Declaration of Stephen Wicker in Support of Petition for *inter partes* review of U.S. Patent No. 7,023,913

Mail Stop Inter Parties Review

Attn: Patent Trial and Appeal Board
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Commissioner:

I, Stephen Wicker, declare as follows:

1. I have been retained on behalf of Mobotix Corp. for the above-captioned *inter partes* review proceeding, involving U.S. Patent No. 7,023,4913 (hereinafter "the '913 Patent").

2. I have reviewed and am familiar with the specification of the '913 Patent, which was filed on June 14, 2000 and issued on April 4, 2006.

3. I have reviewed and am familiar with PCT Publication WO1998041022 to Brusewitz, et al. (hereinafter "Brusewitz"), European Patent Application EP0920211 to Ohki (hereinafter "Ohki"), U.S. Patent No. 6,069,655 to Seeley, et al. (hereinafter "Seeley"), and U.S. Patent No. 5,200,818 to Neta et al. (hereinafter "Neta"), Japanese Patent Application No. H10-224696 to Umeda (hereinafter "Umeda").

4. I have been asked to provide my technical review, analysis, insights, and opinions regarding the above-noted references that form the basis for the

grounds for rejection set forth in the Petition for *inter partes* review of the ’913 Patent.

I. Qualifications

5. I possess the knowledge, skills, experience, training and the education to form an expert opinion and testimony in this case. My Curriculum Vitae, including a listing of academic/professional publications and patents, is set forth in MOB1104.

6. My academic background includes a Ph.D. in Electrical Engineering, received from the University of Southern California, a Master of Science (“M.Sc.”) degree in Electrical Engineering from Purdue University, and a Bachelor of Science, (“B.Sc.”) degree in Electrical Engineering from the University of Virginia.

7. During 1982 I worked for the Network Architecture Research Group of Bell Laboratories. From 1983-1987, I worked as a Staff Engineer for Hughes Aircraft, Information Sciences Department, System Laboratories, Space and Communications Group.

8. From 1987-1996, I was an Assistant Professor, then an Associate Professor in the School of Electrical and Computer Engineering at Georgia Institute of Technology.

9. In 1996, I became an Associate Professor in the School of Electrical and Computer Engineering at Cornell University in Ithaca, NY. Since 1999 I have been a full Professor at Cornell.

10. I currently teach and conduct research in wireless information networks, secure networks, packet-switched computer networks, and digital telephony.

11. Current research and academic interests include privacy-aware design practices for wireless networks and self-configuring sensor networks for disaster recovery, infrastructure monitoring, and national security. Other interests include secure anonymous networking, the behavior of complex systems, phase transitions in NP-hard problems, and the evolution of the nation's telecommunications networks.

12. I am the Cornell Principal Investigator for the TRUST Science and Technology Center – a National Science Foundation center dedicated to the development of technologies for securing the nation's critical infrastructure. I have briefed the staff of the Congressional Committee on Science and Technology and have been appointed to the Air Force Scientific Advisory Board.

13. In 2011 I was made a Fellow of the IEEE for "contributions to wireless information systems."

II. Background of the Technology

14. Networking technologies have evolved over time and various terms have come into use to describe general aspects of networks. Two of those terms used to characterize the size of networks are "LAN" and "WAN."

15. The earliest networked computers were often large, single-computer installations owned by military or academic institutions. Eventually networks evolved to link together these smaller networks. ARPANET is an example of such a network. As computing and networking technologies advanced, the terms "LAN" and "WAN" came into use.

16. "LAN" is the short form of "local area network." A local area network typically consists of a collection of communication nodes in a given, geographically confined, area that share a common communication medium. The nodes (*i.e.*, "computers and/or devices") may be remote terminals, computers, printers, sensors, or some other, similar device, while the communication medium may consist of a single wire, a collection of wires, or one or more radio frequencies. Given the restrictions of LAN technology, a given LAN may interconnect the computers on the floor of a building or possibly several floors; to cover larger distances requires switching and, potentially, wide area networking technologies.

17. "WAN" is the short form of "wide area network." The term came into more widespread use when the proliferation of computers required local area networks to support communications between nearby computers. The need to connect LANs gave rise to the use of the term "WAN," essentially indicating an interconnectedness between two or more LANs.

18. Nodes connected to a LAN may use any number of different network communication protocols, including Ethernet (IEEE 802.3\\), token ring (IEEE 802.5), and FDDI (fiber distributed data interface). Within each of these protocols are sub-protocol variants. For instance, Fast Ethernet and Gigabit Ethernet are both related to the original Ethernet protocol developed by Xerox, DEC, and Intel. Generally, the same communication protocol is used to facilitate communication between nodes on the same LAN.

19. Network-connected nodes can include any number of devices intended to communicate across a network. Some examples include computers; monitoring equipment, such as radar, smoke detectors, or pressure sensors; video or still cameras; telephones; modems; and routers, to name a few. Generally, each network-connected node will contain a network interface that includes or is a port for connecting to the network. By the 1990s, the most common forms of network connectors were RJ-11 jacks for connecting

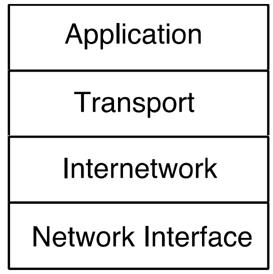
to a network with telephone wire or RJ-45 jacks for connecting to a network with Ethernet cabling.

20. Although the same communication protocol is generally used within a given LAN, the same may not be true across LANs. For instance, one LAN may use the Ethernet protocol, while another LAN uses the FDDI protocol. To make it possible to connect and enable communication between two LANs that use different communication protocols, a solution was required to standardize network communication.

21. Such a solution was proposed in a paper by Vinton G. Cerf and Robert E. Kahn, entitled "A Protocol for Packet Network Intercommunication," *IEEE Transactions on Communications*, Vol. Com-22, No. 5, May 1974. That paper describes the beginning of what we now call TCP/IP.

