IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

VIDEO SOLUTIONS PTE. LTD., Plaintiff, v. CISCO SYSTEMS, INC., Defendant.	Case No. 2:23-cv-222-JRG JURY TRIAL DEMANDED

DEFENDANT'S THIRD AMENDED INVALIDITY CONTENTIONS AND SUBJECT MATTER ELIGIBILITY CONTENTIONS FOR THE ASSERTED PATENTS

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Defendant Cisco Systems, Inc. ("Defendant" or "Cisco") hereby provides these Third Amended Invalidity Contentions ("Invalidity Contentions") and Subject-Matter Eligibility Contentions ("Eligibility Contentions") to Plaintiff Video Solutions Pte. Ltd. ("Plaintiff" or "Video Solutions").

I. INTRODUCTION

These Invalidity Contentions and Eligibility Contentions are based on Defendant's current knowledge of four patents asserted by Video Solutions in this case, U.S. Pat. No. 8,446,452 ("the '452 Patent"), U.S. Pat. No. 9,204,099 ("the '099 Patent"), U.S. Patent No. 8,446,823 ("the '823 Patent"), and U.S. Pat. No. 8,649,426 ("the '426 Patent") (together, "Asserted Patents" or "patents-in-suit"), the prior art, and Defendant's current understanding of Plaintiff's apparent claim interpretation.[1] Defendant continues to pursue discovery and to investigate and analyze the prior art.

Deficiencies in Plaintiff's Infringement Contentions have made it difficult for Defendant to understand Plaintiff's claim construction and infringement positions. These deficiencies include, but are not limited to, those explained in Defendant's letters to Plaintiff dated August 23, 2023, December 8, 2023, January 10, 2024, Defendant's Motion to Compel dated March 27, 2024, and Defendant's forthcoming letter regarding Plaintiff's April 16 Infringement Contentions. Accordingly, Defendant's Invalidity Contentions and Eligibility Contentions are based on Defendant's present understanding of Plaintiff's apparent positions as to the scope of the claims of the Asserted Patents asserted by Plaintiff (at times, "Asserted Claims"). By

[1] Defendant's understanding of Plaintiff's apparent claim interpretation is based on Plaintiff's Second Amended Disclosures Pursuant to Local Patent Rules 3-1 and 3-2 dated April 16, 2024 ("Infringement Contentions").

explaining how the prior art invalidates the Asserted Claims, Defendant is neither adopting nor acceding in any manner to Plaintiff's claim construction and infringement positions. Furthermore, the statements herein shall not be treated as an admission or suggestion that Defendant agrees with Plaintiff regarding either the scope of any of the Asserted Claims or the claim constructions Plaintiff appears to advance in its infringement contentions or anywhere else. Nor shall anything in these Invalidity Contentions be treated as an admission that any of Defendant's products or instrumentalities meet any limitations of the claims.

To the extent that these Invalidity Contentions rely on or otherwise embody particular constructions of terms or phrases in Asserted Claims, Defendant is not proposing any such constructions as the proper constructions of those terms or phrases at this time. In particular, certain of these Invalidity Contentions, including the charts attached hereto, may be based on claim constructions that appear to underlie Plaintiff's Infringement Contentions.[2] Defendant, however, does not concede that Plaintiff's apparent constructions are proper, and it reserves the right to contest any such constructions. Moreover, nothing herein admits in any way that any Accused Instrumentality, or any of Defendant's other products or services, infringes any of the Asserted Claims. Defendant reserves the right to supplement, modify, or otherwise amend these Invalidity Contentions as allowed by P.R. 3-6.

The information that Defendant provides and the documents that Defendant produces are provisional and subject to further revision. Defendant expressly reserves the right to amend the

[2] Plaintiff's Infringement Contentions are inconclusive, vague, and not compliant with the Local Patent Rules. In addition, they appear to be based on an improperly broad interpretation of the Asserted Claims. Thus, certain of these Invalidity Contentions may likewise be based on Plaintiff's overbroad interpretation. Defendant reserves the right to supplement and/or modify these Invalidity Contentions if, for example, Plaintiff or to modify its positions regarding the scope of the Asserted Claims (e.g., by amending its Infringement Contentions).

disclosures and document production herein if, for example, Plaintiff provides any information that it failed to provide in its infringement contentions or if Plaintiff attempts to amend its infringement contentions in any way. Further, because Plaintiff's failures have prevented Defendant from completing its search for and analysis of relevant prior art, Defendant reserves the right to revise, amend, and/or supplement the information provided herein, including identifying and relying on additional references, should Defendant's further search and analysis yield additional information or references, consistent with this Court's orders and the Federal Rules of Civil Procedure. Moreover, Defendant reserves the right to revise its ultimate contentions concerning the invalidity of the Asserted Claims, which may change depending upon the Court's construction of the Asserted Claims, any findings as to the invention date of the Asserted Claims, and/or positions that Plaintiff or its expert witness(es) may take concerning issues of claim construction, infringement, and/or invalidity.

The prior art not included in this disclosure, whether known or not known to Defendant, may become relevant. In particular, Defendant is currently unaware of the extent to which Plaintiff will contend that limitations of the Asserted Claims are not disclosed in the prior art identified herein. To the extent that such an issue arises, Defendant reserves the right to identify additional teachings in the same references or other references that disclose or render obvious the allegedly missing limitation(s).

Defendant's accompanying claim charts cite to particular teachings and disclosures of the prior art as applied to the features of the Asserted Claims. Although Defendant has complied with P.R. 3-3's directive to identify "where specifically in each alleged item of prior art each element of each asserted claim is found," Defendant has not necessarily identified each and every disclosure of an element in a reference in an effort to avoid redundancy. Similarly, the

lack of a citation for an element should not be deemed an admission that the element is not disclosed or is not inherent in the reference. In an effort to focus the issues, Defendant is identifying exemplary portions of the cited references from which Plaintiff can easily ascertain Defendant's invalidity theories. Moreover, Defendant is not providing the complete universe of knowledge held by a person of ordinary skill in the art. As such, the cited portions of references are only examples, and Defendant reserves the right to rely on uncited portions of the prior art references, other publications, and expert testimony as aids in understanding and interpreting the cited portions, as providing context thereto, and as additional evidence that a claim limitation is known or disclosed. Defendant further reserves the right to rely on uncited portions of the prior art references, other publications, and testimony to establish bases for combinations of certain cited references that render the Asserted Claims obvious. Where Defendant cites to a particular figure in the accompanying charts, the citation encompasses the description of the figure, as well as any text associated with the figure. Similarly, where Defendant cites to particular text concerning a figure, the citation encompasses that figure as well.

Throughout the attached Exhibits, Defendant provides examples of where references disclose subject matter recited in preambles, without regard to whether the preambles are properly considered to be limitations of the Asserted Claims. Defendant reserves the right to argue that any claim elements of the Asserted Claims (including preambles) do not in fact limit the scope of the Asserted Claims.

The references discussed in the claim charts or elsewhere identified may disclose the elements of the Asserted Claims explicitly and/or inherently, and/or may be relied upon to show that state of the art in the relevant time frame. Defendant's proposed obviousness arguments or obviousness combinations are provided in the alternative to Defendant's anticipation contentions

and are not to be construed to suggest that any reference included in the combinations is not by itself anticipatory.

These Invalidity Contentions and Eligibility Contentions address only those claims that Plaintiff has asserted in its Infringement Contentions. Defendant reserves the right to supplement these contentions if Plaintiff attempts to assert any claims not addressed in its Infringement Contentions or attempts to modify or revise the Infringement Contentions in any way.

Defendant further reserves the right to assert that the Asserted Claims are invalid under 35 U.S.C. § 102(f) in the event that Defendant obtains evidence that the inventor named in a patent-in-suit did not invent the subject matter claimed in the patent-in-suit. Should Defendant obtain such evidence, it will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived.

Although these Invalidity Contentions may associate particular prior art patents and/or printed publications with a specific statutory subsection of 35 U.S.C. § 102, it should be understood that Defendant may also rely on these patents and/or printed publications under other subsections of Section 102. For example, where patents or printed publications are cited as evidence of the functionality of system prior art under § 102(g)(2), it should be understood that such patents or printed publications are also being disclosed for use as prior art under §§ 102(a), (b), or (e).

II. PRIORITY DATE

Plaintiff's Infringement Contentions assert that "[a]ll asserted claims of the '452 patent are entitled to a priority date at least as early as November 7, 2008," that "[a]ll asserted claims of the '099 patent are entitled to a priority date at least as early as February 1, 2012," that "[a]ll asserted claims of the '823 patent are entitled to a priority date at least as early as June 23,

2009," and that "[a]ll asserted claims of the '426 patent are entitled to a priority date at least as early as September 18, 2008." Infringement Contentions at 14.

Despite being required to by P.R. 3-1 and 3-2, Plaintiff has made no specific disclosure regarding conception and reduction to practice of the Asserted Patents any earlier than the application's filing date (for the '452 Patent, '823 Patent, and '426 Patent) or the filing date of the provisional application to which the patent claims priority (for the '099 Patent). Thus, in preparing these Invalidity Contentions, Defendant has relied on Plaintiff's failure to assert or produce any documents supporting any earlier invention dates for the Asserted Patents. It is improper for Plaintiff to leave the door open to a future assertion of an invention date or conception date earlier than November 7, 2008 (for the '452 Patent), February 1, 2012 (for the '099 Patent), June 23, 2009 (for the '823 Patent), or September 18, 2008 (for the '426 Patent). To the extent that Plaintiff attempts to seek an earlier priority date or invention date for any of the asserted patents (which, in all events, would be improper), Defendant reserves the right to object to such attempts and to supplement its Invalidity Contentions, including by identifying additional prior art.

III. ASSERTED PATENTS AND CLAIMS

Plaintiff asserts the following claims from the Asserted Patents (collectively, "Asserted Claims"):

Asserted Patent	Asserted Claims
'452 Patent	1-6, 9-13, 15-19, and 21-24
'099 Patent	3-6, 10
'823 Patent	1-2, 7-8
'426 Patent	1-5, 7, and 10-11

Infringement Contentions at 2.

IV. INVALIDITY OF THE '452 PATENT

A. Invalidity Based on the Prior Art

As shown below, the alleged inventions of the Asserted Patents were well-known in the prior art. Those skilled in the art were aware of all of the limitations claimed in the Asserted Patents. Thus, many prior art patents, publications, products, and combinations thereof, disclose, teach, or embody every limitation of the Asserted Claims and thus invalidate those claims. Examples of these disclosures, teachings, and embodiments are identified in the following sections and in the attached claim charts.

1. Identification of Prior Art References (P.R. 3-3(a))

Subject to the reservation of rights above, Defendant identifies each item of prior art that anticipates and/or renders obvious one or more of the Asserted Claims of the Asserted Patents. The patents/applications, publications, and systems identified are also relevant for their showing of the state of the art and reasons and motivations for making improvements, additions, and combinations.

Some of the below citations and those in the corresponding invalidity claim charts involve prior art references that have corresponding related, foreign, and/or PCT counterpart publications. In such cases, where either the U.S. patent or related, foreign, and/or PCT counterpart is cited, it is to be understood that the corresponding disclosures from the counterpart patent and publications (which are substantively the same) are implicitly incorporated by reference in the alternative to avoid needless repetition.

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
A-01	U.S. Pat. No. 6,212,232 ("Reed") (CISCO_00076023 - CISCO_00076040)	June 18, 1998	Apr. 3, 2001
A-02	U.S. Pat. No. 6,526,097 ("Sethuraman") (CISCO_00076041 - CISCO_00076054)	Sept. 2, 1999	Feb. 25, 2003

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
A-03	U.S. Pat. No. 6,704,281 ("Hourunranta") (CISCO_00076287 - CISCO_00076299)	Jan. 13, 2000	Mar. 9, 2004
A-04	U.S. Pat. No. 7,400,588 ("Izzat") (CISCO_00075990 - CISCO_00075998)	Aug. 1, 2003	July 15, 2008
A-05	U.S. Pat. No. 7,554,922 ("Vega-Garcia") (CISCO_00075942 - CISCO_00075961)	Nov. 16, 2006	June 30, 2009
A-06	U.S. Pat. No. 7,701,884 ("Chapweske") (CISCO_00075793 - CISCO_00075812)	Nov. 19, 2004	Apr. 20, 2010
A-07	U.S. Pat. No. 7,782,775 ("Flott") (CISCO_00075962 - CISCO_00075976)	Nov. 21, 2007	Aug. 24, 2010
A-08	U.S. Pat. Pub. No. 2006/0245378 ("Jeong") (CISCO_00076132 - CISCO_00076168)	Apr. 28, 2005	Nov. 2, 2006
A-09	U.S. Pat. Pub. No. 2007/0053446 ("Spilo") (CISCO_00076300 - CISCO_00076308)	Sept. 22, 2005	Mar. 8, 2007
A-10	U.S. Pat. Pub. No. 2007/0280359 ("Prieto") (CISCO_00076274 - CISCO_00076286)	May 30, 2006	Dec. 6, 2007
A-11	U.S. Pat. Pub. No. 2008/0055399 ("Woodworth") (CISCO_00075977 - CISCO_00075989)	Nov. 1, 2006	Mar. 6, 2008
A-12	U.S. Pat. Pub. No. 2008/0091838 ("Miceli") (CISCO_00075910 - CISCO_00075925)	Oct. 12, 2006	Apr. 17, 2008

Table A-1: Prior Art Patents and Patent Publications for the '452 Patent

Ex.	Title	Author(s)	Publisher	Date of Publication
A-13	TFRC-based Rate Control Scheme for Real-Time JPEG 2000 Video Transmission ("Futemma") (CISCO_00076055 - CISCO_00076060)	S. Futemma, K. Yamane, E. Itakura	IEEE	Apr. 18, 2005
A-14	RTP: A Transport Protocol for Real-Time Applications ("RFC 1889") (CISCO_00075835 - CISCO_00075909)	H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson	IETF	Jan. 1996
A-15	RTP: A Transport Protocol for Real-Time Applications ("RFC 3550") (CISCO_00076169 - CISCO_00076257)	H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson	IETF	July 2003
A-16	TCP Friendly Rate Control (TFRC): Protocol Specification ("RFC 3448") (CISCO_00075999 - CISCO_00076022)	M. Handley, S. Floyd, J. Padhye, J. Widmer	IETF	Jan. 2004

Ex.	Title	Author(s)	Publisher	Date of Publication
A-17	MPEG-2 Compression (CISCO_00075813 - CISCO_00075834, *see also* CISCO_00075926 - CISCO_00075941)		Cisco Press	Aug. 20, 2001
A-18	Monitoring Access Link Capacity Using TFRC Probe ("Chen") (CISCO_00076111 - CISCO_00076121)	L. Chen, T. Sun, G. Yang, M. Sanadidi, M. Gerla	Elsevier, Science Direct	June 2006
A-19	Bullet: High Bandwidth Data Dissemination Using An Overlay Mesh ("Kostic") (CISCO_00076258 - CISCO_00076273)	D. Kostic, A. Rodriguez, J. Albrecht, A. Vahdat	ACM	Dec. 2003
A-20	ITU-T Recommendation H.263 Appendix III ("Appendix III") (CISCO_00076061 - CISCO_00076110)		ITU	June 2001
A-21	On End-to-End Architecture for Transporting MPEG-4 Video Over the Internet ("Wu") (CISCO_00076309 - CISCO_00076327)	D. Wu, Y. Hou, W. Zhu, H. Lee, T. Chiang, Y. Zhang, H. Chao	IEEE	Sept. 2000
A-22	Dynamic QoS Control of Multimedia Applications Based on RTP ("Busse") (CISCO_00076122 - CISCO_00076131)	I. Busse, B. Deffner, H. Schulzrinne	Elsevier, Science Direct	Jan. 1996
A-26	MPEG: A Video Compression Standard for Multimedia Applications ("Gall") (CISCO_00079661 - CISCO_00079673)	D. Le Gall	Communications of the ACM	Apr. 1991
A-27	Towards Optimal Rate Control: a Study of the Impact of the Spatial Resolution, Frame Rate, and Quantization on Subjective Video Quality and Bit Rate ("Wang") (CISCO_00079675- CISCO_00079687)	D. Wang, F. Speranza, A. Vincent, T. Martin, P. Blanchfield	SPIE	June 2003

Table A-2: Prior Art Non-Patent Publications for the '452 Patent[3]

Defendant is still investigating prior uses. Based upon at least Plaintiff's apparent positions as to the scope of the Asserted Claims, and as further explained below and in the cited exhibits, it appears that the following systems (and development thereof) qualify as prior art under at least one or more of 35 U.S.C. §§ 102(a), (b), and (g):

Ex.	Description	Entities Involved	Prior Art Date
A-24	Cisco TelePresence and Unified Communications Manager ("TelePresence")	Cisco Systems, Inc.	Various dates on or before March 7, 2008
A-25	WebEx	WebEx Communications, Inc.; Cisco Systems, Inc.	Various dates on or before September 21, 2006

Table A-3: Prior Art Systems for the '452 Patent

To the extent that Plaintiff argues that Defendant's current products infringe, for the same reasons, these prior art products read on the claims. Defendant's investigation and analysis are still ongoing, and Defendant is further investigating whether it can make the source code for these products available for inspection.

2. Anticipation and Obviousness (P.R. 3-3(b) and (c))

The Asserted Claims of the '452 Patent are invalid because they were anticipated by the prior art, and also because they would have been obvious in view of the prior art.

The prior art identified by Defendant anticipates one or more of the Asserted Claims of the '452 Patent under at least 35 U.S.C. §§ 102(a), (b), (e), or (g). For each prior art reference, Defendant has provided claim charts attached to these Invalidity Contentions as Exhibits A-1

[3] Exhibit A-23 is intentionally omitted.

through A-22, and A-24 through A-27. These charts identify where each element of each Asserted Claim can be found in each item of prior art.

In addition, the Asserted Claims of the ’452 Patent are invalid as obvious under 35 U.S.C. § 103. Each prior art reference identified in the preceding sections—either alone or in combination with other prior art references, and/or in combination with the knowledge of one skilled in the art—renders the Asserted Claims invalid as obvious. In rendering the Asserted Claims obvious, each prior-art reference identified in the preceding sections may be combined with: (1) information known to persons skilled in the art at the time of the alleged invention, (2) any of the other anticipatory or obviousness prior-art references, (3) any statements in the intrinsic record of the ’452 Patent and related applications, or (4) any of the additional prior art identified below.

3. Motivations to Combine

A person of ordinary skill in the art (sometimes, “POSA”) would have been motivated to combine the preceding references (*see* Section IV.A.1) for the following reasons. Teachings, suggestions, motivations and/or reasons to modify any of the references and/or to combine any two or more of the references can come from many sources, including the prior art (by specific reference and when read as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obviousness to try, the nature of the problem faced, and/or knowledge possessed by a person of ordinary skill.

Although a patent claim may be invalidated based on a teaching-suggestion-motivation (“TSM”) rationale—*i.e.*, that some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention—the Supreme Court identified additional rationales

in *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The following of these rationales apply here:

> (A) the asserted claims combine prior-art elements according to known methods to yield predictable results;
>
> (B) the asserted claims involve the simple substitution of one known element for another to obtain predictable results;
>
> (C) the asserted claims involve the use of a known technique to improve similar devices (methods, or products) in the same way;
>
> (D) the asserted claims apply a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) the asserted claims involve combinations of prior-art references that would have been "obvious to try"'—a person of ordinary skill in the art could have reached the asserted claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) the asserted claims are simply variations of work from one field of endeavor or a different one that would have been prompted based on design incentives or other market forces because the variations were predictable to one of ordinary skill in the art.

See KSR, 550 U.S. at 414-18 (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, and instead espousing an "expansive and flexible" approach); *see also* Department of Commerce, Patent and Trademark Office, Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420-21.

Thus, even in the absence of a specific teaching, suggestion, or motivation to combine references, the Asserted Claims here are obvious and therefore invalid. Each of the cited

references or devices is in the same field as the ’452 patent, making it obvious for someone of ordinary skill in the art to identify and combine elements from these references and devices. One of ordinary skill in the art would have recognized that improvements could be achieved by combining or modifying prior-art references that described such improvements. Each of the above prior-art references describes systems, products, or methods that were known to offer such improvements, and, accordingly, one of ordinary skill in the art would have been motivated to combine or modify the references as identified below.

Furthermore, because each prior art reference concerns videoconferencing or other networked systems, common industry knowledge supplied a reason to combine any one the above references. It was well understood that software modules implementing, for example, video bit rate adaptation, video encoding, network topology and interconnectivity, and various aspects of the user interface could be interchanged with each other, fitting together like puzzle pieces. Each combination would have produced predictable results and would simply represent a known alternative to one of ordinary skill in the art of videoconferencing software. This is a further motivation to combine any of the above references.

The below sections further address particular reasons to combine the above references. The below should not be construed as an admission that there is any value to the alleged invention of the ’452 Patent. As discussed previously, these contentions are based in significant part on how Plaintiff is apparently construing the Asserted Claims in its Infringement Contentions, which is an incorrect and overbroad interpretation of the alleged invention of the ’452 Patent. Accordingly, to the extent the below refers to benefits of certain elements or industry trends towards these elements, this is not an admission that the alleged invention of the ’452 Patent provides any benefits – to the contrary, properly construed and compared to the

prior art, the ’452 Patent provides no benefits. Likewise, to the extent the below refers to substituting elements, this is not an admission that the elements subject to the substitution are in any way similar, *e.g.*, perform the same function, in the same way, to achieve the same result.

The various elements of the Asserted Claims were well known in the prior art at the time of the alleged invention, and the combinations would have been obvious to one of skill in the art. The combinations simply (a) combine prior-art elements according to known methods to yield predictable results; (b) involve the simple substitution of one known element for another to obtain predictable results; (c) involve the use of a known technique to improve similar devices (methods, or products) in the same way; (d) apply a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) involve combinations of prior-art references that would have been “obvious to try” – a person of ordinary skill in the art could have reached the Asserted Claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and/or (f) would have been prompted by known work, based on design incentives or other market forces, because such variations were predictable to one of ordinary skill in the art.

Moreover, the Supreme Court has stated that a motivation to combine may be simply “common sense” and that “familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *KSR*, 550 U.S. at 420. Indeed, the Supreme Court held that it is sufficient that a combination of elements was “obvious to try,” holding that, “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options

within his or her technical grasp." *Id.* at 421. Here, all the claim elements are common sense and are easily fit together by one of ordinary skill in the art.

While not necessary, a motivation to combine may also be found in the references themselves. One of skill in the art would have been motivated to combine a reference that refers to, or otherwise explicitly invites combination with, another reference. Where the references cited herein have such an explicit invitation to combine, that invitation would have motivated one of skill in the art to combine any such references.

Cisco hereby identifies the following references as '452 Patent Primary References: Reed, Sethuraman, Izzat, Flott, Jeong.

The below provides several exemplary combinations and motivations for combining a '452 Patent Primary Reference with another reference.

a) Encoding and Transmitting Videoconference Data Limitations

Claim 15 of the '452 Patent recites:

> 15. A method of exchanging videoconference data between a first endpoint and a second endpoint via a network, comprising:
>
> transmitting videoconference data between the first endpoint and the second endpoint via the network;
>
> exchanging between the first endpoint and the second endpoint statistical data relating to network performance characteristics during at least a known time-interval of transmitting the videoconference data;
>
> determining, based on the statistical data, a recommended data transmission rate for each direction of transmission between the first endpoint and the second endpoint; and,
>
> for each one of the first endpoint and the second endpoint, adjusting the output bit rate of a video encoder associated therewith, so as to support transmission of videoconference data via the network at approximately the recommended data transmission rate if the recommended data transmission

> rate falls within a predetermined range of output bit rates tolerated by the video encoder;
>
> if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range; and
>
> encoding the second videoconference data with the video encoder to provide output data for transmission via the network.

Other Asserted Claims include substantially similar limitations to those highlighted above.[4][5] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Encoding and Transmitting Videoconference Data Limitations."

At the time of the claimed invention, techniques for encoding and transmitting videoconference data across a network in the manner claimed by the Encoding and Transmitting Videoconference Data Limitations were well known to a POSA. To provide a few, nonexhaustive examples, the '452 Patent's background section admits that encoding and transmitting videoconference data was already well known in the art and, what's more, systems for doing so were commercially available. '452 Patent, 1:13-2:55. Standards for encoding videoconference data, such as MPEG-2, were well-known to people of skill in the art. MPEG-2 Compression, at 2-3. Standard protocols for transmitting videoconference data, such as RTP, were also well known to people of skill in the art. RFC 1899, at 1; RFC 3550, at 1. And numerous patents, patent publications, other publications, and systems taught the "transmitting

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[4] Although for present purposes claim 15's preamble is characterized as a "limitation," Defendant take no position here as to whether the preamble of claim 15 (or any other claim) is limiting.

[5] E.g., claims 1, 2, 9.

and encoding videoconference data" limitations. *See, e.g.*, Chapweske, 3:17-18; Chen, at 1606; Futemma, Abstract; Hourunranta, 1:16-44; Izzat, 1:16-17; Jeong, Figure 1; Kostic, at 282; Miceli, [0002]; Prieto, [0014]; RFC 1889, Abstract; RFC 3550, Abstract; Spilo, Figure 1; TelePresence (materials cited for limitation [1.Pre]). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Encoding and Transmitting Videoconference Data Limitations will collectively be referred to as the "Encoding and Transmitting Videoconference Data Prior Art."[6]

To the extent that any of the '452 Patent Primary References is shown not to disclose the Encoding and Transmitting Videoconference Data Limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Encoding and Transmitting Videoconference Data Prior Art references.

A person of ordinary skill would have recognized the benefit to encoding and transmitting videoconference data as claimed. Those of skill in the art had long recognized the benefit of being able to communicate remotely with others via a video link. *See, e.g.*, Vega-Garcia, 1:26-43. Encoding and transmitting videoconference data are conventional, or at the very least obvious, steps in enabling a video conferencing system.

