UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTELLIGENT PROTECTION MANAGEMENT CORP.,
Petitioner,

v.

CISCO TECHNOLOGY, INC.,
Patent Owner.

Case IPR2025-01588
U.S. Patent No. 8,830,293

DECLARATION OF OMID KIA, Ph. D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,830,293

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CLAIM LISTING

1.pre	1. A method comprising:
1.a	receiving at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image;
1.b	combining the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the combining comprises:
1.c	scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;

1.d	removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and
1.e	superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream; and
1.f	supplying the combined video stream to a video display for displaying the combined video stream.
2	2. The method of claim 1, wherein the subject image of video frames of the first video stream comprises images of multiple videoconference participants and the subject image of video frames of the second video stream comprises images of multiple videoconference participants.
3.pre	3. The method of claim 1, wherein combining comprises:

3.a	scaling the video frames of the second video stream and repositioning in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;
3.b	extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and
3.c	superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream.
4	4. The method of claim 3, wherein the second direction is opposite to the first direction.
5.pre	5. The method of claim 1, wherein combining further comprises:
5.a	removing the background image in the video frames of the first and second video streams to produce first and second background separated video frames;
5.b	generating supplemental background image video frames that comprise a supplemental background image; and

5.c	superimposing corresponding ones of the first background separated video frames and the second background separated video frames onto corresponding ones of the supplemental background video frames to produce the combined video frames of the combined video stream.
6	6. The method of claim 1, wherein the first and second video streams are produced at a same video conferencing site.
7	7. The method of claim 1, wherein the first and second video streams are produced at different video conferencing sites.
8	8. The method of claim 1, wherein combining is performed at a site other than where the first and second video streams are produced.
9	9. The method of claim 1, wherein the subject images of video frames of the first and second video streams are images of video conference participants.
10.pre	10. An apparatus comprising:
10.a	a first memory configured to store data for at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image; and

10.b	at least one data processor configured to:
10.c	combine the subject images of corresponding video frames of the first and second video streams into a combined frame of a first combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the at least one data processor is configured to combine the subject images of video frames by:
10.d	scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;
10.e	removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and

10.f	superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream.
11.pre	11. The apparatus of claim 10,
11.a	wherein the at least one data processor is configured to combine the subject images of video frames by:
11.b	scaling the video frames of the second video stream and reposition in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;
11.c	extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and
11.d	superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream.

12.pre	12. A system comprising the apparatus of claim 10, and further comprising:
12.a	a first video conferencing endpoint configured to communicate with the apparatus, the first endpoint including:
12.b	a first video camera configured to generate the first real-time video stream, wherein the subject image of the first real-time video stream comprises an image of a first video conferencing participant at the first endpoint;
12.c	a second video camera configured to generate the second real-time video stream, wherein the subject image of the second real-time video stream comprises an image of a second video conferencing participant at the first endpoint; and
12.d	a first control unit configured to forward the first and second real-time video streams to the apparatus; and
12.e	a second video conferencing endpoint configured to communicate with the apparatus, the second endpoint including:
12.f	a second control unit configured to receive the combined video stream of the apparatus; and

12.g	a display configured to receive and render the combined video stream from the control unit.
13.pre	13. Logic encoded in one or more tangible non-transitory storage media for execution and when executed operable to:
13.a	receive at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image;
13.b	combine the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the subject images are combined by:
13.c	scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;

13.d	removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and
13.e	superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream; and
13.f	supply the combined video stream to a video display for displaying the combined video stream.
14	14. The logic of claim 13, wherein the logic that receives is configured to receive video frames of the first video stream comprising images of multiple videoconference participants in the subject image and video frames of the second video stream comprising images of multiple videoconference participants in the subject image.
15.pre	15. The logic of claim 13, wherein the logic that combines is configured to:

15.a	scale the video frames of the second video stream and reposition in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;
15.b	extend the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and
15.c	superimpose the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream.
16	16. The logic of claim 15, wherein the second direction is opposite to the first direction.
17.pre	17. The logic of claim 13, wherein the logic that combines is configured to:
17.a	remove the background image in the video frames of the first and second video streams to produce first and second background separated video frames;

17.b	generate supplemental background image video frames that comprise a supplemental background image; and
17.c	superimpose corresponding ones of the first background separated video frames, and the second background separated video frames onto corresponding ones of the supplemental background video frames to produce the combined video frames of the combined video stream.
18	18. The logic of claim 13, wherein the first and second video streams are produced at the same video conferencing site.
19	19. The logic of claim 13, wherein the first and second video streams are produced at different video conferencing sites.
20	20. The logic of claim 13, wherein the logic that combines is configured to be performed at a site other than where the first and second video streams are produced.

I, Omid Kia, Ph. D., hereby declare as follows:

I. INTRODUCTION

1. I have been retained as an expert on behalf of Petitioner Intelligent Protection Management Corp. ("Petitioner" or "IPM") to support a petition for *inter partes* review ("IPR") of claims 1-20 ("the Challenged Claims") of U.S. Patent No. 8,830,293 ("the '293 patent").

2. I am being compensated for my time in connection with this IPR at my standard rate for consulting services. My compensation is not dependent on the outcome of this proceeding, the results of my analysis, or on the substance of my opinions and testimony.

3. I have been asked to provide my opinion on the validity of claims 1-20 of the '293 patent. In particular, I have been asked to consider whether U.S. Patent No. 8,345,082 ("Tysso") renders obvious claims 1-20 of the '293 patent. Relatedly, I have also provided opinions on other matters as set forth in this Declaration, including issues regarding the effective priority date of Tysso and the disclosure of U.S. Patent Application No. 61/103,588 ("Tysso Provisional").

4. In preparing this Declaration, I have reviewed the following materials, including other materials discussed in this document:

Exhibit Number	Exhibit Description
1001	U.S. Patent No. 8,830,293 ("the '293 patent")
1002	File History of U.S. Patent No. 8,830,293
1004	U.S. Patent No. 8,345,082 ("Tysso")
1005	U.S. Patent Application No. 61/103,588 ("Tysso Provisional")
1006	User Manual for GNU Image Manipulation Program (dated May 1, 2007) ("GIMP")
1007	Printout of https://web.archive.org/web/20070521020845/http://docs.gimp.org/download.html, captured by Internet Archive on May 21, 2007
1008	Screenshot of https://web.archive.org/web/20070512113240/http://docs.gimp.org/en.pdf, captured by Internet Archive on May 12, 2007
1009	Printout of https://archive.org/legal/affidavit

II. BACKGROUND AND QUALIFICATIONS

5. A brief summary of my background and qualifications is provided in this section. which I believe qualifies me to opine as one skilled in the art of relevant technology. A true and correct copy of my *curriculum vitae*, attached hereto, provides additional details regarding my background and qualifications.

6. I earned my Bachelor's of Science in electrical engineering from Catholic University of America in 1987. In 1989, I completed my Master's of Science in electrical engineering from the University of Illinois at Chicago. I then

attended the University of Maryland at College Park, where I earned my Ph.D. in electrical engineering in 1997.

7. A chief focus of my career has been designing and developing computed imaging, video, and content processing systems for medical and other uses, considering all aspects of the user, patient and system components, including the requisite hardware, software, networking, and user-facing system elements. My experience in this space spans industry and academia. For example, after I completed my Ph.D., I took the position of Chief Technical Officer at IMACOM in 1999. In this role, I managed a team of engineers in developing medical imaging software including both ultrasound and X-ray imaging applications. Among other things, my role involved the development of video pipeline processing, real-time storage and retrieval of live video, creating custom software applications and integrating custom graphical user interfaces to meet customer demands. For example, I designed algorithms where the user interface exploits the underlying information by interacting with the user interface implemented in desktop, server and mobile environments.

8. My experience includes design and development of systems for video and content processing and communication, among many other concepts, including Video over IP, video surveillance, storage and processing of real-time live video,

multimedia compression and communication, and image and video indexing. For example, after I completed my Ph.D., I worked as an Electronics Engineer at the National Institute of Standard and Technology, where I performed research and development on various projects involving multimedia compression and communication and video indexing using media processing tools to develop new and innovative techniques for archiving, processing and transmitting video and other media. I also researched techniques for serving large microscope images annotated with educational pointers for educational purposes and served as the U.S. Ambassador to the MPEG standardization Group working on the standards for MPEG-4 at the time. As another example, while working as a principal consultant for Sigma Vision, I authored several proposals directed to Video Over IP and video surveillance systems, including development of Video Over IP systems for thin clients that were java enabled. Later on, as President of Sigma Vision, I also performed several large scale consulting projects in the area of Video Over IP.

9. I am currently a senior systems engineer, serving as subject matter expert at Coastal Communication Consultants, Inc. (hereinafter referred to as "CCCi"). In this capacity, I serve as an expert in all of CCCi's imaging and video data initiatives along with high-technology research and development. I also serve

as an expert in all of CCCi's activities pertaining to video processing, video surveillance, image/signal processing, and other software development problems.

10. Prior to joining CCCi, I served as the Chief Image Scientist at Northstrat Inc. (hereinafter referred to as "Northstrat") and Senior Scientist at ITT Exelis, Space Sciences Division (hereinafter referred to as "ITT Exelis") in a similar capacity. In my role at ITT Exelis and similarly Northstrat, I led research and development efforts with respect to all high technology development, including in the areas of video processing, compression and standards.

11. ITT Exelis and Northstrat expanded their business into product-based services and as such utilized my innovative approach to develop high technology products that carried a service-based revenue model. ITT Exelis (now part of Harris Corporation) was a leader in Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance ("C4ISR") related products and systems and information and technical services, supplying military, government, and commercial customers in the United States and globally.

12. Also at ITT Exelis, I served as one of the leading experts in image and computer vision related activities. In particular I designed the camera processing for a large field of view, multi-sensor camera with field-steerable mirrors to be used in an Unmanned Aerial Vehicle (UAV). I also served as the video processing

subject matter expert to address all aspects of video coding and decoding as it pertains to image quality, channel model, display, format, indexing, error recovery and transmission.

13. Prior to joining ITT, I served as the Chief Scientist at Imaging Sciences International, Inc. where my efforts catapulted the company into the leading Cone Beam Computed Tomography (CBCT) provider in the world. The application of CBCT was targeted for the general dental market with first adopters including Implantologists but later to other providers. I also served as the primary Intellectual Property Manager for all patent related work for Imaging Sciences and its affiliates, as well as a subject matter expert for all efforts involving digital imaging. Prior to joining Imaging Sciences, in my roles at Sigma Vision, Portis, and IMACOM, I researched and developed numerous medical and consumer technologies, involving imaging and signal processing, video processing, Video On Demand, video surveillance, and multimedia communication systems. These activities included hardware and software design throughout the entire system development cycle, including networking and user interface solutions.

14. Also, prior to that, and immediately after my graduation, I continued work in media compression and processing at the Compression Group in the Information Technology Laboratory of the National Institutes of Standards and

Technology. In this role, I continued my research and expanded on similar topics across several media forms. In particular, I served as the United States Government ambassador to the MPEG standardization group. I also expanded on my thesis research topic to exploit compressed-domain processing of media for images, video and multimedia content. I worked with engineers who utilized the MPEG standardization body's source code for performance, quality, and testing.

15. In these capacities, I have worked on many aspects of video and content systems, including algorithm development, software development, hardware development, networking architecture, and system design. I have also implemented video processing baselines for various products including performance criteria such as video quality, processing and communication requirements.

III. UNDERSTANDING OF PATENT LAW

16. In forming the opinions expressed in this Declaration, I relied upon my education and experience in the relevant field of the art, and I have considered the viewpoint of a person having ordinary skill in the relevant art at the time of the invention. I am not a patent attorney, nor have I independently researched the law of patent validity. Attorneys have explained certain legal principles to me that I have relied on in forming my opinions as set forth in my Declaration, including principles of prior art, anticipation, and obviousness.

17. I understand that in an *inter partes* review, the petitioner carries the burden of proving patent claim invalidity by a preponderance of the evidence on a claim-by-claim basis, based on either patents or printed publications. Each claim is analyzed independently. It is my understanding that when a party has the burden of proving a claim invalid by the preponderance of the evidence, the party must show that it is more likely than not that the claim is invalid.

18. I understand that a patent can be invalid for anticipation or for obviousness.

19. I understand that a patent claim may be invalidated as anticipated under § 102 of the patent statutes only if a single prior art reference discloses each and every limitation of the invention. To render a claim anticipated, the single reference must disclose each and every limitation of the claim either expressly or inherently, and must disclose every limitation of the claim as those limitations are arranged in the claim. I understand that a limitation inherently exists in a reference only if that limitation is necessarily disclosed by the reference. The mere fact that something may result from a given set of circumstances is not sufficient to show inherency, as inherency cannot be established by probabilities or possibilities.

20. I understand that under § 103 of the patent statutes, a patent claim may be invalid as obvious in view of a combination of prior art references or in

view of a single prior art reference. Obviousness is determined from the perspective of a hypothetical person of ordinary skill in the art (also known as a "POSITA" as discussed below in ¶¶25-28).

21. I understand that an obviousness analysis involves three factual inquiries: (1) the scope and content of the prior art, (2) differences between the prior art and the claims at issue, and (3) the level of ordinary skill in the art.

22. I understand that a patent claim may not be obvious if the prior art, either alone or in combination, and even when combined with the knowledge of one having ordinary skill in the art, does not disclose or suggest all of the limitations of a claim, i.e. that there remain differences between the prior art and the claim at issue. I also understand that a patent claim may not be obvious if a POSITA would not have modified or combined the prior art in a manner that would have disclosed or suggested all of the limitations of the claim.