22. TCP/IP – the Transmission Control Protocol/Internetworking Protocol – is a collection of software protocols. The protocols are arranged in the "layered" format shown below. Communication system designers often organize their systems into layers, with each layer providing services to the layer above it and using the services of the layer below. Layering simplifies the overall design task by breaking it up into well-defined pieces. Layering also increases compatibility between systems – if communication between layers

is well-defined, it is easier for engineers and programmers to design new systems that will be compatible with existing systems.



The Layers of the Internet

23. In the case of the Internet, the lowest layer, the Network Interface Layer (also called the link or data link layer), provides the physical connection to the local network hardware. The next layer up is the Internetwork Layer (also called the Internet, or network layer).

24. The Internetwork Layer is the heart of the Internet, for it is here that the Internet Protocol (IP) makes millions of computers on many different networks look like one, big "virtual network." Thus, in the earlier example described above, the Ethernet LAN and the FDDI LAN can exchange network communications because IP standardizes the communications between the two LANs.

25. IP is a packet communication protocol based on IP datagrams. IP datagrams are packets that have source and destination addresses that allow for the routing of packets between arbitrary networks on the Internet.

26. In short, TCP/IP is a suite of protocols that provides a series of services that allow for the interconnection of a large number of computers on incompatible networks. Indeed, in 1983, ARPA management decided that all networks that wanted to be part of ARPANET had to use TCP/IP, and the Internet finally reached maturity. By the mid-1990's, the commercialization of the Internet made TCP/IP nearly ubiquitous in networked computing environments.

27. In addition to the goals of standardization and cross-platform compatibility that were achieved by network researchers and scientists, work in parallel occurred in the research field of reliable data delivery. In particular, researchers focused on delivery of data in view of the modest bandwidth means available to early network adopters.

28. Bandwidth is the amount of available capacity, or "throughput," of a link or connection between nodes of a network. Though bandwidth may refer to a portion of the spectrum (and thus measured in Hertz), it also refers to bandwidth, and is measured in bits per second. The latter use of the term is particularly popular among network engineers. Today it is not uncommon to see available bandwidth measured in units such as Mbits (megabits) and Gbits (gigabits) per second.

29. In the early days of the "commercial" Internet in the mid-1990's, bandwidth was a limited resource. Users could get online with ease through services such as Prodigy and AOL, which used dial-in modems. These users, however, would be charged by the hour for time spent connected online. Because bandwidth was a more limited resource in the early days of the Internet, network system designers and networking appliance engineers developed ways to deliver acceptable service quality while working within bandwidth constraints.

30. Acceptable service quality in the mid-1990's could be achieved in different ways depending on the application. For instance, software downloads were often compressed into the form of a .ZIP file. .ZIP files were smaller in size than the original uncompressed files, but could be decompressed upon complete download and delivery to the end user. The end user could then install and use the software program, having downloaded fewer bits than the uncompressed program required to be installed on the end user's computer.

31. Similarly, content such as images and video could be altered to ensure quality of service in view of network bandwidth constraints. For instance, motion video image file sizes could be reduced with various methods such as compression, image size (height and width) reduction, encoding at a lower resolution, or motion video images could be altered with any

combination of these file size reduction methods. These modifications, resulting in lower resolution of motion video images—as compared to still images—were common in view of the tradeoffs necessary to deliver "live" video across limited bandwidth, in contrast to higher-resolution still images. The resultant motion video image, however, was one that could be delivered to the end user's computer in less time than the original, full-sized motion image, helping to ensure a certain quality of service level for motion video images.

32. Likewise, in the mid-1990's, video content could be altered depending on available bandwidth restrictions. For instance, video content might be compressed. Alternatively, video frames might be dropped such that not all frames recorded are actually delivered. For example, most video cameras record live video at 30 frames per second. In view of bandwidth restrictions and quality of service needs, perhaps only five to ten of those thirty frames would be delivered. In lieu of dropping frames from a video, a system designer might choose to lengthen the amount of time between frames that are delivered, resulting in a "choppier" video. Though bandwidth constraints in the mid-1990s might preclude transmission of 30 frames per second over a network, the benefits of transmitting at up to 30 frames per second were well known at the time and it was also well known at the time that the rate of

transmission would continue to increase, as restrictions on available bandwidth lessened. The variety of options to alter delivered video content were numerous, depending on system resources and design choices.

III. Background of the ’913 Patent

33. The ’913 Patent purports to relate to a fully digital camera system that provides high resolution still images and streaming video signals via a network to a centralized, server supported security and surveillance system. The ’913 Patent; Abstract.

34. The digital camera collects an image from one or more image transducers, compresses the image, and then sends the compressed digital image signal to a receiving station via a digital network. A plurality of image transducers or sensors are arranged to provide panoramic imaging. ’913 Patent, Abstract.

IV. Application of U.S. Pat. No. 6,069,655 to Seeley et al. to the ’913 Patent Claims

35. Seeley discloses an advanced video security system that incorporates a number of separate video cameras into the security system. *See* Seeley, Figure 1. Still and motion images are generated from input analog image signals, digitized, then transmitted over a network to a remote monitoring site. Seeley, 7:1-21; FIG. 7. An alarm trigger signal may be broadcast to the central station upon detection of a “triggering event.” Seeley, Abstract. An

operator at the central station can monitor the cameras and image/video information transmitted upon a "triggering event" via multiple workstations 106. Seeley, Figure 1, 8:3-34.

36. Seeley discloses that the cameras 22 (video sensors) may be digital-out or analog-out. Seeley, 10:60-62 and U.S. Patent No. 5,937,092, incorporated by reference in the Seeley specification at 3:60-62. Focusing on the digitization aspects of Seeley's disclosure, the analog video signals generated by cameras 22 (video sensors) can be input into site control unit (SCU) 12 (processor) for further processing including digitization and compression. Seeley's disclosure of the capture of analog image signals and then subsequent processing into digital signals suitable for transmission over a network indicates that the video security system includes an analog-to-digital (A/D) converter. Seeley, 10:60-62, and 14:7-9.

