environment with a base node connecting functional devices. Ex-1005, ¶¶85-89, 120-122. Dinka focuses on peer-to-peer VoIP communication using an application like Skype. Ex-1006, 6:7-13, 6:24-28. A POSA working on conferencing systems in 2017 would have been intimately familiar with both types of systems and would have recognized that running a Skype-type application on a processing device connected to Beel's base node is exactly the kind of integration that was happening across the industry during this time period. The '347 patent itself identifies Skype as a known "tool[] for unified communications" in its background section. Ex-1001, 8:13-35.

42. Dr. Brogioli suggests that because Dinka is assigned to Skype and Beel is assigned to Barco, a POSA would not think to combine them. Ex. 2004, ¶¶91-92. In my experience, engineers working on conferencing systems do not limit their thinking to solutions developed by a single company. The entire premise of the '347 patent is running third-party unified communications software on a processing device connected to a base unit with functional devices and involves integrating technology from different sources. A POSA would think nothing of considering how a Skype-type application could leverage hardware from a different vendor. Moreover, Dr. Brogioli's requirement for what's necessary for combinability would undercut basic tenants of an obviousness analysis.

43. Regarding Christison, the concept of presenting remote devices as if they were locally connected was well established by 2017. The Wireless USB Specification (Rev. 1.1, Sept. 2010) (Ex-) defined the protocols for wireless USB device presentation, and technologies like Wi-Fi Direct (documented by the Wi-Fi Alliance) provided the underlying wireless connectivity frameworks. Christison's use of a Proxy WUSB Hub to present wired USB devices as native wireless devices represents one specific implementation of this broadly understood concept. In my view, a POSA looking to present Beel's functional devices as virtual devices on a processing device would naturally have considered techniques like those described in Christison.

B. Beel's Base Unit Transmits Data to the Processing Device

44. Dr. Brogioli argues that Beel does not disclose data transmission from the base unit to the processing device. Ex. 2004, ¶¶74, 104-106. From a technical standpoint, I find this argument difficult to reconcile with what Beel actually describes.

45. Beel describes "microphone or microphones 38 that can be used to transfer audio, e.g. to the processing devices 31." Ex-1005, ¶120. The microphones are functional devices connected to the base node. For audio data from those microphones to reach the processing devices, it must pass through the base node's wireless connection. Beel's description of the base node having a "transceiver" (Ex-

1005, ¶129) confirms this; a transceiver, by definition, both transmits and receives. Similarly, Beel's software on the processing device includes "a third software code portion for receiving media content from the network and for displaying the media content on the display." Ex-1005, ¶71. The processing device has software expressly designed to receive media content, which in the context of Beel's system includes content from functional devices connected through the base node.

46. Even if one were to read Beel narrowly on this point, Dinka's bidirectional communication architecture provides the missing piece. Dinka's system encodes, decodes, and (de)multiplexes data in both directions. Ex-1006, Abstract, 8:7-51, 9:32-50. In the combination, data from functional devices connected to the base unit would flow to the processing device through the bidirectional communication channel, exactly as the claims describe.

47. I also note that Beel's description of its system is not limited to simple screen sharing. Beel expressly describes "electronic meeting systems," "web conferencing systems," and "data conferencing" for "screen sharing and voice conferencing" so that "a screen, keyboard, mouse, camera, etc. can be shared." Ex-1005, ¶¶85, 87-88. Beel further explains that "the present invention provides an electronic meeting tool for communicating arbitrary media content between different users 37 (with their own processing devices 31, e.g. PC, mobile phone, or tablet) and one display or projector or multiple displays or projectors 44 in the meeting room

30." Ex-1005, ¶122. This broader context confirms that Beel's system was designed for the same bidirectional collaborative communication that characterizes modern conferencing systems. Dr. Brogioli's focus on isolated embodiments ignores this overarching purpose.

C. Virtual Device Presentation in Beel's Peripheral-Less Embodiments

48. I addressed the general principle that software functionality is independent of storage medium in Section IV above. Here, I want to add a specific technical point about virtual device presentation.

49. Beel describes software that causes a "functional device" to appear to the operating system "as a composite device comprising for instance a (virtual) audio speaker device." Ex-1005, ¶317. This virtual device presentation is accomplished through software running on the processing device that interacts with the operating system's device management framework, using pre-installed generic drivers such as the USB Audio Class (UAC) driver. Ex-1005, ¶¶43, 312, 319. The peripheral device in Beel's earlier embodiments is merely the delivery mechanism for this software; the actual virtual device presentation is performed by code executing on the processing device, interacting with the processing device's operating system. Once the software is loaded and launched on the processing device (Ex-1005, ¶208), the peripheral device's involvement in virtual device presentation is complete. Notably,

Dr. Brogioli confirmed this understanding during his deposition, testifying that Beel describes "capturing audio on the peripheral device and then that peripheral device preferably acts as a composite device comprising, for instance, a virtual audio speaker." Ex-1050, 116:12-17.