23. In addition, I understand that a variety of factors are considered in determining whether an invention would have been obvious to a person of ordinary skill in the art. For example, a teaching, suggestion, or motivation in the prior art that would have led a person of ordinary skill in the art to modify a prior art reference or select multiple prior art references and combine them in such a fashion as in the claimed invention, may render an invention obvious. As well, a

combination of elements that was obvious to try, for example, in light of market pressures, may render an invention obvious if there was a reasonable expectation of success. I understand that other factors can be considered in an obviousness analysis, including: whether known elements are combined using known methods to create predictable results; whether one known element is substituted for another known element to obtain predictable results; whether a known technique is used to improve a similar device in the same way; whether a known technique is applied to a known device ready for improvement to yield predictable results; and whether design incentives or other market forces would have prompted a POSITA to implement predictable variations in known work in one field of endeavor for use of those predictable variations in either the same field or a different one.

24. I understand that an invention may not be obvious if the prior art reference(s) teaches away from the proposed modification or combination of prior art references. In addition, an invention may not obvious if the proposed combination creates "unpredictable results." Also, an invention may not obvious if the proposed modification or combination would render the prior art device inoperable.

IV. PERSON OF ORDINARY SKILL IN THE ART

25. I understand that the factors considered in determining the level of ordinary skill in the art include education and experience of persons working in the art, and the types of problems encountered in the art.

26. In my opinion, a person of ordinary skill in the art ("POSITA") relevant to the '293 patent would be familiar with the technical field relating to video conferencing. A POSITA at the time of the invention would have had at least a computer science, computer engineering, or electrical engineering degree, or a related field, and two years of experience in image or video processing. Work experience can substitute for formal education and additional formal education can substitute for work experience.

27. The patent application for the '293 patent was filed on May 26, 2009. My analysis and opinions are based on the perspective of a person of ordinary skill in the art as of May 2009.

28. As noted above with regard to my education and experience as of May 26, 2009, I believe I possessed at least an ordinary level skill as of that date. I am familiar with the knowledge that a POSITA would have had at this time and the manner in which such a person would have viewed the available information at the time. My declaration and opinions are offered from this perspective, even if my

declaration does not specifically refer to the perspective of a POSITA in every instance below.

V. TECHNICAL INTRODUCTION TO THE '293 PATENT

29. The '293 patent is entitled, "Video Superposition for Continuous Presence." It seeks to describe a system for creating more natural-looking video conferencing displays with multiple participants ('293 patent, 2:23-29) in contrast to videoconferencing systems using a "Hollywood Squares" arrangements where participant images are reduced and stacked in rectangles, breaking the illusion of being in the same room ('293 patent, 1:20-28).

30. As set out in the abstract of the '293 patent, the system receives two or more real-time video streams, each with video frames having subject and background images. The system combines the video frames of the video streams into combined video frames to produce a combined real-time video stream such that a subject image of the first video stream is positioned in an anterior (front) portion of the combined frame and a subject image of the second video stream is positioned in a posterior (back) portion of the combined frame. As an example, the '293 patent allows the superimposed subject images of the combined video frame to be scaled to "near life-size" and arranged such that the subject images appear to be sitting in the same room one in front of another (e.g., individuals seated in stadium seating). '293 patent, 5:20-35.

31. The ’293 patent achieves this by taking advantage of unused background space in a video frame to maintain near “life-size” participant images while achieving continuous presence. ’293 patent, 5:65-6:3.

32. FIG. 4 of the ’293 patent, reproduced below, depicts a flowchart depicting a method 720 of combining the subject images of corresponding video frames into a combined video frame (’293 patent, FIG. 4, 6:53-67):

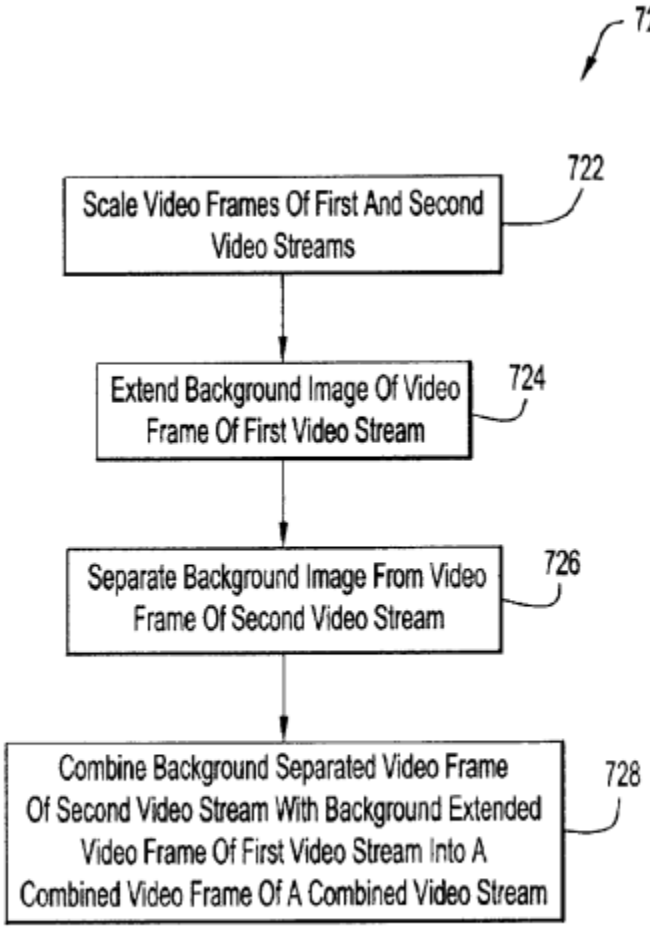


FIG.4

33. Video frames of a first video stream (as shown in FIG. 5A, ’293 patent, 7:5-8) and a second video stream (as shown in FIG. 5B, ’293 patent, 7:8-9) captured at substantially the same time are scaled in step 722. FIG. 5C and 5D illustrate the scaling function 722 applied to video frames of the first and second real-time video streams:

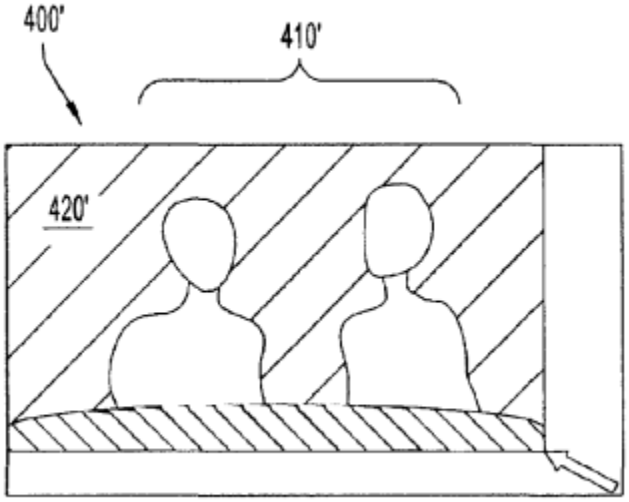


FIG.5C

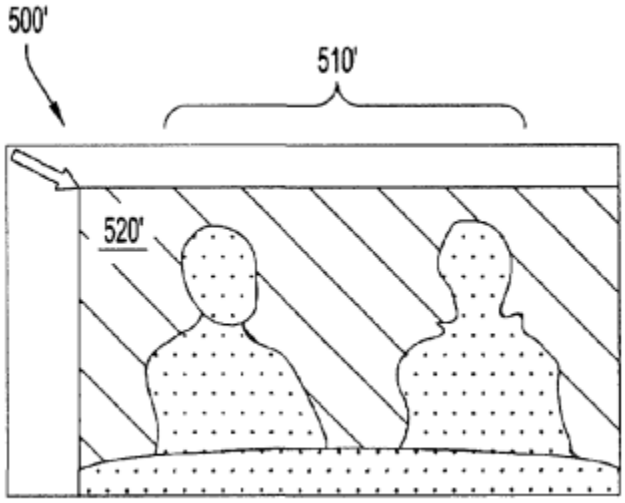


FIG.5D

Scaled video frames include a scaled subject image (410′ and 510′) and scaled background images (420′ and 520′). ’293 patent, 7:13-19.

34. In step 724, the background image of the video frame of the first video stream is extended. FIG. 5E illustrates the background extension function 724 applied to the scaled background image 420′ of the scaled video frame 400′ of the first real-time video stream (’293 patent, 7:20-23):

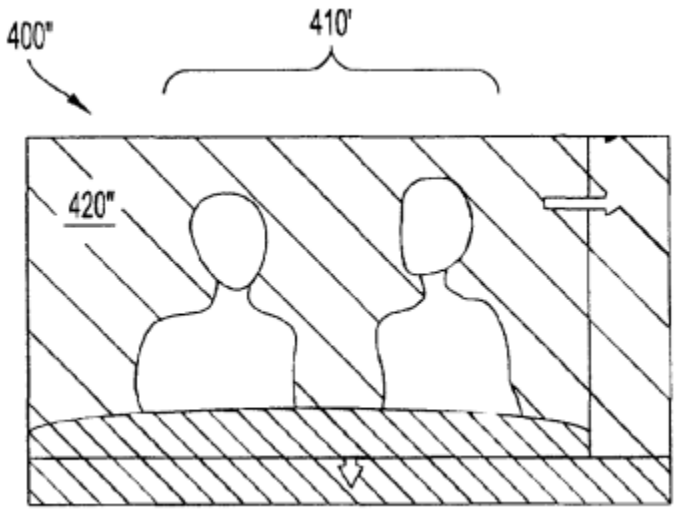


FIG.5E

The ’293 patent discloses that “[e]xtending of the background image … may be performed via a video enhancing technique (e.g., inpainting).” ’293 patent 7:27-29. The ’293 patent further discloses additional details of “inpainting” technique in various arrangements such as extending in horizontal or vertical directions. ’293 patent 7:30-52. In another embodiment of the ’293 patent, a supplemental

background image can be used instead of a background image from one of the video streams. ’293 patent, FIGS. 6, 7A-7H, ’293 patent, 8:54-9:40.

35. Turning back to FIG. 4, in step 726, the background image of second video stream is separated from a video frame of the second video stream. FIG. 5F illustrates a background separated video frame 500″ of the second real-time video stream that results from the background separation function 726 (’293 patent, 7:53-55):

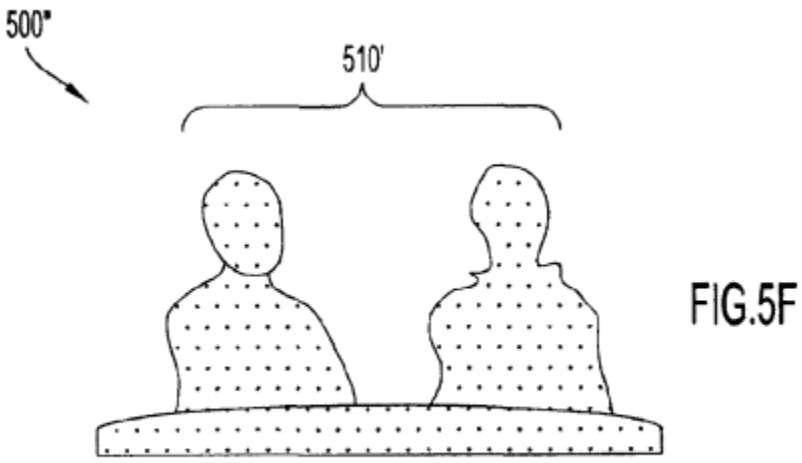


FIG.5F

The background image 520 is separated from the scaled subject image 510′ of the scaled video frame 500′ of the second video stream resulting in a background separated video frame 500″ of the second real-time video stream. ’293 patent, 7:55-59.

36. In step 728, the background separated video frame of the second video stream and the background extended video frame of the first video stream are combined into a combined video frame of a real-time combined video stream. FIG. 5G illustrates a combined video frame that results from the combining function 728, where the background extended video frame 400″ of the first video stream shown in FIG. 5E is combined with the background separated video frame 500″ of the second video stream shown in FIG. 5F into a combined video frame 600 of the combined video stream (’293 patent, 7:60-65):

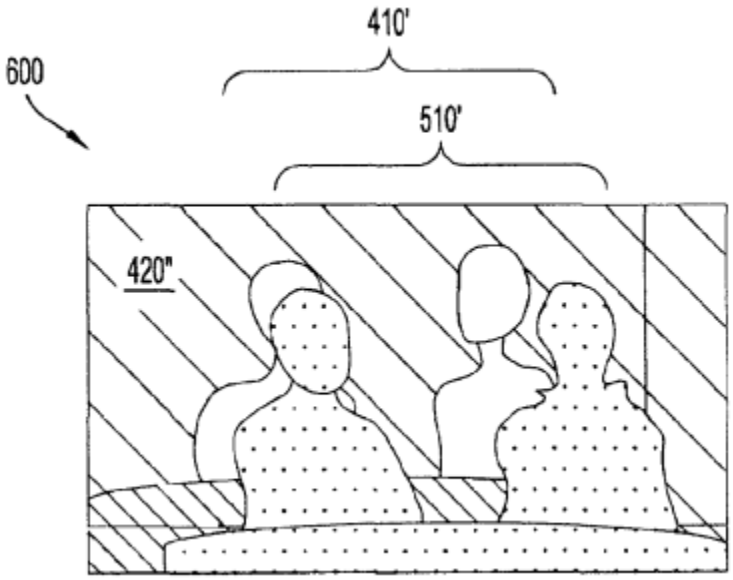


FIG.5G

The combined video frame 600 includes the scaled subject image 510′ of the second video stream in an anterior portion and the scaled subject image 410′ and the extended background image 420″ of the video frame of the first video stream in a posterior portion. ’293 patent, 7:66-8:7.

