UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SPRINT SPECTRUM L.P.,
Petitioner

v.

GENERAL ACCESS SOLUTIONS, LTD.,
Patent Owner

Case IPR2017-001889
Patent No. 7,230,931

PATENT OWNER'S RESPONSE

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Patent Owner, General Access Solutions, Ltd., submits the following Patent Owner Response pursuant to 37 C.F.R. § 42.120.

I. INTRODUCTION

Prior to the Supreme Court's decision in SAS Institute, Inc. v. Iancu, 138 S.Ct. 1353 (U.S. 2018) and the subsequent Patent Office guidance requiring institution on all challenged claims on all grounds presented, the Board had declined to institute review of dependent claims 2, 11 and 20 of U.S. Patent No. 7,230,931 ("the '931 patent"). The Board found that Petitioner had not provided "sufficient analysis to explain why one of ordinary skill in the art would understand the broadcast timeslot reservations of the LCH and SCH to be a beam map usable to detect directed scanning beam signals," and therefore had not demonstrated a reasonable likelihood of prevailing in establishing claims 2, 11 and 20 would have been obvious in view of Vornefeld and Andersson. (Institution Decision at 18.)

Patent Owner submits that the Board's initial determination was correct. Patent Owner provides further support herein, and in the accompanying Expert Declaration of Kurt Humphrey, for why the prior art cited by Petitioner does not disclose a beam map containing scanning beam information usable by wireless access devices to detect/receive directed scanning beam signals. Absent this

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element in the cited prior art, Petitioner has not shown that dependent claims 2, 11 and 20 are unpatentable.

Claims 3-9, 12-18 and 21-27 depend from claims 2, 11 and 20, respectively. Accordingly, Petitioner has also not shown that claims 3-9, 12-18 and 21-27 are unpatentable.

Petitioner's cited prior art also does not disclose transmitting second downlink data in the TDD frame to a different sector using a different directed scanning beam signal, as required by claims 28 and 29. Accordingly, Petitioner has not shown that claims 28 and 29 are unpatentable.

Patent Owner respectfully requests that the Board find claims 2-9, 11-18 and 20-29 of the '931 patent to be patentable over the prior art relied on by Petitioner.[1]

II. LEGAL STANDARDS

A. Claim Construction

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1115 (Fed. Cir. 2004)). "[A] claim construction analysis must begin and remain centered on the

[1] Patent Owner does not herein dispute the patentability of the independent claims 1, 10 and 19 of the '931 patent.

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claim language itself, for that is the language the patentee has chosen to 'particularly point out and distinctly claim [regarding] the subject matter which the patentee regards as his invention.'" Innova/Pure Water, 381 F.3d at 1116 (quoting Interactive Gift Exp., Inc. v. Compuserve Inc., 256 F.3d 1323, 1331 (Fed. Cir. 2001)). Claim terms "are generally given their ordinary and customary meaning." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996).

When deciding whether to construe the claims of a patent, courts construe "only those terms [that] need be construed that are in controversy, and only to the extent necessary to resolve the controversy." Vivid Technologies, Inc. v. American Science & Engineering, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999).

Dependent claims include all limitations of the claims from which they depend. "A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers." 35 U.S.C. § 112(d).

B. Burden of Proof

"In an *inter partes* review, the burden of persuasion is on the petitioner to prove 'unpatentability by a preponderance of the evidence,' 35 U.S.C. § 316(e), and that burden never shifts to the patentee." Dynamic Drinkware, LLC v. Nat'l Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015). "[I]f the fact trier of the issue is left uncertain, the party with the burden loses." Tech. Licensing Corp. v. Videotek, Inc., 545 F.3d 1316, 1327 (Fed. Cir. 2008).

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C. Obviousness

A patent claim is unpatentable as obvious under 35 U.S.C. § 103(a) if "the differences between" the claimed subject matter and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a); KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007).

> Under § 103, [(1)] the scope and content of the prior art are to be determined; [(2)] differences between the prior art and the claims at issue are to be ascertained; and [(3)] the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such [(4)] secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

Graham v. John Deere Co., 383 U.S. 1, 17-18 (1966).

An obviousness determination "cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." In re Kahn, 441 F.3d 977, 988 (Fed. Cir. 2006). The Board must "be careful not to allow hindsight

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reconstruction of references to reach the claimed invention without any explanation as to how or why the references would be combined to produce the claimed invention." Kinetic Concepts, Inc. v. Smith & Nephew, Inc., 688 F.3d 1342, 1368 (Fed. Cir. 2012). "Care must be taken to avoid hindsight reconstruction by using 'the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit."' Grain Processing Corp. v. Am.-Maize Prods. Co., 840 F.2d 902, 907 (Fed. Cir. 1988) (quoting Orthopedic Equip. Co. v. United States, 702 F.2d 1005, 1012 (Fed. Cir. 1983)).