37. Seeley's disclosure states that the cameras can be located on the premises, although none of them have to be, and that outputs from the cameras are routed to an image acquisition means of the SCU, which provides the images as a digital output via the Ethernet connection. Seeley 9:10-20. Seeley also states that the cameras may conform to an analog television format standard such as the RS170 or CCIR standards, or that the cameras may be digital. Seeley 10:60-62. Digital cameras are digital-out image transducers, while

analog cameras are analog-out image transducers. Conversion of analog-out image signals to the digital data output of the SCU would necessitate the use of an analog-to-digital converter (i.e., a "frame grabber"). The use of such analog-to-digital converters for converting analog video signals to digital data was well-known at the time of the invention.

38. Seeley Figure 7 indicates a video compression module 50 for video compression. Seeley describes the video compression module 50 as capable of receiving both image data and audio data for compression. *See, e.g.*, Seeley, 18:26-28; 18:54-56. Although Seeley does not explicitly reference an MPEG compressor, MPEG was a well-known compression standard at the time of the invention of the '913 patent. Moreover, MPEG was capable of compressing both image and audio data. A person of ordinary skill in the art (POSITA)[1] at the time of the invention of the '913 patent would have been motivated to use the MPEG compression standard to accomplish both video and audio compression, as MPEG was one of a limited number of well known, commonly used audio and video compression standards at that time.

[1] All references to a POSITA in this declaration refer to a POSITA at the time the invention of the '913 patent was made and prior to the June 14, 2000, filing date of the application for the '913 patent.

Alternatively, although Seeley does not explicitly reference M-JPEG compression, M-JPEG (motion-JPEG) was a well-known compression technique at the time of the invention. A POSITA at the time of the invention of '913 patent would have been motivated to use M-JPEG (which uses a JPEG chip) for video compression in Seeley as M-JPEG was one of a limited number of well-known, commonly used video compression techniques at that time.

39. Seeley Figure 7 indicates a frame compression unit 44 connected to the snapshot buffer 40 for compressing snapshots (still images). *See also* Seeley, 13:11-27. Following compression of the audio/video and image data in video compression module 50 and frame compression unit 44, respectively, the resulting compressed signals are combined by video out 46. Figure 7 shows, among other things, live and snapshot data as inputs to video out 46. The video out 46 operates as a multiplexer to combine the data and output that combined signal onto the signal line extending between video out 46 and terminal adaptor 20 for transmission. Seeley 13:27-30; 18:34-38.

40. Seeley further teaches a customer premise connected through a terminal adapter 20 via Ethernet to an Integrated Services Data Digital Network (ISDN), which is further connected to the central station. *See, e.g.*, Seeley, FIG. 1. ISDN is a circuit-switched telephone network system, designed to

allow digital transmission of voice and data over ordinary telephone copper wires. An ISDN network provides capability for simultaneous voice, video, and text transmission between individual nodes across separate networks and enables, for instance, video conferencing.

41. At the time of the filing date of the ’913 patent, the determination of delivered media (image or video) content resolution was one that was made in the context of available system resources, such as bandwidth. The resolution of other compressed image data as compared to the resolution of the stored image data was a matter of design choice, and the resolution of one can be either greater than, less than, or the same as the other depending on what is desired for an application in view of available system resources.

42. Given that transmission of a relatively small number of individual images would require much less bandwidth than continuous transmission of motion video data, a POSITA would have understood the benefits and possibility of transmitting still image data at a higher resolution than motion image data (video), which could still be at high resolution, in view of available network bandwidth. A POSITA would have been motivated to make the appropriate trade-offs and modifications between still image data and motion image data in view of the requirements and needs of end users. Furthermore, a POSITA at the time of filing the application for the ‘913 patent would have

understood the benefits of video transmission at higher frame rates and would have been motivated to transmit motion video at full motion video frame rates. By the time of filing the application for the ‘913 patent, transmission of full motion video was achieved on many networks, and transmission of full motion video was described in Brusewitz, discussed further below. A POSITA reading Seeley’s description of the relay of video images to the system control at a “fast frame rate” (Seeley, 14:55-66) would understand the disclosure to refer to generation and transmission of a compressed full motion video image data signal.

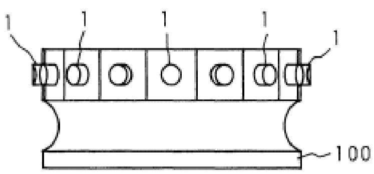
V. Application of Seeley in view of Ohki to the ’913 Patent Claims

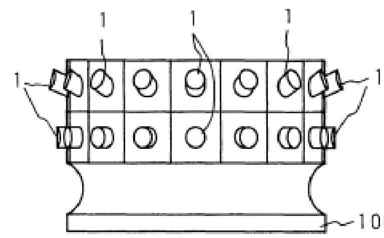
43. Seeley teaches the features described in ¶¶ 35-42.

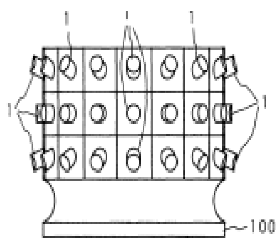
44. Okhi discloses a camera system used for security purposes to capture a plurality of images by using a plurality of cameras arranged around a predetermined point as a center. The plurality of cameras and their respective transducers are arranged in a cylindrical housing and aimed outward from the center point. These cameras may be arranged along a common plane. Ohki, Figure 1A. The images from these cameras can then be arranged in a way to provide a panoramic view over the entire region surround the predetermined center point. Okhi [0006]-[0009].

45. Ohki Figure 1A (shown below on the left), Figure 12 (shown below in the

middle), and Figure 13 (shown below on the right) show various housing configurations for camera arrays that can be mounted externally to observe a wide angle viewable area.