VI. CLAIM CONSTRUCTION

37. I understand that it is sometimes necessary or useful for claim terms in a patent to be further explained or interpreted. This process, as I understand it, is commonly referred to as claim construction.

38. I understand that in IPRs, the Patent Board applies the same claim construction standard used by District Courts. This process involves construing claim terms in accordance with the ordinary and customary meaning of such terms, as understood by a POSITA, in light of the claim language, the patent's specification, and any relevant prosecution history of correspondence between the patent applicant and the USPTO during the application process.

39. I also understand that certain "extrinsic" evidence, such as dictionaries or publications, can sometimes be useful to understand the meaning of a claim term, but that extrinsic evidence should not be used to contradict the patent's claim language or prosecution history.

40. Except as otherwise noted below, my analysis and opinions are based on the ordinary and customary meaning of the claims.

41. Elements [1.c], [3.a], [10.d], [11.b], [13.c], and [15.a] in claims 1, 3, 10, 11, 13, and 15 each requires scaling the video frames of a video stream and repositioning "the resulting pictures." *See, e.g.*, claim 1 ("scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures

in the video frames of the first video stream to produce a first sequence of scaled video frames"). Elements [1.d], [3.b], [10.e], [11.c], [13.d], and [15.b] in claims 1, 3, 10, 11, 13, and 15 then recite removing (or extending) the background image in the scaled video frames to produce first background separated video frames. *See, e.g.*, claim 1 ("removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream").

42. I have been informed that method claims can be interpreted to have an "order of steps" under certain circumstances. From the plain language of the claims and the antecedence used, I believe a POSITA would interpret the claims to have the order set out in the claims so that the "scaling" of received frames would occur before "removing" or "extending" the background of a frame. Nevertheless, some of the claims are device claims, such as independent claim 10, which I understand may not implicate the case law concerning an "order of steps." Below, I will address the obviousness of each alternative, specifically the obviousness of whether scaling of frames happens before or after operations on the background of received frames. It is my opinion that a POSITA would understand the obviousness of scaling portions of video frames by retaining a background and then removing (or extending) it as compared to removing a background and then

scaling the remaining portions, as discussed below in Ground 1. Ground 2 is presented to more explicitly recognize the alternatives of scaling selections and layers in the prior art.

VII. CLAIMS 1–20 ARE UNPATENTABLE OVER THE PRIOR ART

A. Tysso's Effective Filing Date

43. It is my opinion that a POSITA would see no meaningful difference between Tysso and the Tysso Provisional, because the Tysso Provisional contains the same or substantially the same disclosure as Tysso and supports all claims of Tysso.

44. Because of this reason, as informed by counsel, I understand that Tysso is entitled to an effective filing date of October 8, 2008, by virtue of a claim to priority to U.S. Provisional Patent Application 61/103,588 (Ex1005) ("Tysso Provisional" or "Tysso Prov."), filed Oct. 8, 2008, and is available as a prior art reference under pre-AIA 35 U.S.C. § 102(e).

B. Ground 1: Tysso Renders Obvious Claims 1-20

45. Tysso is entitled, "System and Associated Methodology for Multi-Layered Site Video Conferencing," and describes a video conferencing that displays multiple participants from different locations on a single monitor using a dynamic layering approach. Tysso, 1:15-19; Tysso Prov., 1:2-4. Like the '293 patent, Tysso addresses problems with then conventional video conferencing

systems where participants are displayed in windows "as opposed to being in the same room." Tysso, 1:30-40; Tysso Prov., 1:27-32. Tysso also notes concerns about issues when participants are scaled differently causing people at greater-populated sites to appear smaller in the combined video. *Id*.

46. The dynamic layering approach of Tysso separates participant images from their corresponding backgrounds and merges them to make all participants appear the same size on the monitor, as if they were all located in the same room. *See* Tysso, Abstract, 2:63-66; *see also* Tysso Prov., 2:31-33. FIG. 1 of Tysso is a diagram illustrating a process of combining images of participants situated at different locations to display the participants of a video conference as if located in a same room (Tysso, FIG. 1, 2:39-43; *see also* Tysso Prov., FIG. 1, 3:1-2):

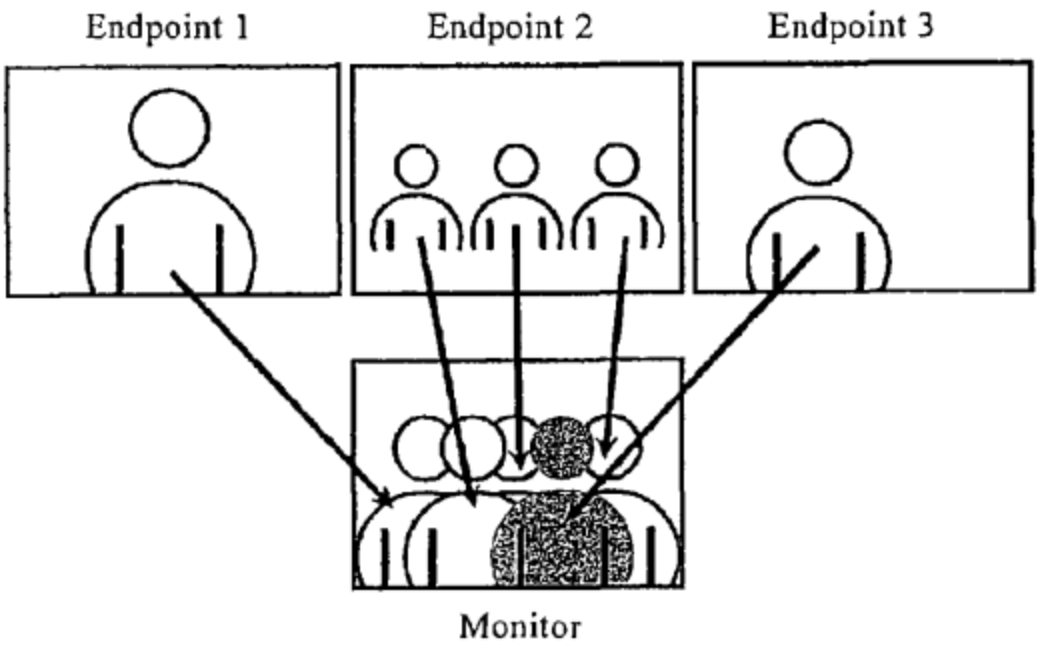


Fig. 1

In FIG. 1, endpoints 1 and 3 include only one participant and are sized differently than endpoint 2, which includes three participants. The arrows in FIG. 1 indicate that the participant images from endpoints 1-3 are "scaled" to have a same size and merged by overlapping and aligning them for display on monitor 4. Tysso, 3:22-30; *see also* Tysso Prov., 5:6-14. In particular, participant image data is extracted from the received video data in order to separate the participant image data from background image data also included in the video data. Tysso, 5:11-17; *see also* Tysso Prov., 4:36-5:2. Thus, the processed participant images are merged "wherein the participant images are overlapped." Tysso, 5:17-20; *see also* Tysso Prov., 5:3-4 ("participant images are also overlapped and aligned horizontally so

that participants appear to be located in a same room when displayed on monitor 4.").

47. In the table below, I identify how the claims of Tysso are supported by the Tysso Provisional:

Tysso Claim	Examples of Support in Tysso Provisional
1. A method to cause a video conferencing system to display a plurality of participants, comprising:	Tysso Prov., 2:10-25; 7:1-19.
receiving, at a multipoint control unit, video data including sound and image data from a plurality of endpoints connected to the multipoint control unit, the video data corresponding to participants located at each of the plurality of endpoints, at least one of the endpoints capturing video data corresponding to more than one participant;	Tysso Prov., 2:13-16; 7:7-8; Fig. 1 (endpoint 2).
extracting, at the multipoint control unit, participant image data from the sound and image data included in the video data;	Tysso Prov., 6:37-38.
processing, at the multipoint control unit, the extracted participant image data to have a same appearance;	Tysso Prov., 3:32-35; 4:11-14.

Tysso Claim	Examples of Support in Tysso Provisional
combining, at the multipoint control unit, the processed participant image data to generate a merged image data of participants from other endpoints, the merged image data excluding surrounding background image data corresponding to each of the participants, images of the participants overlapping in the merged image data;	Tysso Prov., Fig. 1; 3:15-17; 3:32-35; 5:3-5.
transmitting the merged image data from the multipoint control unit to a respective endpoint; and	Tysso Prov., Fig. 1; 6:26-30.
displaying, at a monitor of the respective endpoint, the merged image data received from the multipoint control unit, the monitor displaying participants from other endpoints as being located in a same room.	Tysso Prov., Fig. 1; 6:26-30.
2. The method according to claim 1, further comprising: identifying, at the multipoint control unit, an endpoint with a highest sound level as an active endpoint.	Tysso Prov., 7:21-24.
3. The method according to claim 1, wherein the extracted image data corresponds to a body image of the participants without corresponding background imagery.	Tysso Prov., 7:32-36.

Tysso Claim	Examples of Support in Tysso Provisional
4. The method according to claim 1, wherein the participant image data is extracted from the video data using a synthetic blue or green screen and an algorithm to analyze background imagery and image depth information.	Tysso Prov., 8:6-9.
5. The method according to claim 1, wherein the participants are displayed aligned horizontally on the monitor, the horizontal alignment and overlapping dynamically varying according to changes in a number of participants in the video conference.	Tysso Prov., 8:11-14.
6. The method according to claim 1, wherein the processing of the extracted participant image data includes determining mean values for image size, color balance, contrast and intensity based on the extracted participant image data, and based on the mean values determined scaling each participant image to a same size, adjusting each participant image to a same color balance and adjusting each participant image to a same contrast and intensity.	Tysso Prov., 8:16-22.
7. The method according to claim 2, wherein a participant image from the active endpoint is highlighted on the monitor.	Tysso Prov., 8:24-25.

Tysso Claim	Examples of Support in Tysso Provisional
8. The method according to claim 7, wherein the participant image from the active endpoint is highlighted with borders.	Tysso Prov., 8:27-29.
9. The method according to claim 2, wherein participant images from endpoints other than the active endpoint are softened.	Tysso Prov., 8:31-33.
10. The method according to claim 2, wherein a participant image corresponding to the active endpoint is displayed in front of other participant images on the monitor.	Tysso Prov., 8:36-37.
11. The method according to claim 2, wherein a participant image corresponding to the active endpoint is faded out according to a predetermined delay, and a participant image corresponding to a next active endpoint is faded in according to the predetermined delay.	Tysso Prov., 9:1-4.
12. A video conferencing system for displaying a plurality of participants as being located in a single room, comprising:	See claim 1.

Tysso Claim	Examples of Support in Tysso Provisional
a multipoint control unit configured to receive video data including sound and image data from a plurality of endpoints connected to the multipoint control unit, the video data corresponding to a plurality of participants respectively located at the plurality of endpoints, at least one of the endpoints capturing video data corresponding to more than one participant, the multipoint control unit extracting participant image data from the sound and image data and processing the extracted participant image data to have a same appearance; and	See claim 1.
at least one endpoint connected to the multipoint control unit and configured to display merged image data of the participants received from the multipoint control unit, the merged image data of the participants excluding background image data, the at least one endpoint providing the merged image data to a monitor to display the participants corresponding to the plurality of endpoints as being located in a same room,	See claim 1.
wherein images of the participants are overlapped in the merged image data.	See claim 1.

Tysso Claim	Examples of Support in Tysso Provisional
13. The system according to claim 12, wherein the plurality of endpoints are configured to extract the participant image data before transmitting the video data to the multipoint control unit.	Tysso Prov., 4:6-10.
14. The system according to claim 12, wherein the MCU separates the extracted participant image data from background image data.	See claim 1; Tysso Prov., 4:2-5; 6:37-38.
15. The system according to claim 14, wherein the image data is extracted by applying a blue or green screen behind each participant and analyzing corresponding depth information.	See claim 4.
16. A multipoint control unit device for a video conferencing system comprising:	See claim 1.
a receiving unit configured to receive video data including sound and image data from a plurality of endpoints, the sound and image data corresponding to participants respectively located at each of the plurality of endpoints, at least one of the endpoints capturing video data corresponding to more than one participant;	See claim 1.

Tysso Claim	Examples of Support in Tysso Provisional
an extracting unit configured to extract participant image data from the sound and image data included in the video data;	See claim 1.
an image processing unit configured to process the extracted participant image data to have a same appearance;	See claim 1.
a combining unit configured to combine the processed participant image data into a merged participant image data without corresponding background image data, the merged participant image data causing the participants to appear located in a same room, images of the participants overlapping in the merged image data; and	See claim 1.
a transmitter configured to transmit the merged participant image data to at least one of the plurality of endpoints.	See claim 1.
17. The multipoint control unit device according to claim 16, wherein the extracting unit extracts participant body image data from surrounding background image data, the extracted participant body image data being the extracted participant image data.	See claims 1, 13, 14.
18. An endpoint device in a video conferencing system, comprising:	See claim 1.

Tysso Claim	Examples of Support in Tysso Provisional
an imaging device configured to capture video data of a participant and a surrounding background, the video data including sound and image data;	See claim 1.
an extraction unit configured to extract participant image information from the video data;	See claim 1.
a transmitter configured to transmit the extracted participant image information to a multipoint control unit;	See claim 1.
a receiver configured to receive, from the multipoint control unit, a merged participant image data formed by merging image data from a plurality of endpoints, at least one of the endpoints capturing video data corresponding to more than one participant, the merged participant image data excluding surrounding background image data, images of the participants overlapping in the merged image data; and	See claim 1.
a monitor configured to display the merged participant image data, participants corresponding to the merged participant image data being displayed as located in a same room.	See claim 1.