50. When the fourth embodiment teaches that this software can be "copied on the client operating device" (Ex-1005, ¶247), a POSA would understand that the virtual device presentation capability travels with the software. Dr. Brogioli acknowledged this during his deposition, confirming that the portable application "goes on the client operating device" in the fourth embodiment. Ex-1060, 45:6-46:1. He could not identify any technical reason why the executable codes in Beel paragraphs 71-72 "could not be implemented using software on the client device, as explained in the fourth embodiment." Ex-1060, 34:6-35:21. See also "Virtual Audio Device (Kernel Streaming)," Microsoft Learn (describing how virtual audio devices are implemented entirely through software drivers interacting with the operating system's audio stack, with no dependency on any particular physical hardware).

51. I also want to address the dependent claims that are specific to the '347 patent. Claims 2 and 13 recite that "the first video data is interpreted and/or encoded in the base unit." Beel's "Base Node Software" includes "code...for auto-composing of different incoming arbitrary media streams and rendering of composited image on display." Ex-1005, ¶154. The base node "receives the plurality of arbitrary media

content...and auto composes this media content for rendering." Id., ¶143. Auto-composing multiple streams requires interpreting the incoming video data. Beel also discloses "Scaling of incoming arbitrary media Streams" (Ex-1005, ¶156), which requires analyzing the data. Dr. Brogioli admitted he did not address "interpreting" or my definition thereof. Ex-1060, 132:12-24.

52. Claims 3 and 14 recite that "the base unit is configured to enhance, mix, multiplex, and/or encrypt the first video data." Beel's base node software includes "code...for auto-composing of different incoming arbitrary media streams and rendering of composited image on display." Ex-1005, ¶154. Auto-composing is the same as "mixing" or "multiplexing"—combining separate streams into one presentation. Additionally, Beel discloses "encoding, compressing and optionally encrypting" video data (Ex-1005, ¶¶67, 70), which satisfies the "encrypt" alternative.

53. Claims 5 and 16 recite that "the first peripheral device demultiplexes, and/or decrypts, the first processed video data." For Ground 1, a POSA would find it obvious to demultiplex data for "displaying incoming arbitrary media content" obtained through Beel's video mixing, using standard algorithms. Ex-1005, ¶72. Beel's disclosure of "decrypting and decoding" at paragraph 72 further supports this limitation. Ex-1002, ¶142. For Ground 2, Van de Laar expressly discloses that "[r]ead access may be to the original, full resolution AV data, or to a modified, e.g.

scaled and/or transcoded, representation" of the primary AV data. Ex-1007, ¶56. Use of "transcoded" AV data obviously requires that an associated device, such as the peripheral device, be able to decode and/or interpret the video data as required by claims 4 and 15. Additionally, Van de Laar's disclosure of the WDH performing "audio and video mixing, scaling and/or re-encoding" (Ex-1007, ¶123) implies that the receiving peripheral device would demultiplex the mixed data to extract the relevant streams for the unified communications application. Demultiplexing is the inverse of multiplexing—if data is mixed or multiplexed at the base unit, demultiplexing extracts individual streams at the receiving device. This is basic signal processing that a POSA would have understood.

54. I want to provide additional technical context for why a POSA would find it obvious for the peripheral device to demultiplex and/or decrypt the first processed video data, as Claims 5 and 16 require. From a systems architecture perspective, demultiplexing is a fundamental and well-understood signal processing operation that extracts individual data streams from a combined or multiplexed signal. When Beel describes "auto-composing of different incoming arbitrary media streams" (Ex-1005, ¶72), a POSA would understand that the receiving device must perform the inverse demultiplexing operation to separate the composited streams for proper rendering or further processing. This is analogous to how a television receiver demultiplexes broadcast signals to extract audio and video channels, or how a VoIP

application demultiplexes network packets to extract separate audio and video streams. The algorithms for demultiplexing were standardized and widely implemented long before 2017; for example, MPEG transport stream demultiplexing was documented in ISO/IEC 13818-1, and similar techniques were used in protocols like RTP (Real-time Transport Protocol) for separating multiplexed media. Regarding decryption, Beel expressly discloses that the executable software code on the peripheral device includes "eleventh code for providing a means for receiving, decrypting and decoding incoming arbitrary media content." Ex-1005, ¶72. A POSA would understand that if data is encrypted during transmission from the base node to the peripheral device for security purposes—as Beel contemplates at paragraphs 67 and 70—then the receiving device must decrypt that data before it can be processed or displayed. Dr. Brogioli confirmed during his deposition that he understands the term "decrypting" in a generic computing sense, explaining that it involves reversing an encryption process so that "somebody on the other end can have a mechanism to perhaps reverse that process and then see the content." Ex-1060, 53:22-54:9. This testimony confirms that a POSA would have understood exactly how Beel's decryption disclosure applies to Claims 5 and 16.