Second, a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of the Encoding and Transmitting Videoconference Data Prior Art with other teachings. It would have been well appreciated by a person of skill in the art that videoconference data could be encoded using a variety of formats such as MPEG-2, MPEG-4, and H.264. *See, e.g.*, RFC 3550, at 2; Basso, at 1; Woodworth [0044]. Regardless of the format,

[6] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

parameters such as a target bit rate, frame rate, video resolution, and quantization parameters (compression) could be fed into the encoder. *See, e.g.*, MPEG-2 Compression, at 2-6. Thus, a POSA would have recognized that it would be easy to mix and match techniques for deriving a recommended data transmission rate and techniques for encoding videoconference data at or around that recommended data transmission rate. Similarly, a person of skill in the art would have recognized that regardless of the particular encoding algorithm or format used, it was well known and straightforward to transmit videoconference data in the manner claimed by the '452 Patent. *See generally* RFC 1889; RFC 3550. Thus, a POSA would have recognized that methods for transmitting videoconference data could easily be mixed and matched with methods for encoding videoconference data and methods for determining an appropriate bit rate at which the videoconference data is to be encoded.

b) Exchanging Statistical Data Limitations

Claim 15 of the '452 Patent recites:

> 15. A method of exchanging videoconference data between a first endpoint and a second endpoint via a network, comprising:
>
> transmitting videoconference data between the first endpoint and the second endpoint via the network;
>
> exchanging between the first endpoint and the second endpoint statistical data relating to network performance characteristics during at least a known time-interval of transmitting the videoconference data;
>
> determining, based on the statistical data, a recommended data transmission rate for each direction of transmission between the first endpoint and the second endpoint; and,
>
> for each one of the first endpoint and the second endpoint, adjusting the output bit rate of a video encoder associated therewith, so as to support transmission of videoconference data via the network at approximately the recommended data transmission rate if the recommended data transmission

> rate falls within a predetermined range of output bit rates tolerated by the video encoder;
>
> if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range; and
>
> encoding the second videoconference data with the video encoder to provide output data for transmission via the network.

Other Asserted Claims include substantially similar limitations to those highlighted above.[7] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Exchanging Statistical Data Limitations."

At the time of the claimed invention, techniques for transmitting and receiving statistical data between endpoints in the manner claimed by the Exchanging Statistical Data Limitations were well known to a person of ordinary skill.[8]

Indeed, the '452 Patent itself admits that "it is known to provide feedback signals from the recipient to the sender during the streaming of audio-video content via a best effort network." '452 Patent, 2:36-38. And the '452 Patent's only written description support for the exchanging statistical data limitations is its reliance on a well-known standard protocol for doing so. '452 Patent, 5:5-8 (noting that the disclosed video conference system "operates according to

[7] E.g., claims 1, 2, 9.

[8] Certain claims require "bi-directional" communication, such that each side adjusts its sender side transmission. *See, e.g.*, claims 2, 15. This section equally applies to that limitation, that is, a person of ordinary skill in the art would have been motivated to apply the statistical calculations and exchange so both endpoints could adjust their encoding rate. Put simply, the alleged invention purports to improve a sending endpoint transmission. In cases where both ends transmit, it would have been obvious to apply the prior art teachings to both endpoints.

the standardized feedback method . . . RTCP (RTP control protocol as defined in RFC 3550) to feed statistics relating to the received signal 30 back to the sending endpoint 2").

What's more, the exchanging statistical data limitations were part of standards that a person of skill in the art would have been well aware of. RFC 1889 discloses the RTP Control Protocol ("RTCP"), which "is based on the periodic transmission of control packets to all participants in the session," the "primary function [of which] is to provide feedback on the quality of the data distribution." RFC 1889 at 15. RFC 3550, which is the successor to RFC 1889, includes a similar disclosure.

In addition to these admissions and disclosures, numerous prior art references disclose techniques claimed by the Exchanging Statistical Data Limitations. *See, e.g.*, Appendix III, at 3; Chapweske, Abstract, 8:42-47 (determining packet loss and latency using RTCP receiver reports); Chen, at 1606-67; Flott, 6:25-8:42, Figure 7; Futemma at 111-112 ("rate control algorithms for real-time video transmission"), Figures 3-4; Izzat, 5:21-27; Kostic, at 286; Miceli, [0041]; RFC 1889, at 15-39; RFC 3550, at 17-44; Vega-Garcia, Figure 4, 6:7-27; Miceli, [0040]-[0043]; Izzat, 5:17-27, 8:58-65; Vega-Garcia, 8:20-38 ("control packets"); Woodworth, [0042], [0047]-[0048]; Wu, at 924; TelePresence (materials cited for limitation [1.A]).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the exchanging statistical data limitations will collectively be referred to as the "Exchanging Statistical Data Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Exchanging Statistical Data Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Exchanging Statistical Data Prior Art references.

First, a person of ordinary skill would have recognized the benefit to exchanging statistical data as claimed. As a preliminary matter, it was well understood that videoconferencing over the Internet was highly desirable but because the Internet was (and is) a best-effort packet-switched network, connection performance could vary over time. *See, e.g.*, Vega-Garcia, 1:25-43; Flott, 1:26-61; Chapweske, 1:11-55; Bolot, at 58. A POSA would have understood that techniques for dynamic adjustment of video bit rate could better handle these fluctuations than systems that simply transmitted at a fixed bit rate. *See, e.g.*, Vega-Garcia, 1:25-43; Flott, 1:26-61; Chapweske, 1:11-55; Bolot, at 58. Indeed, as was understood in the art, "[s]ince the current Internet only offers best-effort service, it is essential for the end systems (sender and receiver) to actively perform feedback control so that the sender can adjust its transmission rate." Wu, at 1.

Thus, those of skill in the art had long recognized the value of providing "feedback on the quality of data distribution," and indeed that doing so was "an integral part" of any real-time data transmission protocol. RFC 1889, at 15. It was understood that such feedback enables "flow and congestion control functions," and what's more would be "directly useful for control of adaptive encodings." RFC 1889, at 15. Thus, a person of skill in the art would have recognized that "feedback information delivered in [] receiver reports" would beneficially allow a transmitting endpoint "to estimate the loss rates experienced by the receivers and to adjust its bandwidth accordingly." Busse, at 2.

Second, a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of the Exchanging Statistical Data Prior Art with other teachings. In addition to the specific teachings in the identified references, there were well-understood and ubiquitously-used standards for exchanging statistical data in the manner claimed by the '452

Patent. Indeed, the ’452 Patent does not itself explain how to exchange statistical data, but instead relies on Internet Engineering Task Force (“IETF”) standards for doing so, such as RFC 3550. ’452 Patent, 5:5-8. If methods for exchanging statistical data were unknown in the art (and, to be clear, they were known), that would create significant enablement and written description problems for the ’452 Patent.

What’s more, the RTCP protocol as taught by RFC 1889 and RFC 3550 was designed to be agnostic to other aspects of the video conferencing system, such as particular algorithms for determining an appropriate bit rate, encoding video data, etc. RFC 1889, at 14, 20, 30. Thus, a person of ordinary skill in the art would have recognized that RTCP could be fit together with other teachings like puzzle pieces.

In addition, sender-side video bit rate adjustment was one of only two bit rate adjustment architectures that a POSA could have employed, namely, sender-side adjustment and receiver-side adjustment. Receiver-side adjustment involves the receiver of data requesting the data be transmitted at a certain bit rate. Sender-side adjustment, as claimed by the bit rate adjustment limitations and disclosed by the above-mentioned references, involves the determination at the sender of the appropriate bit rate based on statistical data provided by the receiver. A POSA would have understood either approach to be a desirable solution to the issue of varying network conditions over time.

A POSA would have recognized specific benefits to sender-side rate determination. For example, in situations in which an endpoint is streaming video to multiple other endpoints, the sender determining the appropriate bit video bit rate has the benefit of access to receiver reports of all endpoints, thus painting a more detailed picture of network conditions than is available to any single receiving endpoint. RFC 1889 at 15 (noting that “feedback on the quality of the data

distribution" is "an integral part of RTP's role as a transport protocol and is related to the flow and congestion control functions of other transport protocols " and "the feedback may be directly useful for control of adaptive encoding"); *id.* at 16 (describing the advantages of feedback in diagnosing network problems, including determining "whether those problems are local or global"). In addition, sender-side bit rate adjustment can benefit from additional knowledge of the state of the video encoder, thus allowing a more optimal video bit rate to be chosen. And sender-side determination of bit rate allows for the sender to more carefully handle situations in which different recipients have different bandwidth constraints. *See, e.g.*, Busse, at 5-6.

c) Known Time-Interval Limitations

Claim 15 of the '452 Patent recites:

> 15. A method of exchanging videoconference data between a first endpoint and a second endpoint via a network, comprising:
>
> transmitting videoconference data between the first endpoint and the second endpoint via the network;
>
> exchanging between the first endpoint and the second endpoint statistical data relating to network performance characteristics during at least a known time-interval of transmitting the videoconference data;
>
> determining, based on the statistical data, a recommended data transmission rate for each direction of transmission between the first endpoint and the second endpoint; and,
>
> for each one of the first endpoint and the second endpoint, adjusting the output bit rate of a video encoder associated therewith, so as to support transmission of videoconference data via the network at approximately the recommended data transmission rate if the recommended data transmission rate falls within a predetermined range of output bit rates tolerated by the video encoder;
>
> if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range; and

encoding the second videoconference data with the video encoder to provide output data for transmission via the network.

Other Asserted Claims include substantially similar limitations to those highlighted above.[9] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Known Time-Interval Limitations."

As an initial matter, the Known Time-Interval Limitations are indefinite. *See* Section IV.B.1.b), below. The phrase "known time-interval" is never used in the '452 Patent's specification. And it is unclear to whom the time interval is "known." Is the time interval known to the receiving endpoint? To the user? Plaintiff's extremely vague contentions provide no clue as to Plaintiff's understanding of the term. For example, Plaintiff's contentions as to the independent claims in which the term is used merely parrot the claim language and do not identify what aspect of the Accused Products practices that limitation. Infringement Contentions, Appx. A, at 61. The same is true for Plaintiff's contentions regarding the dependent claims (*e.g.*, claim 5). Infringement Contentions, Appx. A, at 110.

Regardless, at the time of the claimed invention, the concept of using a known time interval would have been well known to a POSA. Indeed, using a known time interval for reporting network conditions was part of standards that would have been known to persons of ordinary skill in the art. RFC 1889 discloses that "the RTP control protocol (RTCP) is based on the *periodic* transmission of control packets to all participants in the session." RFC 1889, at 15 (emphasis added). RFC 1889 further discloses an algorithm in which "the calculated interval between RTCP packets is required to be greater than a minimum of 5 seconds." RFC 1889, at 20, 69. And, indeed, when the number of participants in a videoconference is sufficiently small,

[9] E.g., claims 1, 2, 9.

the RTCP reporting interval will be exactly 5 seconds. *Id.* RFC 3550 includes similar disclosure. RFC 3550, at 7, 17, 22, 29, 74-76. And these standards documents disclose detailed code for implementing a known time-interval. RFC 1889, at 68; RFC 3550, at 74.

Even putting aside these disclosures, numerous prior art references disclose techniques claimed by the Known Time-Interval Limitations. *See, e.g.*, Miceli, [0041]-[0042] ("in a preferred embodiment, the RTCP reporting interval [for statistical data relating to network performance characteristics] is two seconds."); Chapweske, 7:23-24 ("measuring loss and latency in intervals of no more than every 0.5 sec"); Flott, 2:9-27 ("every five seconds, the endpoint 310 sends a Receiver Report (RR) RTCP packet and a Sender Report (SR) RTCP packet," where the SR and RR packets include "reception statistics from videoconference participants"); Chen, 1607-1608 (sampling packet interval of 20 packets); Wu, at 926, 929 (control packets sent in interval of 5 seconds); TelePresence (materials cited for limitation [1.A]).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Known Time-Interval Limitations will collectively be referred to as the "Known Time-Interval Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Known Time-Interval Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Known Time-Interval Prior Art references.

First, a person of ordinary skill would have recognized the benefit to using a known time-interval for reporting statistical data as claimed. A person of ordinary skill would have understood that it is beneficial for endpoints in a video conferencing system to have a consistent

and mutually understood algorithm for determining the reporting time interval. *See, e.g.*, RFC 1889, at 20 (noting that the parameters and algorithm by which the reporting interval is calculated should be "known . . . so that each or to spend can independently calculate its share" of the total available bandwidth); *id.* ("all participants in the session must use the same values [as parameters into the reporting interval calculation algorithm] so the same interval will be calculated"). Thus, a person of skill would have recognized that using a "known time-interval" as claimed would be desirable.

A person of ordinary skill in the art would have understood benefits to using a longer reporting time interval than is sometimes disclosed in the art (*e.g.*, longer than the round-trip time). *Cf.* '452 Patent, 5:28-32. For example, a person of ordinary skill would have understood that in video conferencing systems, changing the bit rate too rapidly would have a negative effect on user experience. "While data services can change their rate instantaneously, continuous-media services have adaptation periods measured in tens of seconds to avoid abrupt and annoying changes in perceived quality." Busse, at 2. In addition, a person of skill would have understood that sending reporting packets too often would frustrate the purpose of a video conferencing system by using extra bandwidth, reducing the amount of bandwidth that could be used to transmit videoconference data. *See, e.g.*, RFC 1889, at 20 (noting that "the control traffic should be limited to a small . . . fraction of the session bandwidth . . . so that the primary function of the transport protocol to carry data is not impaired").

Second, a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of the Known Time-Interval Prior Art with other teachings. RFC 1889 and RFC 3550, for example, disclose protocols (*e.g.*, RTP and RTCP) that a person of ordinary skill would recognize could be implemented in a variety of ways and fit together with other

components of the system like puzzle pieces. In addition, a person of skill would recognize that any methodology for determining the known time interval (*e.g.*, a simple constant value or a complicated algorithm) could be used without materially affecting other aspects of the system. In other words, a person of skill in the art would have recognized that a modification to the reporting time interval could be performed easily and without having to modify many (if any) other aspects of the system.

d) Recommended Data Transmission Rate Limitations

Claim 15 of the ’452 Patent recites:

> 15. A method of exchanging videoconference data between a first endpoint and a second endpoint via a network, comprising:
>
> transmitting videoconference data between the first endpoint and the second endpoint via the network;
>
> exchanging between the first endpoint and the second endpoint statistical data relating to network performance characteristics during at least a known time-interval of transmitting the videoconference data;
>
> determining, based on the statistical data, a recommended data transmission rate for each direction of transmission between the first endpoint and the second endpoint; and,
>
> for each one of the first endpoint and the second endpoint, adjusting the output bit rate of a video encoder associated therewith, so as to support transmission of videoconference data via the network at approximately the recommended data transmission rate if the recommended data transmission rate falls within a predetermined range of output bit rates tolerated by the video encoder;
>
> if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range; and
>
> encoding the second videoconference data with the video encoder to provide output data for transmission via the network.

Other Asserted Claims include substantially similar limitations to those highlighted above.[10] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Recommended Data Transmission Rate Limitations."

At the time of the claimed invention, techniques for determining, based on statistical data, a recommended data transmission rate for each direction of transmission between a first endpoint and a second endpoint, would have been well known to a POSA.

Indeed, the '452 Patent itself admits that the Recommended Data Transmission Rate Limitations were well-known. Instead of actually disclosing how to determine recommended transmission rate from statistical data, the '452 Patent refers to a well-known standard that discloses a method of doing so. For example, the '452 Patent admits that its disclosure is "adapted from IETF (Internet Engineering Task Force) RFC 3448, "TCP Friendly Rate Control (TFRC): Protocol Specification." '452 Patent, 5:20-22.

A POSA's general knowledge would include techniques for determining a recommended data transmission rate from statistical data (*e.g.*, as included in RTCP receiver reports). For example, RFC 3448 (of which a POSA would have been aware) explains how statistical data obtained from the receiver is used to calculate a recommended data transmission rate:

> [1] The receiver measures the loss event rate and fees this information back to the sender. [2] The sender also uses these feedback messages to measure the round-trip time (RTT). [3] The loss event rate and RTT are then fit into TFRC's throughput equation, giving the acceptable transmit rate. [4] The sender then adjusts its transmit rate to match the calculated rate.

RFC 3448, at 4.

[10] *See, e.g.*, claims 1, 2, 9.

Even putting aside these admissions and disclosures, numerous prior art references disclose techniques claimed by the Recommended Data Transmission Rate Limitations. *See, e.g.*, Appendix III, at 4 (target bit rate); Chapweske, 7:45-46, 14:30-55, 14:66-15:3 (determining the reception rate); Chen, at 1607-1608 (capacity estimation); Futemma, Figure 4 (TCP rate); Hourunranta, 4:26-32 (available bitstream); Izzat, 2:30-33 (transmission bit rate); Jeong, [0074]-[0079] (dynamic bandwidth determination); Kostic, at 286 (sending rate); Miceli, [0061] (measurement of network bandwidth); Prieto, Figure 1 (TBR); Spilo, [0029]-[0032] (actual data transmission bit rate); Vega-Garcia, 8:19-38 (determination of available bandwidth); Wu, at 929 (output rate); TelePresence (materials cited for limitation [1.B]).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Recommended Data Transmission Rate Limitations will collectively be referred to as the "Recommended Data Transmission Rate Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Recommended Data Transmission Rate Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Recommended Data Transmission Rate Prior Art references.

First, a person of ordinary skill would have recognized the benefit to determining a recommended data transmission rate using statistical data as claimed. As explained in the preceding sections, a POSA would have understood that videoconferencing over lossy, best-effort networks such as the Internet was desirable, but also that for optimal user experience fluctuations in network conditions should be accounted for. *See, e.g.*, Sections IV.A.3.a), IV.A.3.b); RFC 3448, at 2 (noting that an adjustable "congestion control mechanism" is especially useful "for applications such as the telephony or streaming media where a relatively

smooth sending rate is of importance"); RFC 1889, at 15-16 (noting that the statistical data provided in RTCP receiver reports may be used in "the flow and congestion control functions of other transport protocols"); Busse, at 1 ("network load may change significantly during the duration of the connection," and to account for that "multimedia applications are often capable of adjusting their media quality and data rates over a wide range").

Second, a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of the Recommended Data Transmission Rate Prior Art with other teachings. For example, RFC 1889 and RFC 3550, which disclose the RTCP standard and methods for exchanging statistical data between endpoints, do not disclose any equation or algorithm for calculating a recommended data transmission rate. But these references note that known methods for calculating bandwidth can use the statistical data exchanged using RTCP. RFC 1889, at 20; RTCP 3550, at 21. A person of ordinary skill would thus have recognized that any particular formula or algorithm for calculating a recommended data transmission rate could easily be integrated with teachings for any method for encoding and exchanging videoconference data, exchanging statistical data, etc.

e) Predetermined Range Limitations

Claim 15 of the '452 Patent recites:

> 15. A method of exchanging videoconference data between a first endpoint and a second endpoint via a network, comprising:
>
> transmitting videoconference data between the first endpoint and the second endpoint via the network;
>
> exchanging between the first endpoint and the second endpoint statistical data relating to network performance characteristics during at least a known time-interval of transmitting the videoconference data;

> determining, based on the statistical data, a recommended data transmission rate for each direction of transmission between the first endpoint and the second endpoint; and,
>
> for each one of the first endpoint and the second endpoint, adjusting the output bit rate of a video encoder associated therewith, so as to support transmission of videoconference data via the network at approximately the recommended data transmission rate if the recommended data transmission rate falls within a predetermined range of output bit rates tolerated by the video encoder;
>
> if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range; and
>
> encoding the second videoconference data with the video encoder to provide output data for transmission via the network.

Other Asserted Claims include substantially similar limitations to those highlighted above.[11] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Predetermined Range Limitations."

As a preliminary matter, the Predetermined Range Limitations are indefinite. *See* Section IV.B.1.d), below. It is unclear, for example, how the output bit rate of a video encoder could be maintained to be ***within*** a predetermined range when the recommended data transmission rate falls ***outside*** the predetermined range. For purposes of the present discussion only, Defendant will assume that the Predetermined Range Limitations cover down-speeding, as Plaintiff apparently accuses in its infringement contentions.

In any event, functionality purportedly claimed by the Predetermined Range Limitations—namely, adjusting an encoder's frame rate or video resolution if and only if the desired output bit rate falls outside a predetermined range of bit rates—would have been well

[11] *See, e.g.*, claims 1, 2, 9.

known to a POSA. *See, e.g.*, Appendix III, at 18-29 (rate control algorithm), 31-36 (reduced-resolution update mode), 37-39 (control of encoding frame rate); Jeong, [0051]-[0053] (Tables 1-3); Reed, 7:28-30, 7:66-67, 9:64-67, 11:4-6 (adjusting frame rate); Sethuraman, 7:25-33 (MIN_BITS_REQUIRED_FOR_CODING); TelePresence (materials cited for limitation [1.D]).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Predetermined Range Limitations will collectively be referred to as the "Predetermined Range Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Predetermined Range Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Predetermined Range Prior Art references.

First, as explained above, a POSA would have found it desirable for the output bit rate of a video encoder in a video conferencing application to be modified from time to time to reflect current network conditions. *See* Section IV.A.3.b), above.

Second, a POSA would have known that parameters provided to a video encoder could be modified to achieve a target bit rate for the encoded video, a process known as "rate control." Flott, 8:61-9:2; Reed, 1:46-49; Busse, at 1; Prieto, [0005], Woodworth [0005]. A person of ordinary skill would have known that these parameters included, for example, frame rate, video resolution, and the amount of compression applied to each frame of video (sometimes represented by a "quantization parameter" or "QP"). *See, e.g.*, Flott, 8:61-9:2; Reed, 1:46-49; Busse, at 1; Prieto, [0016]; Wang, at 198-199, 203, 207, 209; Woodworth [0005].

Third, a POSA would have known that although there are many possible permutations of video parameters (*e.g.*, frame rate, video resolution, and quantization parameter) that can achieve

a target bit rate, a standard and desirable approach was to modify the encoder's quantization parameter. *See, e.g.*, Wang, at 198-199, 203, 207, 209;Woodworth, [0041]; Futemma, at 113; Song, Figure 1B. Preferentially modifying the quantization parameter was desirable for several reasons, including that the quantization parameter can be modified more easily (*e.g.*, even for P-frames and B-frames, and for different macro blocks within the same frame), and that constant changes in the video resolution or frame rate can be jarring to the user. Busse, at 2. However, a POSA would have known that there was a limit to how much the quantization parameter can be altered. For instance, increasing the quantization parameter reduces the output bit rate, but if the quantization parameter is increased too much the resulting video stream's quality can become corrupted and/or almost unrecognizable. MPEG-2 Compression, at 4 ("If the compression ratio is too high, there are sometimes simply not enough bits to encode the video signal without significant loss."); *id.* at 5 ("The compression ratio cannot be pushed too high.").

Thus, it was known—or at the very least would have been obvious—for a POSA to achieve a target bit rate first by modifying the quantization parameter and then, if modification of the quantization parameter alone is insufficient to achieve the target bit rate, modifying frame rate and/or video resolution. Indeed, although the precise bit rate ranges for a particular video resolution and frame rate could vary between applications, it was generally recognized that transmission of video at certain resolutions was only desirable at certain bit rates. For example, at a bit rate between 3 Mbps and 4 Mbps, video might be transmitted at a resolution of 720x480 pixels, whereas at a bit rate between 2 Mbps and 3 Mbps, video might be transmitted as a resolution of 540x480 pixels. MPEG-2 Compression, at 5 (Table 4-2). It was similarly known to associate a particular frame rate with a range of bit rates. As such, it was known—and certainly would have been obvious—to alter the video resolution and/or frame rate if and only if

the bit rate was outside of a predetermined range as claimed by the Predetermined Range Limitations.

f) Best-Effort Network and Internet Limitations

Claims 16 and 17 of the '452 Patent recites:

> 16. A method according to claim 15, wherein the network is a best-effort network.
>
> 17. The method according to claim 15, wherein the network is Internet.

Other Asserted Claims include substantially similar limitations to those highlighted above.[12] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Best-Effort Network and Internet Limitations."

At the time of the claimed invention, implementing the claimed methods over a best-effort network such as the Internet, as claimed by the Best-Effort Network and Internet Limitations, would have been well known to a POSA.

Indeed, the '452 Patent itself admits that the Best-Effort Network and Internet Limitations were known in the art. The '452 Patent's background section notes that "[t]he Internet is an example of a best-effort network." '452 Patent, 1:43. The '452 Patent acknowledges that video conferencing over best-effort networks like the Internet was known. *Id.* 1:51-53. And the '452 Patent admits that "it is also known to provide feedback signals from the recipient to the sender during streaming of audio-video content via a best effort network." *Id.* 2:36-38. What's more, the very techniques on which the '452 Patent relies for network transmission, such as the RTP and RTCP standards, expressly contemplate being implemented on best-effort networks such as the Internet. RFC 3550, at 1 ("This document specifies an

[12] E.g., claims 3, 4, 10, 11.

Internet standards track protocol for the Internet community."); RFC 3448, at 1 ("TFRC is a congestion control mechanism for unicast flows operating in a best-effort Internet environment.").

Even putting aside these admissions and disclosures, numerous prior art references disclose techniques claimed by the Best-Effort Network and Internet Limitations. *See, e.g.*, Chen, at 1606 (applicability in Internet and wireless networks); Futemma, at 110 ("best-effort Internet"); Izzat, 1:45-48 (communications network . . . such as the Internet"); Jeong, [0001] (Internet); Kostic, at 284 ("best effort"); Miceli, [0030] ("wide area network such as the Internet"); Prieto, [0004] (Internet-based video); Wu, at 1 (the current Internet only offers best-effort service); TelePresence (materials cited for claims 16 and 17).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Best-Effort Network and Internet Limitations will collectively be referred to as the "Best-Effort Network and Internet Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Best-Effort Network and Internet Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Best-Effort Network and Internet Prior Art references.

First, a person of ordinary skill would have recognized the benefit to transmitting videoconference data over the Internet. Indeed, it was generally recognized in the art that a particular advantage of video conferencing software is that it allowed users to communicate over vast distances, as enabled by the Internet. *See, e.g.*, Futemma, at 1; Vega-Garcia, 1:26-42. And since the Internet is a best-effort network, it would thus have been desirable to implement the claimed techniques on a best-effort network. As was understood in the art, "[s]ince the current

Internet only offers best-effort service, it is essential for the end systems (sender and receiver) to actively perform feedback controls of the sender can adjust its transmission rate." Wu, at 1.

Second, a person of ordinary skill would have had a reasonable expectation of success in performing the claimed techniques over a best-effort network such as the Internet. As noted above, a person of skill in the art would have been familiar with common, standardized protocols for transmitting videoconference data, statistical data, and other information over the Internet. *See generally* RFC 1889, RFC 3448, RFC 3550. A person of skill in the art would have easily been able to implement and build on top of these standardized protocols. *See, e.g.*, Flott, 1:62-2:24; Vega-Garcia, at 3:34-57; Izzat, 2:25-37.

g) Order of Seconds Limitations

Claim 18 recites:

> 18. The method according to claim 15, wherein the magnitude of the at least a known time-interval is on the order of seconds.