Tysso Claim	Examples of Support in Tysso Provisional
19. The endpoint device according to claim 18, wherein the extracting unit extracts participant body image data from surrounding background image data, the extracted participant body image data being the extracted participant image data.	See claim 3.
20. The endpoint device according to claim 18, wherein a blue or green screen is placed behind the participant, and the extracting unit extracts the participant image data using a predetermined algorithm to analyze image depth information.	See claim 4.
21. A non-transitory computer-readable medium storing computer-readable instruction thereon, the computer-readable instructions when executed by a computer cause the computer to perform a method comprising:	See claim 1.
receiving, at a multipoint control unit, video data including sound and image data from a plurality of endpoints connected to the multipoint control unit, the video data corresponding to participants located at each of the plurality of endpoints, at least one of the endpoints capturing video data corresponding to more than one participant;	See claim 1.

Tysso Claim	Examples of Support in Tysso Provisional
extracting participant image data from the sound and image data included in the video data;	See claim 1.
processing the extracted participant image data to have a same appearance;	See claim 1.
combining the processed participant image data to generate a merged image data of participants from other endpoints, the merged image data excluding surrounding background image data corresponding to each of the participants, images of the participants overlapping in the merged image data;	See claim 1.
transmitting the merged image data from the multipoint control unit to a respective endpoint; and	See claim 1.
displaying the merged image data received from the multipoint control unit on a monitor, the monitor displaying participants from other endpoints as being located in a same room.	See claim 1.

1. Independent Claim 1: [1.pre] "A method comprising"

48. Tysso discloses a method. Tysso, 7:4-31; Tysso Prov., 2:10-25; 7:1-19.

a) [1.a] "receiving at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image;"

49. Tysso discloses receiving real-time video streams with video frames containing a picture comprising a subject image and a background image. As explained in the Tysso Provisional:

> "a method for presenting a plurality of participants in a video conference on one monitor in such a way that ***participants located at … least three endpoints*** seems to be located in the same room, and where the person currently talking is highlighted on the monitor. The method is characterized by the following steps performed in an MCU connected to said endpoints through a network: - ***receiving video signals comprising sound- and image data of the participants at each endpoint;***"

Tysso Prov., 2:10-16 (emphasis added); *see also id.*, 3:21-22; Tysso, 2:1-7. Tysso discloses processing "received video data" and "extracts participant image data from the video data received" (Tysso Prov. 3:21-30, *see also* Tysso, 5:8-11) indicating that Tysso has video streams with video frames having subject images and background images. Also, Tysso discloses sending image frames with both participant images and corresponding background to Tysso's MCU (Tysso Prov.,

4:2-5; 6:37-38; *see also* Tysso, 5:23-32) or only participant images (Tysso Prov., 4:6-10; *see also* Tysso, 5:39-46).

b) [1.b] "combining the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the combining comprises:"

50. A POSITA would understand Tysso to disclose combining the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream as claimed.

51. As shown in Fig. 1 of the Tysso Provisional and Tysso, Tysso's MCU uses a dynamic layering technique to combine participants (the subject images) of corresponding video frames of video streams into a combined frame of a combined video stream in an overlapping manner. Because the dynamic layering technique allows the participants to be overlapped in the combined frame, a participant in one video stream can be positioned in "an anterior portion" of the combined frame and a participant from another video stream can be positioned in a "posterior portion" of the combined frame.

52. Specifically, the Tysso Provisional discloses, "An object of the present invention is to provide a method and a device for presenting several

participants located at different endpoints on a single monitor by ***displaying a dynamic layered multi-site***." Tysso Prov., 1:2-4, 2:7-9 (emphasis added); *see also* Tysso, 1:15-20. Tysso achieves this by "merging video images from each end point in such a way that the participants appear to be sitting in the same room." Tysso Prov., 2:31-33; *see also* Tysso, 2:63-67. Furthermore, "[t]he resulting images of the participants will then be presented aligned horizontally and ***overlapped on a monitor***. This process is performed dynamically according to the number of participants in the video conference." Tysso Prov., 5:3-5 (emphasis added); *see also* Tysso, 3:27-30, 7:42-46.

53. It is my opinion that it was well within the knowledge and skill of a POSITA (and recognized by Tysso) that presentation of multiple objects from different sources can benefit from a visual equalizing process where objects are scaled to be of similar size but also can be equalized in contrast, color balance and intensity as well to be visually pleasing. Tysso Prov. 4:36-5:14, *See also* Tysso 3:25-33. Tysso recognized the relationship between scale and presentation of large number of objects in a limited space. When visualizing multiple objects, it can be advantageous to scale the objects to fit into a limited space. At a certain level of scaling, where objects are made smaller by scaling them down, the visual acuity of the represented objects diminishes, and the objects may not be recognizable by the

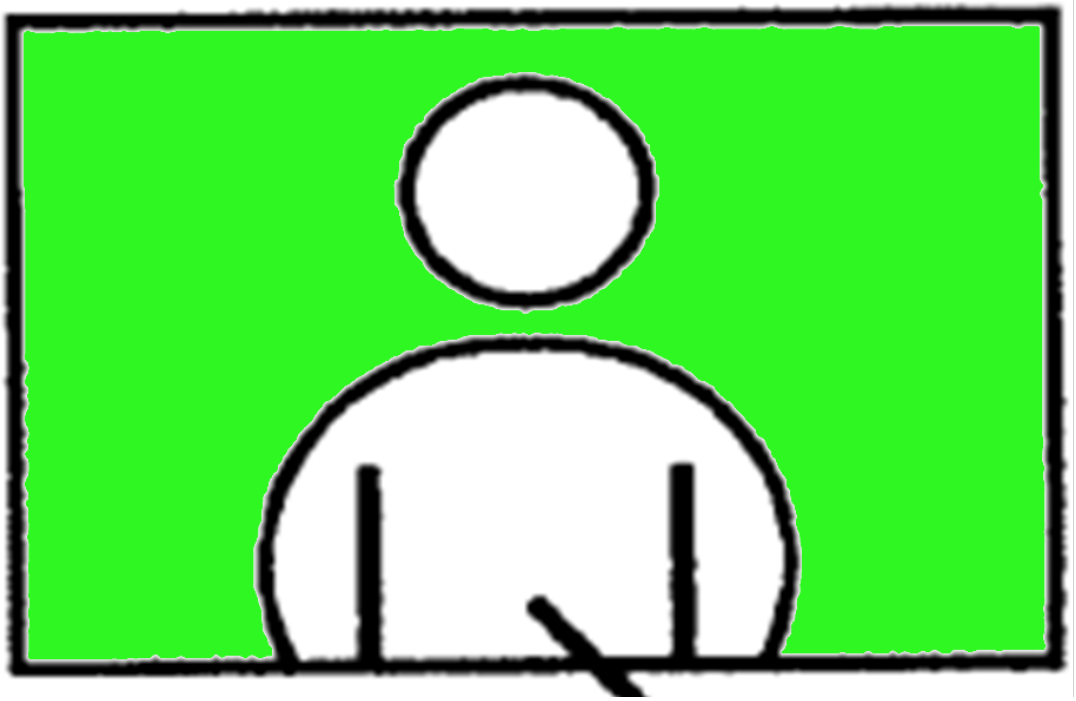
viewer. An option is to overlap the objects where the exposed portions provide detailed information to the viewer while some of the objects are covered by others. This approach is addressed in the Tysso Provisional at 5:6-14 and in Tysso at 3:28-33. Tysso discloses "[t]he single monitor shows all participants aligned horizontally, scaled to the same sized and possibly overlapped, giving the impression that they are located in the same conference room." Tysso Prov. 5:11-14, *see also* Tysso 3:28-30.

54. Accordingly, using the example below, I explain how a POSITA would understand Tysso's process of creating the combined frame shown in Tysso's FIG. 1 with respect to a layer of Tysso's dynamic layered multi-site for one endpoint (specifically Endpoint 1, as similar processing would occur for Endpoints 2 and 3).

55. First, a POSITA would recognize that Tysso seeks to create a combined frame for display. To achieve this, Tysso would place layers for the participants in each Endpoint into a frame forming a base for the final combined image, as shown below:

56. As explained in Tysso, that base frame could have a lower layer as a conference room scene. Tysso Prov. 5:11-14 ("The single monitor shows all participants aligned horizontally, scaled to the same sized and possibly overlapped, giving the impression that they are located in the same conference room."); *see also* Tysso 3:28-30.

57. For Endpoint 1, Tysso's MCU would receive a frame from Endpoint 1 with participant image and a background, e.g., a green screen background:



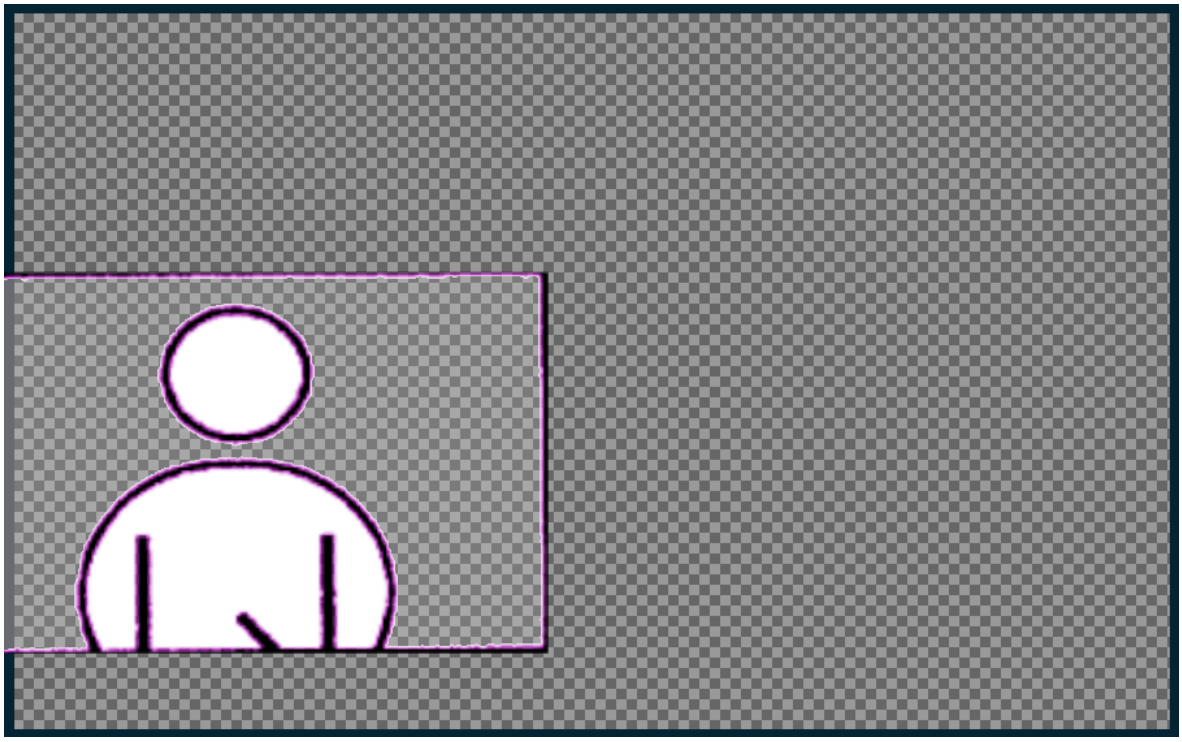
58. Tysso discloses removing the existing background from Endpoint 1, which could be achieved by changing the background pixels in Endpoint 1 with alpha channel pixels, to create transparent portions around the image:

59. Tysso then discloses scaling Endpoint 1 before placing it in the background layer, which could be achieved by changing the vertical and horizontal

dimensions of the frame:

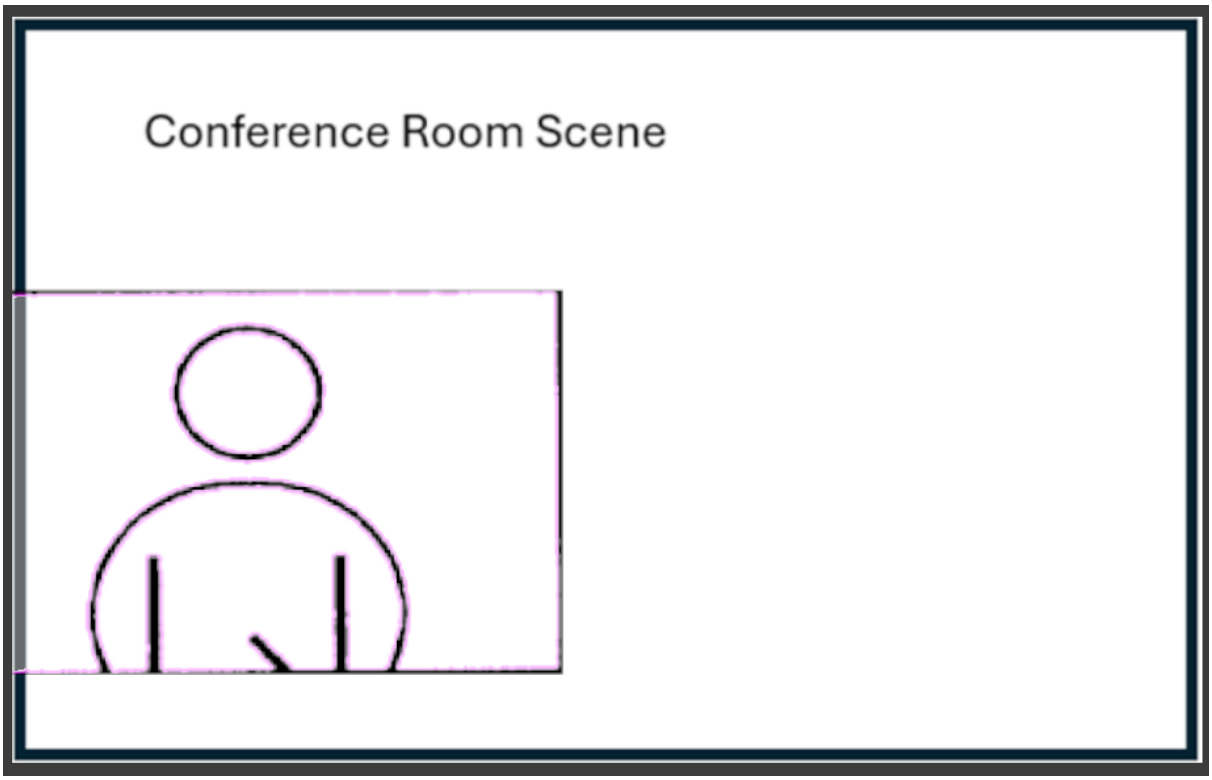
60. Due to the use of an alpha channel, the pixels surrounding the resized received frame in the layer for the received frame would also be made transparent to "extend" the background of the frame to match the size of the base frame, if necessary, for the combined image when repositioning the participant in the frame