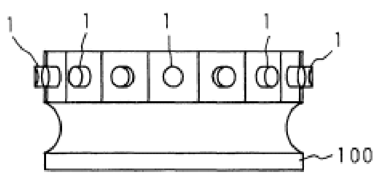


46. At the time of invention of the ’913 patent, a person of ordinary skill in the art (“POSITA”) would have been motivated to modify the camera sensor taught by Seeley with a plurality of camera sensors arranged in a cylindrical pattern along a common plane, as taught by Okhi, for example, at Figure 1A, to achieve a full panoramic view. Such a modification according to the combined teachings of Seeley and Okhi—to achieve panoramic images—would have been a routine modification to achieve a predictable result.

47. Further modifications to the camera housings taught by Ohki would have been apparent to a POSITA at the time of invention of the ’913 patent. For instance, a POSITA would have considered different shapes and mounting angles for the camera housing. Any number of camera housing shapes to

include spheres (described, but not shown in Neta), hemispheres (shown in Neta), cylinders (shown in Ohki), cones, domes (shown in Sorokin), cubes, ellipsoids, S-curves (shown in Sorokin) etc., or modifications to these shapes to enable, for instance, mounting on a flat surface (as shown in Neta), would have been within the knowledge, understanding, and skill of a POSITA. For example, a POSITA would have considered using an axial sliced cylindrical or spherical housing in order provide for easy mounting to a flat surface such as a wall or a ceiling.

48. Prior to June 14, 2000, it was well known to a POSITA to connect cameras to a security system with wires and cables. For example, Figure 2 of Seeley shows wires/cables attached to the cameras.



A POSITA familiar with the cylindrical housing of Ohki with stand 100 for mounting to a floor or ceiling shown above, would understand to run the wires/cables out of the ceiling (or floor), through the stand and to the cameras to ensure that no one would have access to the cables in order to cut them and stop the transmission of images. The walls of the stand would serve as a passageway for the wires/cables, but a POSITA would be motivated to construct a housing with built-in cabling and wiring conduits in order to keep the cabling for each camera readily identifiable and separate from the other cables. Similarly, a POSITA would have considered modifications, such as adding an on-board, self-contained, and rechargeable power supply (e.g. a battery) in the stand to be used as backup power for the cameras in the event of a power failure as in claims 26 and 27, an on-board, fixed or removable, storage devices for the storage of image data such as a removable hard drive as in claim 29,[2] and wireless transceivers (e.g., a WLAN transceiver) for transmission of image data to a network, as in claim 30. *See, e.g.,* power unit 310 and battery-backup unit 330 with rechargeable batteries 332 for a surveillance system in U.S. Patent No. 4,831,438 issued May 16, 1989; and rechargeable back-up battery 42 for a portable alarm system in U.S. Patent No. 5,777,551 issued Jul 7, 1998. *See also, e.g.,* a WLAN transceiver 30 for wireless transmissions in accordance with the IEEE 802.11 standard in European Patent Application (EP 0866588), published Sep 23, 1998. A POSITA at the time of the invention of the '913

[2] I note that hard drives are generally removable to some degree. However, a POSITA would have recognized the advantage of employing a readily detachable hard drive in order to more easily access the data residing on the hard drive.

patent would have been motivated to include the features of claims 25-27, 29 and 30 inside the housing and/or stand for aesthetic and/or security reasons (e.g., to prevent tampering with the security cameras or other claimed features). A POSITA at the time of the invention of the '913 patent would have recognized the benefits of using wireless communications for the system of Seeley and Ohki. Wireless communications would involve a wireless transceiver, and WLAN (wireless local area network, e.g., WiFi) was a well-known and commonly used wireless communication standard. Thus, a POSITA at the time of invention of the '913 patent would have been motivated to use a WLAN transceiver as one of a limited number of options for transceivers for wireless networking.

49. Prior to June 14, 2000, it was well known to a POSITA to mount security cameras on ceilings and walls. *See, e.g.,* Seeley, FIG. 2. A POSITA would have considered housing designs that would enable easy and secure mounting of the camera housing to a wall or ceiling. For instance, using a housing with a planar surface cutting the housing in half would have been within the understanding of a POSITA to enable, for instance, mounting on a flat surface such as a wall. A floor stand or similar type of shelf might have been used for surface mounting. And a bracket, post, cable, or rod might have been used to mount a camera housing to the ceiling. In addition, a

POSITA at the time of invention of the ’913 patent would understand that the modifications discussed above with respect to the camera housings (power supplies, wireless transceivers, cabling conduits) could be incorporated into the structures used for mounting or securing the camera housing. Any number of standard modifications to the camera housing and attached structural supports would have been within the purview and understanding of a POSITA and yielded predictable results.

VI. Application of Seeley in view Ohki and Sorokin

50. Seeley and Ohki teach the features as described in ¶¶ 35-42 and 44-45.

51. Sorokin discloses a camera system with a camera array oriented in an X, Z coordinate system. Alternatively, the camera array may be oriented in a 3-dimensional, X, Y, Z, coordinate system. Sorokin, 5:1-18. In one embodiment, as show in Figure 3, a planar housing of image transducers is arranged, essentially allowing a user a bottom, front, and top view of any object placed in the same plane as the middle row of image transducers. Sorokin, 7:45-59. Sorokin describes the cameras (image transducers) of its system as being hardwired to the computer server, yet communication links for transmitting images may take other forms, such as fiber optics, cable, satellite, microwave transmission, the Internet, and the like. Sorokin, 5:27-33; 6:30-36.

52. Figure 3 of Sorokin shows multiple cameras mounted in a planar array, while Figure 4 shows multiple cameras mounted in an axial sliced cylinder array. In the Figure 4 embodiment the cameras are facing radially inward.