Other Asserted Claims include substantially similar limitations to those highlighted above.[13] For ease of reference, the highlighted limitations as well as similar limitations in other Asserted Claims will be referred to as the "Order of Seconds Limitations."

At the time of the claimed invention, implementing the claimed methods to exchange statistical data with a time interval on the order of seconds, as claimed by the Order of Seconds Limitations, would have been well known to a POSA. *See* Section IV.A.3.c) (discussing use of a known reporting interval in multiple well-known standards). Indeed, well-known standards used a reporting interval on the order of seconds. For example, RFC 1889 further discloses an algorithm in which "the calculated interval between RTCP packets is required to be greater than

[13] E.g., claims 5, 12.

a minimum of 5 seconds." RFC 1889, at 20, 69. And, indeed, when the number of participants in a videoconference is sufficiently small, the RTCP reporting interval will be exactly 5 seconds. *Id.* RFC 3550 includes similar disclosures.

Even putting aside these disclosures, numerous prior art references disclose techniques claimed by Order of Seconds Limitations. *See, e.g.*, Miceli, [0041]-[0042] ("in a preferred embodiment, the RTCP reporting interval [for statistical data relating to network performance characteristics] is two seconds."); Chapweske, 7:23-24 ("measuring loss and latency in intervals of no more than every 0.5 sec"); Flott, 2:9-27 ("every five seconds, the endpoint 310 sends a Receiver Report (RR) RTCP packet and a Sender Report (SR) RTCP packet," where the SR and RR packets include "reception statistics from videoconference participants"); Chen, 1607-1608 (sampling packet interval of 20 packets); Wu, at 926, 929 (control packets sent in interval of 5 seconds); TelePresence (materials cited for claim 18).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Order of Seconds Limitations will collectively be referred to as the "Order of Seconds Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Order of Seconds Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Order of Seconds Prior Art.

A person of ordinary skill would have recognized the benefit to exchanging statistical data as claimed by the Order of Seconds Limitations. A person of skill would have known that exchanging statistical data incurs overhead; since statistical data is transmitted over the same communications link as video conferencing data, sending statistical data more often reduces the amount of video conferencing data that can be exchanged between endpoints. RFC 1889, at 19.

As such, a POSA would have known that sending statistical data extremely frequently (*i.e.*, more frequently than on the order of seconds) could incur significant overhead, thus reducing video quality. What's more, a POSA would have recognized that a reporting interval more frequent than on the order of seconds would be unnecessary in the context of video conferencing applications. That's because users may find it jarring for video quality to be constantly changing. Busse, at 2.

Conversely, too long of a reporting interval (*i.e.*, less frequently than on the order of seconds) would be less desirable because it would reduce the extent to which the encoder's output bit rate matches network conditions. For example, a video conferencing system with a reporting interval of one hour would likely be unable to react to short-term fluctuations in network conditions.

Thus, a reporting interval on the order of seconds would have been desirable to a POSA because it would have reduced overhead (as compared to a more frequent reporting interval) while being better able to adapt to network conditions (as compared to a less frequent reporting interval).

Second, a person of ordinary skill in the art would have had a reasonable expectation of success in implementing the subject matter of the Order of Seconds Limitations. That's at least because the applicable standards for exchanging statistical data (*e.g.*, RFC 1889 and RFC 3550) allow for a configurable reporting interval. *See, e.g.*, RFC 1889, at 20; RFC 3550, at 21. Thus, a POSA would have easily been able to implement a reporting interval on the order of seconds in a system that used a different reporting interval.

h) Specific Statistical Data Limitations

Claim 19 of the '452 Patent recites:

> 19. The method according to claim 15, wherein the statistical data relating to the or performance characteristics includes an array of loss interval statistics, round trip delay value and jitter value.

Other Asserted Claims include substantially similar limitations to those highlighted above.[14] For ease of reference, the highlighted limitations as well as similar limitations and other Asserted Claims will be referred to as the "Specific Statistical Data Limitations."

At the time of the claimed invention, the use of loss interval statistics, round trip delay, and jitter value, as claimed by the Specific Statistical Data Limitations, was well known to a POSA. Indeed, the '452 Patent's background section notes that "jitter, delays, [and] loss packets," were recognized as "impairments" in "best-effort network[s]" such as the Internet. '452 Patent, 1:43-50. What's more, the '452 Patent itself admits that the standard protocol on which the '452 Patent relies (RTCP receiver report messages as defined in RFC 3550) include round trip delay, jitter, and packet loss information. *Id.* 5:8-10. Indeed, RFC 3550 expressly lists "cumulative number of packets lost," "fraction lost," interarrival jitter," and "delay" as part of the sender and receiver report packets. RFC 3550, at 30, 35. And although the '452 Patent contends that standard RTCP receiver reports do not include loss intervals, a standard protocol relied on by the '452 Patent, TFRC as defined by RFC 3448, discloses the use of loss interval array to calculate a recommended data transmission rate. RFC 3448, at 14-17.

Even putting aside these admissions and disclosures, numerous prior art references disclose techniques claimed by Specific Statistical Data Limitations. *See, e.g.*, Appendix III, at 4; Chapweske, 2:26-28; Chen, at 4; Futemma; Izzat, 5:21-27, 5:66-6:2, 5:27-29, 8:65-9:3;

[14] E.g., claims 6, 13.

Kostich, at 5; Miceli, [0041], [0062]; Vega-Garcia, 3:46-58, 4:60-62, 6:7-27, 6:60-61, 8:30-38; TelePresence (materials cited for claim 19).

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Specific Statistical Data Limitations will collectively be referred to as the "Specific Statistical Data Prior Art."

To the extent that any of the '452 Patent Primary References is shown not to disclose the Specific Statistical Data Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Specific Statistical Data Prior Art references.

A person of ordinary skill would have recognized the benefit to using an array of loss interval statistics, round trip delay value, and jitter value as statistical data used to determine a recommended data transmission rate as claimed by the Specific Statistical Data Limitations. As the '452 Patent admits, each of these metrics was well known in the art to indicate "impairments" in a network. '452 Patent, 1:43-50. What's more, it was well known in the art that these metrics could beneficially be used to adjust the transmission rate of data between endpoints. Indeed, the TFRC standard (which would have been known to a person of ordinary skill in the art, and which a person of ordinary skill in the art would have viewed as desirable because it enables a "relatively smooth sending rate" in light of changing network conditions) uses an array of loss interval statistics and round-trip delay value to calculate a recommended data transmission rate. RFC 3448, at 4-5, 11-17. More generally, it was recognized that using statistical data to adapt the rate of transmission between endpoints was desirable. *See, e.g.*, Woodworth, [0042], [0047]-[0048]; Futemma at 111-112, Figures 3-4; Miceli, [0040]-[0043];

Izzat, 5:17-27, 8:58-65; Vega-Garcia, 8:20-3; Chapweske, Abstract, 8:42-47; Flott, 6:25-8:42, Figure 7.

In addition, a person of ordinary skill in the art would have had a reasonable expectation of success in implementing the Specific Statistical Data Limitations. To the extent that standard RTCP receiver reports do not include any of the claimed metrics (*e.g.*, an array of loss interval statistics), a POSA readily could have included such information in the receiver reports (*e.g.*, for a TFRC-style rate calculation at the sender). *See, e.g.*, RFC 1889, at 53 (RTP profiles); RFC 3550, at 59 (same). And, as noted above, standard RTCP receiver reports include loss, delay, and jitter information. *See, e.g.*, RFC 1889, at 23, 28; RFC 3550, at 30, 35. In sum, it was easily within the ability of a person of ordinary skill in the art to make the proposed combinations.

i) I-Frame Limitations

Claim 21 of the '452 Patent recites:

> 21. A method according to claim 15, wherein the adjusting of the bit rate, frame rate, or video resolution occurs at a time that an I-frame of the video conference data is being encoded at the respective endpoint.

Other Asserted Claims include substantially similar limitations to those highlighted above.[15] For ease of reference, the highlighted limitations as well as similar limitations and other Asserted Claims will be referred to as the "I-Frame Limitations."

At the time of the claimed invention, adjusting bit rate, frame rate, or video resolution at the time when an I-frame is being encoded, as claimed by the I-Frame Limitations, was well known to a POSA.

[15] Claim 9.

The concept of "Interframe Coding" was well known in the art. Nair, at 1. Instead of encoding each frame of a video separately and independently, frames can be encoded with reference to the content of earlier and/or later frames. *Id.* Thus, it was known to use three types of frames: I-frames, P-frames, and B-frames. I-frames are "intra-coded" frames; they can be decoded without reference to any other frames. P-frames are "predicted" frames; they depend only on the previous I- or P-frame. And B-frames are directional" frames; they can depend both on the previous and the next I-or P-frames.

It was well understood that because P-frames and B-frames are not self-contained (that is, they depend on data in other frames), such frames' resolution is constrained by that of other frames. Thus, it was well known and obvious to adjust the bit rate, frame rate, or video resolution at the time that an I-frame of the video conference data is being encoded. Indeed, numerous prior art references disclose techniques claimed by I-Frame Limitations. *See, e.g.*, Appendix III, at 29; Izzat, 7:29-31, 8:19-23; Sethuraman, 6:6-11; Wu, at 931.

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the I-Frame Limitations will collectively be referred to as the " I-Frame Prior Art."

Thus, to the extent that any of the '452 Patent Primary References is shown not to disclose the I-Frame Limitations, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the I-Frame Prior Art references.

j) Maximum and Minimum Value Limitations

Claims 22-24 of the '452 Patent recite:

> 22. A method according to claim 1, wherein if the recommended data transmission rate is above a maximum of said predetermined range, the

> output bit rate of the video encoder is adjusted to the maximum, and the frame rate and video resolution are set at the maximum values therefor.
>
> 23. A method according to claim 22, wherein if the recommended data transmission rate falls within said predetermined range, the output bit rate of the video encoder is set to the recommended transmission rate, and if the frame rate is not at its maximum value, the frame rate is increased if the video resolution is at its maximum value, and if the video resolution is not at its maximum value, the video resolution is increased.
>
> 24. A method as claimed in claims 23, wherein if the recommended data transmission rate lies below a minimum of said predetermined range, a determination is made as to whether the current frame rate is equal to the minimum value therefor, and if not, the frame rate is decreased and the output bit rate is set the minimum, and if yes the video resolution is decreased the output bit rate set to the minimum.

For ease of reference, the highlighted limitations will be referred to as the "Maximum and Minimum Value Limitations."

The functionality claimed by the Maximum and Minimum Value Limitations—*e.g.*, various features for adjusting an encoder's frame rate or video resolution if the desired output bit rate falls within or outside a predetermined range of bit rates—would have been well known to a POSA, or at least are obvious variations of techniques that would have been known to a POSA. *See, e.g.*, Appendix III, at 18-29, 31-36, 37-39; Jeong, [0051]-[0053]; Reed, 7:28-30, 7:66-67, 9:64-67, 11:4-6; Sethuraman, 7:25-33; Gall, Table 9; MPEG-2 Compression, Table 4-2; TelePresence (materials cited for claims 22-24)

The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Minimum and Maximum Value Limitations will collectively be referred to as the "Minimum and Maximum Value Prior Art."

To the extent that any of the references identified above in Section IV.A.1 is shown not to literally disclose the subject matter claimed by the Minimum and Maximum Value Limitations, it may nevertheless anticipate these limitations. "The disclosure of a small genus may anticipate

the species of that genus even if the species are not themselves recited." *Bristol-Myers Squibb Co. v. Ben Venue Lab'ys, Inc.*, 246 F.3d 1368, 1380 (Fed. Cir. 2001). Even of the references that do not expressly disclose the Minimum and Maximum Value Limitations, many of these references contemplate that frame rate and/or video resolution could be adjusted to achieve a target bit rate. From any one of these references, a person of skill would have at once envisaged the subject matter of the Minimum and Maximum Value Limitations, which merely recite obvious and readily apparent ways of achieving a target bit rate (*e.g.*, by setting the frame rate and resolution to maximum values, as in claim 22, by increasing frame rate before video resolution, as in claim 23, or by decreasing frame rate before video resolution, as in claim 24).

In all events, a person of ordinary skill in the art would have been motivated to combine any of the '452 Patent Primary References with any one of the Minimum and Maximum Value Prior Art references.

As an initial matter, a person of ordinary skill in the art would have found the techniques claimed in the Minimum and Maximum Value Limitations to be obvious to try. As the Supreme Court explained in *KSR*, "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *KSR*, 550 US at 421. Here, the Minimum and Maximum Value Limitations merely recite obvious variations on the adjustment of bit rate, frame rate, and video resolution.

What's more, a POSA would have found desirable the specific manner of adjusting frame rate and video resolution claimed by the Minimum and Maximum Value Limitations. As a conceptual matter, frame rate, video resolution, and quantization parameter can be conceptualized as knobs or dials that, when turned, alter the output bit rate of a video encoder.

Of these dials, the video resolution operates the most coarsely (that is, its adjustment makes the greatest difference to output bit rate), quantization parameter operates most finely, and frame rate operates in between. *See, e.g.*, MPEG-2 Compression, at 4-5; Gall, Table 9; TelePresence (materials cited for limitation [1.D]). A POSA would have found it desirable, in terms of achieving a target bit rate, to adjust the finer knob (*i.e.*, quantization parameter) first, the middle knob (*i.e.*, frame rate) next, and most coarse knob (*i.e.*, the video resolution) last.

Yet another benefit of adjusting frame rate before adjusting video resolution, which would have been understood by a POSA, has to do with the interframe encoding scheme used by many common encoding standards such as MPEG-2, MPEG-4, and H.264. In some situations, video resolution can only be adjusted when encoding an I-frame, which only occurs periodically. However, frame rate can be adjusted by skipping *any* frame (*e.g.*, I-frames, P-frames and/or B-frames). Gall, at 51-52. Thus, frame rate is more immediately adaptable to changing network conditions, and so a person of ordinary skill in the art would have found a benefit to adjusting frame rate and, only when the frame rate reaches a minimum or maximum, adjusting the video resolution.

A POSA would have also seen a benefit in adjusting video resolution first (that is, before adjusting frame rate) to achieve a certain target bit rate. As would have been well known to a POSA, fluctuations in a video's frame rate may in at least some circumstances detract more from the user's experience than fluctuations in a video's resolution or compression level. *See, e.g.*, Wu, at 928 ("even a slight reduction in frame rate can substantially degrade the perceptual quality of the receiver, especially during a dynamic a scene change"); Appendix III, at 37 ("[i]t is observed that human eyes are sensitive to the abrupt encoding frame rate (or interval) change"); Futemma, at 113 (noting that in "live streaming of soccer games," maintaining a high frame rate

is important). Thus, a POSA would have found a benefit in preferentially adjusting video resolution to achieve a desired output bit rate and, if the video resolution reaches a minimum or maximum, only then adjusting the frame rate.

For these reasons, a POSA would have found it desirable to adjust video resolution and frame rate in the manner claimed by claims 23 and 24.

What's more, the subject matter claimed by the Minimum and Maximum Value Limitations was simply common sense. For example, it would have been common sense to a POSA that above a certain threshold of available bandwidth, it is no longer desirable to scale up frame rate and/or resolution. One reason for this, which would have been well understood by a POSA, is that participant's display capabilities are largely fixed, and increases in resolution and frame rate beyond a certain level will not be perceptible to the user yet would still require additional bandwidth on the network. Thus, a POSA would have recognized that, after frame rate and resolution are increased to a certain level, the participant's display capabilities—more so than the participant's network connection—is the limiting factor for further increases in video quality. Yet another reason, which would also have been known to a POSA, is that a participant's computer capabilities are largely fixed, and increases in resolution and frame rate beyond a certain level would actually decrease performance because the participant's computing resources would become overwhelmed. In other words, a POSA would have recognized that, after frame rate and resolution are increased to a certain level, the participant's device's computing power—more so than the participant's network connection—is the limiting factor for further increases in video quality. Increasing video resolution and/or frame rate beyond the participant's display or compute capabilities would use network bandwidth while providing little to no benefit to the participant. For these and other reasons, a POSA would have found it

desirable to cap or limit the frame rate and video resolution to "maximum values therefor" as claimed by claim 22.

The prior art confirms that the Minimum and Maximum Value Limitations were known, conventional, and obvious. Indeed, Flott discloses starting all the "knobs" at the maximum value, as does claim 22. Flott, 3:48-67. And Reed discloses favoring adjustment of encoder rate and frame rate over resolution, as does claim 23. Reed, 6:25-44. Similarly, Sethuraman discloses checks on frame rates, as claim 24 adds. Sethuraman, 7:1-64.

In sum, a POSA would have found it desirable to integrate the teachings of the Minimum and Maximum Value Prior Art into any other system or method.

Moreover, person of ordinary skill in the art would have had a reasonable expectation of success in implementing the techniques claimed by the Minimum and Maximum Value Limitations. As explained in the foregoing sections, it was well understood that parameters to a video encoder (such as frame rate, resolution, and quantization parameter) could be modified to adjust the output bit rate of the encoder. *See* Section IV.A.3.e), above. It would have been easy for a person of ordinary skill in the art to implement the teachings of the Minimum and Maximum Value Prior Art by simply passing the desired parameters to the video encoder.

B. Invalidity Based on Section 112 (P.R. 3-3(d))

1. Indefiniteness[16]

Defendant provides the following grounds for invalidity under 35 U.S.C. § 112. Defendant's investigation of the Asserted Patents is ongoing, and Defendant reserves the right to

[16] Defendant's indefiniteness arguments do does not preclude invalidity findings in an IPR because, for example, while the outer bounds of a claim limitation may be uncertain, the prior art may nevertheless provide a disclosure within the uncertain outer bounds. "[I]t is not always impossible to adjudicate a prior-art challenge, one way or the other, just because some aspect of

amend or supplement these disclosures based on further investigation and in a manner consistent with the Federal Rules of Civil Procedure, the Local Patent Rules for the Eastern District of Texas, and the Docket Control Order, or otherwise in accordance with any order or direction of this Court or agreement of the parties. Further, Plaintiff's Infringement Contentions fail to provide sufficient detail to fully understand its proposed application of the Asserted Claims, and Defendant reserves the right to assert additional grounds for invalidity under 35 U.S.C. § 112 in response to Plaintiff's claim interpretations. Defendant also reserves the right to supplement, modify, or otherwise amend these grounds for invalidity under 35 U.S.C. § 112 based on the Court's claim construction rulings or opinions or the parties' positions or arguments taken in connection with the claim construction process.

Certain of the Asserted Claims are invalid for failing to comply with the definiteness requirement of § 112. Defendant notes that its charting of a prior art reference for a claim or limitation that Defendant contends is invalid for lack of definiteness in no way represents an admission or concession that the scope of the claim or limitation is definite or ascertainable. § 112 paragraph 2 requires that a patent claim "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention." Claim terms that fail to inform those skilled in the art "with reasonable certainty . . . about the scope of the invention" fail the definiteness requirement of Section 112 paragraph 2. *Nautilus, Inc. v. Biosig Instruments, Inc.,* 572 U.S. 898, 901 (2014).

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a claim renders the claim indefinite." *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 813 (Fed. Cir. 2021).

Defendant provides below an identification of terms[17] in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as indefinite:

a) "first / third video conference data transmitted previously"

b) "known time-interval" / "known time interval of transmitting the videoconference data"

c) "the statistical data"

d) "predetermined range" / "said predetermined range" / "within said predetermined range" / "outside said predetermined range" / "above a maximum of said predetermined range" / "below a minimum of said predetermined range"

e) "recommended data transmission rate" / "if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range" / "if the recommended data transmission rate is falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of said video encoder associated with the second endpoint within said predetermined range"

f) "video resolution"

g) "the second videoconference data"

h) "the output bit rate"

i) "the video encoder"

j) "if the recommended data transmission rate is above a maximum of said predetermined range, the output bit rate of the video encoder is adjusted to the maximum, and the frame rate and video resolution are set at maximum values therefor"

[17] These terms may also be read in the broader context, *i.e.*, the terms with surrounding claim language, and the terms with that surrounding claim language is likewise indefinite.

k) "if the recommended data transmission rate falls within said predetermined range, the output bit rate of the video encoder is set to the recommended transmission rate, and if the frame rate is not at its maximum value, the frame rate is increased if the video resolution is at its maximum value, and if the video resolution is not at its maximum value, the video resolution is increased"

l) "a determination is made as to whether the current frame rate is equal to the minimum value therefor, and if not, the frame rate is decreased and the output bit rate set to the minimum, and if yes the video resolution is decreased the output bit rate set to the minimum"

2. Written Description and Enablement

The specifications of the Asserted Patents do not provide adequate written description to support the scope of the claims asserted by Plaintiff in furtherance of its infringement theories or any reasonably understood scope of the claims. 35 U.S.C. § 112[18] paragraph 1 requires that a patent specification contain "a written description of the invention." To fulfill the written description requirement, the specification "must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed." *Ariad Pharm., Inc. v. Eli Lilly & Co.,* 598 F.3d 1336, 1351 (Fed. Cir. 2010) (citation omitted). To satisfy the written description requirement, "the applicant must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate that by disclosure in the specification of the patent." *Carnegie Mellon Univ. v. Hoffmann-La Roche Inc.,* 541 F.3d 1115, 1122 (Fed. Cir. 2008) (quoting *Vas-Cath Inc. v. Mahurkar,* 935 F.2d 1555, 1563–64 (Fed. Cir. 1991)). The Asserted Patents do not meet that requirement for the list of terms below, which Defendant reserves the right to amend.

[18] Because the Asserted Claims are alleged to have a priority date before March 16, 2013, Defendant applies pre-AIA 35 U.S.C. § 112.

Additionally, the Asserted Patents do not enable the claim scopes contained in Plaintiff's Infringement Contentions. Section 112 paragraph 1 requires a specification to describe "the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains … to make and use the [invention]." The enablement requirement is separate from and in addition to the written description requirement. *Ariad,* 598 F.3d at 1344. This "requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp. v. Sollac & Ugine,* 344 F.3d 1234, 1244 (Fed. Cir. 2003) (citation omitted); *see Wyeth & Cordis Corp. v. Abbott Labs.,* 720 F.3d 1380, 1385–86 (Fed. Cir. 2013). The Asserted Patents do not meet that requirement for the list of terms below, which Defendant reserves the right to amend.

Defendant provides below an identification of terms in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as not enabled or lacking sufficient written description:

a) "endpoint"

b) "predetermined range" / "said predetermined range" / "within said predetermined range" / "outside said predetermined range" / "above a maximum of said predetermined range" / "below a minimum of said predetermined range"

c) "if the recommended data transmission rate falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of the video encoder within said predetermined range" / "if the recommended data transmission rate is falls outside said predetermined range, adjusting the frame rate or video resolution to maintain the output bit rate of said video encoder associated with the second endpoint within said predetermined range"

d) "exchanging … statistical data"

e) "known time-interval" / "known time interval of transmitting the videoconference data"

f) "magnitude of the known time-interval is on the order of seconds"

V. INVALIDITY OF THE '099 PATENT

A. Invalidity Based on the Prior Art

As shown below, the alleged inventions of the Asserted Patents were well-known in the prior art. Those skilled in the art were aware of all of the limitations claimed in the Asserted Patents. Thus, many prior art patents, publications, products, and combinations thereof, disclose, teach, or embody every limitation of the Asserted Claims and thus validate those claims. Examples of these disclosures, teachings, and embodiments are identified in the following sections and in the attached claim charts.

1. Identification of Prior Art References (P.R. 3-3(a))

Subject to the reservation of rights above, Defendant identifies each item of prior art that anticipates and/or renders obvious one or more of the Asserted Claims of the Asserted Patents. The patents/applications, publications, and systems identified are also relevant for their showing of the state of the art and reasons and motivations for making improvements, additions, and combinations.

Some of the below citations and those in the corresponding invalidity claim charts involve prior art references that have corresponding related, foreign, and/or PCT counterpart publications. In such cases, where either the U.S. patent or related, foreign, and/or PCT counterpart is cited, it is to be understood that the corresponding disclosures from the counterpart patent and publications (which are substantively the same) are implicitly incorporated by reference in the alternative to avoid needless repetition.