(the purple and black frame around the image is provided for illustration and would not be present as each background pixel would be set as transparent):



61. With the use of transparency in the alpha channel of the received layer for Endpoint 1, placing the layer over the base layer for the combined image would result in that participant image being shown in the conference room scene (with the

outline of the resized and repositioned received frame shown for clarity):



62. The layering process would proceed to build the combined frame until all of the Endpoints and participants are processed:

63. While the process described above would remove the existing background (e.g., green screen) of the layer for the rearmost Endpoint, alternatively, the background of the rearmost Endpoint layer could be retained or readded in a similar manner (with a suitable filler of transparent pixels or generic background pixels to account for a reduction in size of received frames).

64. Further, a POSITA would understand that the claim does not contain a requirement concerning any degree of separation between the recited "anterior" and "posterior" portions. Nevertheless, as Tysso shows the visual effect of

layering to align all participants horizontally, a POSITA would have found it obvious, once images are provided in layers, to arrange those layers with any number of intermediate layers by scaling and shifting the participants to provide additional video effects such as to provide an illusion of 3D depth in the combined frame.

c) [1.c] "scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;"

65. Tysso discloses, or at least suggests to a POSITA, scaling video frames of first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames.

66. Tysso's Provisional discloses that "[w]hen the images of the participants in the video conference are extracted from the background image, they will be subjected to further processing in the MCU by processing the image data of the participants in such a way that the images of each participant located at the endpoints are ***scaled to the same size***, and adjusted to have similar colour balance, contrast and intensity by comparing the image data received from each endpoint and finding a mean value for said parameters." Tysso Prov., 4:36-5:2 (emphasis added); *see also* Tysso, 6:3-9.

67. It is my opinion that Figure 1 of Tysso shows the pictures in video streams being repositioned in a first direction in at least two ways (resulting in different "first directions"). With regard to Endpoint 3, a picture of a person is scaled and moved in a direction relatively from the left of the frame to the right. In this way, the person in Endpoint 3 is moved in a "first direction" relatively to the right. Also, in Endpoint 3, the picture of the person is placed in the front-most layer (anterior) of the frame to overlap other pictures. In this way, the first direction that the picture of the person moves is relatively forward (to the anterior), *see* Tysso Prov., 5:6-14; *see also* Tysso, 3:22-33:

> Figure 1 illustrates visually the process performed for presenting participants located at different endpoint on a single monitor. As seen from the figure, the participants at endpoints 1 through 3 have different sizes, and different number of participants at the endpoints. When they are presented merged on one monitor, the image data from each end point has been processed and scaled such that all participants appear to have the same size on the monitor. The single monitor shows all participants aligned horizontally, scaled to the same sized and possibly overlapped, giving the impression that they are located in the same conference room.

68. I also note that the other pictures move in other directions (as will be discussed further with regard to claim 3 below). For example, with regard to Endpoint 1, a picture of a person is scaled and moved from the center of the frame to the left of the frame and placed in a back layer (posterior) of the frame allowing the picture of the person to be overlapped by other pictures. Thus, with regard to Endpoint 1, the person's picture is moved in a second direction relatively to the left or in a second direction relatively backwards. *See* Tysso Prov., 5:6-14; *see also* Tysso, 3:22-33.

69. As I have explained above for element [1.b], Tysso's description of removing a background of a frame and scaling an image would disclose, or at least suggest, scaling a received video frame. To the extent that the claim is interpreted to require a specified order of steps where received frames are scaled and then background processing occurs to remove the received background, such operation would have been obvious.

70. As Tysso explains, it is not critical where and when a background is removed from an image, and Tysso allows the background to be removed prior to transmission to the MCU or at the MCU, as explained above. *See* Tysso Prov., 4:2-10; 6:37-38; *see also* Tysso, 5:23-32, 5:39-46. Specifically, Tysso's endpoints can provide full frames to the MCU, as noted above, or frames with backgrounds

removed. Similarly, a POSITA would find no criticality in removing a background before or after a scaling operation, as the steps of removing a background (that is determining background pixels and setting them to alpha pixels) would be merely an engineering design choice.

71. The decision of when and where to remove a background presents engineering design choices that would have been known to a POSITA. For example, the choice to transmit frames with backgrounds to the MCU comes at the expense of bandwidth to transmit the frames, which a POSITA could weigh against whether to provide processing power at an endpoint to remove backgrounds before sending them to the MCU. Similarly, the choice to remove the background of a full-resolution frame would allow a higher quality of background removal, which a POSITA could weigh against the less processing power needed to remove the background of a scaled down frame. Thus, it is my opinion that a POSITA would not consider such choices concerning the order of processing to remove background from a frame to create a non-obvious distinction given these well-known processing tradeoffs.

72. Accordingly, it is my opinion that a POSITA would have found it to be an obvious alternative for scaling the pictures in the frames by either (1) extracting a background from the frame and then scaling the remaining picture

containing the subject to the desired size (as expressly taught in Tysso) or (2) scaling of a frame and then extracting the background, as either equivalent alternative would result in a picture that has been scaled to an appropriate size. And Tysso expressly discloses that the manipulation of the frames to "process and extract image data of participants" can involve multiple sub-steps. Tysso Prov., 3:32-4:5; *see also* Tysso, 5:33-38.

73. Thus, a POSITA would have known that contents of a frame could be scaled by scaling a frame to decrease (or increase) the size of the contents of the frame to a certain size or by extracting the contents of the frame and scaling the extracted content. Thus, there being known alternatives to scale the contents of a video frame containing a subject and a background, namely scaling either the entire video frame or scaling a frame with only the subject, either choice would have been obvious.

d) [1.d] "removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and"

74. Tysso discloses, or at least suggests to a POSITA, a step of removing the background image of scaled video frames to produce background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream. As noted above for element [1.c], Tysso discloses

removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream.

75. For example, Endpoint 3's video frame is shown with its background image removed and scaled to place the video frame for Endpoint 3 in the front layer of the video frame of the merged video frame. As explained in the Tysso Provisional, "[t]he second step is to process and extract image data of participants from their backgrounds. . . . This second step can be performed with several sub-steps including extracting the participants from the image data. For doing this, the MCU processes the received image data by extracting each participant from the background surroundings in the image in such a way that only the bodies of the participants are included in the extracted image data." Tysso Prov., 3:32-4:5; *see also* Tysso, 5:33-38.

76. Further, under the equivalent obvious alternatives discussed for element [1.c] above, it is my opinion that a POSITA would have found it to be an obvious alternative for scaling the pictures in the frames by either (1) extracting a background from the frame and then scaling the remaining picture containing the subject to the desired size (as expressly taught in Tysso) or (2) scaling of an entire frame and then extracting the background, as either equivalent alternative would

result in a picture that has been scaled to an appropriate size. Thus, to the extent that claim 1 of the '293 patent does or does not require an order of steps of scaling prior to background processing (that is, an order where removing the background image occurs after scaling), this process would have been obvious in view of Tysso.

e) [1.e] "superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream; and"

77. Tysso discloses, or at least suggests to a POSITA, the step of superimposing first background separated video frames onto corresponding ones of the video frames of second video stream to produce combined video frames of the combined video stream. As shown in Fig. 1 of Tysso, Tysso superimposes background separated video frames onto other video frames from other endpoints to produce combined video frames of the combined video stream.

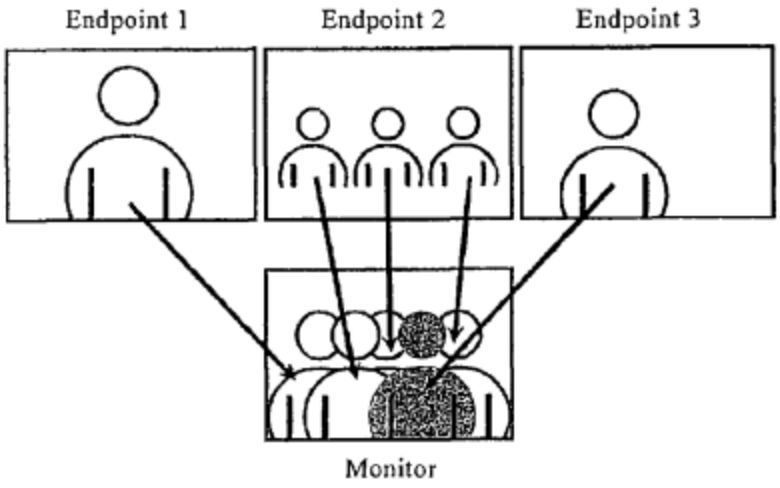


Fig. 1

Tysso, Fig. 1; Tysso, Prov., Fig. 1. Again, as explained in the Tysso Provisional, "participants at endpoints 1 through 3 have different sizes, and different number of participants at the endpoints. When they are presented merged on one monitor, the image data from each end point has been processed and scaled such that all participants appear to have the same size on the monitor. The single monitor shows all participants aligned horizontally, scaled to the same sized and possibly overlapped, giving the impression that they are located in the same conference room." Tysso Prov., 5:6-14; *see also* Tysso, 3:22-33. In Tysso's Fig. 1, the frames of Endpoint 3 are placed in the front layer of the combined frame in a manner that overlaps pictures in an intermediate layer from Endpoint 2 and the back layer of Endpoint 1.

f) [1.f] "supplying the combined video stream to a video display for displaying the combined video stream."

78. Tysso discloses, or at least suggests to a POSITA, supplying the combined video stream to a video display for displaying the combined video stream. Tysso displays the combined video stream on a monitor, as shown in Fig. 1 of Tysso. *See also* Tysso Prov., Fig. 2; 1:2-4; 2:7-9; 5:3-17; *see also* Tysso, 3:11-14, 3:28-30, 7:42-46.

2. Claim 2: "The method of claim 1, wherein the subject image of video frames of the first video stream comprises images of multiple videoconference participants and the subject image of video frames of the second video stream comprises images of multiple videoconference participants."

79. Tysso discloses, or at least suggests to a POSITA, that the subject image of video frames of the first video stream comprises images of multiple videoconference participants and the subject image of video frames of the second video stream comprises images of multiple videoconference participants. Tysso discloses that each endpoint may have multiple participants. Tysso Prov., 5:3-9; *see also* Tysso, 3:11-14, 3:28-30, 7:42-46.

3. Claim 3: [3.pre] "The method of claim 1, wherein combining comprises:

80. Tysso discloses, or at least suggests to a POSITA, the claimed method of claim 1 for the reasons stated above and the claimed combining of claim 3 as discussed below.

a) [3.a] "scaling the video frames of the second video stream and repositioning in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;"

81. Tysso discloses, or at least suggests to a POSITA, scaling the video frames of the second video stream and repositioning in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames. It is my opinion that Tysso scales video frames from each endpoint, including the "second video stream." For example and as explained above with regard to elements [1.b]-[1.d], Fig. 1 of Tysso and the Tysso Provisional show a reduction in the scale of the image from Endpoint 1.

82. A POSITA would understand that Tysso's reduction in scale would effectively reduce the ratio of the participant image relative to the original frame size, as explained above with regard to element [1.b]. Further, and also explained above with regard to elements [1.b] and [1.c], Tysso then repositions the picture in the video frames for Endpoint 1 to the back and to the left of the combined frame. *See* Tysso Prov., 5:6-14; *see also* Tysso, 3:22-33. Thus, with regard to Endpoint 1, the person's picture is moved in a second direction relatively to the left or in a second direction relatively backwards.

b) [3.b] "extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior

portion of the combined frames of the combined video stream; and"

83. Tysso at least suggests to a POSITA extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream. It is my opinion that Tysso suggests to a POSITA extending the background image of, e.g., the rearmost Endpoint layer, if its size has been reduced. The preferred embodiment of Tysso can remove all the backgrounds from the source video streams. But a background would still be needed and found desirable by a POSITA, and a POSITA could select from a number of predictable and finite alternatives, such as using a generic background or using a live background from one of the images, as described above with regard to element [1.b]. Also, the Tysso Provisional explains that "[t]he surroundings can be extracted from an image by applying a blue- or green screen behind the participant(s) that are filmed at the endpoint together with depth information." Tysso Prov., 9:29-21; *see also* Tysso, 5:47-51. A POSITA would understand the "green screen" process to suggest use of supplemental background image that would then be added as a layer to final video image to supplement video frame with a desired background image, such as to show that a participant is in a studio, particular landscape, etc.