III. PATENT OWNER'S EXPERT AND POSITA DEFINITION

A. Patent Owner's Expert

This Response is supported by the Expert Declaration of Kurt Humphrey. (EX2001). Mr. Humphrey has over forty years of experience as an engineer and engineering executive, including expert technical consulting and forensic analyses in the areas of optical, cable and wireless telecommunications including 3G/4G LTE, IEEE 802.11 (WiFi), 802.16 (WiMAX), 802.3 (Ethernet), Bluetooth, DOCSIS and DVB-T. (Id. at ¶¶ 6-7.) Mr. Humphrey has investigated numerous key commercial networking products including Ericsson and Nokia eNodeBs (*i.e.*, 4G LTE base stations), Hewlett Packard, Arris and Cisco modems, routers and

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switches and optical networking Erbium-doped fiber amplifiers (EDFAs), ROADMs and distributed feedback lasers (DFBs). (Id.)

B. Person of Ordinary Skill in the Art

Patent Owner submits that a person of ordinary skill in the art would have been a telecommunications engineer or technologist working in the wireless networking sector having at least a bachelor's degree in engineering and relevant work experience, including at least two years of academic, practical, or industry experience in the wireless networking and/or telecommunications field.

(Id. at ¶ 24.)

IV. THE '931 PATENT

A. '931 Patent Disclosure

1. Selectively Adaptable Beam Forming

The '931 patent discloses and claims a wireless network that utilizes selectively adaptable beam forming in time division duplex ("TDD") frames. Selectively adaptable beam forming allows a wireless network antenna array or group of antennas to selectively and dynamically direct radio frequency signals, or beams, to specific subscribers or groups of subscribers in a certain area. (Id. at ¶ 26.) Using the '931 patented technique, in addition to improving TDD data transfer rates and signal quality, multiple beams can be dynamically modified, adapted and directed based on environmental factors, quality of the connection,

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overall demand on the network and specific subscribers' needs or service level. Thus, selectively adaptable beam forming dynamically improves individual subscriber connections, and also maximizes overall system efficiency. (Id.)

2. Beam Patterns

The invention disclosed in the '931 patent "uses pre-programmed sets of directed beam patterns to cover a cell in angular fashion," which is defined in the specification as "beam scanning." (EX1001 at 28:1-3.) An example of a directed beam scanning pattern with nine directed scanning beams, each approximately 10 degrees wide, covering a "cell sector" that is approximately 90 degrees wide is shown in Figure 12A, reproduced below. (Id. at 28:5-9; EX2001 at ¶ 27.)

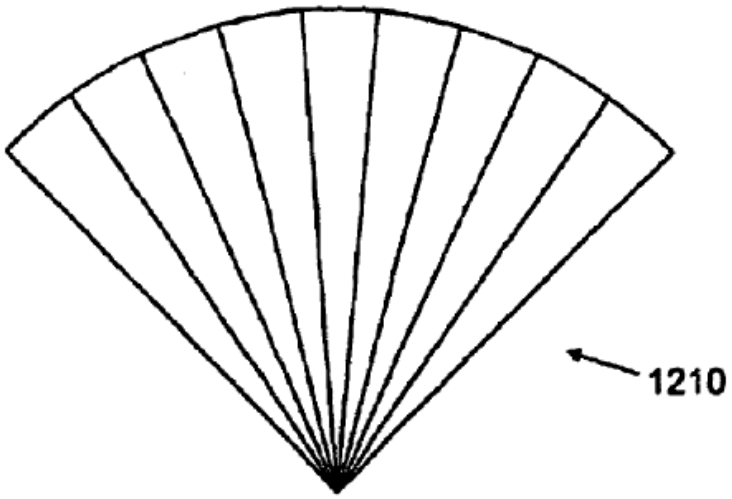

FIG. 12A

The nine directed scanning beams of Figure 12A are also represented in Figure 12B, reproduced below, which shows the scanning beams separated

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spatially 10 degrees apart, and transmitting/receiving at an angle of approximately -40 degrees to the left of an arbitrary 0 degree reference, and +40 degrees to the right of the 0 degree reference. (Id. at 28:14-23; EX2001 at ¶ 28.)