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
B-01	U.S. Pat. No. 7,362,349 ("Nelson") (CISCO_00075161 - CISCO_00075187)	July 10, 2002	Apr. 22, 2008
B-02	U.S. Pat. No. 7,373,428 ("Armstrong") (CISCO_00075295 - CISCO_00075318)	Dec. 14, 1999	May 13, 2008
B-03	U.S. Pat. No. 7,401,121 ("Wong") (CISCO_00075535 - CISCO_00075552)	Aug. 11, 2006	July 15, 2008
B-04	U.S. Pat. No.7,456,858 ("Schrader") (CISCO_00075628 - CISCO_00075636)	May 28, 2004	Nov. 25, 2008
B-05	U.S. Pat. No. 7,830,824 ("Decker") (CISCO_00075666 - CISCO_00075683)	Oct. 7, 2004	Nov. 9, 2010
B-06	U.S. Pat. No. 7,899,170 ("Jeong") (CISCO_00075378 - CISCO_00075416)	Apr. 28, 2005	Mar. 1, 2011
B-07	U.S. Pat. No. 8,260,854 ("Cockerton") (CISCO_00075655 - CISCO_00075665)	Sep. 12, 2007	Sept. 4, 2012
B-08	U.S. Pat. No. 8,290,128 ("Qiu") (CISCO_00075684 - CISCO_00075700)	June 10, 2010	Oct. 16, 2012
B-09	U.S. Pat. No. 8,390,669 ("Catchpole") (CISCO_00075592 - CISCO_00075614)	Dec. 15, 2009	Mar. 5, 2013
B-10	U.S. Pat. No. 8,601,097 ("Sartori") (CISCO_00075362 - CISCO_00075377)	Feb. 22, 2011	Dec. 3, 2013
B-11	U.S. Pat. No. 9,049,338 ("Witt") (CISCO_00075319 - CISCO_00075334)	Aug. 27, 2012	June 2, 2015
B-12	U.S. Pat. No. 9,077,849 ("Meek") (CISCO_00075615 - CISCO_00075627)	Feb. 11, 2011	July 7, 2015
B-13	U.S. Pat. No. 9,124,757 ("Weber") (CISCO_00075553 - CISCO_00075591)	Oct. 3, 2011	Sep. 1, 2015
B-14	U.S. Pat. No. 10,218,688 ("Howell") (CISCO_00075637 - CISCO_00075654)	May 4, 2015	Feb. 26, 2019
B-15	U.S. Pat. Pub. No. 2005/0080894 ("Apostolopoulos") (CISCO_00075143 - CISCO_00075160)	Oct. 9, 2003	Apr. 14, 2005
B-16	U.S. Pat. Pub. No. 2007/0147241 ("Wang") (CISCO_00075188 - CISCO_00075207)	Oct. 17, 2006	June 28, 2007
B-17	U.S. Pat. Pub. No. 2008/0068446 ("Barkley") (CISCO_00075089 - CISCO_00075119)	Aug. 29, 2006	Mar. 20, 2008
B-18	U.S. Pat. Pub. No. 2010/0287238 ("Setton") (CISCO_00075078 - CISCO_00075088)	Jan. 10, 2008	Nov. 11, 2010
B-19	U.S. Pat. Pub. No. 2011/0187813 ("Musgrave") (CISCO_00000875 - CISCO_00000889)	Feb. 1, 2010	Aug. 4, 2011
B-20	U.S. Pat. Pub. No. 2011/028320 ("Periyannan") (CISCO_00075500 - CISCO_00075534)	May 11, 2011	Nov. 17, 2011

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
B-21	U.S. Pat. Pub. No. 2012/0262537 ("Baker") (CISCO_00075120 - CISCO_00075142)	Apr. 18, 2011	Oct. 18, 2012
B-22	U.S. Pat. Pub. No. 2012/0274736 ("Robinson") (CISCO_00075228 - CISCO_00075250)	Apr. 29, 2011	Nov. 1, 2012
B-23	U.S. Pat. Pub. No. 2013/0027502 ("Skramstad") (CISCO_00075701 - CISCO_00075716)	July 27, 2012	Jan. 31, 2013
B-24	U.S. Pat. Pub. No. 2013/0063542 ("Bhat") (CISCO_00075208 - CISCO_00075227)	Sept. 14, 2011	Mar. 14, 2013
B-25	U.S. Pat. Pub. No. 2013/0070045 ("Meek") (CISCO_00075350 - CISCO_00075361)	Feb 11, 2011	Mar. 21, 2013
B-26	U.S. Pat. Pub. No. 2013/0147900 ("Weiser") (CISCO_00075438 - CISCO_00075499)	Dec. 7, 2011	June 13, 2013
B-27	EP2569940 ("Grupenhoff") (CISCO_00075251 - CISCO_00075294)	Dec 5, 2011	Mar. 20, 2013
B-28	WO 2012/175227 ("Burman") (CISCO_00075717 - CISCO_00075792)	Mar. 7, 2012	Dec. 27, 2012

Table B-1: Prior Art Patents and Patent Publications for the '099 Patent

Ex.	Title	Author(s)	Publisher	Date of Publication
B-29	Internet Engineering Task Force (IETF), *Requests for Comments 5117, RTP Topologies* ("RFC 5117") (CISCO_00075417 - CISCO_00075437)	M. Westerlund, S. Wenger	IETF	Jan. 2008
B-30	Network Working Group (NWG), *Overview: Real-Time Protocols for Browser-based Applications* ("RTCWEB") (CISCO_00075335 - CISCO_00075349)	H. Alvestrand	IETF	Sept. 28, 2001
B-31	RTP: A Transport Protocol for Real-Time Applications ("RFC 1889") (CISCO_00075835 - CISCO_00075909)	H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson	IETFp	Jan. 1996
B-32	RTP: A Transport Protocol for Real-Time Applications ("RFC 3550") (CISCO_00076169 - CISCO_00076257)	H. Schulzrinne, S. Casner, R. Frederick, V. Jacobson	IETF	July 2003

Table B-2: Prior Art Non-Patent Publications for the '099 Patent[19]

Defendant is still investigating prior uses. Based upon at least Plaintiff's apparent positions as to the scope of the Asserted Claims, and as further explained below and in the cited exhibits, it appears that the following systems (and development thereof) qualify as prior art under at least one or more of 35 U.S.C. §§ 102(a), (b), and (g):

Ex.	Description	Entities Involved	Prior Art Date
B-34	Cisco TelePresence	Cisco Systems, Inc.	Various dates on or before March 31, 2009
B-35	WebEx	WebEx Communications, Inc.; Cisco Systems, Inc.	Various dates on or before September 21, 2006

Table B-3: Prior Art Systems for the '099 Patent

To the extent that Plaintiff argues that Defendant's current products infringe, for the same reasons, these prior art products read on the claims. Defendant's investigation and analysis are still ongoing, and Defendant is further investigating whether it can make the source code for these products available for inspection.

Additionally, although Defendant's investigation is ongoing, information available to date indicates that the following systems are prior art to the '099 patent under at least 35 U.S.C. §§ 102(a)-(b) because they were in public use, on sale, or otherwise available to the public before the effective filing date of the claimed inventions of claims 3-6.

Ex.	Description	Entities Involved	Prior Art Date
C-04	Magor HDPassport	Magor Communications Corp.	Various dates on or before February 1, 2011
C-04	Magor TeleCollaboration software	Magor Communications Corp.	Various dates on or before February 1, 2011

[19] Exhibit B-33 is intentionally omitted.

Ex.	Description	Entities Involved	Prior Art Date
C-04	Magor TeleCollaboration HDWorkPlace software	Magor Communications Corp.	Various dates on or before February 1, 2011
C-04	Magor TeleCollaboration HDSolo	Magor Communications Corp.	Various dates on or before February 1, 2011
C-04	Magor TeleCollabration HDDuo	Magor Communications Corp.	Various dates on or before February 1, 2011
C-04	Magor TeleCollaboration HDTrio	Magor Communications Corp.	Various dates on or before February 1, 2011

2. Anticipation and Obviousness (P.R. 3-3(b) and (c))

The Asserted Claims of the ’099 Patent are invalid because they are anticipated by the prior art, and also because they would have been obvious in view of the prior art.

The prior art identified by Defendant anticipates one or more of the Asserted Claims of the ’099 Patent under at least 35 U.S.C. §§ 102(a), (b), (e), or (g). For each prior art reference, Defendant has provided claim charts attached to these Invalidity Contentions as Exhibits B-1 through B-32 and B-34 through B-35. These charts identify where each element of each Asserted Claim can be found in each item of prior art.

In addition, the Asserted Claims of the ’099 Patent are invalid as obvious under 35 U.S.C. § 103. Each prior art reference identified in the preceding sections—either alone or in combination with another prior art reference and/or in combination with the knowledge of one skilled in the art—renders the Asserted Claims invalid as obvious. In rendering the Asserted Claims obvious, each prior-art reference identified in the preceding sections may be combined with: (1) information known to persons skilled in the art at the time of the alleged invention, (2) any of the other anticipatory or obviousness prior-art references, (3) any statements in the

intrinsic record of the ’099 Patent and related applications, or (4) any of the additional prior art identified below.

3. Motivations to Combine

A person of ordinary skill in the art (sometimes, “POSA”) would have been motivated to combine the preceding references (*see* Section V.A.1.) for the following reasons. Teachings, suggestions, motivations and/or reasons to modify any of the references and/or to combine any two or more of the references can come from many sources, including the prior art (by specific reference and when read as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obviousness to try, the nature of the problem faced, and/or knowledge possessed by a person of ordinary skill.

Although a patent claim may be invalidated based on a teaching-suggestion-motivation (“TSM”) rationale—*i.e.*, that some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention—the Supreme Court identified additional rationales in *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The following of these rationales apply here:

> (A) the asserted claims combine prior-art elements according to known methods to yield predictable results;
>
> (B) the asserted claims involve the simple substitution of one known element for another to obtain predictable results;
>
> (C) the asserted claims involve the use of a known technique to improve similar devices (methods, or products) in the same way;
>
> (D) the asserted claims apply a known technique to a known device (method, or product) ready for improvement to yield predictable results;

> (E) the asserted claims involve combinations of prior-art references that would have been "obvious to try"'—a person of ordinary skill in the art could have reached the asserted claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) the asserted claims are simply variations of work from one field of endeavor or a different one that would have been prompted based on design incentives or other market forces because the variations were predictable to one of ordinary skill in the art.

See KSR, 550 U.S. at 414-18 (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, and instead espousing an "expansive and flexible" approach); *see also* Department of Commerce, Patent and Trademark Office, Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420-21.

Thus, even in the absence of a specific teaching, suggestion, or motivation to combine references, the Asserted Claims here are obvious and therefore invalid. Each of the cited references or devices is in the same field as the '099 patent, making it obvious for someone of ordinary skill in the art to identify and combine elements from these references and devices. One of ordinary skill in the art would have recognized that improvements could be achieved by combining or modifying prior-art references that described such improvements. Each of the above prior-art references describes systems, products, or methods that were known to offer such improvements, and, accordingly, one of ordinary skill in the art would have been motivated to combine or modify the references as identified in each of the combinations below.

Furthermore, because each prior art reference concerns videoconferencing or other networked systems, common industry knowledge supplied a reason to combine any one the

above references. It was well understood that software modules implementing, for example, network topology and various aspects of the user interface could be interchanged with each other, fitting together like puzzle pieces. Each combination would have produced predictable results and would simply represent a known alternative to one of ordinary skill in the art of videoconferencing software. This is a further motivation to combine any of the above references.

The below sections further address particular reasons to combine the above references. The below should not be construed as an admission that there is any value to the alleged invention of the ’099 Patent. As discussed previously, these contentions are based in significant part on how Plaintiff is apparently construing the asserted claim in its Infringement Contentions, which is an incorrect and overbroad interpretation of the alleged invention of the ’099 Patent. Accordingly, to the extent the below refers to benefits of certain elements or industry trends towards these elements, this is not an admission that the alleged invention of the ’099 Patent provides any benefits – to the contrary, properly construed and compared to the prior art, the ’099 Patent provides no benefits. Likewise, to the extent the below refers to substituting elements, this is not an admission that the elements subject to the substitution are in any way similar, *e.g.*, perform the same function, in the same way, to achieve the same result.

The various elements of the Asserted Claims were well known in the prior art at the time of the alleged invention, and the combination would have been obvious to one of skill in the art. The combinations simply (a) combine prior-art elements according to known methods to yield predictable results; (b) involve the simple substitution of one known element for another to obtain predictable results; (c) involve the use of a known technique to improve similar devices (methods, or products) in the same way; (d) apply a known technique to a known device

(method, or product) ready for improvement to yield predictable results; (e) involves combinations of prior-art references that would have been "obvious to try" – a person of ordinary skill in the art could have reached the Asserted Claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and/or (f) would have been prompted by known work, based on design incentives or other market forces, because such variations were predictable to one of ordinary skill in the art.

Moreover, the Supreme Court has stated that a motivation to combine may be simply "common sense" and that "familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420. Indeed, the Supreme Court held that it is sufficient that a combination of elements was "obvious to try," holding that, "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *Id.* at 421. Here, all the claim elements are common sense and are easily fit together by one of ordinary skill in the art.

While not necessary, a motivation to combine may also be found in the references themselves. One of skill in the art would have been motivated to combine a reference that refers to, or otherwise explicitly invites combination with, another reference. Where the references cited herein have such an explicit invitation to combine, that invitation would have motivated one of skill in the art to combine any such references.

Cisco hereby identifies the following '099 Patent Primary References: Setton, Baker, Apostolopoulos, Jeong, and Burman.

The below provides several exemplary combinations and motivations for combining a '099 Patent Primary Reference with another reference.[20]

a) Teleconferencing Systems Limitations

Claim 3 recites a "a teleconferencing system."[21] Similarly, claim 10 recites "an endpoint for use as a mesh-connected endpoint in a teleconferencing system." Collectively, these limitations will be referred to as the "Teleconferencing System Limitations." The '099 patent admits that video conferencing generally, and videoconferencing specifically in a mesh configuration, were well known. '099 patent, 1:21-64. These systems are based on video encoding and streaming technology and on well-known components such as MCUs. *Id.* Numerous patents, patent publications, other publications, and systems describe the techniques for a teleconferencing system. *See, e.g.*, Musgrave; Weiser; Baker; Apostolopoulos; TelePresence. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for the Teleconferencing Systems Limitations will collectively be referred to as the "Teleconferencing System Prior Art."[22]

To the extent that any of the '099 Patent Primary References is shown not to disclose the Teleconferencing Systems Limitations, one having ordinary skill in the art would have been

[20] Notwithstanding the language below, Cisco does not assert the combinations of references on which trial was instituted in IPR2024-00194. Petition for IPR, *Cisco Systems, Inc. v. Video Solutions Pte. Ltd.*, No. IPR2024-00194 (Nov. 21, 2024), at 79-80.

[21] Although for present purposes claim 3's preamble is characterized as a "limitation," Defendant take no position here as to whether the preamble of claim 3 is limiting.

[22] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

motivated to combine that reference with any one of the Teleconferencing System Prior Art references.

A person of ordinary skill would have recognized the benefit of applying video encoding and network architecture teachings to Teleconferencing System Prior Art. Those of ordinary skill in the art had long recognized the benefit of being able to communicate remotely with others via a video link. *See, e.g.*, Vega-Garcia, 1:26-43. And as the Teleconferencing System Prior Art demonstrates, such video encoding and corresponding network architecture are building blocks for teleconferencing. Thus, any reference that teaches building blocks naturally would have been understood to be applicable to teleconferencing systems. Put another way, the Teleconferencing System Prior Art demonstrates the practical and beneficial use of building blocks such as video encoding and network architecture to teleconference systems, and thus those of ordinary skill in the art would have been motivated to consider these building block teachings for use in a teleconference system.

Second, a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of the Teleconferencing System Prior Art with other teachings. For example, it would have been well appreciated by a person of ordinary skill in the art that videoconference data could be encoded using a variety of formats such as MPEG-2, MPEG-4, and H.264. *See, e.g.*, RFC 3550, at 2; Basso, at 1; Woodworth [0044]. Such teachings are applicable to teleconferencing and are building blocks for such systems. Thus, a POSA would have recognized that it would have been easy to mix and match techniques for creating such a system.

b) Mesh and Non-Mesh Configuration Limitations

Claim 3 recites a "a plurality of endpoints, at least some of which are connected in a mesh configuration and at least one of which is connected in a non-mesh configuration to a selected one of the mesh-connected endpoints." Similarly, claim 10 recites "a plurality of endpoints, at least some of which are connected in a mesh configuration and at least one of which is connected in a non-mesh configuration to a selected one of the mesh-connected endpoints." These limitations will be referred to as the "Mesh and Non-Mesh Configuration Limitations."

The '099 patent admits that mesh and non-mesh networks were known. '099 patent, 2:33-41. Indeed, numerous patents, patent publications, other publications, and systems describe these networks, and in fact, describe combining such network as claim 3 purports to claim. *See, e.g.*, Setton; Apostolopoulos; Jeong; Musgrave; RFC 1889; RFC 3550; RFC 5117; TelePresence. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for the mesh and non-mesh systems will collectively be referred to as the "Mesh and Non-Mesh Prior Art."

To the extent that any of the '099 Patent Primary References is shown not to disclose the above limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Mesh and Non-Mesh Prior Art references.

A person of ordinary skill in the art would have recognized the benefit of using a mesh network with a non-mesh network. For example, Apostolopoulos discusses the problems with a mesh network that scales too large, *e.g.*, the inordinate bandwidth usage. And Jeong discusses the problems with mesh (*e.g.*, power and bandwidth) and non-mesh networks (*e.g.*, dedicated servers). Jeong, 1:42-2:3. As a result, it was known how to mix these networks, addressing the problems of each and arriving at a better solution given the circumstances. Apostolopoulos

teaches, for example, when specific types of networks are most appropriate and when mixing the networks are most suitable. Apostolopoulos, [0054], [0058]-[0060], [0069]-[0072]. Likewise, Jeong teaches a solution to the issues with mesh and non-mesh networks, which provides a way to integrate different types of networks as well. Jeong, 2:7-13. Similarly, RFC 1889 and RFC 3550 teach that connecting an endpoint to a mesh network as a non-mesh endpoint may be desirable because of certain network restrictions on the endpoint (*e.g.*, it is behind a firewall), or because the endpoint lacks the bandwidth to be connected to the full mesh. RFC 1889, at 39; RFC 3550, at 45. As such, a person of ordinary skill in the art would have been motivated to consider the teachings of the Mesh and Non-Mesh Prior Art to improve any teleconferencing system (or network more generally). By way of example, Apostolopoulos teaches ways to reduce the bandwidth issues of a mesh configuration by incorporating non-mesh endpoints. Apostolopoulos, [0054], [0058]-[0060], [0069]-[0072]. Likewise, Jeong suggests ways to modify mesh and non-mesh networks to reduce costly equipment, *e.g.*, MCUs. Jeong, 2:7-13.

By way of another example, Setton teaches these same problems of mesh and non-mesh networks. Setton, [0003]-[0006]. Setton provides a solution of connecting mesh and non-mesh endpoints to address these issues. *Id.* [0016]-[0019]. And Setton provides examples of when mixing such networks may be advantageous, such as when certain users have different access desires or processing power. *Id.* [0015]-[0019]. Indeed, Baker teaches, for example, that depending on the user's endpoint, different network configurations may be desirable. Baker, [0049]-[0050].

Applying network modifications in view of the Mesh and Non-Mesh Prior Art would have been routine and highly predictable for a person of ordinary skill. As the Mesh and Non-Mesh Prior Art demonstrates, network modifications affect the network, not other aspects of, for

example, a video conference. Thus, technology sitting "on top" of the network, *e.g.*, film strip functionality or the like, would fit interchangeably with the Mesh and Non-Mesh Prior Art. Indeed, Apostolopoulos teaches various networks and the ease with which such networks may be modified. Apostolopoulos, Figs. 1-3. Likewise, Jeong teaches the ability to modify a network to obviate the need for an MCU. Jeong, 2:7-13, Figs. 1-5. And RFC 5117, which would have been known to a person of ordinary skill in the art, describes how the RTP and RTCP standards could be used with a variety of technologies, including hybrid topologies that include some mesh-connected endpoints and some non-mesh connected endpoints. *See, e.g.*, RFC 5117, at 7 (topo-translator topology), 9 (topo-mixer topology). Thus, a person of ordinary skill in the art would have recognized that the hybrid topologies claimed by the Mesh and Non-Mesh Limitations could easily be integrated into references that use a different network topology.

c) Film Strip Limitations

Claim 3 recites "a film strip with frames containing reduced-size video feeds from the conference participants is displayed at the mesh endpoints." Claim 10 recites a similar limitation. These limitations will be referred to as the "Film Strip Limitations."

The '099 patent admits that conventional film strips were known in the art. '099 patent, 5:39-47. Indeed, numerous patents, patent publications, other publications, and systems describe these film strips. *See, e.g.*, Baker, Pariyanna, Meek, Skramstad, Robinson, Bhat, Barkley, TelePresence. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for the film strip teachings will collectively be referred to as the "Film Strip Art."

To the extent that any of the 099 Primary References is shown not to disclose the Film Strip Limitations, one having ordinary skill in the art would been motivated to combine that reference with one of the Film Strip Art references.

A person of ordinary skill in the art would have recognized the benefits of using a film strip. By way of example, Baker discloses that displaying a video of a user allows "the local participant" to "judge mood and facial expressions of" other participants. Baker, [0023]. Indeed, such film strips can visualize a round table setting and help bring the conference to life. *Id.* [0017]. Similarly, as Meek recognizes, this provides an orderly conference in which users understand who is in the conference and who is, for example, speaking. Meek, [0042]-[0043].

By way of another example, it was known that with film strips, it was possible to reduce the video feed's size (which reduces bandwidth). Barkley, [0044]. As Baker teaches, such film strips reduce "the size of the data streaming" into the user's endpoint. Baker, [0039].

Implementing a film strip in view of the Film Strip Prior Art teachings would have been routine and highly predictable. As the Film Strip Prior Art demonstrates, the film strip is simply made up of video feeds from various users, which are naturally part of any videoconference. Indeed, it would have been well appreciated by a person of ordinary skill in the art that videoconference data could be encoded using a variety of formats such as MPEG-2, MPEG-4, and H.264, and each of these easily implements a film strip. *See, e.g.*, RFC 3550, at 2; Basso, at 1; Woodworth [0044]. Further, techniques to reduce the video feed size were well known in the prior art. *See, e.g.*, Barkley, [0044]; Baker, [0039].

d) Proxy Limitations

Claim 3 recites "a proxy at the selected mesh-connected endpoint for the non-mesh connected endpoint and connected to each of the mesh-connected endpoints to receive video

feeds from the mesh-connected endpoints for the non-mesh connected endpoint." Claim 10 recites a similar limitation. These limitations will be referred to as the "Proxy Limitations."

Numerous patents, patent publications, other publications, and systems describe these types of proxies and proxies for such use as the claim recites. *See, e.g.*, Burman, Setton, Wang, Weiser, Jeong, RFC 1889, RFC 3550, RFC 5117, TelePresence. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for proxies will collectively be referred to as the "Proxy Prior Art."

To the extent that any of the '099 Patent Primary References is shown not to disclose the proxy limitations above, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Proxy Prior Art references.

A person of ordinary skill in the art would have recognized the benefits of using a proxy. To start, it was well known that the use of a proxy at an endpoint may reduce costs, *e.g.*, obviate the need for a standalone MCU or central server. Jeong, for example, discloses that: "[s]ome embodiments provide an architecture for establishing a multi-participant conference. This architecture has one participant's computer in the conference act as a central content distributor for the conference. The central distributor receives data (*e.g.*, video and/or audio streams) from the computer of each other participant, and distributes the received data to the computers of all participants." Jeong, 2:7-13. By having a computer act as a proxy for another endpoint, it obviates the need for "deployment of dedicated servers." *Id.* 2:1-3. Similarly, Jeong teaches that having a computer act as a proxy for other endpoints reduces bandwidth. *Id.* Similarly, Burman teaches that an endpoint may serve as a proxy and server for other endpoints. Burman, [00191] (receiver endpoint devices 111-2 operating as RTP mixer, and endpoint 111-3 as a non-mesh-connected endpoint).

By way of another example, Setton discloses that a mesh-endpoint can use a "bridge" with a proxy function between the mesh-endpoint and the non-mesh endpoint. Setton, [0021]. Setton teaches that using such a proxy reduces "cost" and enables greater "scalability." *Id.* [0014].

By way of another example, Weiser discloses the use of a "proxy." Weiser, [0233], [0270]. This enables "proxy connections" to each device using "different signaling and media protocols," which increases the ability to integrate different systems. *Id.* [0270]. It further enables interaction with a mixer. *Id.*

By way of another example, RFCs 8099, 3550, and 5117 disclose the use of "translators" and "mixers," and thus anticipate the "proxy" claimed by the '099 Patent. RFC 1889, at 39-44; RFC 3550, at 45-49; *see generally* RFC 5117. "An RTP translators/mixer connects two or more transport-level 'clouds,'" and they are especially useful, for example, in "the presence of firewalls and low bandwidth connections." RFC 1889, at 39; RFC 3550, at 45. RFC 5117 builds on RFC 1889 and RFC 3550, and further notes that "[o]ne common application for a [m]ixer is to allow a participant to receive a session with a reduced amount of resources." RFC 5117, at 9. A person of ordinary skill in the art would have been familiar with RFC 1889, RFC 3550, and RFC 5117, which were well-known standards, and would have appreciated that a proxy (such as an RTP translator or mixer) would have been desirable because it allows for endpoints behind a firewall or using a low bandwidth connection to participate in a videoconference.

Finally, a "proxy" may serve as a functional building block in connecting mesh and non-mesh networks, because it facilitates the mesh-endpoint in connecting the non-mesh endpoints. Weiser, [0233], [0270]. Thus, all the benefits in V.A.3.b are equally applicable here.

Incorporating a proxy into a video conference network configuration, including at an endpoint, would have been routine and highly predictable. As an initial matter, a "proxy" may serve as a functional building block in connecting mesh and non-mesh networks, because it facilitates the mesh-endpoint in connecting the non-mesh endpoints. Thus, all the reasons that such an implementation would be routine and predictable in V.A.3.b are equally applicable here. Further, as the Proxy Prior Art demonstrates, a proxy is a basic networking element that, for example, receives video streams. Even in 2005, this was so routine that basic, personal computers were able implement such functionality. Indeed, proxies were a part of the well-known RFC 1889, RFC 3550, and RFC 5117 standards, illustrating that integrating a proxy into a video conferencing system would have been easy and straightforward to a person of ordinary skill in the art. For example, Jeong teaches that such functionality, which often is in an MCU, is implementable in a basic computer. Jeong, 2:7-14. In fact, the '099 patent concedes that such functionality was well known. '099 patent, 1:34-39. Finally, the underlying functionality of handling the data streams was well known, including as set forth in various standards, *e.g.*, MPEG-2, MPEG-4, H.264, and RFC 3550. *See, e.g.*, Basso, at 1; Woodworth [0044].

e) Server Limitations

Claim 3 recites "a server associated with the proxy for serving the film strip with frames containing reduced-size video feeds from the mesh-connected conference participants to the non-mesh connected endpoint." Claim 10 recites a similar limitation. These limitations will be referred to as the "Server Limitations."

Numerous patents, patent publications, other publications, and systems describe servers of the sort claimed by the "Server Limitation." *See, e.g.*, Burman, Apostolopoulos, Setton, Wang, Weiser, Jeong, Armstrong, Wong, RFC 1889, RFC 3550, RFC 5117, TelePresence. The

prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for servers will collectively be referred to as the "Server Prior Art."

To the extent that any of the '099 Patent Primary References is shown not to disclose the server limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Server Prior Art references.

A person of ordinary skill in the art would have recognized the benefits of using a server to serve the non-mesh endpoints. To start, having a server as part of an endpoint was well known in the art. Setton, [0032]. Indeed, Armstrong and Wong teach the use of servers with endpoints, which fit hand-in-hand with endpoint functionality. Wong ("server"), 5:23-28, 12:10-14, 14:4-18; Armstrong ("server"), 15:53-64. In fact, it was "typical[]" to use servers to stream video. Setton, [0003]. Similarly, Burman teaches that an endpoint may server as a proxy and server for other endpoints. Burman, [00191] (receiver endpoint devices 111-2 operating as RTP mixer, and endpoint 111-3 as a non-mesh-connected endpoint).

By way of example, Wong demonstrates that servers are ubiquitous, including in home deployments. Wong, 12:10-14. This makes the use of a server with an endpoint, which may also reside in a home, particularly suitable.

By way of another example, servers enable well-known client/server programming functionality, particularly suitable for provision of video. *Id.* 12:50-58.

Finally, servers by definition provide services to other users, such as providing video content. As a result, by definition, associating a server with a proxy at an endpoint would have been understood by a person of ordinary skill in the art to be a useful tool for providing content to non-mesh endpoints.