55. I also want to provide specific technical analysis for the dependent claims under Ground 2. Patent Owner and Dr. Brogioli argue that the combination of Kaplan, Van de Laar, and Christison does not teach the video data processing

limitations in claims 2-3, 5, 13-14, and 16. Ex. 2004, ¶¶180-182; POR at 47-48. In my view, these arguments fail to account for what Van de Laar and Kaplan actually disclose about video data processing in the base unit.

56. For claims 2 and 13, which require that "the first video data is interpreted and/or encoded in the base unit," Van de Laar expressly discloses video data processing in the WDH. Van de Laar teaches that "the display output may be merged by the WDH using split screen, PIP overlay or any other means of audio and video mixing, scaling and/or re-encoding." Ex-1007, ¶123. The term "re-encoding" directly satisfies the "encoded" limitation. Van de Laar further discloses that the WDH provides "read access...to a modified, e.g. scaled and/or transcoded, representation of the primary AV data." Ex-1007, ¶56. "Transcoding" is a well-understood term in video processing that refers to converting video data from one encoding format to another—a process that necessarily involves both decoding the original format and encoding into the new format. A POSA would understand that transcoding satisfies the "interpreted and/or encoded" limitation because interpreting the incoming video format is a prerequisite to re-encoding it into a different format.

57. Kaplan also contributes to claims 2 and 13. Kaplan discloses that video processing tasks are divided between the computer, transmitter, and receiver, including "video processing, buffering, storage, and the like." Ex-1008, ¶27. Kaplan further discloses that the transmitter includes "resident software application" that

manages "compression/decompression algorithms (codecs)." Ex-1008, ¶¶47-48. A POSA would understand that using codecs to compress video data inherently involves interpreting and encoding that data—the codec must analyze the video frames (interpret) and apply compression algorithms (encode) before transmission. Dr. Brogioli could not articulate any technical reason why video processing, buffering, and the use of codecs would not constitute "interpreting and/or encoding." Ex-1060, 132:5-133:20.

58. For claims 3 and 14, which require that "the base unit is configured to enhance, mix, multiplex, and/or encrypt the first video data," Van de Laar provides multiple disclosures that satisfy these alternatives. Van de Laar teaches that the WDH performs "audio and video mixing, scaling and/or re-encoding." Ex-1007, ¶123. "Mixing" directly satisfies the claim language. Van de Laar also discloses that "[i]f two or more primary docking devices send output to the same display peripherals simultaneously, the display output may be merged by the WDH using split screen, PIP overlay or any other means of audio and video mixing." Ex-1007, ¶123. Merging multiple video streams into a single output through split screen or picture-in-picture overlay is precisely what "mixing" and "multiplexing" describe—combining multiple input streams into a unified output presentation.

59. Van de Laar also satisfies the "encrypt" alternative in claims 3 and 14. Van de Laar expressly discloses using "secure direct link" Wi-Fi connections

between the WDH and dockees. Ex-1007, ¶¶118-119. Secure Wi-Fi connections, as of 2017, used encryption standards including WEP, WPA, WPA2, and AES, as documented by the Wi-Fi Alliance. Ex-1033. A POSA would have understood that "secure" wireless communication protocols necessarily involve encryption of the data being transmitted. When the WDH transmits first processed video data to the peripheral device over a secure wireless link, that data is encrypted as part of the wireless communication protocol. This satisfies the "encrypt" alternative. Dr. Brogioli did not dispute that secure Wi-Fi involves encryption. Ex-1060, 53:22-54:9.

60. For claims 5 and 16, which require that "the first peripheral device demultiplexes, and/or decrypts, the first processed video data," Van de Laar and Kaplan together provide the necessary teachings. As I explained above, Van de Laar discloses that the WDH performs video mixing by merging multiple streams using split screen, PIP overlay, or other means. Ex-1007, ¶123. When the receiving dockee (in the proposed combination, through the peripheral device) receives this mixed video data and needs to display it or provide it to a unified communications application like Skype, the inverse operation—demultiplexing—is necessary to extract the relevant video stream. This is a fundamental principle of signal processing: multiplexed data must be demultiplexed at the receiving end before it can be properly processed or rendered.