84. As noted above, Tysso already scales the participant image for Endpoint 1. This scaling could be achieved by scaling the entire video frame or the picture in the video frame. Under either approach, the reduction in size of the participant image (or frame) would result in the image size (or frame size) being reduced relative to the original size of the image and frame (or frame) for Endpoint 1.

85. A POSITA would know that extending a background image would be desirable, and possibly required, because the reduction in size of the image would leave a gap relative to original-size image (if the image were replaced in the frame) or original-size frame (comparing the reduced-size frame to the original-size frame) or the combined frame to be displayed (when it is larger than the size of a reduced frame, which would be typical when the original-size frame and combined frame are the same size). A POSITA would understand that there are a limited number of ways to address this gap in the reduction in size of an image or frame that would effectively "extend" the background image of the frame. In particular, additional image processing to fill the gap caused by a reduction in image or frame size would increase the size of the background to replace the pixels lost by reduction in scale. In particular, as explained regarding element [1.b] above, simply adding additional transparent pixels to allow a frame to be transparent

around a participant image would "extend" the background of the frame to allow transparency in all areas of the frame other than the participant image, which would be desirable to allow a predetermined background, such as Tysso's conference room setting, to be displayed. Similarly, instead of transparent pixels, filler pixels (such as those corresponding to Tysso's conference room setting) could be added to the rear-most participant layer of Tysso's combined video image to eliminate gaps in the combined video image.

86. Thus, a POSITA would have understood Tysso to disclose, or at least suggest to a POSITA, using an extended background produced from a reduction in scale of the picture as the background for all of the endpoints, or an extended green screen, to provide a consistent experience across endpoints. To do so would be consistent with Tysso's aim to give "the impression that they are located in the same conference room." Tysso Prov., 5:13-14; *see also* Tysso, 2:59-63.

c) [3.c] "superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream."

87. Tysso discloses, or at least suggests to a POSITA, superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video

streams. It is my opinion that Tysso discloses, or at least suggests to a POSITA, this feature for the reasons stated above with regard to element [1.e].

4. Claim 4: "4. The method of claim 3, wherein the second direction is opposite to the first direction."

88. Tysso discloses, or at least suggests to a POSITA, the method of claim 3 as discussed above. Tysso discloses, or at least suggests to a POSITA, that the second direction is opposite to the first direction. For example, and as explained with regard to elements [1.c] and [3.a], the pictures of Endpoint 1 are moved backwards and to the left so that the claimed "second direction" could be satisfied by either the backward movement or the movement to the left and the pictures of Endpoint 3 are moved forward and to the right so that the claimed "first direction" could be satisfied by either the forward movement (opposite to the backward movement of Endpoint 1) or the movement to the right (opposite to the movement to the left of Endpoint 1). *See* Tysso Prov., 5:6-14; *see also* Tysso, 3:22-33.

89. As explained with regard to element [1.b], this manipulation of participant images in Tysso recognizes the relationship between scale and presentation of large number of objects in a limited space. Tysso's movement of the images relative to the video frame allows more users to be shown in a combined video frame in a clear manner and with minimal obstruction by only overlapping the participant images as necessary.

5. Claim 5: [5.pre] "5. The method of claim 1, wherein combining further comprises:"

90. Tysso discloses, or at least suggests to a POSITA, the method of claim 1 for the reasons discussed above, and also discloses, or at least suggests to a POSITA, the claimed combining as discussed below.

a) [5.a] "removing the background image in the video frames of the first and second video streams to produce first and second background separated video frames;"

91. Tysso discloses, or at least suggests to a POSITA, removing the background image in the video frames of video streams to produce first and second background separated video frames. As explained in the Tysso Provisional, "the MCU processes the received image data by extracting each participant from the background surroundings in the image in such a way that only the bodies of the participants are included in the extracted image data." Tysso Prov., 4:1-5; *see also* Tysso, 5:33-38.

b) [5.b] "generating supplemental background image video frames that comprise a supplemental background image; and"

92. Tysso suggests to a POSITA generating a supplemental background image video frames with supplemental background images. As noted above with regard to element [3.b], the preferred embodiment of Tysso can remove all the backgrounds from the source video streams. But a background would still be

needed and found desirable by a POSITA, and a POSITA could select from a number of alternatives, such as using a generic background of a conference room or using a live background from one of the images. *See, e.g.*, Tysso Prov., 9:29-21 (discussing green screen processing); *see also* Tysso, 5:47-51.

93. It is my opinion that it would have been obvious to use a generic conference room image as the rear-most layer of the combined video frame as the background for all of the endpoints to provide a consistent experience across endpoints. To do so would be consistent with Tysso's aim to give "the impression that they are located in the same conference room." Tysso Prov., 5:11-14; *see also* Tysso, 2:59-63.

c) [5.c] "superimposing corresponding ones of the first background separated video frames and the second background separated video frames onto corresponding ones of the supplemental background video frames to produce the combined video frames of the combined video stream"

94. Tysso discloses, or at least suggests to a POSITA, superimposing corresponding ones of the first background separated video frames and the second background separated video frames onto corresponding ones of the supplemental background video frames to produce the combined video frames of the combines video stream. As noted above and with regard to elements [1.e] and [5.b], Tysso discloses, or at least suggests to a POSITA, superimposing the first background

separated video frames (i.e., frames of having only picture data) onto a generic conference room background so as to give the impression that all participants "are located in the same conference room." Tysso Prov., 5:11-14; *see also* Tysso, 2:59-63.

6. Claim 6: "6. The method of claim 1, wherein the first and second video streams are produced at a same video conferencing site."

95. Tysso discloses, or at least suggests to a POSITA, the method of claim 1 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, the same first and second video streams are produced at a same video conferencing site.

96. I note that the '293 patent does not define "site." It does, however, refer to videoconferencing as allowing "two or more locations to interact via simultaneous two-way video and audio transmissions." '293 patent, 1:12-14. Further, the '293 patent states, the components of its video distribution system "may be distributed over a wide area network (e.g., WAN, internet, etc.) or may be distributed over a local area network (LAN) within ***a same facility (e.g., building, campus, etc.***)." '293 patent, 3:30-34 (emphasis added). Thus, it is my opinion that a POSITA would have understood that a "site" refers to a physical facility, such as an office building.

97. Also, it is my opinion that it would be obvious to a POSITA that the video streams in Tysso can and would be allowed to originate from the same building, such as to allow two or more office workers to conduct a meeting in a "virtual" conference room. A POSITA would understand that the problems associated with multi-site teleconferencing and utilization of "IP and ISDN based teleconferencing" (Tysso Prov. 3:9-10) or "WAN, internet, etc.)" '293 Patent 3:32, such as bandwidth utilization and latency, would not be present or at least not as prevalent in local areas networks such as a single conferencing site. It is well understood that the solutions to the problems associated with bandwidth utilization and latency are easier to solve in a local area than in a wide area, indicating that the POSITA would be well informed in solving a solution for teleconferencing in a single site if a solution was already there for a multi-site configuration. No technical impediment would preclude Tysso's system from working in a local environment using a local area network (LAN).

7. Claim 7: "7. The method of claim 1, wherein the first and second video streams are produced at different video conferencing sites."

98. Tysso discloses, or at least suggests to a POSITA, the method of claim 1 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, producing video streams at different video conferencing "sites" (*see* discussion of "site" in the analysis of claim 6). The Tysso Provisional discloses,

"Figure 1 illustrates a plurality of participants located at different locations merged and presented on a single monitor." Tysso Prov., 3:1-2; *see also* Tysso, 3:11-14. Furthermore, Tysso Provisional discloses utilization of "IP and ISDN-based videoconferencing" (Tysso Prov. 3:9-10) and "Internet" (Tysso Prov. Fig. 2) which are common technologies to interconnect video conferencing devices at different sites, as was well known to a POSITA.

8. Claim 8: "8. The method of claim 1, wherein combining is performed at a site other than where the first and second video streams are produced."

99. Tysso discloses, or at least suggests to a POSITA, the method of claim 1 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, combining video streams at a "site" (*see* discussion of "site" in the analysis of claim 6) other than where the first and second video streams are produced. As shown in Fig. 2 of the Tysso provisional, the MCU in Tysso may be at a location remote from the endpoints in Tysso:

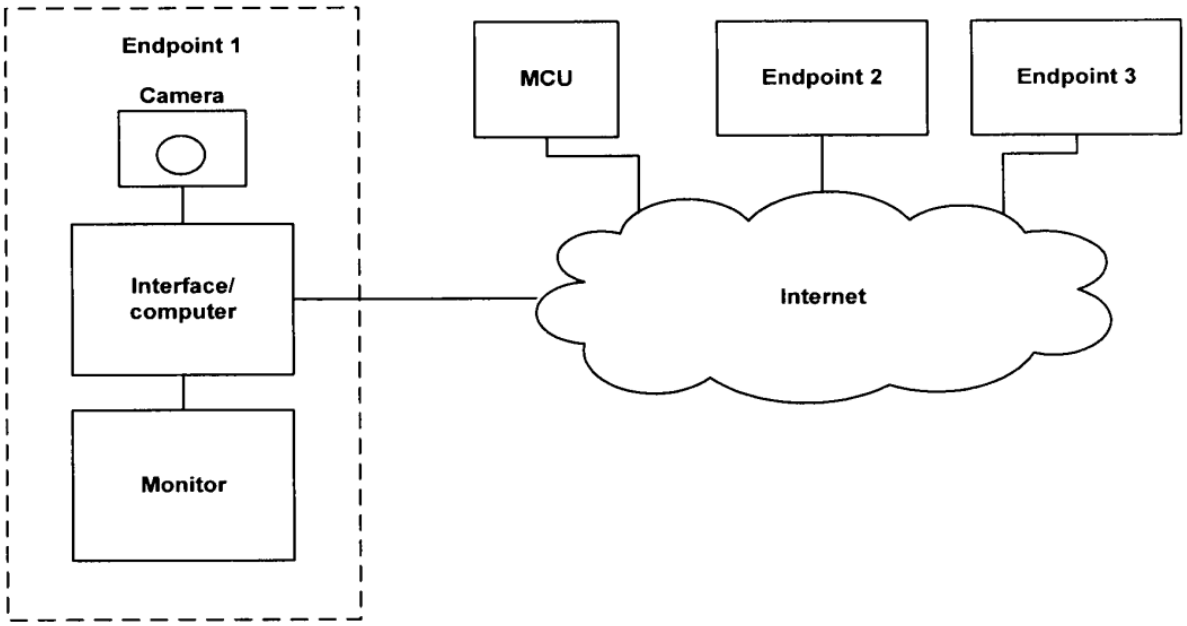


Fig. 2

Tysso Prov., Fig. 2; 6:18-30 ("Each endpoint sends image and sound data of the participants in a video conference to the MCU, and the MCU processes the data before sending the resulting processed video signals to respective endpoints."); *see also* Tysso, Fig. 2, 3:52-62.

9. Claim 9: "9. The method of claim 1, wherein the subject images of video frames of the first and second video streams are images of video conference participants."

100. Tysso discloses, or at least suggests to a POSITA, the method of claim 1 for the reasons discussed above, and Tysso discloses that the subject images of the video frames are images of video conference participants. The Tysso Provisional discloses, "The last step of the inventive method is to present processed video signals on said single monitor at respective endpoints showing

video images of the participants at other endpoints than the endpoint receiving the video signals, and ***where all participants in the video conference***, appear removed from their surroundings and seems to be located in the same room." Tysso Prov., 6:13-17 (emphasis added); *see also* Tysso, 5:33-38, 6:28-37.

101. Further confirming the video conferencing nature of Tysso, Tysso discloses various techniques to focus on certain participants. *See* Tysso Prov., 6:2-9 ("One way of showing that a certain participant currently is talking is to place that participant, at endpoint marked as active, in front of the others. Another way of highlighting the participant is by making borders around the participant. Yet another way is to soften the other participants that are not currently talking, i.e. at endpoint not marked as active"); *see also* Tysso, 6:12-24.

10. Claim 10: [10.pre] 10. An apparatus comprising:

102. Tysso discloses an apparatus. *See* Tysso, 7:1-31; *see also* Tysso Prov., Fig. 2; 6:18-20; 2:10-25; 7:1-19; 9:7-25.

a) [10.a] "a first memory configured to store data for at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image; and"

103. Tysso discloses, or at least suggests to a POSITA, the claimed first memory configured to store data for at least first and second real-time video streams, each of the first and second real-time video streams comprising video

frames containing a picture comprising a subject image and a background image for the reasons discussed above with regard to element [1.a]. In additional, Tysso discloses, or at least suggests to a POSITA, a "first memory configured to store data" because Tysso's system includes a computer-implemented processes to interface with Tysso's MCU. *See* Tysso Fig. 2 at 22, 24 ("Interface/computer", "MCU"); 3:1-10, 3:63-65; Tysso Prov., Fig. 2 ("Interface/computer", "MCU"); 3:5-11; 6:21-23.

b) [10.b] "at least one data processor configured to:"

104. Tysso discloses, or at least suggests to a POSITA, the claimed data processor with its MCU for the reasons discussed above with regard to element [1.b]. *See also* Tysso Prov., 3:18-20 ("In order to do so, pictures from the different end points are processed by performing a method comprising different steps performed in an MCU connected to said endpoints."); Tysso, 3:53-55 ("the MCU 22 processes the data before sending the resulting processed data to respective endpoints 1-3").

c) [10.c] "combine the subject images of corresponding video frames of the first and second video streams into a combined frame of a first combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the at least one data processor is configured to combine the subject images of video frames by:"

105. Tysso discloses, or at least suggests to a POSITA, the recitations of element [10.c] for the reasons discussed above with regard to element [1.b].

d) [10.d] "scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;

106. Tysso discloses, or at least suggests to a POSITA, the recitations of element [10.d] for the reasons discussed above with regard to element [1.c].

e) [10.e] "removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and

107. Tysso discloses, or at least suggests to a POSITA, the recitations of element [10.e] for the reasons discussed above with regard to element [1.d].

f) [10.f] "superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream."