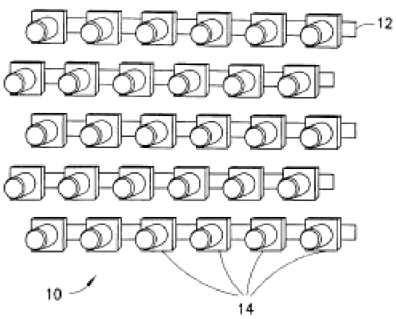


FIG.3

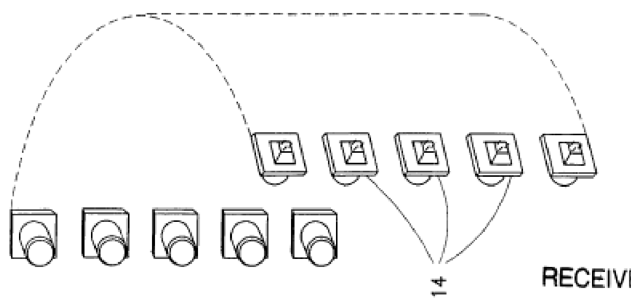


FIG.4

53. Figure 7a of Sorokin (shown below) shows multiple cameras mounted in an “S” curve array.

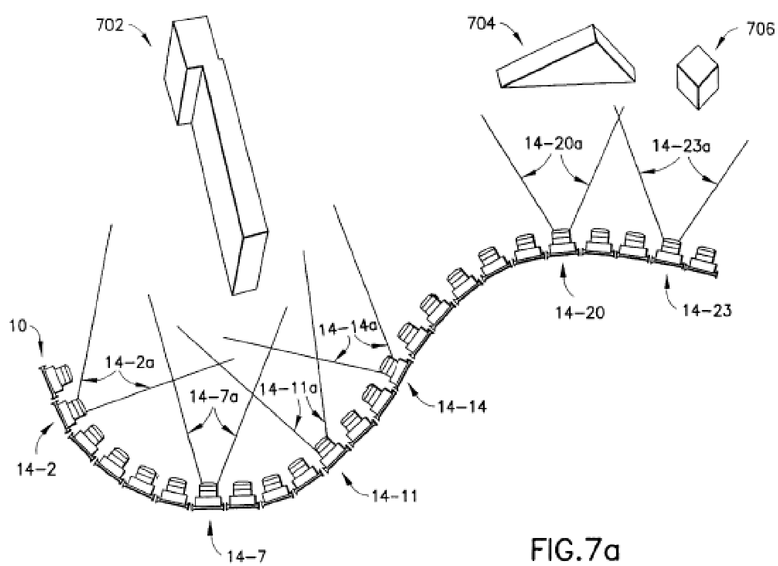


FIG.7a

54. At the time of invention of the ’913 patent, a POSITA would have been motivated to mount the plurality of camera units taught by Seeley to capture a complete view (such as a panoramic view) of a desired area, as taught by

Ohki, in a planar housing as taught by Sorokin. Each of these references teaches the use of known monitoring and surveillance components (such as cameras) to be used in the same way (for transmission of surveillance/monitoring image data) to yield predictable results (the ability to monitor a predetermined area). These types of substitution, combinations, and modifications were within the understanding, knowledge, and skill of a POSITA at the time of invention of the ’913 patent.

VII. Application of Seeley in view of Neta

Application of Seeley in view of Ohki and Neta

55. Seeley and Ohki teach the features as described in ¶¶ 35-42 and 44-45.

56. Neta discloses camera systems mounted in housings taking various shapes. In one embodiment, a plurality of cameras are mounted in a hemispherical housing, as shown in Figures 1 and 2. Neta, 3:60-64. Neta specifically identifies that one goal of the invention is to provide a video output that includes “an image of the entire scene” including an angle of 180 degrees or more and notes that “the basic shape of the field of view is spherical.” Neta, 2:66-3:2.

57. Figures 1 and 2 of Neta (shown below) show the hemispherical shape of the housing for mounting the multiple transducers. Figure 1 shows use of the planar surface for mounting the housing. The exemplary embodiment in

Figure 1 shows mounting the housing on a post.

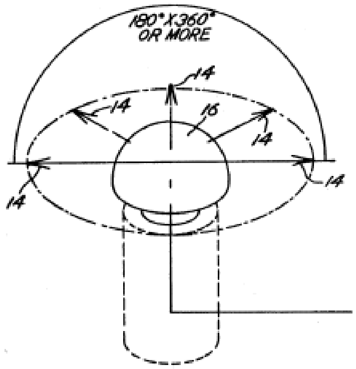
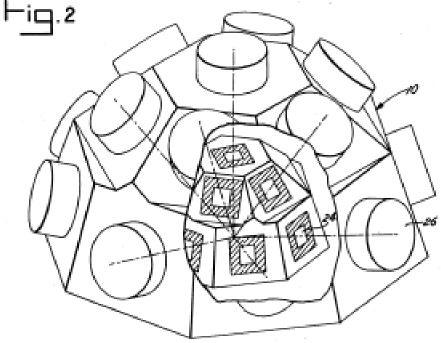


FIG.1

Fig.2



58. At the time of invention of the ’913 patent, a POSITA would have been motivated to mount the plurality of camera units taught by Seeley to capture a complete view (such as a panoramic view or 360 degree angle view) of a desired area in a spherical housing as taught by Neta because Neta teaches that “the basic shape of the field of view is spherical.” Neta, 2:66-3:2. Each of these references teaches the use of known monitoring and surveillance components (such as cameras) to be used in the same way (for transmission of surveillance/monitoring image data) to yield predictable results (the ability to monitor a predetermined area). These types of substitution, combinations, and modifications were within the understanding, knowledge, and skill of a POSITA at the time of invention of the ’913 patent. Furthermore, as Ohki teaches a cylindrical housing and Neta teaches a hemispherical housing which includes a planar surface used for mounting the housing on a wall, ceiling or post. A POSITA would have been

motivated to modify the cylindrical housing as taught by Ohki, such that it has one planar side as taught by Neta, which would result in an axial sliced cylindrical housing. A POSITA at the time of invention of the '913 patent would have been motivated to construct an axial sliced cylindrical housing (for example, by cutting the cylindrical housing of Ohki in half) in order to provide a housing suitable for coverage of a large viewing area while being easily mounted to a flat surface, such as a wall or ceiling.