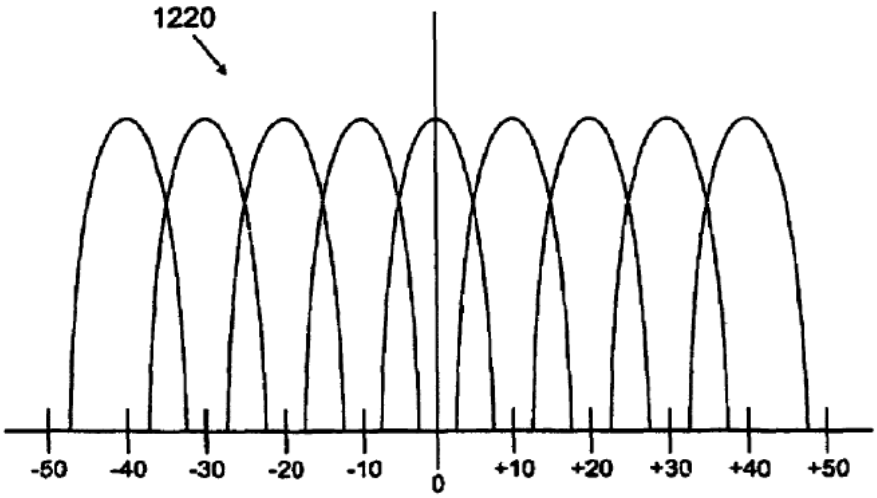

FIG. 12B

3. Wide Spectrum Broadcast Beam

As noted in the specification, if subscribers were equally divided among the cell sectors, the nine scanning beams could be utilized equally with "a simple round robin polling method." (Id. at 28:26-29.) Subscribers, of course, are rarely equally divided among cell sectors, among other factors that make it preferable to direct scanning beams to certain sectors nonuniformly, and as needed by subscribers of the system and to maximize the overall efficiency of the system. (EX2001 at ¶ 29.)

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To determine when and where to utilize individual scanning beams, the '931 patent discloses utilizing a single "full-sector coverage broadcast beam" that covers all of the 90 degree cell sector, as shown in Figure 13B, reproduced below. (Id. at 28:34-43; EX2001 at ¶ 30.)

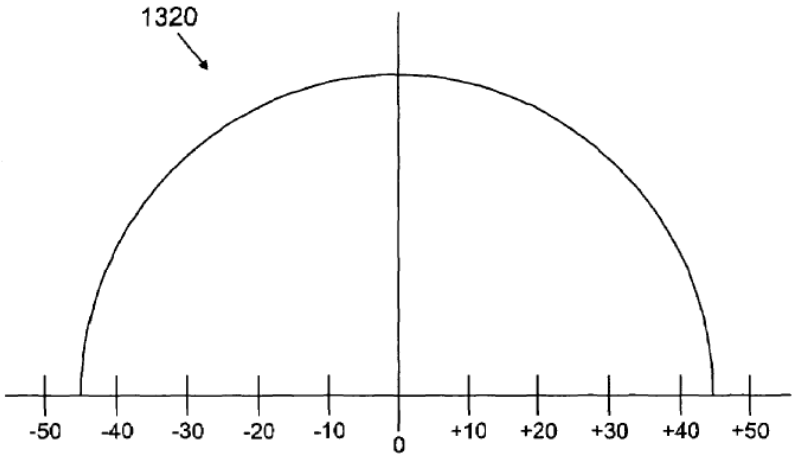

FIG. 13B

The broadcast beam is broadcast at the start of every TDD frame, allowing the system to acquire and synchronize individual subscriber receivers and obtain information about the entire cell sector for selecting and scheduling individual scanning beams. This "provides improved performance for acquisition and synchronization as opposed to either equal duration round robin polling per scan beam or dynamic weighted polling per scan beam based on the throughput per cell." (Id. at 28:45-58; EX2001 at ¶ 31.)

4. TDD Frames Utilizing Broadcast Beams and Scanning Beams

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An example of TDD frames utilizing the spread spectrum broadcast beam, and then directed scanning beams, is shown in Figure 14, reproduced below.