108. Tysso discloses, or at least suggests to a POSITA, the recitations of element [10.f] for the reasons discussed above with regard to element [1.e].

11. Claim 11: [11.pre, 11.a] "11. The apparatus of claim 10, wherein the at least one data processor is configured to combine the subject images of video frames by:"

109. Tysso discloses, or at least suggests to a POSITA, the apparatus of claim 10 for the reasons discussed above, and Tysso discloses, or at least suggests

to a POSITA, the requirements of the apparatus with a data processor configured to combine subject images of video frames as noted above with regard to element [3.pre].

a) [11.b] "scaling the video frames of the second video stream and reposition in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;"

110. Tysso discloses, or at least suggests to a POSITA, the recitations of element [11.b] for the reasons discussed above with regard to element [3.a].

b) [11.c] "extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and"

111. Tysso discloses, or at least suggests to a POSITA, the recitations of element [11.c] for the reasons discussed above with regard to element [3.b].

c) [11.d] "superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream."

112. Tysso discloses, or at least suggests to a POSITA, the recitations of element [11.d] for the reasons discussed above with regard to element [3.c].

12. Claim 12: [12.pre] "12. A system comprising the apparatus of claim 10, and further comprising:"

113. Tysso discloses, or at least suggests to a POSITA, the apparatus of claim 10 for the reasons discussed above, and Tysso discloses a system comprising the apparatus for the reasons stated above with regard to element [10.pre].

a) [12.a] "a first video conferencing endpoint configured to communicate with the apparatus, the first endpoint including:"

114. Tysso discloses, or at least suggests to a POSITA, the recitations of element [12.a]. The Tysso Provisional discloses multiple endpoints. *See* Tysso Prov., Fig. 2.

b) [12.b] "a first video camera configured to generate the first real-time video stream, wherein the subject image of the first real-time video stream comprises an image of a first video conferencing participant at the first endpoint;"

115. Tysso discloses, or at least suggests to a POSITA, a system with video cameras configured to generate real-time video streams having subject images being images of video conferencing participants at endpoints. *See* Tysso Prov., Fig. 2, 6:18-30 ("Each endpoint comprises at least a camera with means for recording images and sound from the endpoint, a computer, and a monitor, all connected together through interfaces. The monitor is the means for displaying the other participants in the video conference. The computer is further connected to said MCU that is managing an ongoing conference, and is carrying out the inventive method."); *see also* Tysso, Fig. 2, 3:63-65; Tysso Prov., 6:26-28 ("Each endpoint

sends image and sound data of the participants in a video conference to the MCU, and the MCU processes the data before sending the resulting processed video signals to respective endpoints."); Tysso, 3:52-62, 6:28-37.

c) [12.c] "a second video camera configured to generate the second real-time video stream, wherein the subject image of the second real-time video stream comprises an image of a second video conferencing participant at the first endpoint; and"

116. Tysso suggests to a POSITA the recitations of element [12.c] for the reasons discussed above with regard to element [12.b].

117. The level of ordinary skill of a POSITA would include capturing a scene with multiple cameras. Thus, a POSITA would have found it obvious to provide more than one camera at an endpoint so as to improve the functionality of the system by capturing participants that could not fit within the field of view of a camera or by capturing participants located in different rooms of a same building and then forwarding all captured streams to the MCU.

d) [12.d] "a first control unit configured to forward the first and second real-time video streams to the apparatus; and"

118. Tysso discloses, or at least suggests to a POSITA, the recitations of element [12.d] for the reasons discussed above with regard to element [12.c].

119. When a POSITA would have provided more than one camera at an endpoint so as improve the functionality of the system by capturing participants

that could not fit within the field of view of a camera or by capturing participants located in different rooms of a same building and then forwarding all captured streams to the MCU, the POSITA would have found it obvious to forward those video signals to Tysso's MCU with a control unit, as Tysso expressly discloses a control unit for a preferred embodiment having a camera. Tysso Prov., Fig. 1 ("Interface/computer"); Tysso, Fig. 1 ("Interface/computer 24").

120. In my opinion, the level of skill of a POSITA would include knowledge that computers at the time would often interface with distinct peripherals. Thus, a POSITA would have found that allowing a single computer to interface with multiple cameras to have been obvious in order to avoid the use of duplicate computing resources, such redundant processor, memory, power supply, and other components for interfacing with each camera.

e) [12.e] "a second video conferencing endpoint configured to communicate with the apparatus, the second endpoint including:"

121. Tysso discloses, or at least suggests to a POSITA, the recitations of element [12.e] for the reasons discussed above with regard to element [12.a].

f) [12.f] "a second control unit configured to receive the combined video stream of the apparatus; and"

122. Tysso discloses, or at least suggests to a POSITA, the recitations of element [12.f] for the reasons discussed above with regard to elements [1.f] and

[12.d] and as Tysso discloses multiple endpoints for receiving the combined video stream from the MCU. *See* Tysso Prov., Fig. 2; Tysso, Fig. 2.

g) [12.g] "a display configured to receive and render the combined video stream from the control unit."

123. Tysso discloses, or at least suggests to a POSITA, the recitations of element [12.g] for the reasons stated above with regard to elements [1.f] and [12.f]. *See* Tysso Prov., 6:21-24, Fig. 2; Tysso, 3:63-65, Fig. 2.

13. Claim 13: [13.pre] "13. Logic encoded in one or more tangible non-transitory storage media for execution and when executed operable to:"

124. To the extent that the preamble is limiting, Tysso discloses, or at least suggests to a POSITA, logic encoded in one or more tangible non-transitory storage media for execution and when executed operable to an apparatus in a system because Tysso discloses a system operating on computer equipment. *See also* Tysso Prov., Fig. 2; Tysso, Fig. 2.

a) [13.a] "receive at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image;"

125. Tysso discloses, or at least suggests to a POSITA, the recitations of element [13.a] for the reasons stated above with regard to element [1.a].

b) [13.b] "combine the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream such that the

subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the subject images are combined by:"

126. Tysso discloses, or at least suggests to a POSITA, the recitations of element [13.b] for the reasons stated above with regard to element [1.b].

c) [13.c] "scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;"

127. Tysso discloses, or at least suggests to a POSITA, the recitations of element [13.c] for the reasons stated above with regard to element [1.c].

d) [13.d] "removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and"

128. Tysso discloses, or at least suggests to a POSITA, the recitations of element [13.d] for the reasons stated above with regard to element [1.d].

e) [13.e] "superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream; and"

129. Tysso discloses, or at least suggests to a POSITA, the recitations of element [13.e] for the reasons stated above with regard to element [1.e].

f) [13.f] "supply[ing] the combined video stream to a video display for displaying the combined video stream."

130. Tysso discloses, or at least suggests to a POSITA, the recitations of element [13.f] for the reasons stated above with regard to element [1.f].

14. Claim 14: "14. The logic of claim 13, wherein the logic that receives is configured to receive video frames of the first video stream comprising images of multiple videoconference participants in the subject image and video frames of the second video stream comprising images of multiple videoconference participants in the subject image.

131. Tysso discloses, or at least suggests to a POSITA, logic of claim 13 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, the recitations of claim 14 for the reasons stated above with regard to claim 2.

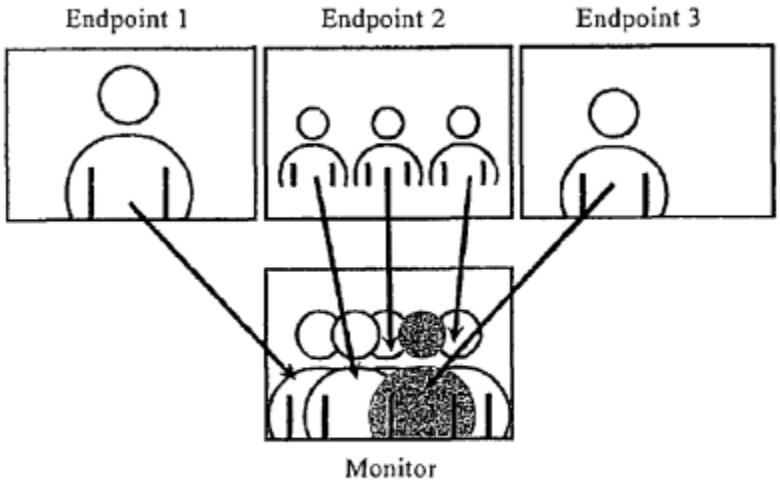


Fig. 1

Tysso, Fig. 1; Tysso, Prov., Fig. 1.

15. Claim 15: [15.pre] "15. The logic of claim 13, wherein the logic that combines is configured to:"

132. Tysso discloses, or at least suggests to a POSITA, the logic of claim 13 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, the claimed logic that combines as discussed below.

a) [15.a] "scale the video frames of the second video stream and reposition in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;"

133. Tysso discloses, or at least suggests to a POSITA, the recitations of element [15.a] for the reasons stated above with regard to element [3.a].

b) [15.b] "extend the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and"

134. Tysso discloses, or at least suggests to a POSITA, the recitations of element [15.b] for the reasons stated above with regard to element [3.b].

c) [15.c] "superimpose the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream."

135. Tysso discloses, or at least suggests to a POSITA, the recitations of element [15.c] for the reasons stated above with regard to element [3.c].

16. Claim 16: "16. The logic of claim 15, wherein the second

direction is opposite to the first direction."

136. Tysso discloses, or at least suggests to a POSITA, the logic of claim 15 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, the recitations of claim 16 for the reasons stated above with regard to claim 4.

17. Claim 17: [17.pre] "17. The logic of claim 13, wherein the logic that combines is configured to:"

137. Tysso discloses, or at least suggests to a POSITA, the logic of claim 13 for the reasons discussed above, and Tysso discloses, or at least suggests to a POSITA, the claimed logic that combines as discussed below.

a) [17.a] "remove the background image in the video frames of the first and second video streams to produce first and second background separated video frames;"

138. Tysso discloses, or at least suggests to a POSITA, the recitations of element [17.a] for the reasons stated above with regard to elements [1.d] and [5.a].

b) [17.b] "generate supplemental background image video frames that comprise a supplemental background image; and"

139. Tysso discloses, or at least suggests to a POSITA, the recitations of element [17.b] for the reasons stated above with regard to element [5.b].

c) [17.c] "superimpose corresponding ones of the first background separated video frames, and the second background separated video frames onto corresponding ones of the supplemental background video frames to

produce the combined video frames of the combined video stream."

140. Tysso discloses, or at least suggests to a POSITA, the recitations of element [17.c] for the reasons stated above with regard to element [5.c].

18. Claim 18: "18. The logic of claim 13, wherein the first and second video streams are produced at the same video conferencing site."

141. Tysso discloses, or at least suggests to a POSITA, the logic of claim 13 for at least the reasons set forth above, and Tysso discloses or at least suggests to a POSITA the recitations of claim 18 for the reasons stated above with regard to claim 6.

19. Claim 19: "19. The logic of claim 13, wherein the first and second video streams are produced at different video conferencing sites."

142. Tysso discloses, or at least suggests to a POSITA, the logic of claim 13 for at least the reasons set forth above, and Tysso discloses or at least suggests to a POSITA the recitations of claim 19 for the reasons stated above with regard to claim 7.

20. Claim 20: "20. The logic of claim 13, wherein the logic that combines is configured to be performed at a site other than where the first and second video streams are produced."

143. Tysso discloses, or at least suggests to a POSITA, the logic of claim 13 for at least the reasons set forth above, and Tysso discloses or at least suggests

to a POSITA the recitations of claim 20 for the reasons stated above with regard to claim 8.

C. Ground 2: Tysso in view of GIMP Renders Obvious Claims 1-20

144. As noted above, Tysso in view of GIMP demonstrates the obviousness of claims 1-20 more particularly.

145. The User Manual for GNU Image Manipulation Program ("GIMP") demonstrates that a POSITA would regard scaling image frames and pictures in image frames to be alternate ways to manipulate and scale images, and contemplates that the use of either technique is within the level of skill of a POSITA.

146. I understand GIMP to have been publicly available as of at least May 21, 2007.

147. GIMP is analogous art to the '293 patent and to Tysso as it deals with techniques to process images, and video can be regarded as a collection of images.

148. In GIMP, a "canvas" corresponds to the visible area of an image. GIMP, 346. An image in GIMP consists of "layers" stacked on each other, and GIMP allows the layers to be individually manipulated. *See, e.g,* GIMP, 82-100. For example, an image on one layer can overlap an image found on another layer, so that only the upper layer covers the layers below it, which only appear when the upper layer has some transparency in areas surrounding, e.g., the picture in the

upper layer. GIMP, 86, 422 ("The Color to Alpha filter makes transparent all pixels with a selected color").