Associating a server with the proxy, including at an endpoint, would have been routine and highly predictable. As an initial matter, a "server" may serve as a functional building block in connecting mesh and non-mesh networks, because it facilitates the mesh-endpoint in connecting the non-mesh endpoints. Thus, all the reasons that such an implementation would be routine and predictable in V.A.3.b are equally applicable here. Further, as the Server Prior Art demonstrates, a server is a basic networking element that, for example, receives and sends video streams. Even in 2005, this was so routine that basic, personal computers were able to implement such functionality. For example, Jeong teaches that such functionality, which often is in an MCU, is implementable in a basic computer. Jeong, 2:7-14. In fact, the '099 patent concedes that such functionality was well known. '099 patent, 1:34-39. Finally, the underlying functionality of handling the data streams was well known, including as set forth in various standards and including through the use of servers, *e.g.*, MPEG-2, MPEG-4, H.264, and RFC 3550. *See, e.g.*, Basso, at 1; Woodworth [0044]. Servers were, in effect, as simple and routine to a person of ordinary skill in the art as a personal computer well before the '099 patent.

f) Promotion Limitations

Claim 3 recites "a control connection permitting a user located at the non-mesh connected endpoint to select a video feed on the film strip for promotion to full size and to initiate transfer of the full size video feed to the non-mesh connected endpoint." Claim 10 similarly recites "a proxy controller permitting a user located at the non-mesh connected endpoint to select a video feed on the film strip for promotion to full size and to initiate transfer of the full size video feed to the non-mesh connected endpoint." These limitations will collectively be referred to as the "Promotion Limitations."

Numerous patents, patent publications, other publications, and systems describe these types of control connections for promoting a video to full-size in a video conference. *See, e.g.*, Baker, Bhat, Nelson, Burman, RFC 5117, TelePresence. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for promotion will collectively be referred to as the "Promotion Prior Art."

To the extent that any of the '099 Patent Primary References is shown not to disclose the promotion limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Promotion Prior Art references.

A person of ordinary skill in the art would have recognized the benefits of using promotion. To start, promoting a video to a large size was well known to enable "judg[ing] the mood and facial expressions of at least one remote participant." Baker, [0017]. And providing the videos on a smaller feed reduces bandwidth (*see* Section V.A.3.c), and thus sending the larger size only for promotion preserves bandwidth as long as possible.

By way of example, Apostolopoulos teaches that "if the resource capability of a local node associated with a local collaborator comprises very low processing power, then the processing of data signals used for generating communication traffic in the communicative environment may be transferred to a remote location, such as, at a central server/node." Apostolopoulos, [0036]. Thus, it was well known that while a user may desire to promote a video feed, it was often desirable to have the remote unit provide the larger feed to reduce the burden on the user device. Thus, the user initiates the transfer, but the remote unit sends the larger size video. *Id.*

By way of another example, Nelson teaches that promotion allows for a "primary" participant, which focuses the users on the main speaker. Nelson, 16:8-26. Further, Nelson

teaches that allowing a remote server to service such promotion beneficially offloads computation from the user's computer. *Id.* Abstract, 3:8-27. Similarly, Bhat teaches that promotion allows display of an "active speaker," thereby focusing the audience. Bhat, [0057].

By way of another example, Burman teaches simulcasting both high resolution and lower resolution media streams. Burman, [0055]-[0065]. This allows a particular endpoint device to select a desired quality of the media stream using, for example, a graphical user interface. *Id.* [00191]. A person of ordinary skill would have recognized the benefit, as in Burman, of allowing endpoints to receive a lower resolution version of a media stream when the media stream is displayed smaller to the user (thus requiring less bandwidth), and similarly of allowing endpoints to receive a higher resolution version of the media stream when the media stream is displayed larger to the user. *Id.* [0055]-[0065].

Promotion would have been routine and highly predictable. To start, the functionality for effectuating promotion on another endpoint was often built into endpoints. For example, Jeong discloses "resize[r]s" for this purpose, *i.e.*, promoting video to a remote endpoint. Jeong, 19:54. Similarly, giving a user the ability to initiate such promotion was basic GUI functionality, well known in videoconferencing art. *See, e.g.*, Periyanna, [0127]; Burman, at [00191]. Simulcasting a stream at differing qualities was also well understood to a person of ordinary skill in the art. Burman, [0046]. Finally, the underlying functionality of handling the data streams and resizing was so well known that various standards cover it, *e.g.*, MPEG-2, MPEG-4, H.264, and RFC 3550. *See, e.g.*, Basso, at 1; Woodworth [0044].

g) Browser Limitations

Claim 4 recites: "A teleconferencing system as claimed in claim 3, wherein the server is configured to serve the filmstrip to a browser co-located with the non-mesh connected endpoint."

Claim 5 recites "A teleconferencing system as claimed in claim 4, wherein the browser is displayed on a computer co-located with the non-mesh connected endpoint." These claims will be collectively referred to as the "Browser Limitations."

These claims, in effect, require serving the filmstrip to a browser that is with the endpoint or on a computer that is with the endpoint. Numerous patents, patent publications, other publications, and systems describe serving videoconference material, such as filmstrips, to a video conference application that is run within a browser at the endpoint. *See, e.g.*, Howell, Decker, Witt, Catchpole, Cockerton, Meek, RTCWEB, TelePresence. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for browsers and user displays will collectively be referred to as the "Browser Prior Art."

To the extent that any of the '099 Patent Primary References is shown not to disclose the Browser Limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Browser Prior Art references.

A person of ordinary skill in the art would have recognized the benefits of using browsers (including on a computer at the endpoint). To start, common sense dictates that, because users are familiar with browsers, browsers are a good vehicle to present a video conference. Indeed, most computer users have browsers. And using video conferencing on browsers was conventional and ubiquitous. Howell, 2:53-3:36, Figs. 1-9 (browser); Decker, 7:15-36 (browser); Witt, 3:62-4:8 (browser); Catchpole, 2:21-36 (browser); Cockerton, 1:57-2:12 (browser); Meek, 4:30-41 (browser).

By way of another example, browsers enable easy access to web servers, facilitating video conferences. Decker, 7:15-36. And web browsers are usually presents at a user's site. *Id.* 7:37-58.

By way of another example, it was well known that browsers provide "simple" plug-ins for use with video conferencing applications. Witt, 4:17-38.

Using browsers for the video conference would have been routine and highly predictable. To start, the functionality of browsers was incredibly well understood. And the programming provides easy means for implementing the functionality of a video conference. *Id.* 4:17-38. Indeed, standards already existed at the time of the '099 Patent for implementing videoconferencing systems on Web browsers. RTCWEB, at 3-4 (describing "a necessary and sufficient set of functions to allow the use of interactive audio and video in applications that communicate directly between browsers across the Internet").

h) Virtualization Limitations

Claim 6 recites "wherein the proxy and server are merged into a virtualized environment." Numerous patents, patent publications, other publications, and systems describe virtualization. *See, e.g.*, Sartori, Weber, Qiu, Grupenhoff, TelePresence. These claims will be collectively referred to as the "Virtualization Limitations." The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for virtualization will collectively be referred to as the "Virtualization Prior Art."

To the extent that any of the '099 Patent Primary References is shown not to disclose the virtualization limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Virtualization Prior Art references.

To start, virtualization, including the video conferencing context, was incredibly well known. *See, e.g.*, Sartori, 2:5-18, 3:9-29 (virtualization); Weber, 4:3-20 (virtualization), Qiu, 3:13-25 (virtualization), Grupenhoff, [0017].

The benefits of virtualization were well known. These include saving money, time and space; having fewer servers to purchase; managing servers more efficiently. Virtualize Now (https://www.principledtechnologies.com/clients/reports/Dell/2-2-1_virtualization_benefits_1111.pdf); *see also* The Bright Side of Server Virtualization (https://biztechmagazine.com/article/2011/02/bright-side-server-virtualization).

Virtualization was routine, as the Virtualization Prior Art demonstrates. In effect, virtualization is simply operating what appears to be physical, *e.g.*, server, but it is "virtual" because the physical aspects of it are transparent to the operator. In fact, in many cases, virtual devices are easier to implement because one not need deal with the physical issues of the physical hardware.

B. Invalidity Based on Section 112 (P.R. 3-3(d))

1. Indefiniteness[23]

Defendant provides the following grounds for invalidity under 35 U.S.C. § 112. Defendant's investigation of the Asserted Patents is ongoing, and Defendant reserves the right to amend or supplement these disclosures based on further investigation and in a manner consistent with the Federal Rules of Civil Procedure, the Local Patent Rules for the Eastern District of Texas, and the Docket Control Order, or otherwise in accordance with any order or direction of this Court or agreement of the parties. Further, Plaintiff's Infringement Contentions fail to provide sufficient detail to fully understand its proposed application of the Asserted Claims, and Defendant reserves the right to assert additional grounds for invalidity under 35 U.S.C. § 112 in

[23] Indefiniteness does not preclude invalidity findings in an IPR because, for example, while the outer bounds of a claim limitation may be uncertain, the prior art may nevertheless provide a disclosure within the uncertain outer bounds. "[I]t is not always impossible to adjudicate a prior-art challenge, one way or the other, just because some aspect of a claim renders the claim indefinite." *Intel Corp.*, 21 F.4th at 813.

response to Plaintiff's claim interpretations. Defendant also reserves the right to supplement, modify, or otherwise amend these grounds for invalidity under 35 U.S.C. § 112 based on the Court's claim construction rulings or opinions or the parties' positions or arguments taken in connection with the claim construction process.

Certain of the Asserted Claims are invalid for failing to comply with the definiteness requirement of § 112. Defendant notes that its charting of a prior art reference for a claim or limitation that Defendant contends is invalid for lack of definiteness in no way represents an admission or concession that the scope of the claim or limitation is definite or ascertainable. § 112 paragraph 2 requires that a patent claim "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention." Claim terms that fail to inform those skilled in the art "with reasonable certainty . . . about the scope of the invention" fail the definiteness requirement of Section 112 paragraph 2. *Nautilus,* 572 U.S. at 901.

Defendant provides below an identification of terms[24] in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as indefinite:

a) "mesh-connected endpoint" / "mesh endpoint"

b) "proxy"

c) "the non-mesh connected endpoint"

2. Written Description and Enablement

The specifications of the Asserted Patents do not provide adequate written description to support the scope of the claims asserted by Plaintiff in furtherance of its infringement theories or

[24] These terms may also be read in the broader context, *i.e.*, the terms with surrounding claim language, and the terms with that surrounding claim language is likewise indefinite.

any reasonably understood scope of the claims. 35 U.S.C. § 112[25] paragraph 1 requires that a patent specification contain "a written description of the invention." To fulfill the written description requirement, the specification "must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed." *Ariad,* 598 F.3d at 1351. To satisfy the written description requirement, "the applicant must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate that by disclosure in the specification of the patent." *Carnegie Mellon Univ,* 541 F.3d at 1122 (quoting *Vas-Cath Inc.*, 935 F.2d at 1563–64). The Asserted Patents do not meet that requirement for the terms below, which Defendant reserves the right to amend.

Additionally, the Asserted Patents do not enable the claim scopes contained in Plaintiff's Infringement Contentions. Section 112 paragraph 1 requires a specification to describe "the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains … to make and use the [invention]." The enablement requirement is separate from and in addition to the written description requirement. *Ariad,* 598 F.3d at 1344. This "requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp.*, , 344 F.3d at 1244 (citation omitted); *see Wyeth & Cordis Corp.*, 720 F.3d at 1385–86. The Asserted Patents do not meet that requirement for the list of terms below, which Defendant reserves the right to amend.

Defendant provides below an identification of terms in Asserted Claims that render the

[25] Because the Asserted Claims are alleged to have a priority date before March 16, 2013, Defendant applies pre-AIA 35 U.S.C. § 112.

Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as not enabled or lacking sufficient written description:

a) "endpoint"

b) "mesh-connected endpoint" / "mesh endpoint"

c) "proxy"

d) "server associated with the proxy"

e) "a control connection permitting a user located at the non-mesh connected endpoint to select a video feed on the film strip for promotion to full size and to initiate transfer of the full size video feed to the non-mesh connected endpoint"

f) "merged into a virtualized environment"

Under Plaintiff's apparent infringement theory, the Asserted Claims are invalid on these bases that the specification does not show possession of or enabled the "endpoints" limitation. In particular, it appears that Plaintiff is reading this limitation on intermediary servers or nodes. The specification did not show possession of such scope nor enabled such scope.

Under Plaintiff's apparent infringement theory, the Asserted Claims are invalid on these bases that the specification does not show possession of or enabled the "mesh-connected endpoints" limitation. In particular, it appears that Plaintiff is reading this limitation on endpoints connected through "clusters" or "nodes." The specification did not show possession of such scope nor enabled such scope.

VI. INVALIDITY OF THE '823 PATENT

A. Invalidity Based on the Prior Art

As shown below, the alleged inventions of the Asserted Patents were well-known in the prior art. Those skilled in the art were aware of all of the limitations claimed in the Asserted

Patents. Thus, many prior art patents, publications, and combinations thereof disclose, teach, or embody every limitation of the Asserted Claims and thus invalidate those claims. Examples of these disclosures, teachings, and embodiments are identified in the following sections and in the attached claim charts.

1. Identification of Prior Art References (P.R. 3-3(a))

Subject to the reservation of rights above, Defendant identifies each item of prior art that anticipates and/or renders obvious one or more of the Asserted Claims of the Asserted Patents. The patents/applications, publications, and systems identified are also relevant for their showing of the state of the art and reasons and motivations for making improvements, additions, and combinations.

Some of the below citations and those in the corresponding invalidity claim charts involve prior art references that have corresponding related, foreign, and/or PCT counterpart publications. In such cases, where either the U.S. patent or related, foreign, and/or PCT counterpart is cited, it is to be understood that the corresponding disclosures from the counterpart patent and publications (which are substantively the same) are implicitly incorporated by reference in the alternative to avoid needless repetition.

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
D-01	U.S. Pat. No. 5,805,983 ("Naidu") (CISCO_00080494 - CISCO_00080505)	July 18, 1996	Sept. 8, 1998
D-02	U.S. Pat. No. 6,188,698 ("Galand") (CISCO_00090643 - CISCO_00090663)	Jan. 26, 1998	Feb. 13, 2001
D-03	U.S. Pat. No. 8,964,655 ("Fan") (CISCO_00090628 - CISCO_00090642)	June 18, 2007	Feb. 24, 2015
D-04	U.S. Pat. No. 9,084,010 ("Cooper") (CISCO_00090708 - CISCO_00090720)	Oct. 27, 2003	July 14, 2015
D-05	U.S. Pat. Pub. No. 2002/0049985 ("Olshansky") (CISCO_00090730 - CISCO_00090743)	Feb. 26, 2001	Apr. 25, 2002

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
D-06	U.S. Pat. Pub. No. 2005/0080894 ("Apostolopoulos") (CISCO_00075143 - CISCO_00075160)	Oct. 9, 2003	Apr. 14, 2005
D-07	U.S. Pat. Pub. No. 2009/0135906 ("Comer") (CISCO_00090701 - CISCO_00090707)	July 27, 2006	May 28, 2009
D-08	U.S. Pat. Pub. No. 2009/0141800 ("Larson") (CISCO_00090686 - CISCO_00090700)	Sept. 3, 2008	June 4, 2009

Table D-1: Prior Art Patents and Patent Publications for the '823 Patent

Ex.	Title	Author(s)	Publisher	Date of Publication
D-09	Multipath Routing For Video Delivery Over Bandwidth-Limited Networks ("Chen") (CISCO_00090673 - CISCO_00090685)	J. Chen, S. G. Gary Chan, V. O.K. Li	IEEE Journal on Selected Areas in Communications, Vol. 22, No. 10	Dec. 2004
D-10	On adaptive bandwidth sharing with rate guarantees ("Duffield") (CISCO_00090721 - CISCO_00090729)	N.G. Duffield, T. V. Lakshman, D. Stiliadis	IEEE Infocom'98, the Conference on Computer Communications	1998
D-11	Exploiting Temporal Parallelism for Software-Only Video Affects Processing ("Patel") (CISCO_00090664 - CISCO_00090672)	K. Mayer-Patel, L.A. Rowe	Proceedings of the sixth ACM international conference on Multimedia	1998
D-12	RTP Topologies ("RFC 5117") (CISCO_00075417 - CISCO_00075437)	M. Westerlund, S. Wenger	Network Working Group Request for Comments: 5117	Jan. 2008

Table D-2: Prior Art Non-Patent Publications for the '823 Patent

2. Anticipation and Obviousness (P.R. 3-3(b) and (c))

The Asserted Claims of the '823 Patent are invalid because they are anticipated by the prior art, and also because they would have been obvious in view of the prior art.

The prior art identified by Defendant anticipates one or more of the Asserted Claims of the '823 Patent under at least 35 U.S.C. §§ 102(a), (b), (e), or (g). For each prior art reference, Defendant has provided claim charts attached to these Invalidity Contentions as Exhibits D-1

through D-12. These charts identify where each element of each Asserted Claim can be found in each item of prior art.

In addition, the Asserted Claims of the ’823 Patent are invalid as obvious under 35 U.S.C. § 103. Each prior art reference identified in the preceding sections—either alone or in combination with another prior art reference and/or in combination with the knowledge of one skilled in the art—renders the Asserted Claims invalid as obvious. In rendering the Asserted Claims obvious, each prior-art reference identified in the preceding sections may be combined with: (1) information known to persons skilled in the art at the time of the alleged invention, (2) any of the other anticipatory or obviousness prior-art references, (3) any statements in the intrinsic record of the ’823 Patent and related applications, or (4) any of the additional prior art identified below.

3. Motivations to Combine

A POSA would have been motivated to combine the preceding references (*see* Section VI.A.1) for the following reasons. Teachings, suggestions, motivations and/or reasons to modify any of the references and/or to combine any two or more of the references can come from many sources, including the prior art (by specific reference and when read as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obviousness to try, the nature of the problem faced, and/or knowledge possessed by a person of ordinary skill.

Although a patent claim may be invalidated based on a TSM rationale—*i.e.*, that some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention—the Supreme Court identified additional rationales in *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The following of these rationales apply here:

(A) the asserted claims combine prior-art elements according to known methods to yield predictable results;

(B) the asserted claims involve the simple substitution of one known element for another to obtain predictable results;

(C) the asserted claims involve the use of a known technique to improve similar devices (methods, or products) in the same way;

(D) the asserted claims apply a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) the asserted claims involve combinations of prior-art references that would have been "obvious to try"'—a person of ordinary skill in the art could have reached the asserted claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) the asserted claims are simply variations of work from one field of endeavor or a different one that would have been prompted based on design incentives or other market forces because the variations were predictable to one of ordinary skill in the art.

See KSR, 550 U.S. at 414-18 (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, and instead espousing an "expansive and flexible" approach); *see also* Department of Commerce, Patent and Trademark Office, Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420-21.

Thus, even in the absence of a specific teaching, suggestion, or motivation to combine references, the Asserted Claims here are obvious and therefore invalid. Each of the cited references or devices is in the same field as the '823 patent, making it obvious for someone of ordinary skill in the art to identify and combine elements from these references and devices. One of ordinary skill in the art would have recognized that improvements could be achieved by

combining or modifying prior-art references that described such improvements. Each of the above prior-art references describes systems, products, or methods that were known to offer such improvements, and, accordingly, one of ordinary skill in the art would have been motivated to combine or modify the references as identified in each of the combinations below.

Furthermore, because each prior art reference concerns videoconferencing or other networked systems, common industry knowledge supplied a reason to combine any one the above references. It was well understood that software modules implementing, for example, network topology and various aspects of the user interface could be interchanged with each other, fitting together like puzzle pieces. Each combination would have produced predictable results and would simply represent a known alternative to one of ordinary skill in the art of videoconferencing software. This is a further motivation to combine any of the above references.

The below sections further address particular reasons to combine the above references. The below should not be construed as an admission that there is any value to the alleged invention of the ’823 Patent. As discussed previously, these contentions are based in significant part on how Plaintiff is apparently construing the asserted claim in its Infringement Contentions, which is an incorrect and overbroad interpretation of the alleged invention of the ’823 Patent. Accordingly, to the extent the below refers to benefits of certain elements or industry trends towards these elements, this is not an admission that the alleged invention of the ’823 Patent provides any benefits – to the contrary, properly construed and compared to the prior art, the ’823 Patent provides no benefits. Likewise, to the extent the below refers to substituting elements, this is not an admission that the elements subject to the substitution are in any way similar, *e.g.*, perform the same function, in the same way, to achieve the same result.

The various elements of the Asserted Claims were well known in the prior art at the time of the alleged invention, and the combination would have been obvious to one of skill in the art. The combinations simply (a) combine prior-art elements according to known methods to yield predictable results; (b) involve the simple substitution of one known element for another to obtain predictable results; (c) involve the use of a known technique to improve similar devices (methods, or products) in the same way; (d) apply a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) involves combinations of prior-art references that would have been "obvious to try" – a person of ordinary skill in the art could have reached the Asserted Claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and/or (f) would have been prompted by known work, based on design incentives or other market forces, because such variations were predictable to one of ordinary skill in the art.

Moreover, the Supreme Court has stated that a motivation to combine may be simply "common sense" and that "familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420. Indeed, the Supreme Court held that it is sufficient that a combination of elements was "obvious to try," holding that, "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *Id.* at 421. Here, all the claim elements are common sense and are easily fit together by one of ordinary skill in the art.

While not necessary, a motivation to combine may also be found in the references themselves. One of skill in the art would have been motivated to combine a reference that refers

to, or otherwise explicitly invites combination with, another reference. Where the references cited herein have such an explicit invitation to combine, that invitation would have motivated one of skill in the art to combine any such references.

Cisco hereby identifies the following '823 Patent Primary References: Larson, Comer, Cooper, or Olshansky.

The below provides several exemplary combinations and motivations for combining an '823 Patent Primary Reference with another reference.

a) Packet Network Limitations

Claim 1 of the '823 Patent recites:

> 1. A method of managing multiple data streams transported through a common communications resource in a packet network, wherein data flowing through said resource travels in both directions, and wherein each stream is subject to data peaks, comprising:
>
> establishing logical two-way connections through the common communications resource between one or more near endpoints and one or more far endpoints,
>
> determining an undelayed round trip delay for each said logical two-way connection,
>
> determining the maximum round trip delay among all said logical two-way connections,
>
> preparing each of said data streams for transmission over respective said logical connections from a said near endpoint to a said far endpoint,
>
> determining the location of said data peaks in said data streams,
>
> transmitting said data streams over said respective logical two-way connections to said one or more far endpoints, and
>
> delaying the transmission of one or more of said data streams that are transmitted over a said logical two-way connection having an undelayed round trip delay less than the maximum round trip delay by an amount dependent on the location of said peaks to reduce the degree of coincidence

> in the data peaks of different streams without increasing the maximum round trip delay for the logical two-way connections.

Claim 7 of the '823 Patent recites:

> 7. A method as claimed in claim 1, wherein the logical connections are established between a common source endpoint and multiple destination endpoints.

For ease of reference, the highlighted limitations will be referred to as the "Packet Network Limitations."[26]

At the time of the claimed invention, network topologies in which data streams were transmitted to and from endpoints via a common communications resource in a packet network were well-known to a POSA.

Indeed, the '823 Patent admits that the Packet Network Limitations were known in the art. The '823 Patent's background section acknowledges that "it is becoming increasingly common to establish videoconferencing sessions over IP networks." '823 Patent, 1:13-14. It was well known that IP (Internet Protocol) networks are typically packet-switched. The background section further notes that it was "typical" that "a TCP/IP virtual connection is established between a pair of endpoints, which can then communicate with each other to provide a telecollaboration session." *Id.* 1:18-20. "The endpoints stream video and audio data to each other over other virtual connections (*e.g.* using RTP)." *Id.* 1:20-22. The background section further notes that "when multiple video sources are streamed onto an IP network, I-frames occurring simultaneously create bandwidth or traffic peaks." *Id.* 1:37-39.

[26] Cisco takes no position at this time as to whether the preamble of any claim (such as claim 1) is limiting.

That the Packet Network Limitations were well known in the art is also evidenced by numerous prior art references that disclose these limitations. *See, e.g.*, Larson, Figures 1, 4, [0002]-[0004]; Comer, [0002]-[0003]; Chen, Figure 1; RFC 5117, at 3-14; Apostolopoulos, Figures 1, 3A-D. The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Packet Network Limitations will collectively be referred to as the "Packet Network Prior Art."[27]

To the extent that any of the '823 Patent Primary References is shown not to disclose the Packet Network Limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Packet Network Prior Art references.

A POSA would have recognized the benefit to using the network arrangement claimed in the Packet Network Limitations. For example, those skilled in the art would have recognized that the Internet was a packet-switched network, and that any video conferencing application would benefit from being used over the Internet. Similarly, a POSA would have recognized that there were multiple viable network topologies, such as topologies in which all endpoints were connected to a multipoint control unit ("MCU"), topologies in which each endpoint maintains a connection to every other endpoint, and combinations of these topologies. *See, e.g.*, RFC 5117, at 3-14; Apostolopoulos, Figures 1, 3A-D. What's more, a POSA would have recognized that it was conventional or at the very least obvious that in transmitting data streams over such a network, the data streams should be first prepared and then transmitted.

A POSA would have had a reasonable expectation of success in implementing the Packet Network Limitations. As noted, video conferencing systems using a variety of network

[27] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

topologies were well-known in the art at the relevant time. This is evidence by, among other things, the standards surrounding videoconferencing such as the RTP standard, the TFRC standard, and RFC 5117 (which pertains to RTP topologies).

b) Avoiding Coincidence Limitations

Claim 1 of the '823 Patent recites:

> 1. A method of managing multiple data streams transported through a common communications resource in a packet network, wherein data flowing through said resource travels in both directions, and wherein each stream is subject to data peaks, comprising:
>
> establishing logical two-way connections through the common communications resource between one or more near endpoints and one or more far endpoints,
>
> determining an undelayed round trip delay for each said logical two-way connection,
>
> determining the maximum round trip delay among all said logical two-way connections,
>
> preparing each of said data streams for transmission over respective said logical connections from a said near endpoint to a said far endpoint,
>
> determining the location of said data peaks in said data streams,
>
> transmitting said data streams over said respective logical two-way connections to said one or more far endpoints, and
>
> delaying the transmission of one or more of said data streams that are transmitted over a said logical two-way connection having an undelayed round trip delay less than the maximum round trip delay by an amount dependent on the location of said peaks to reduce the degree of coincidence in the data peaks of different streams without increasing the maximum round trip delay for the logical two-way connections.