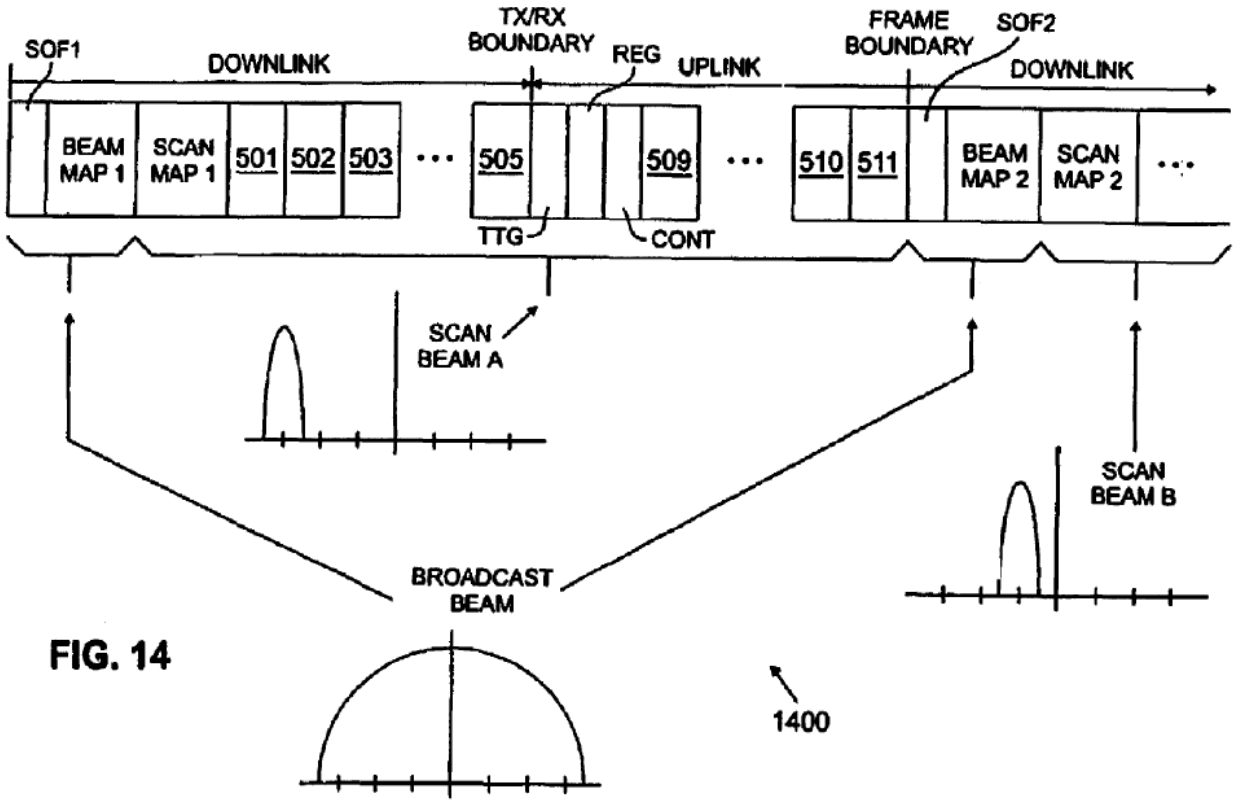

FIG. 14

As shown in Figure 14, the broadcast beam is utilized at the start of each TDD frame, SOF1 and SOF2. For each TDD frame, the broadcast beam transmits a beam map, which "provide[s] data indicating which scanning beam (or beams) are used at which time…in the frame. (Id. at 29:34-36; EX2001 at ¶ 33.) Then, in each TDD frame, distinct scanning beams are utilized to transmit and receive the remainder of the frame. As shown above, for the first TDD frame, Scan Beam A transmits and receives in the cell sector -30 degrees to the left of the 0 degree

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reference. For the second TDD frame, Scan Beam B transmits and receives in the cell sector -10 degrees to the left of the 0 degree reference. (Id.)

The beam maps sent by the broadcast beam at the start of the TDD frame define all scanning beams used by a given base station, plus the specific start times for each directed scanning beam (by beam number) for subsequent downlink transmissions in the TDD frame. The beam maps also define the number of scanning beams used in the relevant cell sector (the Super-Frame Beam Map).

> Beam Map **1** and Beam Map **2** comprise a Frame Beam Map and Super-Frame Beam Map containing information that defines scanning beams that cover the sector, the adjoining sectors of the same base station, and the sectors of adjoining base stations. The Frame Beam Map defines the number of downlink beams in the remainder of the current frame and lists a beam number and frame time (physical slot) in which each beam starts. The Frame Beam Map also defines the Uplink beam numbers for each subscriber. The Super-Frame Beam Map defines the number of beams in the relevant sector.

(Id. at 29:51-61; EX2001 at ¶ 34.)

The scanning beams transmit scanning beam maps (Scan Map 1 and Scan Map 2) and the remainder of the uplink and downlink portions of each TDD frame. (Id. at 29:30-33.) The scanning beam maps provide uplink and downlink maps. The downlink map "indicates the modulation format and forward error correction code (FEC) and time slots enabled on the downlink (i.e., modulation group). The

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uplink map indicates the specific subscriber, modulation format, FEC, and equalizer…for the allowed uplink data bursts."