61. Regarding decryption for claims 5 and 16, Van de Laar's use of secure Wi-Fi connections necessitates decryption at the receiving device. When the WDH transmits video data over an encrypted wireless link to the dockee, the dockee must decrypt that data before it can be processed or displayed. This is fundamental to how encrypted communication works—encryption at the transmitting end requires corresponding decryption at the receiving end. A POSA would understand without explicit disclosure that receiving encrypted wireless data requires decryption. Dr. Brogioli confirmed he understands decryption as "reversing an encryption process" so that the receiving end "can perhaps reverse that process and then see the content." Ex-1060, 53:22-54:9. Van de Laar's secure wireless communication thus satisfies the "decrypts" alternative in claims 5 and 16.

62. Dr. Brogioli argues that Van de Laar's "audio and video mixing" is different from "multiplexing." Ex. 2004, ¶182. This argument conflates terminology while ignoring technical substance. In signal processing, multiplexing refers to combining multiple signals into a single composite signal for transmission or processing. Van de Laar's description of merging "two or more primary docking devices['s] output to the same display peripherals simultaneously" through "split screen, PIP overlay or any other means" (Ex-1007, ¶123) is exactly what multiplexing accomplishes—combining multiple independent video streams into a unified output. Whether one calls this "mixing," "merging," or "multiplexing," the

technical operation is the same: multiple input streams are combined into a single output that contains elements of each. A POSA would recognize that Van de Laar teaches the claimed video processing operations regardless of the specific terminology used.

63. I want to provide additional technical detail on the Translation Limitation for Ground 2, which appears in claims 11, 22, 23, and 27. This limitation requires the base unit to "expose and make available the functional device...simultaneously with a plurality of first peripheral devices by interpreting, processing and translating the electronic signals coming from the functional device." Dr. Brogioli testified he has "no opinion" on what "translating" means in this context. Ex-1060, 125:6-25. From a technical perspective, "translating" electronic signals refers to converting signals from one format or protocol to another—a fundamental operation in any system that interfaces between different device types or communication standards. Van de Laar's WDH performs exactly this function: it receives A/V data from peripherals (like webcams and microphones) in their native formats, processes that data through operations like mixing, scaling, and re-encoding (Ex-1007, ¶123), and makes the resulting content available to multiple dockee devices through wireless protocols like Wi-Fi Miracast. Ex-1007, ¶¶73, 124-126. The conversion from wired peripheral protocols to wireless streaming protocols is

"translating" the electronic signals. A POSA would understand this as standard multimedia gateway functionality.

64. For claims 17, 24, and 31, which require the functional device to be "exposed natively on the first peripheral device," the combination of Van de Laar, Kaplan, and Christison provides the necessary teachings. The '347 patent suggests that "exposed natively" means USB communication can be established without proprietary software or drivers. Ex-1001, 12:21-29. Van de Laar discloses peripherals that "support standards such as Wi-Fi Serial Bus and Wi-Fi Miracast to make their functionality available through the wireless network to other devices." Ex-1007, ¶73. A POSA would understand that using standardized protocols like Wi-Fi Serial Bus means the peripheral functionality is "exposed natively" because these standards are supported by operating systems without requiring proprietary drivers. Christison further teaches presenting USB devices as "native WUSB [wireless USB] devices" that appear to the host "as if they are attached." Ex-1011, 6:17-19, 6:25-26. In the combination, Kaplan's USB peripheral implements the wireless communication function using standard USB protocols, and Christison's native device presentation allows functional devices connected to the WDH to appear as native USB devices on the processing device—exactly what claims 17, 24, and 31 require.

65. I also want to address Patent Owner's argument that Van de Laar does not disclose a "first peripheral device" at all—only dockees with integrated communication units. POR at 33-35. This argument misunderstands the nature of obviousness combinations. A POSA would not read Van de Laar in isolation but would consider how its teachings could be implemented using known techniques. Van de Laar teaches the communication unit 121 as the component enabling wireless communication between the dockee and the WDH. Ex-1007, ¶¶75-76. Van de Laar does not require this communication unit to be integrated into the dockee; it teaches that the communication may use "WiFi," "Bluetooth," or "60 GHz" technology. Ex-1007, ¶¶74-76. Kaplan teaches implementing wireless communication functionality through an external USB peripheral (transmitter 120) that connects to a computer. Ex-1008, ¶¶16-17, Fig. 2. A POSA would recognize that Van de Laar's communication unit function could be implemented through an external USB peripheral like Kaplan's transmitter—this is simply applying a known technique to a known device ready for improvement to yield predictable results. The form factor (internal vs. external) does not change the technical function being performed.