Claim 2 of the '823 Patent recites:

> 2. A method as claimed in claim 1, wherein the transmission of said data streams is delayed so as to remove any coincidence in said data peaks of different data streams.

Claim 8 of the ’823 Patent recites:

> 8. A method as claimed in claim 1, wherein said data streams represent video streams and said data peaks correspond to I-frames.

For ease of reference, the highlighted limitations will be referred to as the “Avoiding Coincidence Limitations.”

At the time of the claimed invention, numerous references disclosed that in the video streaming context, a coincidence of data peaks could be reduced or removed by staggering the transmission of I-frames of different video streams. *See, e.g.*, Comer, [0023] (“[I]t is advantageous to have the I frames, which are generally significantly larger than motion compensated P and B frames, occur at different times for different programs.”); Larson, [0020] (“The method can include transmitting I-frames in the first and second video streams such that the I-frames do not overlap in the first and second video streams.”); Cooper, 2:40-45 (“The intra coded (I) frames are temporally displaced so as to avoid temporal alignment of I-frames among a selected group of channels sharing a common transmission medium.”); Olshansky, [0024] (disclosing “controlling the exact timing of each key frame (I-frame) so as to stagger information-heavy key frames . . . thus keeping the instantaneous bit rate of the subsequently resultant combined data stream as even as possible.”). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Avoiding Coincidence Limitations will collectively be referred to as the “Avoiding Coincidence Prior Art.”

To the extent that any of the ’823 Patent Primary References is shown not to disclose the Avoiding Coincidence Limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Avoiding Coincidence Prior Art references.

A person of ordinary skill in the art would have recognized the benefit of delaying the transmission of I-frames as claimed by the Avoiding Coincidence Limitations. It was well understood to a POSA that if a network device attempted to transmit data onto a network at an instantaneous bit rate greater than the network's capacity, doing so would cause delay and potentially lost data. Larson, [0073]-[0074]; Cooper, 5:3-6; Olshansky, [0013]. That the transmission of I-frames causes data peaks, exacerbated in the case where multiple I-frames are transmitted simultaneously, was well known to a POSA at the time of the claimed invention. *See, e.g.*, Comer, [0023] ("[I]ntra-coded (I) pictures/frames . . . tend to be larger than inter-coded (P, B) pictures/frames."); Larson, [0004] ("transmission of I-frames occupy more bandwidth [than P frames] during transmission over the communications network."); Cooper, 5:2-3 (where multiple I-frames are transmitted simultaneously, there is a "spike" in "peak bit rates"); Olshansky, [0013] (absent staggering of I-frames, "the resulting video images . . . would be highly distorted, spatially and temporally—reflecting considerable loss of data"); Perlman, [0063] ("The I-frames introduce the longest transmission latencies since they are the largest. . . . Thus, when the average video data rate approaches the data rate capacity of the transmission channels . . . the high peak data rates from I-frames . . . result in a high frame latency."). A POSA would thus have found it desirable to avoid overwhelming the network and, instead, staggering the transmission of I-frames in the manner claimed by the Avoiding Coincidence Limitations.

A POSA would have had a reasonable expectation of success in implementing this functionality. The use of I and P-frames was industry standard; it was part of the ubiquitous MPEG standards, among others. Existing, off-the-shelf encoders implementing MPEG standards allowed users to decide when (or when not) to generate an I-frame for a particular video stream.

It would have thus been straightforward to configure a video encoder to avoid encoding or transmitting multiple I-frames simultaneously in a manner that would practice the Avoiding Coincidence Limitations. What's more, the Avoiding Coincidence Prior Art disclosed specific methods for implementing the techniques claimed by the Avoiding Coincidence Limitations.

c) Avoid Increasing Maximum Delay Limitations

Claim 1 of the '823 Patent recites:

> 1. A method of managing multiple data streams transported through a common communications resource in a packet network, wherein data flowing through said resource travels in both directions, and wherein each stream is subject to data peaks, comprising:
>
> establishing logical two-way connections through the common communications resource between one or more near endpoints and one or more far endpoints,
>
> determining an undelayed round trip delay for each said logical two-way connection,
>
> determining the maximum round trip delay among all said logical two-way connections,
>
> preparing each of said data streams for transmission over respective said logical connections from a said near endpoint to a said far endpoint,
>
> determining the location of said data peaks in said data streams,
>
> transmitting said data streams over said respective logical two-way connections to said one or more far endpoints, and
>
> delaying the transmission of one or more of said data streams that are transmitted over a said logical two-way connection having an undelayed round trip delay less than the maximum round trip delay by an amount dependent on the location of said peaks to reduce the degree of coincidence in the data peaks of different streams without increasing the maximum round trip delay for the logical two-way connections.

For ease of reference, the highlighted limitations will be referred to as the "Avoid Increasing Maximum Delay Limitations."

To the extent that any of the references identified above in Section VI.A.1 are shown not to disclose the Avoiding Increasing Maximum Delay Limitations, a POSA would have found it obvious to implement these references (*e.g.*, Larson, Comer, Cooper, or Olshansky) in a manner that practices the Avoid Increasing the Maximum Delay Limitations.

As an initial matter, the Avoid Increasing Maximum Delay Limitations would have been common sense to a POSA in the context of the Avoiding Coincidence Prior Art. It was understood to a POSA that any network has delay; among other things, it takes time for signals to travel between devices in a network. A POSA would have understood that to be especially true for video conferencing, which derives its utility in part from its ability to allow geographically distributed people to communicate. Each of the Avoiding Coincidence Prior Art references discloses delaying the transmission of I-frames to avoid coincidence of data peaks (that is, where two or more I-frames would otherwise have been transmitted at or around the same time). To a POSA, implementing the teachings of the Avoiding Coincidence Prior Art would raise a straightforward question: of the two or more I-frames that would otherwise coincide, which should be delayed? For a number of reasons, a common-sense approach would have been to delay the I-frame that is to be transmitted to the closer (*i.e.*, lower round-trip time) endpoint, but to not delay the I-frame that is to be transmitted to the farthest-away (*i.e.*, the maximum round-trip time) endpoint.

A POSA would have understood that the endpoint with the longest round-trip delay (that is, the longest latency) is a bottleneck when it comes to the video conference's performance. For example, it was well known that in applications where media is to be played out simultaneously on multiple devices (such as video conferencing), the longest-delay device was the bottleneck. *See, e.g.*, Patel ("the playout delay is set to accommodate the longest delay."); Ren, Abstract

("the peer delay in the mesh is . . . its longest delay . . . among all the trees"); Chen, at 1923 ("[T]he end-host plays back the video after the data from the longest path arrive[s]."); U.S. Pat. Pub. No. 2007/0271358 ("Effectively the longest latency of either stream becomes the system latency because the streams must be synchronized at the receiver."). If the maximum round-trip delay is large, the playout delay will also necessarily be large, compromising user experience. Thus, a POSA would have found it desirable to minimize the maximum round-trip delay.

In addition, it was well known that the user experience of a video conference depends significantly on latency; as latency increases, a user's perceived experience of the videoconference goes down. What's more, latency is especially distracting if it is above a certain threshold. Panwar, at 833 ("Voice communication requires that the end-to-end propagation delay be no more than about 300 ms for normal conversation.") Thus, a POSA would have recognized that it is critical to user experience to ensure that the highest latency device is as low latency as possible. For example, it was recognized that in the context of a video conference, it is better for two endpoints to each have a latency of 175 ms than for one device to have a latency of 25 ms and the other device to have a latency of 325 ms, even though the sum total of latencies is identical in both scenarios.

Even aside from the knowledge and common sense of a POSA, network scheduling algorithms that teach the avoiding Increasing Maximum Delay Limitations were disclosed in the prior art. *See, e.g.*, Chen, 1921-1922 (scheduling of a video to minimize delay); Duffield, 1 ("longest delay first (LDF)" scheduling algorithm that "serves the flow with current longest delay," which "reduces the variance of the delay distribution [and] has the benefit of reducing the playout buffer for voice and video sources."); Fan, 2:10-14 ("[P]ackets of those users having larger delay . . . are given higher priority."); Galand, 9:5-11 (disclosing one real-time

transmission queue for applications requiring "very low delay," and a separate real-time transmission queue for applications "that can support slightly more delay"); Naidu, 3:56-59 (disclosing a "delay compensator" for adjusting delay times "so that all of the associated delay times are substantially equalized"); Patel, at 167 ("The challenge is to dynamically adjust the buffering required to avoid frame drops while minimizing buffering latency."). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Avoid Increasing Maximum Delay Limitations will collectively be referred to as the "Avoid Increasing Maximum Delay Prior Art."

To the extent that any of the '823 Patent Primary References is shown not to disclose the the Avoid Increasing Maximum Delay Limitations, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Avoid Increasing Maximum Delay Prior Art references.

For the reasons explained above, implementing a transmission scheduling algorithm that practices the Avoid Increasing Maximum Delay Limitations would have been desirable to a POSA. And a POSA would have had a reasonable expectation of success in incorporating the teachings of the Avoid Increasing the Maximum Delay Prior Art because it was recognized that these transmission scheduling algorithms were general-purpose and could have been implemented in a variety of systems.

B. Invalidity Based on Section 112 (P.R. 3-3(d))

1. Indefiniteness[28]

Defendant provides the following grounds for invalidity under 35 U.S.C. § 112. Defendant's investigation of the Asserted Patents is ongoing, and Defendant reserves the right to amend or supplement these disclosures based on further investigation and in a manner consistent with the Federal Rules of Civil Procedure, the Local Patent Rules for the Eastern District of Texas, and the Docket Control Order, or otherwise in accordance with any order or direction of this Court or agreement of the parties. Further, Plaintiff's Infringement Contentions fail to provide sufficient detail to fully understand its proposed application of the Asserted Claims, and Defendant reserves the right to assert additional grounds for invalidity under 35 U.S.C. § 112 in response to Plaintiff's claim interpretations. Defendant also reserves the right to supplement, modify, or otherwise amend these grounds for invalidity under 35 U.S.C. § 112 based on the Court's claim construction rulings or opinions or the parties' positions or arguments taken in connection with the claim construction process.

Certain of the Asserted Claims are invalid for failing to comply with the definiteness requirement of § 112. Defendant notes that its charting of a prior art reference for a claim or limitation that Defendant contends is invalid for lack of definiteness in no way represents an admission or concession that the scope of the claim or limitation is definite or ascertainable. Section 112 paragraph 2 requires that a patent claim "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention." Claim terms that fail to

[28] Indefiniteness does not preclude invalidity findings in an IPR because, for example, while the outer bounds of a claim limitation may be uncertain, the prior art may nevertheless provide a disclosure within the uncertain outer bounds. "[I]t is not always impossible to adjudicate a prior-art challenge, one way or the other, just because some aspect of a claim renders the claim indefinite." *Intel Corp.*, 21 F.4th at 813.

inform those skilled in the art "with reasonable certainty . . . about the scope of the invention" fail the definiteness requirement of Section 112 paragraph 2. *Nautilus, Inc.,* 572 U.S. at 901.

Defendant provides below an identification of terms[29] in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as indefinite:

> a) "determining an undelayed round trip delay for each said logical two-way connection"
>
> b) "delaying the transmission of one or more said data streams that are transmitted over a said logical two-way connection having an undelayed round trip delay less than the maximum round trip delay by an amount dependent on the location of said peaks to reduce the degree of coincidence in the data peaks of different streams without increasing the maximum round trip delay for the logical two-way connections"
>
> c) "to remove any coincidence in said data peaks of different data streams"

2. Written Description and Enablement

The specifications of the Asserted Patents do not provide adequate written description to support the scope of the claims asserted by Plaintiff in furtherance of its infringement theories or any reasonably understood scope of the claims. 35 U.S.C. § 112[30] paragraph 1 requires that a patent specification contain "a written description of the invention." To fulfill the written description requirement, the specification "must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed." *Ariad Pharm.,* 598 F.3d at 1351

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[29] These terms may also be read in the broader context, *i.e.*, the terms with surrounding claim language, and the terms with that surrounding claim language is likewise indefinite.

[30] Because the Asserted Claims are alleged to have a priority date before March 16, 2013, Defendant applies pre-AIA 35 U.S.C. § 112.

(citation omitted). To satisfy the written description requirement, "the applicant must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate that by disclosure in the specification of the patent." *Carnegie Mellon Univ.*, 541 F.3d at 1122 (quoting *Vas-Cath Inc.*, 935 F.2d at 1563–64). The Asserted Patents do not meet that requirement for the terms below, which Defendant reserves the right to amend.

Additionally, the Asserted Patents do not enable the claim scope contained in Plaintiff's Infringement Contentions. Section 112 paragraph 1 requires a specification to describe "the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains … to make and use the [invention]." The enablement requirement is separate from and in addition to the written description requirement. *Ariad,* 598 F.3d at 1344. This "requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp.*, , 344 F.3d at 1244 (citation omitted); *see Wyeth & Cordis Corp.*, 720 F.3d at 1385–86. The Asserted Patents do not meet that requirement for the list of terms below, which Defendant reserves the right to amend.

Defendant provides below an identification of terms in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as not enabled or lacking sufficient written description:

> a) " wherein the transmission of said data streams is delayed so as to remove any coincidence in said data peaks of different data streams"

b) "delaying the transmission of one or more of said data streams that are transmitted over a said logical two-way connection having an undelayed round trip delay less than the maximum round trip delay by an amount dependent on the location of said peaks to reduce the degree of coincidence in the data peaks of different streams without increasing the maximum round trip delay for the logical two-way connections."

VII. INVALIDITY OF THE '426 PATENT

A. Invalidity Based on the Prior Art

As shown below, the alleged inventions of the Asserted Patents were well-known in the prior art. Those skilled in the art were aware of all of the limitations claimed in the Asserted Patents. Thus, many prior art patents, publications, and combinations thereof, disclose, teach, or embody every limitation of the Asserted Claims and thus validate those claims. Examples of these disclosures, teachings, and embodiments are identified in the following sections and in the attached claim charts.

1. Identification of Prior Art References (P.R. 3-3(a))

Subject to the reservation of rights above, Defendant identifies each item of prior art that anticipates and/or renders obvious one or more of the Asserted Claims of the Asserted Patents. The patents/applications, publications, and systems identified are also relevant for their showing of the state of the art and reasons and motivations for making improvements, additions, and combinations.

Some of the below citations and those in the corresponding invalidity claim charts involve prior art references that have corresponding related, foreign, and/or PCT counterpart publications. In such cases, where either the U.S. patent or related, foreign, and/or PCT counterpart is cited, it is to be understood that the corresponding disclosures from the counterpart patent and publications (which are substantively the same) are implicitly incorporated by reference in the alternative to avoid needless repetition.

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
E-01	U.S. Patent No. 5,809,176 ("Yajima") (CISCO_00080627 - CISCO_00080670)	Oct. 18, 1995	Sept. 15, 1998
E-02	U.S. Pat. No. 6,304,295 B1 ("Krishnamurthy") (CISCO_00090879 - CISCO_00090885)	Jan. 8, 1999	Oct. 16, 2001
E-03	U.S. Pat. Pub. No. 2003/0023982 ("Lee") (CISCO_00090982 - CISCO_00091017)	May 17, 2002	Jan. 30, 2003
E-04	U.S. Pat. Pub. No. 2004/0151244 ("Kim") (CISCO_00090860 - CISCO_00090878)	Sept. 8, 2003	Aug. 5, 2004
E-05	U.S. Pat. Pub. No. 2004/0218673 (Wang '673) (CISCO_00090958 - CISCO_00090977)	Feb. 23, 2004	Nov. 4, 2004
E-06	U.S. Pat. Pub. No. 2005/0207497 ("Rovati") (CISCO_00090822 - CISCO_00090834)	Mar. 18, 2005	Sept. 22, 2005
E-07	U.S. Pat. Pub. No. 2005/0243922 A1 ("Magee") (CISCO_00090886 - CISCO_00090904)	Apr. 18, 2005	Nov. 3, 2005
E-08	U.S. Pat. Pub. No. 2006/0072831 ("Pallister") (CISCO_00091106 - CISCO_00091113)	Sept. 27, 2004	Apr. 6, 2006
E-09	U.S. Pat. Pub. No. 2006/0239343 ("Mohsenian") (CISCO_00080772 - CISCO_00080782)	Apr. 22, 2005	Oct. 26, 2006
E-10	U.S. Pat. Pub. No. 2007/0133674 A1 ("Garnier") (CISCO_00090851 - CISCO_00090859)	Dec. 8, 2006	June 14, 2007
E-11	U.S. Pat. Pub. No. 2008/0055463 ("Lerner") (CISCO_00090905 - CISCO_00090918)	July 3, 2006	Mar. 6, 2008
E-12	U.S. Pat. Pub. No. 2008/0151997 ("Oguz") (CISCO_00091080 - CISCO_00091105)	Dec. 20, 2007	June 26, 2008
E-13	U.S. Pat. Pub. No. 2008/0152014 ("Schreier") (CISCO_00080739 - CISCO_00080760)	Dec. 14, 2007	June 26, 2008
E-14	U.S. Pat. Pub. No. 2008/0253461 ("Lin '461") (CISCO_00090835 - CISCO_00090850)	Apr. 13, 2007	Oct. 16, 2008
E-15	U.S. Pat. Pub. No. 2009/0118017 ("Perlman") (CISCO_00090744 - CISCO_00090821)	Dec. 5, 2007	May 7, 2009
E-16	E.P. Pub. No. 1 227 684 ("Bourne") (CISCO_00080822 - CISCO_00080828)	Jan. 16, 2002	July 31, 2002
E-17	WO Pub. No. 00/64167 ("Prakash") (CISCO_00091018 - CISCO_00091079)	Apr. 17, 2000	Oct. 26, 2000
E-18	WO Pub. No. 03/094530 ("Wang '530")	Apr. 28, 2003	Nov. 13, 2003

Ex.	Patent No./Patent Pub. No.	Filing Date	Date of Issue/Publication
	(CISCO_00090919 0 CISCO_00090957)		

Table E-1: Prior Art Patents and Patent Publications for the ’426 Patent

Ex.	Title	Author(s)	Publisher	Date of Publication
E-19	On the Error Resilience of Rate Smoothing Using Explicit Slice-Based Mode Selection (“Lin”) (CISCO_00091114 - CISCO_00091117)	Y. Lin, A. N. Kim, E. Gürses, A. Perkis	IEEE International Conference on Multimedia and Expo, pp. 2134-37	2007
E-20	Low-Latency Methods for Wireless Video Transmission (“Tredici”) (CISCO_00090978 - CISCO_00090981)	A.D. Del Tredici, J. Rosiene, T. Q. Nguyen	IEEE International Conference on Acoustics, Speech, and Signal Processing	2005

Table E-2: Prior Art Non-Patent Publications for the ’426 Patent

2. Anticipation and Obviousness (P.R. 3-3(b) and (c))

The Asserted Claims of the ’426 Patent are invalid because they are anticipated by the prior art, and also because they would have been obvious in view of the prior art.

The prior art identified by Defendant anticipates one or more of the Asserted Claims of the ’426 Patent under at least 35 U.S.C. §§ 102(a), (b), (e), or (g). For each prior art reference, Defendant has provided claim charts attached to these Invalidity Contentions as Exhibits E-1 through E-20. These charts identify where each element of each Asserted Claim can be found in each item of prior art.

In addition, the Asserted Claims of the ’426 Patent are invalid as obvious under 35 U.S.C. § 103. Each prior art reference identified in the preceding sections—either alone or in combination with another prior art reference and/or in combination with the knowledge of one

skilled in the art—renders the Asserted Claims invalid as obvious. In rendering the Asserted Claims obvious, each prior-art reference identified in the preceding sections may be combined with: (1) information known to persons skilled in the art at the time of the alleged invention, (2) any of the other anticipatory or obviousness prior-art references, (3) any statements in the intrinsic record of the '426 Patent and related applications, or (4) any of the additional prior art identified below.

3. Motivations to Combine

A POSA would have been motivated to combine the preceding references (*see* Section VII.A.1.) for the following reasons. Teachings, suggestions, motivations and/or reasons to modify any of the references and/or to combine any two or more of the references can come from many sources, including the prior art (by specific reference and when read as a whole), common knowledge, common sense, predictability, expectations, industry trends, design incentives or need, market demand or pressure, market forces, obviousness to try, the nature of the problem faced, and/or knowledge possessed by a person of ordinary skill.

Although a patent claim may be invalidated based on a TSM rationale—*i.e.*, that some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention—the Supreme Court identified additional rationales in *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). The following of these rationales apply here:

> (A) the asserted claims combine prior-art elements according to known methods to yield predictable results;
>
> (B) the asserted claims involve the simple substitution of one known element for another to obtain predictable results;
>
> (C) the asserted claims involve the use of a known technique to improve similar devices (methods, or products) in the same way;

> (D) the asserted claims apply a known technique to a known device (method, or product) ready for improvement to yield predictable results;
>
> (E) the asserted claims involve combinations of prior-art references that would have been "obvious to try"'—a person of ordinary skill in the art could have reached the asserted claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
>
> (F) the asserted claims are simply variations of work from one field of endeavor or a different one that would have been prompted based on design incentives or other market forces because the variations were predictable to one of ordinary skill in the art.

See KSR, 550 U.S. at 414-18 (rejecting the Federal Circuit's "rigid" application of the teaching, suggestion, or motivation to combine test, and instead espousing an "expansive and flexible" approach); *see also* Department of Commerce, Patent and Trademark Office, Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57,526 (Oct. 10, 2007). Indeed, the Supreme Court held that a person of ordinary skill in the art is "a person of ordinary creativity, not an automaton" and "in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420-21.

Thus, even in the absence of a specific teaching, suggestion, or motivation to combine references, the Asserted Claims here are obvious and therefore invalid. Each of the cited references or devices is in the same field as the '426 Patent, making it obvious for someone of ordinary skill in the art to identify and combine elements from these references and devices. One of ordinary skill in the art would have recognized that improvements could be achieved by combining or modifying prior-art references that described such improvements. Each of the above prior-art references describes systems, products, or methods that were known to offer such

improvements, and, accordingly, one of ordinary skill in the art would have been motivated to combine or modify the references as identified in each of the combinations below.

Furthermore, because each prior art reference concerns methods of video encoding for videoconferencing or video transmissions, common industry knowledge supplied a reason to combine any one the above references. It was well understood that common video encoders, for example, could be used interchangeably to encode video signals. Each combination would have produced predictable results and would simply represent a known alternative to one of ordinary skill in the art of videoconferencing software. This is a further motivation to combine any of the above references.

The below sections further address particular reasons to combine the above references. The below should not be construed as an admission that there is any value to the alleged invention of the ’426 Patent. As discussed previously, these contentions are based in significant part on how Plaintiff is apparently construing the asserted claim in its Infringement Contentions, which is an incorrect and overbroad interpretation of the alleged invention of the ’426 Patent. Accordingly, to the extent the below refers to benefits of certain elements or industry trends towards these elements, this is not an admission that the alleged invention of the ’426 Patent provides any benefits – to the contrary, properly construed and compared to the prior art, the ’426 Patent provides no benefits. Likewise, to the extent the below refers to substituting elements, this is not an admission that the elements subject to the substitution are in any way similar, *e.g.*, perform the same function, in the same way, to achieve the same result.

The various elements of the Asserted Claims were well known in the prior art at the time of the alleged invention, and the combination would have been obvious to one of skill in the art. The combinations simply (a) combine prior-art elements according to known methods to yield

predictable results; (b) involve the simple substitution of one known element for another to obtain predictable results; (c) involve the use of a known technique to improve similar devices (methods, or products) in the same way; (d) apply a known technique to a known device (method, or product) ready for improvement to yield predictable results; (e) involve combinations of prior-art references that would have been "obvious to try" – a person of ordinary skill in the art could have reached the Asserted Claims by choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and/or (f) would have been prompted by known work, based on design incentives or other market forces, because such variations were predictable to one of ordinary skill in the art.

Moreover, the Supreme Court has stated that a motivation to combine may be simply "common sense" and that "familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle." *KSR*, 550 U.S. at 420. Indeed, the Supreme Court held that it is sufficient that a combination of elements was "obvious to try," holding that, "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp." *Id.* at 421. Here, all the claim elements are common sense and are easily fit together by one of ordinary skill in the art.

While not necessary, a motivation to combine may also be found in the references themselves. One of skill in the art would have been motivated to combine a reference that refers to, or otherwise explicitly invites combination with, another reference. Where the references cited herein have such an explicit invitation to combine, that invitation would have motivated one of skill in the art to combine any such references.

Cisco hereby identifies the following ’426 Patent Primary References: Lerner, Perlman, Rovati, Schreier, Wang ’673.

The below provides several exemplary combinations and motivations for combining a ’426 Patent Primary Reference with another reference.

a) Real-time Video Encoding Limitation

Claim 1 of the ’426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;
>
> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;
>
> wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the "Real-time Video Encoding Limitation."[31]

The '426 Patent admits that real time encoding of a video signal associated with a videoconferencing or telepresence session was well known. '426 Patent, 1:36-39, 64-67; 2:16-18. This method is based on known videoconferencing technology and video encoding techniques. *Id*. 1:39-67, 2:33-53. Numerous patents, patent publications, and other publications described methods for real-time encoding a video signal associated with a videoconferencing or telepresence session. *See, e.g.*, Lerner, Perlman, Lee, Krishnamurthy. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for the Real-time Video Encoding Limitation will collectively be referred to as the "Real-time Video Encoding Prior Art."[32]

To the extent that any of the '426 Patent Primary References is shown not to disclose the Real-time Video Encoding Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Real-time Video Encoding Prior Art references.

A person of ordinary skill would have recognized the benefit of applying video encoding and network architecture teachings to Real-time Video Encoding Prior Art. Those of ordinary skill in the art had long recognized the benefit of encoding in real-time a video signal that is associated with a videoconference or telepresence session. *See, e.g.*, Perlman [0163]; Lee [0004]. And as the Real-time Video Encoding Prior Art demonstrates, video compression and

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[31] Although for present purposes claim 1's preamble is characterized as a "limitation," Defendant take no position here as to whether the preamble of claim 1 (or any other claim) is limiting.

[32] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

encoding technologies are building blocks for real-time encoding of video teleconferencing or telepresence. Thus, any reference that teaches video encoding naturally would have been understood to be applicable to methods of encoding video signals associated with teleconferencing or telepresence. Put another way, the Real-time Video Encoding Prior Art demonstrates the practical and beneficial use of video encoders, video compression standards, and video encoding technologies to teleconference systems, and thus those of ordinary skill in the art would have been motivated to consider these video encoding teachings for use in a method of encoding video signals associated with teleconferencing or telepresence.