> As note above, the Scanning Beam Map used in the scanning beams are downlink maps and uplink maps. The downlink map indicates the modulation format and forward error correction code (FEC) and time slots enabled on the downlink (i.e., modulation group). The uplink map indicates the specific subscriber, modulation format, FEC, and equalizer (cyclo-stationary processing) for the allowed uplink data bursts.

(Id. at 30:7-12; EX2001 at ¶ 35.)

B. '931 Patent Claims

1. Independent Claims 1, 10 and 19

Independent claims 1, 10 and 19 include the limitation of transmitting a broadcast beam signal at the start of a TDD frame to wireless access devices in multiple sectors. Claim 1 includes the following limitation:

> station, wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

Claim 10 includes the following limitation:

> first base station, wherein said transmit path circuitry transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors, the broadcast beam signal comprising a start of frame field, and

Claim 19 includes the following limitation:

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> transmitting, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of a plurality of sectors within said associated cell site, the broadcast beam signal comprising a start of frame field capable of synchronizing receivers in said wireless access devices; and

This limitation found in found in claims 1, 10 and 19 claims the broadcast beam concept, transmitted at the start of the TDD frame, discussed above.

Claim 19, shown above, also includes the limitation on the broadcast beam signal that it comprises "a start of frame field capable of synchronizing receivers in said wireless access devices."

2. Dependent Claims 2, 11 and 20

Dependent claims 2, 11 and 20 (dependent from claims 1, 10 and 19, respectively) include the limitation that the broadcast beam signal further comprises a first beam map containing scanning beam information usable by wireless access devices to detect/receive directed scanning beam signals. Claim 2 reads as follows:

> **2**. The transceiver as set forth in claim **1** wherein said broadcast beam signal further comprises a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals.

Claim 11 reads as follows:

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> **11**. The fixed wireless access network as set forth in claim **10** wherein said broadcast beam signal further comprises a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals.

Claim 20 reads as follows:

> **20**. The method as set forth in claim **19** wherein said broadcast beam signal further comprises a first beam map containing scanning beam information usable by said wireless access devices to receive said first directed scanning beam signal.

3. Dependent Claims 3-9, 12-18 and 21-27

Dependent claims 3-9, 12-18 and 21-27 are dependent from claims 2, 11 and 20, respectively. Thus, dependent claims 3-9, 12-18 and 21-27 also include the limitation found in claims 2, 11 and 20, namely, that that the broadcast beam signal further comprises a first beam map containing scanning beam information usable by wireless access devices to detect/receive directed scanning beam signals. 35 U.S.C. § 112(d).

4. Dependent Claims 28 and 29

Dependent claims 28 and 29 (dependent from claims 1 and 19, respectively) include the limitation of transmitting, in the downlink portion of the TDD frame, second downlink data traffic to wireless access devices in a different sector with a different directed scanning beam. Claim 28, for example, reads as follows:

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> **28**. The transceiver as set forth in claim **1** wherein said transmit path circuitry transmits, in said downlink portion of said TDD frame, second downlink data traffic to substantially only wireless access devices within an other of said sectors using an other of said directed scanning beam signals.

C. Prosecution History of the '931 Patent

Petitioner's account of the prosecution history of the '931 patent is complete and accurate. (Petition at 6-9.)

V. PETITIONER'S PROPOSED CLAIM CONSTRUCTIONS SHOULD BE REJECTED

Petitioner requests that the Board construe the claim terms "sector" and "directed scanning beam signals[s]." (Petition at 10-13.) Petitioner, however, has given no reason that these claim terms should be construed, the meaning of these terms do not appear to be in dispute and construction of these terms would not resolve any controversy. Petitioner submits that these claim terms should be given their plain and ordinary meaning. Courts must construe "only those terms [that] need be construed that are in controversy, and only to the extent necessary to resolve the controversy." Vivid Technologies, 200 F.3d at 803.

VI. OVERVIEW OF THE PRIOR ART RELIED ON BY PETITIONER

A. EX1004 – Vornefeld

The Vornefeld article describes space-division multiple access (SDMA) techniques utilized in the wireless broadband HIPERLAN/2 system. As noted in the specification of the '931 patent, subscribers in an SDMA system "share a