66. Regarding the Third Video Data Limitation and bidirectional data flow in Ground 2, Patent Owner argues that the Petition conflates data flow directions. POR at 46-47. I want to clarify the technical data flow in the proposed combination. Van de Laar teaches bidirectional A/V communication: primary dockees send A/V

data to the WDH (Ex-1007, ¶¶59, 115, 124), and the WDH sends A/V data back to dockees (Ex-1007, ¶¶115, 126). In the combination, when a user runs Skype on the processing device: (1) video data from the Skype application ("third video data") is sent through the peripheral device to the WDH using standard protocols like Wi-Fi Miracast (Ex-1007, ¶¶73, 128); (2) the peripheral device processes this data to form "second processed video data" by encoding it for wireless transmission (Ex-1007, ¶126—"WFM packets"); and (3) the WDH receives this processed data, decodes/enhances it, and forwards it to functional devices like displays. Ex-1007, ¶¶59, 123. This is exactly the data flow the claims describe. Van de Laar's explicit disclosure of dockees "send[ing] output to the WDH and/or its audio peripherals through an audio stream" using protocols including Skype (Ex-1007, ¶128) directly supports the Third Video Data Limitation.

67. Finally, I want to address claims 4 and 15 under Ground 2, which require the first peripheral device to "decode and/or interpret the first processed video data...to generate the second video data." Van de Laar teaches that dockees receive A/V data that may be "scaled and/or transcoded." Ex-1007, ¶56. When a dockee receives transcoded data, it must decode that data before it can be rendered on the dockee's display or provided to applications. This is fundamental to how video codecs work—transcoded data is encoded data that requires decoding at the receiving end. Kaplan similarly teaches that the receiver includes software for

"compression/decompression algorithms (codecs)" (Ex-1008, ¶¶47-48), which a POSA would understand includes decoding received video streams. Dr. Brogioli acknowledged that a codec is "an encoder and a decoder" and is used to "decode" or "decrypt" an incoming data stream. Ex-1060, 77:4-25. The combination thus satisfies claims 4 and 15.

D. Kaplan, Van de Laar, and Christison (Ground 2)

68. Dr. Brogioli argues that Petitioner "indiscriminately" relies on features of both primary and secondary dockees from Van de Laar. Ex. 2004, ¶¶153-155. In my view, this criticism misunderstands Van de Laar's architecture, which is intentionally flexible. During his deposition, Dr. Brogioli confirmed that dockees "can switch roles between primary and secondary and vice versa." Ex-1060, 85:17-92:24. This admission directly undercuts his written opinion that primary and secondary dockees have rigid, non-overlapping capabilities.

69. Van de Laar expressly teaches that dockees are not locked into a single role: "Each dockee can therefore operate in the capacity as a primary, secondary, or both, by having any combination of write and read permissions." Ex-1007, ¶93. The system "allows for more than one primary dockee to be connected to the wireless docking host (WDH) at the same time, and that each primary dockee can both send AV data to the WDH and receive AV data from the WDH." Ex-1007, ¶¶59-60. Van de Laar even describes "transforming a secondary device into a primary dockee

device, or a primary dockee device into a secondary device." Ex-1007, ¶60. This is a system designed for fluid role assignment, not rigid categories.

70. From a networking perspective, this flexibility is not surprising. Wi-Fi Direct, which underlies many wireless docking protocols, similarly allows devices to negotiate roles dynamically. See "Wi-Fi Direct," Wi-Fi Alliance. In the proposed combination, a processing device can exercise both primary dockee capabilities (running Skype, sending data) and secondary dockee capabilities (receiving simulated peripherals from the WDH) simultaneously. Van de Laar's architecture expressly accommodates this.

71. Regarding the "walled garden" argument, Patent Owner's characterization of Kaplan as requiring pre-paired transmitters and receivers (POR at 31-32), I note that Kaplan describes pre-pairing as occurring "in a particular embodiment." Ex-1008, ¶17. In my experience reading technical disclosures, the phrase "in a particular embodiment" signals that the described feature is one option among several. A POSA would understand that Kaplan's broader teaching of wireless USB transmission between a processing device and a receiver is not limited to configurations that use pre-pairing. During his deposition, Dr. Brogioli confirmed he has "no opinion one way or the other whether Kaplan includes embodiments that do not require a 'walled garden' approach." Ex-1060, 113:6-114:5. His lack of

opinion on this point undercuts Patent Owner's assertion that Kaplan is limited to a "walled garden" configuration.

72. I want to elaborate on why Van de Laar's flexible architecture supports the proposed combination. During his deposition, Dr. Brogioli confirmed that dockees "can switch roles between primary and secondary and vice versa." Ex-1050, 85:16-92:11. He also acknowledged Van de Laar's paragraph 59, which states that "[o]ptionally, the docking processor is arranged for docking multiple primary dockee devices." When confronted with this disclosure, Dr. Brogioli could not dispute that Van de Laar contemplates multiple devices both sending and receiving data simultaneously. This is exactly the architecture the proposed combination requires: a processing device operating as a primary dockee (with control privileges and Skype functionality) while simultaneously receiving simulated peripherals (acting as a secondary dockee for those particular data streams). There is no technical barrier to this dual functionality—Van de Laar's system was designed for precisely this type of flexibility.