Second, a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of the Real-time Video Encoding Prior Art with other teachings. For example, it would have been well appreciated by a person of ordinary skill in the art that videoconference data could be encoded using a variety of formats such as MPEG-2, MPEG-4, H.263, H.263+, and H.264. *See, e.g.*, Perlman [0156]; Rovati [0025]. Such teachings are applicable to methods of encoding video signals associated with teleconferencing and telepresence. Thus, a POSA would have been motivated and had a reasonable expectation of success in designing a method of encoding in real time a video signal that is associated with a videoconference or telepresence session.

b) Video Stream Capture Limitation

Claim 1 of the ’426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;

> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;
>
> wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the "Video Stream Capture Limitation."

At the time of the claimed invention, techniques for capturing a video stream in the manner claimed by the Video Stream Capture Limitation were well known to a person of ordinary skill in the art. Indeed, the '426 Patent admits that capturing a stream of video data was well known. '426 Patent, 1:46-48. Additionally, numerous prior art patents, patent publications, and other publications describe capturing a stream of video data as claim 1 purports to claim. *See, e.g.*, Lee; Lerner; Lin '461, Lin, Oguz, Rovati, Schreier, Tredici. The prior art cited in this paragraph and the prior art for which the corresponding charts cite express teachings for capturing a stream of video data comprising a series of sequential frames will be referred to collectively as the "Video Stream Capture Prior Art."

To the extent that any of the ’426 Patent Primary References is shown not to disclose the Video Stream Capture Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Video Stream Capture Prior Art references.

First, a POSA would have recognized the benefit of capturing a stream of video data comprising a series of sequential video frames. As a preliminary matter, it was well understood that a “series of consecutive frames is required to make a video image.” Schreier [0003]. And a POSA would have understood that having consecutive frames allows for compression algorithms that utilize temporal and spatial redundancies between the sequence of frames that comprise a video, which in turn allows for redundant temporal and spatial information to be removed thereby reducing the amount of data required for each frame. *See, e.g.*, Perlman [0062]; Prakash 3:9-13.

Second, a person of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of the Video Stream Capture Prior Art with other teachings because prior art compression algorithms such as MPEG-2 and H.264 allow for inter-coding, which can use the spatial and temporal redundancies between sequential frames to determine what has changed in the image from the I-frame to the prior and successive frames. *See, e.g.*, Perlman [0062]; Schreier [0003]. For videos that have less motion and less changes to the image, encoding sequential frames with I-frames and P-frames has been shown to reduce the amount of data for the sequence of frames and reduce the frame latency when the frames are transmitted. *See, e.g.*, Perlman [0064]. Thus, a person of ordinary skill in the art would have been motivated and have had a reasonable expectation of success in capturing a stream of video data comprising a series of sequential frames as claimed.

c) Separating Frames Limitation

Claim 1 of the ’426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;
>
> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;
>
> wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the “Separating Frames Limitation.”

At the time of the claimed invention, separating frames into a plurality of frame segments as claimed by the Separating Frames Limitation was well known to a POSA. The concept of breaking down a frame into smaller segments representing a part of the frame was well known in

the art. *E.g.*, Wang [0003]; Lin [0002], Figure 1. Indeed, the H.264 standard taught how to subdivide frames into slices. *H.264 : Advanced video coding for generic audiovisual services* (May 29, 2008), *available at* https://www.itu.int/rec/T-REC-H.264-200711-S/en [hereinafter "H.264 Standard"], at 23-24. Thus, it was known to separate the video frames into segments of data required to display a single picture or graphic. Schreier [0003]. The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Separating Frames Limitation will collectively be referred to as the "Separating Frames Prior Art."

Thus, to the extent that any of the '426 Patent Primary References is shown not to disclose the Separating Frames Limitation, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Separating Frames Prior Art references.

First, the Separating Frames Prior Art teaches that "[v]ideo compression is a process where, instead of transmitting a full set of data for each picture element or pixel on a display for each frame, a greatly reduced amount of data can be coded, transmitted, and decoded to achieve the same picture quality." Rovati [0003]. A person of ordinary skill in the art would have appreciated the benefits of video compression because it "allows digital motion video to be represented efficiently and cheaply," which is desirable for "video-intensive modes of communications [where] limited bandwidth of current transmission modes (*e.g.*, broadcast, cable, telephone lines, etc.) become prohibitive." Prakash 1:15-29. This is especially true for videoconferencing. *Id.* 1:17-19. Furthermore, a person of ordinary skill would have recognized the benefits of dividing up a video frame into smaller segments, such as tiles, because these smaller segments can be encoded as I-frame and P-frame segments to reduce the amount of data that will eventually need to be decoded when displaying an image. *See, e.g.*, Perlman [0169].

And a POSA would have appreciated that encoding the segments of a frame does not require more processing power than encoding the frame. *See, e.g.*, *id.* [0170]. Accordingly, a POSA would have been motivated by the Separating Frames Prior Art to separate frames into smaller segments to leverage existing encoding techniques, reduce the size of a video signal, and better utilize the limited bandwidth of various video transmitting mediums.

Second, a person of ordinary skill in the art would have had a reasonable expectation of success in combining the Separating Frames Prior Art with other teachings because existing video coding standards exploited frames of video data to compress and transmit video data for real-time video streaming over a network. *See, e.g.*, Wang '673 [0002]-[0003], [0013]. Furthermore, the process of segmenting frames into component parts was well known to those of skill in the art. *See, e.g.*, Perlman [0169]-[0170]; Prakash 14:1-25 ("Those skilled in the art of computer vision will be aware that segmentation can be done a plurality of ways. . . . This and other segment techniques usable with the invention are known to those skilled in the art, and need not be described in detail here."). Thus, a person of ordinary skill in the art would have been motivated to and have had a reasonable expectation of success in separating the video frames into a plurality of frame segments as claimed.

d) Independent and Parallel Encoding Limitation

Claim 1 of the '426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;

> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;
>
> wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the "Independent and Parallel Encoding Limitation."

As an initial matter, the Parallel Encoding Limitation is indefinite. *See* Section VII.B.1.a) and VII.B.1.b), below. The phrase "independently and in parallel" is unclear because a POSA would not understand how encoding each frame segment can occur both independently and in parallel when reading the Asserted Claims in light of the specification. Likewise, the phrase "parallel encoded data streams" is also unclear because the specification is not clear enough to teach a POSA as to what the parallel encoded data streams are. For example, do independently encoded data streams constitute parallel encoded data streams? The issue with these two indefinite terms is further reflected in Plaintiff's extremely vague infringement contentions which provide no guidance as to Plaintiff's understanding of the term. For example, Plaintiff's

infringement contentions merely parrot the claim language and do not identify what aspect of the Accused Products practices this limitation. Infringement Contentions at 17-18 ("Cisco encodes each of these frame segments (*e.g.*, frame slices) independently and in parallel, such that it generates a parallel-encoded data stream for each frame segment.").

Regardless, at the time of the claimed invention, encoding frame segments independently and in parallel to generate parallel encoded data streams as claimed was well known to a POSA. First, the concept of encoding frame segments independently and in parallel was well known in the art. *E.g.*, Lin '461 [0022]; Perlman [0212]-[0213], Figure 12; Rovati [0012]; Schreier [0019]-[0033]. Second, the concept of generating a parallel encoded data stream to represent a plurality of frame segments was also well known in the art. *E.g.*, Perlman [0213]; Rovati [0012]; Schreier [0038]. Indeed, the H.264 standard taught the concept of "I slices" and "P slices." H.264 Standard, at 8 ("I slice"), 10 ("P slice"), 11 ("SI slice"). A POSA understood that because each of these slices is independent of the other slices, it would be desirable to encode and decode them in parallel. The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Independent and Parallel Encoding Limitation will collectively be referred to as the "Independent and Parallel Encoding Prior Art."

Thus, to the extent that any of the '426 Patent Primary References is shown not to disclose the Independent and Parallel Encoding Limitation, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Independent and Parallel Encoding Prior Art references.

First, the Independent and Parallel Encoding Prior Art showcase the advantages of encoding a data stream of frame segments independently and in parallel as claimed. For example, individually encoding slices of a video frame allows for slices of different image

resolutions based on the slice's location in the frame, in turn enabling the transmission of high-quality video in low-latency. *See, e.g.*, Lerner [0004]. Additionally, encoding slices of a video frame in parallel speeds up the process of encoding by leveraging improvements in hardware and software. *See, e.g.*, Perlman [0212], Mohsenian [0005]-[0006]. Utilizing both independent and parallel encoding would overcome issues such as high latency video playback that occurs when frames are encoded, transmitted, decoded, and displayed one frame at a time. *See, e.g.*, Pallister [0001]. Accordingly, a person of ordinary skill in the art would have been motivated to combine methods for encoding data streams independently and in parallel as claimed.

Second, a person of ordinary skill in the art would have had a reasonable expectation of success in combining the Independent and Parallel Encoding Prior Art with other teachings because "parallelization is of high importance in architectures used for video encoding and decoding" and that a "variety of parallelism methods are available in the art." Schreier [0019]. Indeed, the Independent and Parallel Encoding Prior Art describes a method of encoding data streams independently and in parallel to reduce the memory requirements for encoding a frame, increase throughput, support real-time streaming, and enable high picture quality. *See, e.g.*, Mohsenian [0035]-[0040] (applicable to video data encoded with a wide variety of standards); Schreier [0032] (applicable to various levels of parallel encoding). Additionally, a person of ordinary skill would know that an encoded data stream using a combination of I-frames and P-frames will require fewer bits and achieve the same quality resolution, and that encoding data streams in parallel would allow for this compression to occur at scale with greater numbers of data streams. *See, e.g.*, Wang '673 [0005]. Thus, a person of ordinary skill in the art would have been motivated to and have had a reasonable expectation of success in encoding each frame segment independently and in parallel to generate parallel encoded data streams as claimed.

e) Data Stream Limitation

Claim 1 of the ’426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;
>
> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;
>
> wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the “Data Stream Limitation.”

As a preliminary matter, the Data Stream Limitation is indefinite. *See* Section VII.B.1.c), below. The phrase “frame segment instances” is never used in the ’426 Patent’s specification. Therefore, a person of skill in the art would not be able to delineate what exactly constitutes

frame segment instances when reading the Asserted Claims in light of the specification. This lack of reasonable certainty regarding the scope of the "frame segment instances" term is apparent in Plaintiff's infringement contentions which appear to equate frame segment instances with frame segment. Second Am. Infringement Contentions at 23 ("For example, Cisco's source code and other Cisco documentation confirm that Cisco's virtual collaboration products (such as Webex, Jabber, TelePresence systems, and Unified Communications Manager) operate such that Cisco encodes a data stream for each particular segment (e.g. slice) of a frame, such that each stream contains a sequence of instances of that segment. And each data stream contains some instances of the segment that are encoded as I-frames (*e.g.*, I-slices), and some instances that are encoded as P-frames (*e.g.*, P-slices)."). For purposes of the present discussion only, Defendant will assume that the Data Stream Limitation's use of frame segment instances is synonymous with frame segment, which is what Plaintiff apparently assumes in its infringement contentions.

At the time of the claimed invention, an I-frame segment could carry complete information about a particular frame and a P-frame segment could carry partial information representing what has changed relative to a previous frame segment as claimed by the Data Stream Limitation. This was well known to a POSA. As discussed previously in Section IV.A.3.i), the concept of I-frames and P-frames was well known in the art. I-frames are "intra-coded" frames; they can be decoded without reference to any other frames. *See, e.g.*, Prakash 3:20-23; Wang '673 [0003]. P-frames are "inter-coded" or "predicted" frames; they depend only on the previous I- or P-frame. *E.g.*, Prakash 3:25-30; Wang '673 [0004]. It was known in the art that intra-coding or inter-coding could not only be applied to frames, but also to segments of frames such as a slice. *See, e.g.*, Lerner [0039]-[0040]. Indeed, the H.264 standard taught the concept of "I slices" and "P slices." H.264 Standard, at 8 ("I slice"), 10 ("P slice"), 11 ("SI

slice"). The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Data Stream Limitation will collectively be referred to as the "Data Stream Prior Art."

Thus, to the extent that any of the '426 Patent Primary References is shown not to disclose the Data Stream Limitation, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Data Stream Prior Art references.

First, the Data Stream Prior Art teaches the benefits of having an encoded data stream of frame segments consist of I-frame segments and P-frame segments, namely, to reduce the amount of data that needs to be compressed while achieving the low latency required for real-time video applications. *See, e.g.*, Tredici at 276. A person of ordinary skill in the art would have been motivated to have an encoding method where each encoded data stream consists of I-frame and P-frame segments because having only I-frames would increase the latency of the video stream and require additional data buffering at the decoder. *Id.* at 274. Indeed, the Data Stream Prior Art describes the weaknesses of I-frames as requiring significantly more bit rates to code than P-frames, which introduces more fluctuation into network traffic. *See, e.g.*, Lin at 2134. Thus, a person of ordinary skill in the art would have been motivated to have an encoded data stream of frame segments that consists of more than just I-frame segments, especially for real time streaming of video communications like videoconferencing.

Second, a person of ordinary skill in the art would have had a reasonable expectation of success in having an encoded data stream contain both I-frame and P-frame segments because P-frames take advantage of temporal redundancies that would reduce the number of bits to be encoded while maintaining visual quality. *See, e.g.*, Lin at 2134; Tredici at 274. Furthermore, the Data Stream Prior Art recognizes the benefits of having both I-frame and P-frame segments

because many prior art video encoding standards could encode I-frame and P-frames to exploit different types of redundancy in a sequence of images to compress video data. *See, e.g.*, Wang '673 [0003] ("In existing video coding standards, such as H.261, H.262, H.263, H.264 and MPEG-4, three main types of pictures are defined: Intra frames (I-frames), Predictive frames (P-frames) and Bidirectional Frames (B-frames). Each picture type exploits a different type of redundancy in a sequence of images."); Krishnamurthy 1:15-20 (Many standards have evolved for video compression, such as H.261, H.263, H.263+, and the MPEG-1, 2, and 4 standards. These standards use motion compensation and predictive coding where some frames are predicted from reference frames in order to achieve coding efficiency."). Accordingly, a person of ordinary skill would have been motivated to create encoded data streams consisting of I-frame and P-frame segments as claimed.

f) Frame Segment Limitation

Claim 1 of the '426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;
>
> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is

an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;

transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;

wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the "Frame Segment Limitation."

At the time of the claimed invention, it was well known to a POSA that when encoding a data stream of frame segments of a frame, if one frame segment is encoded as an I-frame segment, then at least one other frame segment is encoded as a P-frame segment. It was also well known to a POSA that by encoding data streams of a frame in parallel so each encoded data stream has an I-frame segment and at least one P-frame segment, if a P-frame segment is present in one encoded data stream then a P-frame segment would be present in at least one other encoded data stream.

First, it was well understood that encoding frames of a video would entail encoding those frames as I-frames or P-frames. Indeed, the '426 Patent background section admits that "for real-time video communication only Intra (I-frames) and Predictive (P-frames) are considered" and that "[t]ypically, I-frames are interspersed with P-frames in a compressed video." '426 Patent at 2:57-59. Additionally, several prior art references disclosed that frames of a video could be encoded as I-frames or P-frames. *See, e.g.*, Rovati [0045], [0055]-[0056], Figures 5, 7; Perlman [0062], Figures 7a-7b, 10a; Schrier [0062], [0067], Figures 5, 8.

Second, it was also well understood that encoding a data stream of segments of frames would entail encoding those segments as I-frame segments and/or P-frame segments. For example, numerous prior art references disclose encoding frame segments of a frame as I-frame and/or P-frame segments. *See, e.g.*, Lerner [0039]-[0040] (depicting slices of a frame as consisting of one I slice and fifteen P slices), Figure 2 (showing reference frames (I) and non-reference frames (P); Magee [0059]-[0060] (describing encoders that can produce a bitstream representing a series of pictures of slices), Figure 3 (encoder frame sequence consisting of I, P, and B-frames).

What's more, techniques that are staggered the encoding of I slices were generally known to a POSA. For example, the Joint Video Team ("JVT") standard document JVT-C074 disclosed such a method. *Gradual Decoder Refresh Using Isolated Regions*, International Technical Union (May 2002), *available at* https://www.itu.int/wftp3/av-arch/jvt-site/2002_05_Fairfax/JVT-C074.doc [hereinafter "JVT-C074"]. JVT-C074 disclosed techniques by which successive subsets of a frame could be intra-coded (that is, coded as I frame segments). JVT-C074, at 3-7. JVT-C074 and that it's disclosed techniques "provide smoother bit rate compared to instantaneous bit decoder refresh," that is, as compared to a technique in which an entire frame is intra-coded. *Id.* at 2. The disclosure of JVT-C074, which was issued by a standards body well known to a POSA, illustrates that the Frame Segment Limitation was known to a POSA.

Thus, it was well known and obvious to encode parallel data streams of segments of a frame such that each stream would have an I-frame segment and at least one P-frame segment whereby an I-frame segment would be present in one encoded data stream and a P-frame would be present in at least one other encoded data stream. Indeed, numerous prior art references

disclose the Frame Segment Limitation. *See, e.g.*, Lerner [0039], Figure 2; Magee [0051], [0059]-[0060], [0064], Figure 3; Rovati [0011]-[0013], [0045], Fig. 5; Schreier [0012], [0061], [0066]. The prior art cited previously in this section and the prior art for which the corresponding chart cites express teachings for the Frame Segment Limitation will collectively be referred to as the "Frame Segment Prior Art."

Thus, to the extent that any of the '426 Patent Primary References is shown not to disclose the Frame Segment Limitation, a person of ordinary skill in the art would have been motivated to combine that reference with any one of the Frame Segment Prior Art references.

First, the Frame Segment Prior Art—as well as the Data Stream Prior Art discussed above in Section VII.A.3.e)—teaches the benefits of having an encoded data stream of I-frame and P-frame segments to reduce the amount of data that needs to be compressed while achieving the low latency required for real-time video applications. *See, e.g.*, Perlman [0157] ("P frames 612-613 generally are significantly smaller in size than I frames 611 because they take advantage of the data in the previous I frame or P frame; that is they contain data indicating the changes between the previous I frame or P frame."). Relatedly, the prior art also discloses that staggering the transmission of I-frame segment instances (as claimed in the Frame Segment Limitation) is advantageous because it smooths out the transmitted bit rate and reduces or eliminates bandwidth peaks. *See, e.g.*, Perlman [0157]; Lerner [0039]. The Frame Segment Prior Art also teaches that having parallel encoded data streams of frame segments allows the encoding method to scale as computational power and the complexity and size of video data increases. *See, e.g.*, Mohsenian [0005]-[0006]; Magee [0003]-[0008], [0021]. In light of these teachings, a POSA would have been motivated to combine the Frame Segment Prior Art with other teachings to encode data

streams of a frame in parallel so each encoded data stream has I-frame and P-frame segments in the encoded data streams as claimed.

Second, a POSA would have had a reasonable expectation of success in combining the Frame Segment Prior art with other teachings. For example, it would have been well appreciated by a POSA that by having an encoded data stream of varying numbers of I-frame and P-frame segments, it is possible to vary the resolution and amount of data transmitted with each encoded data stream. *See, e.g.*, Lerner [00038]. And that it would be advantageous to encode data streams of varying distributions of I-frame and P-frame segments in parallel to allow for faster, more efficient encoding as the complexity and amount of video data scales. *See, e.g.*, Schreier [0019]. Additionally, a POSA would reasonably have expected that the computational burden of using I-frame and P-frame segments would not exceed that of using full sized I-frames and P-frames because the frame contains the same number of pixels whether it is a whole or segmented frame. *See, e.g.*, Perlman [0170]. Accordingly, a POSA would have been motivated to segment the frames as claimed with a reasonable expectation of success.

g) Transmitting Limitation

Claim 1 of the ’426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;
>
> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a

> particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;
>
> wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the "Transmitting Limitation."

As a preliminary matter, the Transmitting Limitation is indefinite. *See* Sections VII.B.1.d), VII.B.1.e), and VII.B.1.f), below. First, the term "transmitting the parallel encoded data streams independently" is unclear. For example, a person of skill in the art would not understand the scope of the Asserted Claims when read in light of the specification because the specification never describes or discusses how transmitting parallel encoded data streams over a network to a receiver occurs *independently*. Indeed, Plaintiff's infringement contentions do not even attempt to explain how Cisco's allegedly infringing products transmit parallel encoded data stream *independently*. *See* Infringement Contentions at 31-32. Second, the terms "a network" and "a receiver" appear to play a discernable role in defining the scope of the Asserted Claims, but it is unclear what constitutes "a network" and "a receiver" when the Asserted Claims are read in light of the specification. Regarding "a network," the '426 Patent's specification mentions several examples of networks—such as a semaphore networks, analog network, digital telephony

transmission network, local area network, the internet, communications network—but fails to teach a POSA what "a network" covers as claimed. Regarding "a receiver," the phrase is never used in the '426 Patent's specification.

What's more, techniques that are staggered the encoding of I slices were generally known to a POSA. For example, the Joint Video Team ("JVT") standard document JVT-C074 disclosed such a method. JVT-C074 disclosed techniques by which successive subsets of a frame could be intra-coded (that is, coded as I frame segments). JVT-C074, at 3-7. JVT-C074 and that it's disclosed techniques "provide smoother bit rate compared to instantaneous bit decoder refresh," that is, as compared to a technique in which an entire frame is intra-coded. *Id.* at 2. The disclosure of JVT-C074, which was issued by a standards body well known to a POSA, illustrates that the Transmitting Limitation was known to a POSA.

In any event, at the time of the claimed invention, methods for transmitting parallel encoded data streams independently over a network to a receiver that can decode and recombine data to reproduce an image in the manner claimed by the Transmitting Limitation were well known to a POSA. Numerous patents, patent publications, other publications, and systems taught the Transmitting Limitation. *See, e.g.*, Lee [0010], [0048], [0079]-[0080], [0092], [0098]; Lerner [0005], [0039], Figure 2, Claims 2, 6; Lin '461; Oguz; Pallister; Perlman [0212]-[0214]; Rovati [0003], [0024], [0038]; Wang '530 7:4-5, 12-13, Claim 26; Yajima 2:15-17, 21:44-49, Figure 1B. The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Transmitting Limitation will collectively be referred to as the "Transmitting Prior Art."[33]

[33] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

To the extent that any of the ’426 Patent Primary References is shown not to disclose the Transmitting Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Transmitting Prior Art references.

A person of ordinary skill would have recognized the benefit to transmitting data as claimed. Those of skill in the art had long recognized the benefit of transmitting encoded video data over a network to a receiver to be decoded, combined, and displayed. *See, e.g.*, Wang ’673 [0013]; Yajima at Abstract, 12:1-15. Encoding, transmitting, decoding, merging, and displaying videoconference data were conventional, or at the very least obvious, steps in a method for transmitting encoded video data that is associated with a video conference or telepresence session.

First, the Transmitting Prior Art teaches that benefits of transmitting parallel encoded data streams independently over a network to a receiver. For example, one benefit is achieving bandwidth scalability. Wang ’673 [0013]. Bandwidth scalability is an important consideration in video streaming because if there is insufficient bandwidth to receive the transmitted data stream, it will take longer to receive, decode, and display the video image. *See, e.g.*, Krishnamurthy 1:15-20; Wang ’673 [0013]. By having multiple, independent encoded data streams of different bitrates and I-frame and P-frame segments, the transmitter can send parallel encoded data streams of varying bitrates to match the available bandwidth, thus optimizing latency and image quality. *See, e.g.*, Perlman [0175]-[0176], [0212]-[0214]; Wang ’673 [0013].

Second, a POSA would have had a reasonable expectation of success in combining the Transmitting Prior Art with other teachings because it was well known that parallel encoding and decoding of frames can be achieved using a plurality of processing units where each processing unit can run different types of encoding or decoding processes. *See, e.g.*, Mohsenian [0035],

[0034]; Perlman [0212]-[0214], Figure 12; Schreier [0034]-[0035]. And it was also well known that these parallel encoded data streams could be independently transmitted to a receiver which can decode, combine, and output a video. *See, e.g.*, Lerner [0040], [0042]-[0043], [0047]; Perlman [0214]-[0216]. Thus, a POSA would have been motivated and have had a reasonable expectation of success transmitting parallel encoded data streams independently over a network to a receiver that can decode and recombine data to reproduce an image as claimed.

h) Shared Transmission Limitation

Claim 1 of the '426 Patent recites:

> 1. A method of encoding in real time a video signal that is associated with a videoconference or telepresence session, the method comprising:
>
> capturing a stream of video data comprising a series of sequential video frames;
>
> separating the video frames into a plurality of frame segments, wherein each frame segment represents a part of a complete video frame;
>
> encoding each frame segment independently and in parallel to generate parallel encoded data streams, one for each of the plurality of frame segments, each encoded data stream containing a sequence of frame segment instances each corresponding to a particular frame segment in the video frames, and each encoded data stream containing I-frame segment instances that carry complete information about a particular frame segment and P-frame segment instances that carry partial information about the particular frame segment, the partial information representing information that has changed relative to a previous frame segment instance in that encoded data stream, and wherein the encoding of the frame segments for each frame is performed such that when an instance of one of the frame segments within a particular frame is an I-frame segment instance, at least one of the other frame segments instances in that particular frame is a P-frame segment instance, whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams;
>
> transmitting the parallel encoded data streams independently over a network to a receiver to permit the receiver to decode each frame segment and recombine the decoded frame segments from the different encoded data streams to reproduce an image;

wherein during transmission of I-frame segment instances of one of the frame segments, P-frame segment instances of all other frame segments are transmitted.

For ease of reference, the highlighted limitation will be referred to as the "Shared Transmission Limitation."

At the time of the claimed invention, transmitting only one I-frame segment instance of an encoded data stream of at a time (and thus transmitting P-frame segment instances of all other frame segments at that time) was well known to a POSA. *See, e.g.*, Lerner [0005], [0039], Figure 2. Several patents, patent publications, and other publications also taught that the Shared Transmission Limitation. *See, e.g.*, Rovati Figure 7; Schreier [0012], [0073]-[0075]; Wang '673 [0084]. The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Shared Transmission Limitation will collectively be referred to as the "Shared Transmission Prior Art."[34]

What's more, techniques that are staggered the encoding of I slices were generally known to a POSA. For example, the Joint Video Team ("JVT") standard document JVT-C074 disclosed such a method. JVT-C074 disclosed techniques by which successive subsets of a frame could be intra-coded (that is, coded as I frame segments). JVT-C074, at 3-7. JVT-C074 and that it's disclosed techniques "provide smoother bit rate compared to instantaneous bit decoder refresh," that is, as compared to a technique in which an entire frame is intra-coded. *Id.* at 2. The disclosure of JVT-C074, which was issued by a standards body well known to a POSA, illustrates that the Shared Transmission Limitation was known to a POSA.