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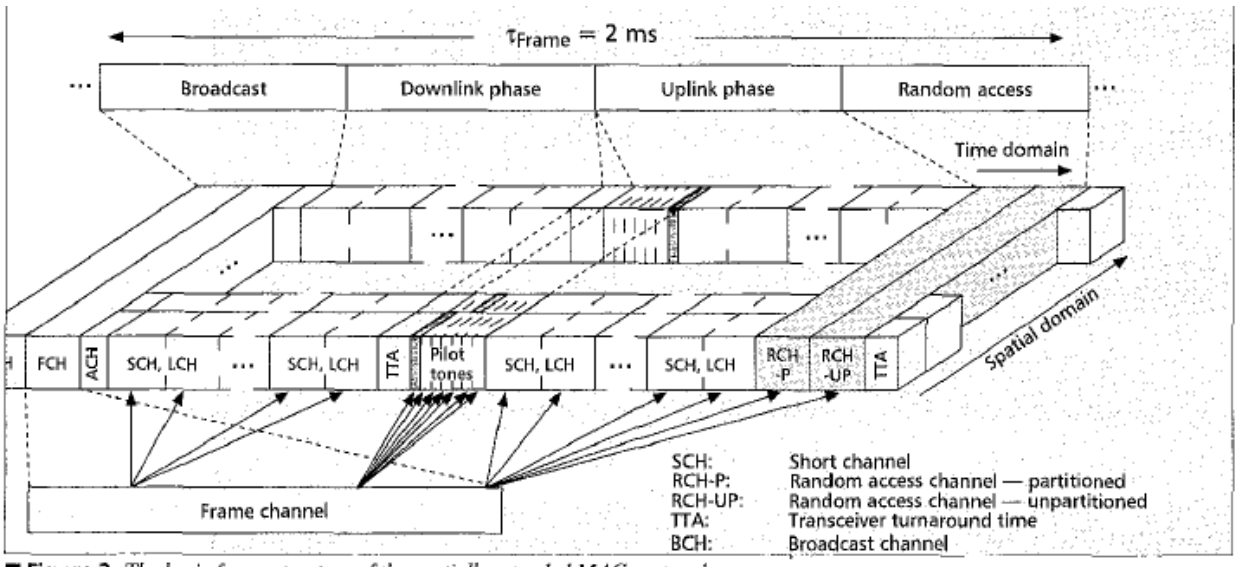
frequency but one or more physical channels are formed using antenna beam forming techniques." (EX1001 at 5:46-49.) Although Vornefeld discloses beam forming, the system is very different from the invention claimed in the '931 patent. (EX2001 at ¶ 41.)

Vornefeld's transmission frame structure is shown in Figure 3, reproduced below.



■ **Figure 3.** *The basic frame structure of the spatially extended MAC protocol.*

(EX1004 Figure 3.) At the start of the frame, Vornefeld discloses broadcasting BCH (broadcast channel) and FCH (frame channel) signals. The BCH and FCH signals provide synchronization information for the frame, as well as the fields designated for the uplink and downlink transmissions.

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> ***BCH*** — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.
>
> ***FCH*** — Used to transmit the information about the structure of the MAC frame for the up- and downlink phases. This channel is broadcast in the downlink direction. It contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive in.

(EX1004 at 54; EX2001 at 42.)

B. EX1005 – Andersson

Andersson describes a generic sectorized cellular radio system, which utilizes FDD frames, where the sector antenna(s) are used to send cell-wide, broadcast beacon signals. Andersson first splits the beacon signal and then processes the signal for transmission on the individual sector antennas. Alternatively, Andersson augments the sector antennas with an omni-directional antenna connected to the base station. The Andersson system is very different from the invention claims in the '931 patent. (EX2001 at 54.)

In contrast to Andersson, the '931 patent utilizes spread spectrum transmissions to address sector-based interference issues. The spread spectrum transmissions utilize broadcast/beacon signals using the same hardware (modems, transceivers, antennas, etc.) as used for the disclosed TDD beamforming wireless network. (Id. at ¶ 55.)