73. Dr. Brogioli argues that Skype and Miracast are "alternatives" that cannot function together. Ex-2004, ¶¶172-173; POR, 43-44. This reflects a fundamental misunderstanding of network architecture. Skype operates at the application layer, generating A/V content. Wi-Fi Miracast operates at a lower layer (transport/network), carrying that content wirelessly. Ex-1006, Abstract; Ex-1007,

¶73. These technologies are not mutually exclusive; they operate at different layers of the protocol stack and routinely coexist. A user can run a Skype call on a laptop while using Miracast to mirror that call to a larger display—precisely Van de Laar's use case. Van de Laar's WDH forwards content to secondary dockees: "The WDH provides an A/V stream representing the output being sent by presenter P to the WDH peripherals. This allows the users of the secondary dockee devices to follow the presentation." Ex-1007, ¶115. The combination requires only that Skype-generated content reach secondary dockees through the WDH, which Van de Laar expressly teaches.

74. Patent Owner also argues that the Petition improperly attributes functions of docking processor 101 (in the WDH) to communication unit 121 (in the dockee). POR, 39-41. This misreads both references and the combination. Van de Laar's Figure 1 shows these as distinct components: docking processor 101 resides in the WDH (host device 100); communication unit 121 resides in dockee 120. Ex-1007, ¶¶75-76, Fig. 1. The Petition maps the WDH to the base unit and the communication unit to the first peripheral device. These are separate devices with separate functions, exactly as the claims require. A POSA would naturally look to Kaplan's USB peripheral to implement Van de Laar's wireless communication function, applying "a known technique to a known device ready for improvement to yield predictable results." Van de Laar does not require the communication unit to

be internal. Van de Laar teaches that the communication unit can use "WiFi," "Bluetooth," or "60 GHz" technology. Ex-1007, ¶¶74-76. Nothing precludes implementing this functionality through an external USB peripheral—the communication protocol, not the form factor, defines the function. Dr. Brogioli identified no technical obstacle to peripheral implementation. Ex-1060, 136:4-17.

75. I also want to address the claim limitations regarding drivers and video data. Patent Owner argues that fundamental Ground 2 provides no teachings of a driver, noting that the word "driver" does not appear in either Kaplan or Van de Laar. POR, 44-45. This argument is technically unfounded. When Van de Laar describes a "simulated webcam" that "would appear to the dockee as if it were a normal peripheral" (Ex-1007, ¶54), and peripherals that "support standards such as Wi-Fi Serial Bus and Wi-Fi Miracast to make their functionality available through the wireless network to other devices" (Ex-1007, ¶73), a POSA would necessarily understand that drivers are involved. As I explained in Section V above, every device that "appears" to an operating system does so through a driver—there is no alternative pathway. Van de Laar's system necessarily or at least obviously includes drivers because that is how operating systems interact with devices, whether physical or virtual. Kaplan further confirms this by disclosing that "compression/decompression algorithms (codecs) are available on the computer" and that resident software on the computer determines which codecs to use. Ex-1008,

¶48. A POSA would understand that this software operates through the operating system's driver and media framework. Dr. Brogioli could not identify any operating system that functions without peripheral drivers (Ex-1060, 78:1-12, 149:14-150:1), which undermines his position that the absence of the word "driver" from Van de Laar or Kaplan is significant.

IX. OBSERVATIONS REGARDING DR. BROGIOLI'S TECHNICAL OPINIONS

76. I want to share several observations about Dr. Brogioli's technical analysis that have informed my own evaluation of his opinions.

77. During his deposition, Dr. Brogioli exhibited a pattern of declining to engage with technical questions that fell outside the precise scope of his written declaration. When asked about basic aspects of the prior art references he had opined on, he repeatedly answered that he had "no opinion" or did "not recall discussing" the topic. Ex-1050, 85:2-19, 97:1-11. In my experience, a technical expert with genuine familiarity in a field would be able to discuss fundamental concepts in that field even if those specific concepts were not addressed in a written report.

78. I was also struck by an inconsistency in Dr. Brogioli's testimony regarding endpoints. He testified that mass storage devices are endpoints under the USB specification (Ex-1060, 97:10-98:1, 114:17-21), yet insisted Beel's mass storage device is not an endpoint because "Beel does not mention endpoints at all."