VIII. Application of Brusewitz in view of Okhi

59. Brusewitz teaches a digital camera imaging system that creates high resolution still images. *See, e.g.*, Brusewitz, Abstract, Fig. 2 (showing "Capture High Resolution Image"). The invention suggests a solution to the problems of perceiving images regarding display of high resolution still images on a video system. *See* Brusewitz, 2:26-3:4. Brusewitz discloses a camera 10 for capturing images, a subsampler device 14 for determining "a spatial resolution (i.e., pixels per line and lines per image) and a temporal resolution (i.e., image per second)," an encoder 16 for encoding the digital images, and a decoder 24 that "reconstitutes the image pursuant to the relevant image format … and the operating parameters, e.g., an indication for a high resolution still image, a conventional video signal at 30 frames per second, …, a video signal with any level of spatial resolution defined by the

standard in use, etc." Brusewitz further identifies example standards in use, including ISO/IEC MPEG-1, MPEG-2, MPEG-4, and ITU-T H.261, H.262 and H.263. *See, e.g.,* Brusewitz, 4: 9-31, 6:2-28. The identified standards in use, for example, MPEG-2/MPEG-4, define various levels of resolutions and had been commonly used for compressing high resolution video signals in various applications (e.g., DVD-Video, HDV, HDTV) by the time of the invention of the '913 patent. Therefore, a POSITA reviewing Brusewitz would understand the video signal having any level of resolution defined in the standards in use to refer to and include high resolution full motion video.

60. Brusewitz further teaches a compressor that compresses both still frame and video images. The compression, however, can occur separately—such that still frame image compression and video image compression occur as separate steps. Indeed, Brusewitz indicates that "encoder 16 encodes the captured high resolution image." *See* Brusewitz, 9:16-17. Yet, Brusewitz also teaches in Figure 2 that compression (or encoding) of the video images—step 58—is a separate step from compression of the still images—step 62. Because these encoding steps are disclosed by Brusewitz as occurring separately, a POSITA at the time of invention of the '913 patent would understand that the encoder can use separate compression algorithms or separate compression chips for still image compression and motion video

compression, respectively. For instance, Brusewitz associates compression algorithms such as MPEG with the video signal stream. Brusewitz, 4:22-5:12. And Brusewitz does not otherwise exclude separate algorithms for still image compression, such as JPEG, which was a well-known still image compression standard and one of a limited number of options for still image compression. Alternatively, although Brusewitz does not explicitly reference an M-JPEG compression, M-JPEG (motion-JPEG) was a well-known compression technique at the time of the invention. A POSITA at the time of the invention of '913 patent would have been motivated to use M-JPEG (which uses a JPEG chip) for video compression in Brusewitz as M-JPEG was one of a limited number of well-known commonly used video compression techniques at that time. Brusewitz discloses a digital camera 10 capable of full motion video; as the camera is capable of operating in "normal video mode, displaying a typical 30 frames per second sequence …" Brusewitz, 7:27-28. Thus, Brusewitz discloses generating and transmitting a compressed full motion video image signal.

61. To accomplish the merging of both motion video image data and still frame image data into a single image data signal, Brusewitz teaches that "production of video image frames . . . continues at a lower bit rate, e.g., through ***interleaving with*** the high resolution image." (emphasis added). A

POSITA at the time of invention of the ’913 patent would understand Brusewitz’s disclosure to indicate that a multiplexer is used to combine the video image frames with the high resolution image via interleaving to form a single image data signal from a single camera.

62. As discussed above, Okhi discloses a camera system used for security purposes to capture a plurality of images by using a plurality of cameras arranged around a predetermined point as a center. The plurality of cameras and their respective transducers are arranged in a cylindrical housing and aimed outward from the center point. These cameras may be arranged along a common plane. Ohki, Figure 1A. The images from these cameras can then be arranged in a way to provide a panoramic view over the entire region surround the predetermined center point. Okhi [0006]-[0009].

63. At the time of invention of the ’913 patent, a POSITA would have been motivated to modify the high resolution camera imaging system of Brusewitz to arrange a plurality of Brusewitz cameras in an array as taught by Ohki to achieve high resolution imaging of a larger viewing area. Moreover, a POSITA would have been motivated to arrange the array in a cylindrical pattern, as taught by Okhi, to achieve panoramic high resolution imaging. Such a modification according to the combined teachings of Brusewitz and Okhi—to achieve high resolution panoramic images—would

have been a routine modification to achieve a predictable result.

64. Further modifications to the camera housings taught by Ohki would have been apparent to a POSITA at the time of invention of the ’913 patent. For instance, a POSITA would have considered different shapes and mounting angles for the camera housing. Any number of camera housing shapes to include spheres (described, but not shown in Neta), hemispheres (shown in Neta), cylinders (shown in Ohki), cones, domes (shown in Sorokin), cubes, ellipsoids, S-curves (shown in Sorokin) etc., or modifications to these shapes to enable, for instance, mounting on a flat surface (as shown in Neta), would have been within the knowledge, understanding, and skill of a POSITA. For example, a POSITA would have considered using an axial sliced cylindrical or spherical housing in order provide for easy mounting to a flat surface such as a wall or a ceiling.

65. Moreover, a POSITA would have considered modifications to a camera housing to support transmission of the digital images. For instance, a housing might be built with built-in cabling and wiring conduits to use, for example, in networking applications. Similarly, a POSITA would have considered modifications, such as adding an on-board, self-contained, and rechargeable power supply (e.g. a battery) in the stand to be used as backup power for the cameras in the event of a power failure as in claims 26 and 27,

an on-board, fixed or removable, storage devices for the storage of image data such as a removable hard drive as in claim 29,[3] and wireless transceivers (e.g., a WLAN transceiver) for transmission of image data to a network. See further discussions re support in ¶ 48 above. A POSITA at the time of the invention of the ‘913 patent would have been motivated to include the features of claims 25-27, 29 and 30 inside the housing and/or stand for aesthetic and/or security reasons (e.g., to prevent tampering with the security cameras or other claimed features).