[34] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

To the extent that any of the ’426 Patent Primary References is shown not to disclose the Shared Transmission Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Shared Transmission Prior Art references.

First, a POSA would have been motivated to combine the Shared Transmission Prior Art with other teachings. For instance, the Shared Transmission Prior Art teaches the benefit that transmitting the I-frame and P-frame segments of an encoded data stream together produces a more accurate depiction of the frame. *See, e.g.*, Lerner [0040]. Also, transmitting the I-frame and P-frame segments together avoids creating data peaks, and ensures that the encoded data stream is decoded and displayed in a timely manner. *See, e.g.*, Perlman [0168]-[0169].

Second, a POSA would have had a reasonable expectation of success in combining the Shared Transmission Prior Art with other teachings. For example, Lerner demonstrated that it is possible to compress slices of a frame into I-frame and P-frame segments using standard compression technologies and transmit the encoded frame segments together as claimed. Lerner [0035]. A POSA would have understood that by transmitting the I-frame and P-frame segments together, the receiving video decoders can independently and efficiently decode each individual encoded data stream before combining them to reconstruct the video frame. *See, e.g.*, Lerner [0045], Perlman [0212]-[0216], Figure 12. Accordingly, a POSA would have been motivated and have had a reasonable expectation of success of transmitting I-frame segment instances of one of the frame segments together with the P-frame segment instances of all other frame segments as claimed.

i) Predetermined Parts Limitation

Claim 2 of the ’426 Patent recites:

> 2. A method according to claim 1, wherein the frame segments correspond to predetermined parts of the video frames.

For ease of reference, the highlighted limitation will be referred to as the "Predetermined Parts Limitation."

As a preliminary matter, the Predetermined Parts Limitation is indefinite. *See* Section VII.B.1.g), below. It is unclear, for example, how a POSA would know how a part of the video frame become "predetermined." Does predetermined mean that the parts of the frame were selected for segmentation before or after the frame was segmented? Who or what makes the determination? For example, Plaintiff's contentions as to the dependent claims in which the "predetermined parts" term is used merely parrot the claim language and do not identify what aspect of the Accused Products practices that limitation. Infringement Contentions at 41.

Regardless, at the time of the claimed invention, the encoding of frame segments corresponding to predetermined parts of the video frames was well known to a POSA. *See, e.g.*, Bourne [0023]; Kim [0015], [0018], [0052], [0074]. The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Predetermined Parts Limitation will collectively be referred to as the "Predetermined Parts Prior Art."[35]

To the extent that any of the '426 Patent Primary References is shown not to disclose the Predetermined Parts Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Predetermined Parts Prior Art references.

For example, a POSA would have recognized the benefit of having frame segments correspond to predetermined parts of a frame as claimed. A POSA would have understood that it is beneficial to identify regions of interest in a frame where it is desirable to have higher resolution and lower delay to improve perceived quality, such as in low-delay applications such

[35] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

as videoconferencing. *See, e.g.*, Krishnamurthy 1:40-44; Lerner [0002]-[0003]. Thus, a POSA would have been motivated to combine the Predetermined Parts Prior Art with other teachings and have had a reasonable expectation of success of encoding frame segments that correspond to predetermined parts of a frame as claimed. *See, e.g.*, Bourne, Garnier, Kim, Krishnamurthy, Lee.

j) Different Predetermined Areas Limitation

Claim 3 of the '426 Patent recites:

> 3. A method according to claim 1, wherein each frame segment correspond to a different predetermined area of the video frames.

For ease of reference, the highlighted limitation will be referred to as the "Different Predetermined Areas Limitation."

As an initial matter, the Different Predetermined Areas Limitation is indefinite. *See* Section VII.B.1.h), below. It is unclear how a POSA would know how an area of the video frame becomes "predetermined." For example, Plaintiff's infringement contentions as to Claim 3 in which the "predetermined area" term is used merely mirror the claim language and do not identify what aspect of the Accused Products practices that limitation. Infringement Contentions at 43 (using the phrases "predetermined area" and "predetermined portion" without further explanation).

Regardless, as discussed above in Section VII.A.3.i), the encoding of frame segments corresponding to predetermined parts of the video frames was well known to a POSA at the time of the claimed invention. *See, e.g.*, Bourne [0023]; Kim [0015], [0018], [0052], [0074]. And encoding frame segments corresponding to different parts of the frame videos was also well known to a POSA. *See, e.g.*, Lerner [0036], Figures 1,2; Schreier [0015]; Wang '673 [0082]. The prior art cited in this paragraph and the prior art for which the corresponding chart cites

express teachings for the Different Predetermined Areas Limitation will collectively be referred to as the "Different Predetermined Areas Prior Art."[36]

To the extent that any of the '426 Patent Primary References is shown not to disclose the Different Predetermined Areas Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Different Predetermined Areas Prior Art references.

For example, a person of ordinary skill would have recognized the benefit of having frame segments correspond to different predetermined part of a frame as claimed. Just as a person of ordinary skill would have understood that it is beneficial to identify regions of interest in a frame as discussed above in Section VII.A.3.i), a skilled artisan would have also understood that frame segments can correspond to multiple, different regions of interest. *See, e.g.*, Krishnamurthy 2:16-20 (describing "a frame of a video sequence, where the frame has been divided into three regions: a "most-important" region, a "less-important" region, and a "least-important" region"); 2:42-47 ("Depending on the specific application, the regions can be selected different, and different numbers of regions can be selected."); Lerner [0004] ("The size of each slice may be determined in accordance with the desired image motion resolution at each region of the video frame, or in accordance with the region of interest of the video frame."); Prakash 14:25-15:3, 15:31-16:8. Thus, a POSA would have been motivated to combine the Different Predetermined Areas Prior Art with other teachings and have had a reasonable expectation of success of encoding frame segments that correspond to different predetermined areas of a frame as claimed. *See, e.g.*, Oguz, Pallister, Prakash, Yajima.

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[36] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

k) Uniform Shapes Limitation

Claim 4 of the ’426 Patent recites:

> 4. A method according to claim 1, wherein the frame segment are uniformly sized geometric shapes.

For ease of reference, the highlighted limitation will be referred to as the “Uniform Shapes Limitation.”

As a threshold matter, the Uniform Shapes Limitation is indefinite. *See* Section VII.B.1.i), below. It is unclear how a person of ordinary skill in the art would know what constitutes frame segments that are “uniformly sized geometric shapes.” The phrase “uniformly sized geometric shapes” is never used in the ’426 Patent’s specification. What aspects or dimensions of the geometric shape must be “uniformly sized”? Does this term refer to uniformity in the size of the geometric shape’s line, curve, angle, or surface? Plaintiff’s infringement contentions as to Claim 4 provide no insight into the definition of this term because the contentions merely repeat the claim language and do not identify what aspect of the frame segments must be “uniformly sized.”

In any case, at the time of the claimed invention, the encoding of uniformly sized geometric shape frame segments was well known to a POSA. *See, e.g.*, Lerner [0036] (“[T]he frames or fields may be sliced into any arbitrary dimensions.”); Rovati [0028], [0043], [0049]. The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Uniform Shapes Limitation will collectively be referred to as the “Uniform Shapes Prior Art.”[37]

[37] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

To the extent that any of the ’426 Patent Primary References is shown not to disclose the Uniform Shapes Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Uniform Shapes Prior Art references.

A POSA would have been motivated with a reasonable expectation of success to have frame segments be uniformly sized geometric shapes. For instance, it takes computational power to determine what shape a frame segment should be, such as when a compression algorithm sizes the frame segment to match a region of interest. By having the shapes be uniform, geometric shapes, the method of encoding saves a computational step and preserves hardware processing power. *See, e.g.*, Tredici at 273 (recognizing that low-complexity implementations in the encoder “eas[es] the overall computational requirements of the codec”). Thus, a POSA would have been motivated to combine the Uniform Shapes Prior Art with other teachings and have had a reasonable expectation of success of encoding frame segments as uniformly sized geometric shapes as claimed.

l) Non-uniform Shapes Limitation

Claim 5 of the ’426 Patent recites:

> 5. A method according to claim 1, wherein at least one of frame segment size and shape is different for one of the frame segments compared to another of the frame segments.

For ease of reference, the highlighted limitation will be referred to as the “Non-uniform Shapes Limitation.”

At the time of the claimed invention, the encoding of frame segments that are non-uniformly sized or shaped was well known to a POSA. *See, e.g.*, Lerner [0036] (“[T]he frames or fields may be sliced into any arbitrary dimensions.”); Perlman [0174] (“Note that the tiles need not be square, nor just the video frame be square, or even rectangular. The tiles can be

broken up into whatever shape best suits the video stream and the application used."), [0178] ("[V]arious shapes and sizes may be employed as 'tiles[.]'"). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Non-uniform Shapes Limitation will collectively be referred to as the "Non-uniform Shapes Prior Art."[38]

To the extent that any of the '426 Patent Primary References is shown not to disclose the Non-uniform Shapes Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Non-uniform Shapes Prior Art references.

A person of ordinary skill in the art would have been motivated with a reasonable expectation of success to have non-uniformly sized and shaped frame segments. For instance, using frame segments of different shapes and sizes can improve the resolution of certain regions of a video stream while reducing data and improving latency, such as regions where there is relatively more scene complexity or motion compared to regions that are less complex or more static. *See, e.g.*, Perlman at [0178] (acknowledging that frame segments of "various different sizes and shapes may be employed as 'tiles'" to encode different areas of a video stream based on the region's complexity or motion relative to other regions). Thus, a POSA would have been motivated to combine the Non-uniform Shapes Prior Art with other teachings and have had a reasonable expectation of success of encoding frame segments with different sizes and shapes as claimed.

m) External Application Data Limitation

Claim 7 of the '426 Patent recites:

[38] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

> 7. A method according to claim 1, wherein the frame segments are determined in dependence upon external application data and indicative of the amount of motion that is expected in different areas of the video frames.

For ease of reference, the highlighted limitation will be referred to as the "External Application Data Limitation."

As a threshold matter, the External Application Data Limitation is indefinite. *See* Section VII.B.1.j), below. It is unclear how a person of ordinary skill in the art would know what constitutes "external application data." The phrase "external application data" is never used in the '426 Patent's specification. Furthermore, it is unclear from the specification as to the scope of the term "application." For example, does the word application refer to a software program or source code? Infringement Contentions at 50-51. Or does the word application refer more generally to certain fields of use or contexts such as broadcasting video, video on demand, DVD video storage, transmission, and real-time video conferencing? *See* '426 patent 5:31-48.

In any case, at the time of the claimed invention, the determination of frame segments based on external application data (to the extent that term can be understood) and indicative of the amount of expected motion in different areas of the video frames was well known to a POSA. *See, e.g.*, Krishnamurthy 3:15-26 ("The analysis of step 202 is referred to as segmentation analysis, which, for purposes of the present invention, can be implemented using any suitable scheme, including automatic schemes or interactive schemes in which the regions of interest are explicitly defined by the user (e.g., a participant in a video-conference located either at the encoder or the decoder). In either case, the segmentation analysis can be performed adaptively through the video sequence. As such, the specific macroblocks that constitute various regions can vary from frame to frame (e.g., as the talking person moves within the field of view)."). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express

teachings for the External Application Data Limitation will collectively be referred to as the "External Application Data Prior Art."[39]

To the extent that any of the '426 Patent Primary References is shown not to disclose the External Application Data Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the External Application Data Prior Art references.

A person of ordinary skill in the art would have been motivated with a reasonable expectation of success to create frame segments based on external application data and indicative of the amount of expected motion in different areas of the video frame. For instance, this method can result in encoding smaller, higher resolution frame segments for regions of the video frame where there will be relatively higher amounts of motion. *See, e.g.*, Lerner [0036] ("For instance, in a video conferencing video stream most of the relevant information is expected to be situated in the center of the frame. The frame may therefore be sliced in a manner which produces larger slices at the frame periphery and smaller ones in the frame center."). Furthermore, this method may also improve coding efficiency and allow for different encoding types. *See, e.g.*, Oguz [0069] ("The current configuration provides an encoding engine **500** (FIG. **7**) to utilize the FMO provision of H.264 in conjunction with the possibility of using different slice (coding) types within a VAU, to achieve improved coding efficiency in the (common and therefore important) global motion cases of camera pan or scroll as well as instances where the scene is composed of semantically different segments."). Thus, a POSA would have been motivated to combine the External Application Data Prior Art with other teachings and have had

[39] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

a reasonable expectation of success of creating frame segments based on external application data and indicative of the amount of expected motion in different areas of the video frame,

n) Uniform Shapes Limitation

Claim 10 of the '426 Patent recites:

> 10. A method according to claim 1, wherein the frame segments are encoded in encoders having different encoding characteristics.

For ease of reference, the highlighted limitation will be referred to as the "Encoding Characteristics Limitation."

As a threshold matter, the Encoding Characteristics Limitation is indefinite. *See* Section VII.B.1.k), below. It is unclear how a POSA would know what constitutes an "encoding characteristic" because this phrase is not found in the '426 Patent's specification. For instance, does an "encoding characteristic" refer to the parameters of an encoder? Or does it refer more specifically to the value of the parameters of an encoder? Plaintiff's infringement contentions as to Claim 10 provide no insight into the definition of this term because the contentions merely repeat the claim language and do not identify what are "encoding characteristics." Infringement Contentions at 52.

In any case, at the time of the claimed invention, the encoding of frame segments using encoders with different encoding characteristics (to the extent that term can be understood) was well known to a POSA. *See, e.g.*, Perlman [0177] ("low-latency video compression logic 404 . . . controls the allocation of bits to the various tiles in the R frames either by being pre-configured by settings, based on known characteristics of the video sequence to be compressed, or automatically, based upon an ongoing analysis of the image quality in each tile"); Wang '673 [0077] ("If multiple bit streams are formed, each of them is encoded from the same video signal using at least partly different encoding parameters. For example, the bit rate can be altered by

selecting the encoding parameters differently, and in this way bit streams with different bit rates can be formed. The encoding parameters can be, for example, frame rate, quantisation parameter, spatial resolution, or another factor affecting the image size."). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Encoding Characteristics Limitation will collectively be referred to as the "Encoding Characteristics Prior Art."[40]

To the extent that any of the '426 Patent Primary References is shown not to disclose the Encoding Characteristics Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Encoding Characteristics Prior Art references.

A person of ordinary skill in the art would have been motivated with a reasonable expectation of success to encode frame segments with encoders having different encoding characteristics. For instance, the encoders may encode the frame segments at different resolutions therefore utilizing computing resources more efficiently by encoding frame segments of a video frame of interest. *See, e.g.*, Bourne [0042] (encoding different image segment at different quantization levels and video compression rates); Kim [0073] (encoding regions of interest with higher picture quality while encoding background regions at a higher compression rate); Perlman [0177] (using different encoding settings to achieve low-latency video compression). Thus, a POSA would have been motivated to combine the Encoding Characteristics Prior Art with other teachings and have had a reasonable expectation of success of encoding frame segments with encoders having different encoding characteristics.

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[40] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

o) Bitrate Limitation

Claim 11 of the '426 Patent recites:

> 11. A method according to claim 1, wherein at least one of the encoders has a bitrate that is greater than a bitrate of the other encoders.

For ease of reference, the highlighted limitation will be referred to as the "Bitrate Limitation."

At the time of the claimed invention, the encoding of frame segments by at least one encoder with a bitrate greater than a bitrate of the other encoders was well known to a POSA. *See, e.g.*, Kim [0073] [0073] ("In this case, the region of interest (ROI) is a portion regarded as subjectively important by a user and is contained in the rectangular slice region. Here, ROI encoding is a technique that a portion regarded as subjectively important by the user is encoded with high picture quality, and a region excluding the portion, i.e., a background region, is compressed with a high compression rate, and thus, an overall subjective picture quality can be improved at a restricted bit rate."); Wang '673 [0077] ("If multiple bit streams are formed, each of them is encoded from the same video signal using at least partly different encoding parameters. For example, the bit rate can be altered by selecting the encoding parameters differently, and in this way bit streams with different bit rates can be formed. The encoding parameters can be, for example, frame rate, quantisation parameter, spatial resolution, or another factor affecting the image size."). The prior art cited in this paragraph and the prior art for which the corresponding chart cites express teachings for the Bitrate Limitation will collectively be referred to as the "Bitrate Prior Art."[41]

[41] For specific citations of the relevant teachings for references throughout this and subsequent sections, see the corresponding claim charts.

To the extent that any of the '426 Patent Primary References is shown not to disclose the Bitrate Limitation, one having ordinary skill in the art would have been motivated to combine that reference with any one of the Bitrate Prior Art references.

A person of ordinary skill in the art would have been motivated with a reasonable expectation of success to encode frame segments by at least one encoder with a bitrate greater than a bitrate of the other encoder. For instance, an encoder can optimize its use of computer resources by encoding frame segments that represent complex scenes and/or motion at a higher bitrate while encoding fragment segments that are more static at a lower bitrate. *See, e.g.*, Kim [0073]. Additionally, encoding certain video segments in a region of interest at a higher bitrate improves the viewer experience. *See, e.g.*, Kim [0073]; Lee [0050] ("[T]he apparatus 100 enables the processing of truly scalable bit streams for media storage and/or distribution. This permits, for example, scalable resolution/frame-rate/bit-rate media streaming for various channel bandwidths under a simple uniform data representation and processing architecture using the same media storage capacity."). Therefore, a POSA would have been motivated to combine the Bitrate Prior Art with other teachings and have had a reasonable expectation of success of encoding frame segments by at least one encoder with a bitrate greater than a bitrate of the other encoder.

B. Invalidity Based on Section 112 (P.R. 3-3(d))

1. Indefiniteness[42]

Defendant provides the following grounds for invalidity under 35 U.S.C. § 112. Defendant's investigation of the Asserted Patents is ongoing, and Defendant reserves the right to

[42] Defendant's indefiniteness arguments does not preclude invalidity findings in an IPR because, for example, while the outer bounds of a claim limitation may be uncertain, the prior art may nevertheless provide a disclosure within the uncertain outer bounds. "[I]t is not always

amend or supplement these disclosures based on further investigation and in a manner consistent with the Federal Rules of Civil Procedure, the Local Patent Rules for the Eastern District of Texas, and the Docket Control Order, or otherwise in accordance with any order or direction of this Court or agreement of the parties. Further, Plaintiff's Infringement Contentions fail to provide sufficient detail to fully understand its proposed application of the Asserted Claims, and Defendant reserves the right to assert additional grounds for invalidity under 35 U.S.C. § 112 in response to Plaintiff's claim interpretations. Defendant also reserves the right to supplement, modify, or otherwise amend these grounds for invalidity under 35 U.S.C. § 112 based on the Court's claim construction rulings or opinions or the parties' positions or arguments taken in connection with the claim construction process.

Certain of the Asserted Claims are invalid for failing to comply with the definiteness requirement of § 112. Defendant notes that its charting of a prior art reference for a claim or limitation that Defendant contends is invalid for lack of definiteness in no way represents an admission or concession that the scope of the claim or limitation is definite or ascertainable. § 112 paragraph 2 requires that a patent claim "particularly point[] out and distinctly claim[] the subject matter which the applicant regards as his invention." Claim terms that fail to inform those skilled in the art "with reasonable certainty . . . about the scope of the invention" fail the definiteness requirement of Section 112 paragraph 2. *Nautilus,* 572 U.S. at 901.

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impossible to adjudicate a prior-art challenge, one way or the other, just because some aspect of a claim renders the claim indefinite." *Intel Corp.*, 21 F.4th at 813.

Defendant provides below an identification of terms[43] in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as indefinite:

a) "in parallel"

b) "parallel encoded data streams"

c) "frame segment instance"

d) "transmitting the parallel encoded data streams independently"

e) "a network"

f) "a receiver"

g) "predetermined parts"

h) "predetermined area"

i) "uniformly sized geometric shapes"

j) "external application data"

k) "encoding characteristics"

2. Written Description and Enablement

The specifications of the Asserted Patents do not provide adequate written description to support the scope of the claims asserted by Plaintiff in furtherance of its infringement theories or any reasonably understood scope of the claims. 35 U.S.C. § 112[44] paragraph 1 requires that a patent specification contain "a written description of the invention." To fulfill the written

[43] These terms may also be read in the broader context, *i.e.*, the terms with surrounding claim language, and the terms with that surrounding claim language is likewise indefinite.

[44] Because the Asserted Claims are alleged to have a priority date before March 16, 2013, Defendant applies pre-AIA 35 U.S.C. § 112.

description requirement, the specification "must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed." *Ariad Pharm., Inc.,* 598 F.3d at 1351 (citation omitted). To satisfy the written description requirement, "the applicant must 'convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention,' and demonstrate that by disclosure in the specification of the patent." *Carnegie Mellon Univ.,* 541 F.3d at 1122 (quoting *Vas-Cath Inc.,* 935 F.2d at 1563–64). The Asserted Patents do not meet that requirement for the list of terms below, which Defendant reserves the right to amend.

Additionally, the Asserted Patents do not enable the claim scopes contained in Plaintiff's Infringement Contentions. Section 112 paragraph 1 requires a specification to describe "the manner and process of making and using [the invention], in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains … to make and use the [invention]." The enablement requirement is separate from and in addition to the written description requirement. *Ariad,* 598 F.3d at 1344. This "requirement is satisfied when one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation." *AK Steel Corp.,* 344 F.3d at 1244 (citation omitted); *see Wyeth & Cordis Corp.,* 720 F.3d at 1385–86. The Asserted Patents do not meet that requirement for the list of terms below, which Defendant reserves the right to amend.

Defendant provides below an identification of terms in Asserted Claims that render the Asserted Claims, at least as apparently construed by Plaintiff in its Infringement Contentions as discussed above, invalid pursuant to 35 U.S.C. § 112 as not enabled or lacking sufficient written description:

a) "encoding each frame segment independently and in parallel to generate parallel encoded data streams"

b) "parallel encoded data streams"

c) "frame segment instance"

d) "whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams"

e) "transmitting the parallel encoded data streams independently"

f) "a receiver"

g) "external application data"

h) "encoding characteristics"

Under Plaintiff's apparent infringement theory, the Asserted Claims are invalid on these bases that the specification does not show possession of or enabled the above limitations. With regards to lack of written description, the '426 Patent's specification does not describe, explain, or mention any components or algorithms related to the above limitations needed to reasonably convey to a person of ordinary skill in the art that the inventor possessed the invention. With respect to lack of enablement, a person of skill in the art would not be able to practice the method of the Asserted Claims without undue experimentation. In particular, the specification provides no direction or guidance, no working examples, and no constraints on the breadth of the claims as it relates to the "encoding each frame segment independently and in parallel to generate parallel encoded data streams", "parallel encoded data streams", "frame segment instance", "whereby in the respective parallel encoded data streams in any period of time when an I-frame segment instance is present in one of the parallel encoded data streams, a P-frame segment instance is present in at least one of the other parallel encoded data streams", "transmitting the parallel encoded data streams independently" "a receiver", "external application data", or

"encoding characteristics" limitations. Thus, the specification did not show possession of such scope nor enabled such scope.

VIII. SUBJECT MATTER ELIGIBILITY CONTENTIONS

The Asserted Claims of the '099, '452 and '823 patents fail to satisfy 35 U.S.C. § 101. As set forth below, Defendant contends that each Asserted Claim is invalid under 35 U.S.C. § 101, among other statutes, because the Asserted Claims are directed to abstract ideas, do not include an inventive concept, and do not claim patent eligible subject matter.

These Subject Matter Eligibility Contentions, and in particular Exhibits C-1 to C-3 hereto, identify in chart form: (i) each exception to eligibility to which each Asserted Claim is directed, including Defendant's supporting factual and legal bases; (ii) the industry in which the Asserted Claims are alleged to be well understood, routine, and conventional, including Defendant's supporting factual and legal bases; (iii) why each Asserted Claim was well understood, routine, and conventional in the relevant industry, including Defendant's supporting factual and legal bases; and (iv) Defendant's other factual and legal bases for its contention that the Asserted Claims are invalid under 35 U.S.C. § 101. These contentions relate only to subject matter eligibility, and do not include any contention or position beyond this issue (*e.g.*, other forms of invalidity, non-infringement, or claim construction).

Defendant's discovery and investigation in this lawsuit are ongoing, and these contentions are based on the information Defendant has obtained to date. Defendant reserves the right to supplement and/or amend its Eligibility Contentions consistent with the Federal Rules of Civil Procedure, the Local Rules, and any orders from the Court, including after the Court issues any Claim Construction Order.

These Eligibility Contentions are based upon Defendant's present understanding of the Asserted Claims and Plaintiff's infringement contentions. Defendant does not concede that any

of Plaintiff's claim constructions are correct. If Plaintiff amends its Infringement Contentions, Defendant reserves the right to update its Eligibility Contentions.

IX. DOCUMENT PRODUCTION ACCOMPANYING INVALIDITY CONTENTIONS (P.R. 3-4)

Pursuant to P.R. 3-4(a) and the Court's Standing Order Regarding Subject Matter Eligibility Contentions, Defendant has produced "source code, specifications, schematics, flow charts, artwork, formulas, or other documentation sufficient to show the operation of any aspects or elements of the Accused Instrumentalities identified by the patent claimant in its P.R. 3-1(c) chart" to the extent they are understood by Defendant following a reasonably diligent search.

Pursuant to P.R. 3-4(b), Defendant has produced a copy of each item of prior art identified pursuant to P.R. 3-3(a) which does not appear in the file history of the asserted patent.

Pursuant to the Court's Standing Order Regarding Subject Matter Eligibility Contentions, Defendant has produced the documents referenced in Exhibits C-1 to C-3.

Defendant's search for prior art references, additional documentation, and/or corroborating evidence is ongoing. Accordingly, Defendant reserves the right to continue to supplement its production as it identifies additional prior art references, documentation, and/or corroborating evidence concerning invalidity during the course of discovery.

Dated: May 16, 2024

Respectfully submitted,

/s/ Jared Bobrow

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CERTIFICATE OF SERVICE

The undersigned certifies that on May 16, 2024, all counsel of record who are deemed to have consented to electronic service are being served with a copy of this document via electronic mail.

/s/ Gabrielle Van Vleck
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