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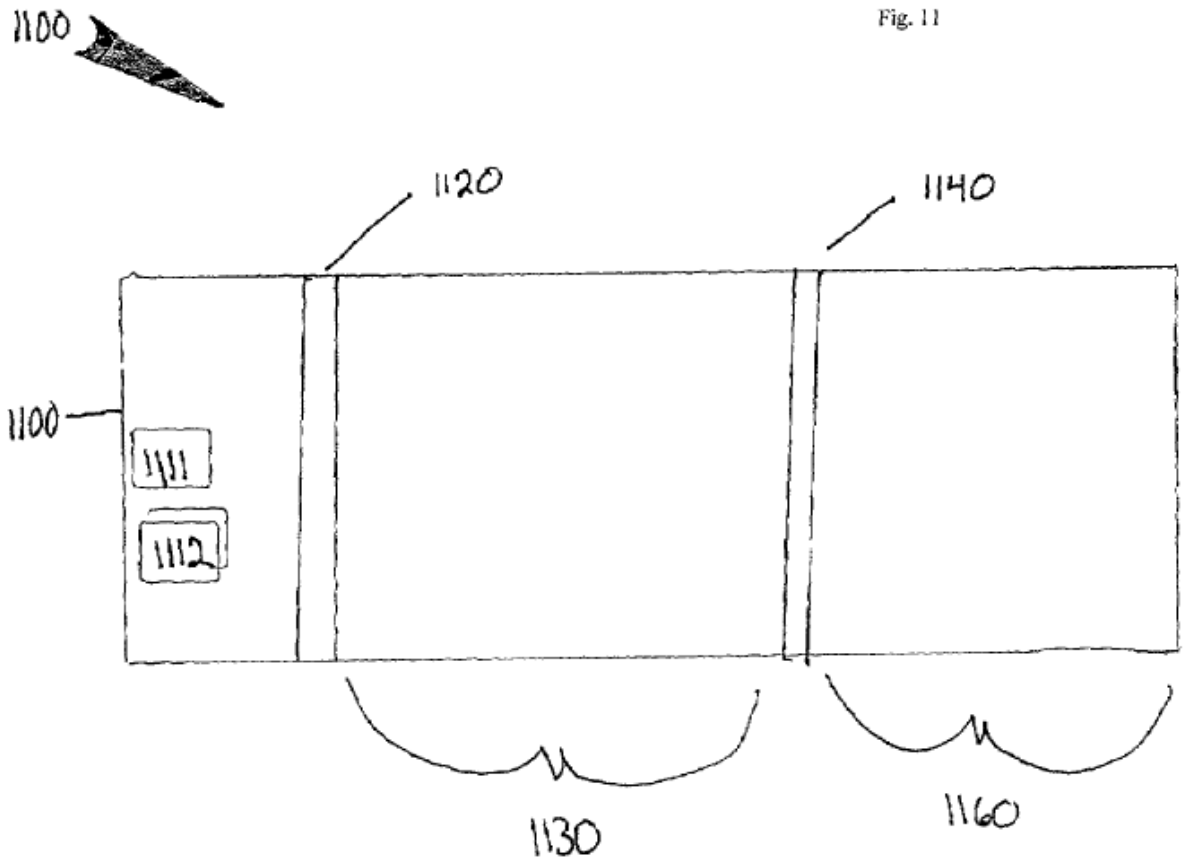
C. EX1006 – Ahy

Ahy discloses a point to multipoint communications system, notably a wireless communication system, and method for adaptively and dynamically optimizing various communication parameters. (Id. at ¶ 57.) Ahy's TDD frame is shown in Figure 11 of Ahy, reproduced below.



Ahy discloses that the TDD frame of Figure 11 includes a time-synchronization portion 1110, which is likely a typographical error and intended to be 1100, at the start of the frame. The synchronization portion includes a first symbol 1111 indicating the start of the frame and "a sequence of parameter setting

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values 112 for each CPE [consumer premises equipment] 130." The following information on the sequence of parameter setting values 112 is provided by Ahy:

> The time-synchronization portion **1110** includes a first symbol **1111** indicating the beginning of the TDD frame **1100**, and a sequence of parameter setting values **1112** for each CPE **130**. The BSC **120** uses the parameter setting values **1112** to inform each selected CPE **130** individually and separately of (a) the PHY and MAC parameters the BSC **120** is using to send messages to that selected CPE **130**, and (b) the PHY and MAC parameters the selected CPE **130** should use to send messages to the BSC **120** during its allocated part of the upstream portion **1160**.

(EX1006 at 15:11-20; EX2001 at ¶ 58.)

D. EX1007 – Newman

Newman teaches the basic design and operation of multi-beam, multi-antenna, sectorized, cellular communication system, i.e., a cellular system capable of beam forming transmissions. Newman does not, however, teach means or methods of optimizing the cellular system such as by maximizing the spectral efficiency between base stations and receivers (subscribers), methods of reducing inter- and intra-sector interference and adapting beam and link parameters for individual subscribers, among other differences from the disclosure of the '931 patent.

The '931 patent, in contrast, specifically teaches improved spectral efficiency, reduced signal interference, and selectively adapting beamforming

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parameters transmitted to subscribers using spread spectrum broadcast beam signals with beam maps containing optimized scanning beam information adapted from both link/channel quality and subscriber-specific characteristics, such as traffic patterns and guaranteed bit rate service level agreements (SLA).