149. GIMP allows pictures, layers, and canvases to be "scaled," which enlarges or reduces the size of the picture, layers, or canvases. GIMP, 189-91 ("The Scale Tool is used to scale layers, selections, or paths"); GIMP, 349 ("The Scale Image command enlarges or reduces the physical size of the image by changing the number of pixels it contains. It changes the size of the contents of the image and resizes the canvas accordingly. … If you only want to scale a particular layer, use the Scale Layer command."); GIMP, 387-88 ("The Scale Layer command resizes the layer and its contents.").

150. When reducing the size of an opaque upper layer in GIMP, portions under the layer can be revealed, creating an "extended" background for the upper layer. For example, a POSITA would understand with regard to Tysso that the processing of a video frame to be presented could include, as a lowest layer, a transparent layer. As disclosed in Tysso, a received video frame could be processed to select a picture in that image according to the principles of GIMP and scale the picture, and apply it as a layer over the transparent layer.

151. Alternatively, a received frame with a green screen, as contemplated by GIMP, could be layered over a lowest green screen fill layer. When the

received frame layer is scaled over the lower fill layer, the scaling of the received layer would reveal the underlying green screen fill, to keep the green screen extended to the size of the frame.

152. A POSITA would find these alternate ways to manipulate and scale images to be obvious alternatives. In fact, GIMP expressly suggests alternative image processing options dependent of the preferences of a POSITA. GIMP, 349 ("If you only want to scale a particular layer, use the Scale Layer command"); GIMP, 189 ("The Scale Tool is used to scale layers, selections or paths (the Object)."); GIMP, 387 ("The Layer to Image Size command resizes the layer boundaries to match the image boundaries, without moving the contents of the layer with respect to the image").

153. Once scaled, the background of a received image could be removed to prevent it from obscuring lower layers, as disclosed in Tysso and GIMP by selecting by color and deleting it.

154. Thus, a POSITA would have been motivated to combine the imaging techniques of GIMP with Tysso as discussed, and claims 1-20 are obvious in view of that combination.

1. Independent Claim 1: [1.pre] "A method comprising"

155. Tysso discloses, or at least suggests to a POSITA, element [1.pre] for the reasons stated above in Ground 1 with regard to element [1.pre].

a) [1.a] "receiving at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image;"

156. Tysso discloses, or at least suggests to a POSITA, element [1.a] for the reasons stated above in Ground 1 with regard to element [1.a].

b) [1.b] "combining the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the combining comprises:"

157. Tysso discloses, or at least suggests to a POSITA, element [1.b] for the reasons stated above in Ground 1 with regard to element [1.b].

c) [1.c] "scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;"

158. Tysso discloses, or at least suggests to a POSITA, element [1.c] for the reasons stated above in Ground 1 with regard to element [1.c].

159. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA scaling entire video frames as layers.

d) [1.d] "removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the

anterior portion of the combined frames of the combined video stream; and"

160. Tysso discloses, or at least suggests to a POSITA, element [1.d] for the reasons stated above in Ground 1 with regard to element [1.d].

e) [1.e] "superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream; and"

161. Tysso discloses, or at least suggests to a POSITA, element [1.e] for the reasons stated above in Ground 1 with regard to element [1.e].

f) [1.f] "supplying the combined video stream to a video display for displaying the combined video stream."

162. Tysso discloses, or at least suggests to a POSITA, element [1.f] for the reasons stated above in Ground 1 with regard to element [1.f].

2. Claim 2: "The method of claim 1, wherein the subject image of video frames of the first video stream comprises images of multiple videoconference participants and the subject image of video frames of the second video stream comprises images of multiple videoconference participants."

163. Tysso discloses, or at least suggests to a POSITA, claim 2 for the reasons stated above in Ground 1 with regard to claim 2.

3. Claim 3: [3.pre] "The method of claim 1, wherein combining comprises:

164. Tysso discloses, or at least suggests to a POSITA, element [3.pre] for the reasons stated above in Ground 1 with regard to element [3.pre].

a) [3.a] "scaling the video frames of the second video stream and repositioning in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;"

165. Tysso discloses, or at least suggests to a POSITA, element [3.a] for the reasons stated above in Ground 1 with regard to element [3.a].

166. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA scaling entire video frames as layers.

b) [3.b] "extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and"

167. Tysso discloses, or at least suggests to a POSITA, element [3.b] for the reasons stated above in Ground 1 with regard to element [3.b].

168. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA extending a background image for a rear layer of a video frame. For example, when a background is transparent, GIMP's "Layer to Image Size" command (GIMP, 387) would resize the layer of a reduced-sized scaled video frame to extend its background to match the frame size of the output video frame so as not to move "the contents of the layer with respect to the image."

c) [3.c] "superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream."

169. Tysso discloses, or at least suggests to a POSITA, element [3.c] for the reasons stated above in Ground 1 with regard to element [3.c].

4. Claim 4: "4. The method of claim 3, wherein the second direction is opposite to the first direction."

170. Tysso discloses, or at least suggests to a POSITA, claim 4 for the reasons stated above in Ground 1 with regard to claim 4.

5. Claim 5

171. Tysso discloses, or at least suggests to a POSITA, claim 5 for the reasons stated above in Ground 1 with regard to claim 5.

6. Claim 6: "6. The method of claim 1, wherein the first and second video streams are produced at a same video conferencing site."

172. Tysso discloses, or at least suggests to a POSITA, claim 6 for the reasons stated above in Ground 1 with regard to claim 6.

7. Claim 7: "7. The method of claim 1, wherein the first and second video streams are produced at different video conferencing sites."

173. Tysso discloses, or at least suggests to a POSITA, claim 7 for the reasons stated above in Ground 1 with regard to claim 7.

8. Claim 8: "8. The method of claim 1, wherein combining is performed at a site other than where the first and second video streams are produced."

174. Tysso discloses, or at least suggests to a POSITA, claim 8 for the reasons stated above in Ground 1 with regard to claim 8.

9. Claim 9: "9. The method of claim 1, wherein the subject images of video frames of the first and second video streams are images of video conference participants."

175. Tysso discloses, or at least suggests to a POSITA, claim 9 for the reasons stated above in Ground 1 with regard to claim 9.

10. Claim 10: [10.pre] 10. An apparatus comprising:

176. Tysso discloses, or at least suggests to a POSITA, element [10.pre] for the reasons stated above in Ground 1 with regard to element [10.pre].

a) [10.a] "a first memory configured to store data for at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image; and"

177. Tysso discloses, or at least suggests to a POSITA, element [10.a] for the reasons stated above in Ground 1 with regard to element [10.a].

b) [10.b] "at least one data processor configured to:"

178. Tysso discloses, or at least suggests to a POSITA, element [10.b] for the reasons stated above in Ground 1 with regard to element [10.b].

c) [10.c] "combine the subject images of corresponding video frames of the first and second video streams into a combined frame of a first combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the at least one data processor is configured to combine the subject images of video frames by:"

179. Tysso discloses, or at least suggests to a POSITA, element [10.c] for the reasons stated above in Ground 1 with regard to element [10.c].

d) [10.d] "scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;

180. Tysso discloses, or at least suggests to a POSITA, element [10.d] for the reasons stated above in Ground 1 with regard to element [10.d].

181. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA scaling entire video frames as layers.

e) [10.e] "removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and

182. Tysso discloses, or at least suggests to a POSITA, element [10.e] for the reasons stated above in Ground 1 with regard to element [10.e].

f) [10.f] "superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream."

183. Tysso discloses, or at least suggests to a POSITA, element [10.f] for the reasons stated above in Ground 1 with regard to element [10.f].

11. Claim 11: [11.pre, 11.a] "11. The apparatus of claim 10, wherein the at least one data processor is configured to combine the subject images of video frames by:"

184. Tysso discloses, or at least suggests to a POSITA, elements [11.pre] and [11.a] for the reasons stated above in Ground 1 with regard to elements [11.pre] and [11.a].

a) [11.b] "scaling the video frames of the second video stream and reposition in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;"

185. Tysso discloses, or at least suggests to a POSITA, element [11.b] for the reasons stated above in Ground 1 with regard to element [11.b].

186. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA scaling entire video frames as layers.

b) [11.c] "extending the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and"

187. Tysso discloses, or at least suggests to a POSITA, element [11.c] for the reasons stated above in Ground 1 with regard to element [11.c].

188. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA extending a background image for a rear layer of a video frame.

c) [11.d] "superimposing the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream."

189. Tysso discloses, or at least suggests to a POSITA, element [11.d] for the reasons stated above in Ground 1 with regard to element [11.d].

12. Claim 12

190. Tysso discloses, or at least suggests to a POSITA, claim 12 for the reasons stated above in Ground 1 with regard to element claim 12.

13. Claim 13: [13.pre] "13. Logic encoded in one or more tangible non-transitory storage media for execution and when executed operable to:"

191. Tysso discloses, or at least suggests to a POSITA, element [13.pre] for the reasons stated above in Ground 1 with regard to element [13.pre].

a) [13.a] "receive at least first and second real-time video streams, each of the first and second real-time video streams comprising video frames containing a picture comprising a subject image and a background image;"

192. Tysso discloses, or at least suggests to a POSITA, element [13.a] for the reasons stated above in Ground 1 with regard to element [13.a].

b) [13.b] "combine the subject images of corresponding video frames of the first and second video streams into a combined frame of a combined video stream such that the subject image of the first video stream is positioned in an anterior portion of the combined frame and the subject image of the second video stream is positioned in a posterior portion of the combined frame, wherein the subject images are combined by:"

193. Tysso discloses, or at least suggests to a POSITA, element [13.b] for the reasons stated above in Ground 1 with regard to element [13.b].

c) [13.c] "scaling the video frames of the first video stream and repositioning in a first direction the resulting pictures in the video frames of the first video stream to produce a first sequence of scaled video frames;"

194. Tysso discloses, or at least suggests to a POSITA, element [13.c] for the reasons stated above in Ground 1 with regard to element [13.c].

195. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA scaling entire video frames as layers.

d) [13.d] "removing the background image in the first sequence of scaled video frames to produce first background separated video frames to be displayed in the anterior portion of the combined frames of the combined video stream; and"

196. Tysso discloses, or at least suggests to a POSITA, element [13.d] for the reasons stated above in Ground 1 with regard to element [13.d].

e) [13.e] "superimposing the first background separated video frames onto corresponding ones of the video frames of the second video stream to produce combined video frames of the combined video stream; and"

197. Tysso discloses, or at least suggests to a POSITA, element [13.e] for the reasons stated above in Ground 1 with regard to element [13.e].

f) [13.f] "supply[ing] the combined video stream to a video display for displaying the combined video stream."

198. Tysso discloses, or at least suggests to a POSITA, element [13.f] for the reasons stated above in Ground 1 with regard to element [13.f].

14. Claim 14: "14. The logic of claim 13, wherein the logic that receives is configured to receive video frames of the first video stream comprising images of multiple videoconference participants in the subject image and video frames of the second video stream comprising images of multiple videoconference participants in the subject image.

199. Tysso discloses, or at least suggests to a POSITA, claim 14 for the reasons stated above in Ground 1 with regard to element claim 14.

15. Claim 15: [15.pre] "15. The logic of claim 13, wherein the logic that combines is configured to:"

200. Tysso discloses, or at least suggests to a POSITA, element [15.pre] for the reasons stated above in Ground 1 with regard to element [15.pre].

a) [15.a] "scale the video frames of the second video stream and reposition in a second direction the resulting pictures in the video frames of the second video stream to produce a second sequence of scaled video frames;"

201. Tysso discloses, or at least suggests to a POSITA, element [15.a] for the reasons stated above in Ground 1 with regard to element [15.a].

202. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA scaling entire video frames as layers.

b) [15.b] "extend the background image in the second sequence of scaled video frames to produce background extended video frames to be displayed in the posterior portion of the combined frames of the combined video stream; and"

203. Tysso discloses, or at least suggests to a POSITA, element [15.b] for the reasons stated above in Ground 1 with regard to element [15.b].

204. In addition, as noted above, Tysso in combination with GIMP suggests to a POSITA extending a background image for a rear layer of a video frame.

c) [15.c] "superimpose the first background separated video frames onto corresponding ones of background extended video frames to produce combined video frames of the combined video stream."

205. Tysso discloses, or at least suggests to a POSITA, element [15.c] for the reasons stated above in Ground 1 with regard to element [15.c].

16. Claim 16: "16. The logic of claim 15, wherein the second direction is opposite to the first direction."

206. Tysso discloses, or at least suggests to a POSITA, claim 16 for the reasons stated above in Ground 1 with regard to element claim 16.

17. Claim 17

207. Tysso discloses, or at least suggests to a POSITA, claim 17 for the reasons stated above in Ground 1 with regard to element claim 17.

18. Claim 18: "18. The logic of claim 13, wherein the first and second video streams are produced at the same video conferencing site."

208. Tysso discloses, or at least suggests to a POSITA, claim 18 for the reasons stated above in Ground 1 with regard to element claim 18.

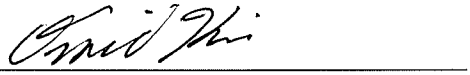
19. Claim 19: "19. The logic of claim 13, wherein the first and second video streams are produced at different video conferencing sites."

209. Tysso discloses, or at least suggests to a POSITA, the recitations of claim 19 for the reasons stated above with regard to claim 19.

20. Claim 20: "20. The logic of claim 13, wherein the logic that combines is configured to be performed at a site other than where the first and second video streams are produced."

210. Tysso discloses, or at least suggests to a POSITA, claim 20 for the reasons stated above in Ground 1 with regard to element claim 20.

This declaration and my opinions herein are made to the best of my knowledge and understanding, and based on the material available to me, at the time of signing this declaration. I declare under penalty of perjury under the laws of the United States of America that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

By: 

Omid Kia

Dated: 9/24/2025