66. Additional modifications that a POSITA would have considered include those required to enable mounting of the camera housing in a secure manner. For instance, modifications, such as cutting the housing in half would have been within the understanding of a POSITA to enable, for instance, mounting on a flat surface such as a wall. A floor stand or similar type of shelf might have been used for surface mounting. And a bracket, post, cable, or rod might have been used to mount a camera housing to the ceiling. In addition, a POSITA at the time of invention of the ’913 patent would

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[3] I note that hard drives are generally removable to some degree. However, a POSITA would have recognized the advantage of employing a readily detachable hard drive in order to more easily access the data residing on the hard drive.

understand that the modifications discussed above with respect to the camera housings (power supplies, wireless transceivers, cabling conduits) could be incorporated into the structures used for mounting or securing the camera housing. Any number of standard modifications to the camera housing and attached structural supports would have been within the purview and understanding of a POSITA and yielded predictable results.

67. Additionally, in order transmit the combined image data from a plurality of cameras into a signal for delivery to a monitoring station, as a result of the combined teachings of Brusewitz and Ohki, such as a display screen or a networked monitoring station, a POSITA at the time of invention of the ’913 patent would understand that the signals from the plurality of cameras of the combination of Brusewitz and Okhi would be multiplexed to form a single image data signal suitable for transmission.

68. Brusewitz discloses usage of wireless videoconference of its cameras due to “recent advancements in the field of wireless communications,” Brusewitz, 12: 27-13: 3. Wireless communications would require a wireless transceiver, and WLAN (wireless local area network, e.g., WiFi) was a well-known and commonly used wireless communication standard. Thus, a POSITA at the time of invention of the ‘913 patent would have been motivated to use a WLAN transceiver as one of a limited number of options for transceivers for

wireless videoconferencing.

IX. Application of Brusewitz in view of Ohki and Neta

69. Brusewitz and Ohki teach the features as described in ¶¶ 59-68.

70. Neta discloses camera systems mounted in housings taking various shapes. In one embodiment, a plurality of cameras are mounted in a hemispherical housing, as shown in Figure 2. Neta, 3:60-64. Neta specifically identifies that one goal of the invention is to provide a video output that includes "an image of the entire scene" including an angle of 180 degrees or more and notes that "the basic shape of the field of view is spherical." Neta, 2:66-3:2.

71. At the time of invention of the '913 patent, a POSITA would have been motivated to mount the plurality of camera units taught by Brusewitz to capture a complete view (such as a panoramic view or 360 degree angle view) of a desired area, as taught by Ohki, in a spherical housing as taught by Neta. Each of these references teaches the use of known monitoring and surveillance components (such as cameras) to be used in the same way (for transmission of surveillance/monitoring image data) to yield predictable results (the ability to monitor a predetermined area). These types of substitution, combinations, and modifications were within the understanding, knowledge, and skill of a POSITA at the time of invention of the '913 patent.

X. Application of Umeda in view of Ohki

72. Umeda teaches a digital camera imaging system employing solid state image sensors for processing both still and motion video images. *See, e.g.*, Umeda, Abstract, [0104]. Umeda contemplates that its system may be used for monitoring applications. *See, e.g.*, Umeda, [0166]. A POSITA reviewing Umeda, and in particular its disclosure that the output frame rates from the imaging element 100 can be 30 frames/second, would understand Umeda to disclose generating and transmitting a compressed full motion video image signal. Umeda discloses a MOS type (analog-out) image sensor coupled with an A/D converter that generates digital signals. However, a POSITA at the time of invention of the '913 patent would have understood that, because Umeda teaches a digital system, one could easily substitute a digital-out transducer for the analog-out transducer combined with an A/D converter. This combination would be a simple well-known substitution in order to obtain predictable results. At the time of the filing date of the '913 patent, the determination of delivered media (image or video) content resolution was one that was made in the context of available system resources, such as bandwidth. A POSITA at the time of filing the application for the '913 patent would have understood the benefits of still image and video transmission at higher resolutions and would have been motivated to

transmit still and motion images at high resolution, within the bandwidth constraints of the system. By the time of filing the application for the '913 patent, transmission of full motion video and still images at high resolution was achieved on many networks. Though Umeda does not expressly refer to "high resolution" signals, a POSITA at the time of the invention of the '913 patent reading Umeda's reference to JPEG, MPEG 1, MPEG 2 and MPEG 4 at para. [0098], coupled with Umeda's statement that "the resolution can be changed in accordance with the transmission capacity …." (para. [0135]) would understand Umeda to be disclosing generation and transmission of high resolution still images and full motion video. Umeda discloses generating an output image signal associated with the multiplexer "in accordance with a command received by the interface section 108." The resultant output image signal is transmitted over a network. *See e.g.,* Umeda, [0102], FIG. 1 and FIG. 16. A POSITA reviewing Umeda at the time of the invention of the '913 patent would understand from these references and the context of the Umeda reference that a processor associated with the multiplexer would control the function of generating a conditioned output image signal suitable for transmission over a network.