Ex-1060, 106:2-108:14. In my view, the answer to whether a mass storage device is an endpoint should not depend on which patent is being discussed—it is a technical question with a technical answer. This double standard was further exposed when he testified that ClickShare's webcam is an endpoint "exposed via a USB" (Ex-1060, 146:1-3), but could not explain why Beel's webcam would not also be an endpoint—even though ClickShare also does not use the word "endpoint." Ex-1060, 146:15-24. There is no technical way to reconcile these inconsistent positions.

79. Most significantly, Dr. Brogioli's assertion that "operating a simulated peripheral does not necessarily require using a driver" (Ex. 2004, ¶175) is, in my view, inconsistent with how operating systems have functioned for decades. As I explained in Section V, drivers are the mechanism through which operating systems interact with all devices, whether physical or virtual. I am not aware of any modern operating system that presents a device to application software without a driver in the communication path. This is thoroughly documented in standard references such as the USB 2.0 specification and Microsoft's WDM documentation, and it is a concept taught in introductory operating systems courses.

80. Dr. Brogioli's deposition also revealed significant admissions that support Petitioner's positions. When questioned about Beel's paragraph 254, which describes "[f]urther compression and/or scaling of the arbitrary media content to allow use of low bandwidth connection," Dr. Brogioli confirmed that this describes

video processing operations: "It looks like it's saying there may be somebody—a client operating device from 253 that may be on a low bandwidth connection so they can't get as many bits effectively at a certain rate, for example, and so you may want to compress the media content that's being sent to them or scale it—probably scale it down, I think it's referring to." Ex-1050, 91:16-92:8. When asked whether "scaling is a form of compression," Dr. Brogioli agreed it was "compression and scaling or scaling" and confirmed that "changing a resolution" is an example of such scaling. Ex-1050, 92:9-17. These admissions directly support Petitioner's position that Beel teaches the video data processing operations—including interpreting, encoding, and enhancing—required by claims 2-3 and 13-14.

81. Dr. Brogioli further confirmed Beel's disclosure of virtual device presentation when questioned about paragraph 317. He testified that Beel "talks about scraping audio, like the prior art. And capturing audio on the peripheral device and then that peripheral device preferably acts as a composite device comprising, for instance, a virtual audio speaker." Ex-1050, 116:12-17. He also confirmed the data flow: "The peripheral device captures the audio stream with the device driver and then that is streamed—or the peripheral streams the audio to the base unit." Ex-1050, 117:1-4. These admissions align with my analysis of how Beel implements virtual device presentation through software executing on the processing device.

82. Additionally, Dr. Brogioli confirmed that unified communication between processing devices occurs through client software, as the claims require. When asked about the communication between processing devices 160-3 and 160-4 through "unified communication software," Dr. Brogioli agreed: "That looks like what the first and second sentence of this paragraph in Column 18 seem to be referring to." Ex-1050, 68:7-14. This testimony supports the combination of Beel and Dinka for teaching unified communication functionality.

83. Finally, Dr. Brogioli's lack of familiarity with the accused products undermines Patent Owner's secondary considerations arguments. When asked whether he had performed a "side-by-side analysis" of the ClickShare button in Beel's Figure 10 versus the modern conference version, Dr. Brogioli admitted: "I don't recall performing a side-by-side analysis of those different devices." Ex-1050, 143:17-19. He also could not identify the version of ClickShare button depicted in his declaration or explain whether the conference version includes the same internal components. Ex-1050, 141:11-144:19. Without this analysis, Patent Owner cannot establish a nexus between any alleged commercial success and the specific claims of the '347 patent.

84. Dr. Brogioli's more recent deposition (Ex-1060) in this '347 IPR proceeding revealed additional significant admissions. When asked about Beel's fourth embodiment, Dr. Brogioli acknowledged that the portable application "goes

on the client operating device" and confirmed there is "no plug-and-play port such as the USB port...required on the client operating device." Ex-1060, 45:6-46:1. He further confirmed that in Beel's third embodiment, "the execution of the software would ultimately be the execution of instructions on the Intel processor in the...Windows laptop," and when asked whether the instructions "would be executed on the processor of the processing device," he answered: "As far as I recall, that sounds correct." Ex-1060, 49:15-50:1. These admissions directly contradict his written opinion that peripheral-device features cannot be attributed to peripheral-less embodiments. *See*, *e.g.*, Ex-2004, ¶101.

85. Dr. Brogioli was asked whether Figure 7 of Beel illustrates a peripheral device—even though Beel paragraph 100 explicitly states "Figure 7 shows a peripheral device"—He could not give a yes-or-no answer despite extended questioning. Ex-1060, 38:18-44:9. He also maintained contradictory positions on endpoints: he testified that mass storage devices are endpoints under the USB specification (Ex-1060, 97:10-98:1, 114:17-22), yet insisted Beel's mass storage device is not an endpoint because "Beel does not mention endpoints at all." Ex-1060, 106:2-108:10. This double standard was further exposed when he testified that ClickShare's webcam is an endpoint "exposed via a USB" (Ex-1060, 146:1-3), but could not explain why Beel's webcam would not also be an endpoint—even though ClickShare also does not use the word "endpoint." Ex-1060, 146:15-24.