73. As discussed above, Okhi discloses a camera system used for security purposes to capture a plurality of images by using a plurality of cameras

arranged around a predetermined point as a center. The plurality of cameras and their respective transducers are arranged in a cylindrical housing and aimed outward from the center point. These cameras may be arranged along a common plane. Ohki, Figure 1A. The images from these cameras can then be arranged in a way to provide a panoramic view over the entire region surround the predetermined center point. Okhi [0006]-[0009]. At the time of invention of the '913 patent, a POSITA would have been motivated to modify the system of Umeda to arrange a plurality of the image sensors in an array as taught by Ohki to achieve high resolution imaging of a larger viewing area. Moreover, a POSITA would have been motivated to arrange the array in a cylindrical pattern, as taught by Okhi, to achieve panoramic imaging. Such a modification according to the combined teachings of Umeda and Okhi—to achieve panoramic images—would have been a routine modification to achieve a predictable result. Furthermore, Umeda teaches a still frame compressor and a motion video compressor associated with an image transducer. Ohki discloses that a single still frame compressor and a single motion video compressor may be associated with a plurality of image transducers. Whether to assign a separate pair of still image and motion video compressors to each image transducer, or configure the system such that all of the image transducers share a single still image and motion video compressor would be a design choice. A POSITA at the time of invention of the ‘913 patent would have been motivated to use a single still frame compressor and a single motion video compressor, as taught by Ohki, associated with all of the image transducers of the combination of Umeda and Ohki, for example, to eliminate the extra cost associated with having multiple pairs of compressors (one pair for each transducer). This design alternative would be a simple well-known option to use in order to obtain predictable results.

74. Further modifications to the camera housings taught by Ohki would have been apparent to a POSITA at the time of invention of the ’913 patent. For instance, a POSITA would have considered different shapes and mounting angles for the camera housing. Any number of camera housing shapes to include spheres (described, but not shown in Neta), hemispheres (shown in Neta), cylinders (shown in Ohki), cones, domes (shown in Sorokin), cubes, ellipsoids, S-curves (shown in Sorokin) etc., or modifications to these shapes to enable, for instance, mounting on a flat surface (as shown in Neta), would have been within the knowledge, understanding, and skill of a POSITA. For example, a POSITA would have considered using an axial sliced cylindrical or spherical housing in order provide for easy mounting to a flat surface such as a wall or a ceiling.

75. Moreover, a POSITA would have considered modifications to a camera housing to support transmission of the digital images. For instance, a housing might be built with built-in cabling and wiring conduits to use, for example, in networking applications. Similarly, a POSITA would have considered modifications, such as adding an on-board, self-contained, and rechargeable power supply (e.g. a battery) in the stand to be used as backup power for the cameras in the event of a power failure as in claims 26 and 27, an on-board, fixed or removable, storage devices for the storage of image data such as a removable hard drive as in claim 29,[4] and wireless transceivers (e.g., a WLAN transceiver) for transmission of image data to a network. See further discussions re support in ¶ 48 above. A POSITA at the time of the invention of the '913 patent would have been motivated to include the features of claims 25-27, 29 and 30 inside the housing and/or stand for aesthetic and/or security reasons (e.g., to prevent tampering with the security cameras or other claimed features).

76. Additional modifications that a POSITA would have considered include

[4] I note that hard drives are generally removable to some degree. However, a POSITA would have recognized the advantage of employing a readily detachable hard drive in order to more easily access the data residing on the hard drive.

those required to enable mounting of the camera housing in a secure manner. For instance, modifications, such as cutting the housing in half would have been within the understanding of a POSITA to enable, for instance, mounting on a flat surface such as a wall. A floor stand or similar type of shelf might have been used for surface mounting. And a bracket, post, cable, or rod might have been used to mount a camera housing to the ceiling. In addition, a POSITA at the time of invention of the ’913 patent would understand that the modifications discussed above with respect to the camera housings (power supplies, wireless transceivers, cabling conduits) could be incorporated into the structures used for mounting or securing the camera housing. Any number of standard modifications to the camera housing and attached structural supports would have been within the purview and understanding of a POSITA and yielded predictable results.

77. Umeda discloses an interface section 108 for performing output control on signals from a digital signal processor section 107. Output image signals can be generated “in accordance with a command received by the interface section 108.” The resultant output image signal is transmitted over a network. *See e.g.,* Umeda, [0102] [0172], FIG. 1 and FIG. 16. A POSITA at the time of the invention of the ‘913 patent would understand that the foregoing references in the context of the rest of Umeda, would indicate that

to perform the output control and generate the conditioned output signal, there would exist a processor (e.g., in the form of appropriate software, hardware, or a combination of them) that is associated with the multiplexer to perform the output control and generate the conditioned output signal suitable for transmission over the network. The processor may also control, for example, the format and data rate of the output signal to comply with any protocol requirement of the network. Umeda discloses "wire or wireless communication means" associated with its imaging element. *See, e.g.,* Umeda, FIG. 39. Wireless communications would require a wireless transceiver, and WLAN (wireless local area network, e.g., WiFi) was a well-known and commonly used wireless communication standard. Thus, a POSITA at the time of invention of the '913 patent would have been motivated to use a WLAN transceiver as one of a limited number of options for transceivers for wireless communications.

XI. Application of Umeda in view of Ohki and Neta

78. Umeda and Ohki teach the features described above including in ¶¶ 72-77.

79. As discussed above, Neta discloses camera systems mounted housings taking various shapes. In one embodiment, a plurality of cameras is mounted in a spherical housing, as shown in Figure 2. Neta, 3:60-64. Neta specifically identifies that one goal of the invention is to provide a video

output that includes “an image of the entire scene” including an angle of 180 degrees or more and notes that “the basic shape of the field of view is spherical.” Neta, 2:66-3:2.

80. At the time of invention of the ’913 patent, a POSITA would have been motivated to mount the plurality of camera units taught by Umeda to capture a complete view (such as a panoramic view or 360 degree angle view) of a desired area, as taught by Ohki, in a spherical housing as taught by Neta. Each of these references teaches the use of known monitoring and surveillance components (such as cameras) to be used in the same way (for transmission of surveillance/monitoring image data) to yield predictable results (the ability to monitor a predetermined area). These types of substitution, combinations, and modifications were within the understanding, knowledge, and skill of a POSITA at the time of invention of the ’913 patent.

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

Executed this 6th day of August, 2013 in New York, NY.

Stephen Wicker