86. Critically, Dr. Brogioli confirmed key technical teachings that support Petitioner's combination. He acknowledged that Beel's "video encoder can encode video data using a video codec, and audio data using an audio codec" and that "a client PC...could run an audio encoder" to "encode a .wav file to mp3." Ex-1060, 77:1-25. He also confirmed that pre-installed generic drivers for WiFi interfaces were well-known at Beel's priority date and that "the person of skill in the art would be aware of the use of these types of drivers." Ex-1060, 63:5-64:19. When confronted with Dinka's disclosure of "a plurality of computer terminals 102" connected for VoIP communication, Dr. Brogioli acknowledged Dinka "talks about...computers connected...over a packet-based computer network such as the internet" for voice and video calls. Ex-1060, 102:8-103:14.

87. Perhaps most difficult to reconcile with applying the knowledge of a POSA, he admitted having "no opinion" on fundamental technical questions that any POSA in this field, let alone an expert in the field, should be able to address. He testified he had no opinion on: (1) whether operating systems present devices to applications without using drivers (Ex-1060, 78:1-12, 149:10-150:1); (2) what "translating" means in the context of the '347 patent (Ex-1060, 125:6-25); (3) what "interpreting" or "encoded" mean (Ex-1060, 126:1-14, 132:5-133:20); (4) whether endpoints must be either fixed or configurable (Ex-1060, 115:16-116:23); and (5) what technical challenges a POSA would face using a WiFi interface (Ex-1060,

60:1-62:5). When confronted with his opinion that "operating a simulated peripheral does not necessarily require using a driver," he could not "identify any real-world operating systems where a simulated peripheral is presented to an application without any driver involvement." Ex-1060, 149:18-24.

88. Finally, Dr. Brogioli testified that he could not recall ever using a dongle to share content in a conference room before this litigation. Ex-1050. The technologies at issue in this proceeding, *e.g.*, wireless conferencing systems, virtual device presentation, and unified communications applications, are technologies I have used, researched, and taught about throughout my career, as documented in my curriculum vitae (Ex-1003) and original Declaration (Ex-1002, ¶¶5-30).

X. SECONDARY CONSIDERATIONS

89. Patent Owner points to a Crestron license agreement and alleged commercial success of ClickShare products as evidence of non-obviousness. POR at 58-62. I am not offering a legal opinion on the weight of this evidence, but I can offer relevant technical observations.

90. From a technical standpoint, Barco's ClickShare product line encompasses a wide range of features that go well beyond the specific claims of the '346 patent. Modern ClickShare products support integration with platforms like Microsoft Teams and Zoom, can operate with or without dongles, provide cloud management capabilities, and include numerous other sophisticated features. Ex-

1061. In my view, it is difficult to attribute the commercial performance of a product with this many features to any single patent's claims, particularly when the core underlying technologies—wireless communication between a processing device and a base unit with connected functional devices, video data processing and transmission through endpoints via generic drivers, and bidirectional data flow between base units and peripheral devices—were, as I have explained, well understood and widely implemented before the claimed priority date.

91. Regarding the Crestron license, I understand it covers multiple patents from multiple patent families and includes international rights. Without a way to isolate what portion of the license value, if any, is attributable to the specific claims of the '347 patent, I do not believe the license tells us much about whether those specific claims would have been obvious to a POSA. Dr. Brogioli performed no analysis of which features drive the cited recognition. Ex-1060, 142:23-143:9. Without evidence tying commercial success or industry praise to the claimed invention rather than unclaimed features, this evidence lacks probative value.

XI. CONCLUSION

92. For the reasons set forth above and in my original Declaration (Ex-1002), it is my view that all challenged claims 1-31 of the '347 patent would have been obvious to a POSA at the time of the alleged invention. After carefully reviewing Dr. Brogioli's declaration and deposition testimony, I find that his

technical arguments do not withstand scrutiny. The core technologies at issue—transmitting video data between a base unit and peripheral devices via generic communications protocols, exposing endpoints of functional devices on peripheral devices, processing video data in the base unit, making video data available through standard or generic drivers, and communicating wirelessly between a processing device and a base unit with connected functional devices—were each individually well known and routinely combined in conferencing systems before December 2017.

93. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: March 31, 2026

By: Kevin C. Almeroth
Kevin C. Almeroth, Ph.D.