VII. PETITONER'S CITED REFERENCES FAIL TO DISCLOSE, TEACH OR SUGGEST A "BEAM MAP CONTAINING SCANNING BEAM INFORMATION"

Dependent claims 2, 11 and 20 contain the claim limitation of "said broadcast beam signal further comprises a first beam map containing scanning beam information usable by said wireless devices to detect said directed scanning beam signals." (EX1001; claim 2.) Claims 3-9, 12-18 and 21-27 depend from claims 2, 11 and 20, respectively. Thus, claims 2-9, 11-18 and 21-27 all require this claim element. The prior art cited by Petitioner does not disclose a system with a start of frame beam map with scanning beam information.

A. Vornefeld Does Not Disclose a "Beam Map Containing Scanning Beam Information

Petitioner argues that the FCH signal broadcast at the start of the frame in Vornefeld "is equivalent to the claimed 'first beam map' in claim 2." (Petition at 26; EX1003 at 83-84.) Petitioner must argue that the FCH signal is "equivalent" because Vornefeld says nothing about a beam map containing scanning information, and nothing about scanning beam information usable by wireless devices to detect scanning beam signals.

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Further, the FCH signal cited by Petitioner is not "equivalent" to a first beam map. The BCH and FCH signals provide synchronization information for the frame, as well as the fields designated for the uplink and downlink transmissions.

> ***BCH*** — Conveys signaling information concerning the whole radio cell in the downlink direction. Announces the location of the FCH and RCH within the actual MAC frame. Every frame starts with a BCH.
>
> ***FCH*** — Used to transmit the information about the structure of the MAC frame for the up- and downlink phases. This channel is broadcast in the downlink direction. It contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive in.

(EX1004 at 54; EX2001 at 42.) The start of frame BCH and FCH signals do not provide a beam map with scanning beam information.

The FCH signal includes only information about the structure of the frame, i.e. the uplink (UL)/downlink (DL) configuration, meaning when the base station will be sending information and when it will be receiving information. The FCH signal includes no information about what scanning beam will be used to cover the sector, or when it will be used. This information would be necessary for a signal to serve as a "beam map." (EX2001 at 44.)

Further, in Vornefeld, beam forming is accomplished with the use of algorithms, not a start of frame beam map. "A beamforming algorithm computes a weight matrix for each time slot that adjusts the phases at the antenna elements to steer the main beam point direction toward the estimated DoA of the desired MT."

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(EX1004 at 53; EX2001 at ¶ 43.) Thus, Vornefeld actually teaches away from the beam map concept of the '931 patent.

In its Institution Decision (Paper 5), the Board determined that Petitioner had not provided "sufficient analysis to explain why one of ordinary skill in the art would understand the broadcast timeslot reservations of the LCH and SCH to be a *beam map* usable to *detect directed scanning beam signals*," and therefore had not demonstrated a reasonable likelihood of prevailing in establishing claims 2, 11 and 20 would have been obvious in view of Vornefeld and Andersson. (Decision at 18.) Petitioner did not provide such analysis because timeslot reservations for the subsequent LCH and SCH signals do not constitute beam map information indicating the specific beam(s) and their precise start times in the frame which are usable by the wireless access devices to detect the directed scanning beam signals. (EX2001 at ¶ 45.)

Further, as set forth in Expert Declaration of Kurt Humphrey, one of ordinary skill in the art would not and could not assume that that start of frame information would necessarily or inherently include a beam map. Beam forming and beam mapping are not inherent features of TDD signal transmission. (EX2001 at ¶¶ 46-48.

Accordingly, Vornefeld does not disclose a beam map as required by dependent claims 2, 11 and 20, nor anything equivalent to a beam map.

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B. Andersson Does Not Disclose a "Beam Map Containing Scanning Beam Information

Andersson does not disclose, and Petitioner does not argue that Andersson discloses, the beam map containing scanning beam information required by dependent claims 2, 11 and 20. (EX2001 at ¶ 56.)

C. Ahy Does Not Disclose a "Beam Map Containing Scanning Beam Information

Petitioner argues that the start of frame information disclosed in Ahy "teaches providing information usable by CPEs (e.g., wireless access devices) to detect directed scanning beam signals." (Petition at 58; EX1003 at 84.) Ahy, however, says nothing about directed scanning beam signals, and nothing about including a beam map containing scanning beam information in a broadcast beam signal. (EX2001 at ¶ 59.) Although Ahy discloses that the parameter setting values 1112 inform each selected CPE of PHY and MAC parameters, Ahy does not disclose what PHY and MAC parameters are sent, and says nothing about sending a beam map containing scanning beam information to each CPE that would allow the CPEs to detect directed scanning beam signals. (Id. at ¶ 58.)

Ahy's start of frame signal includes basic PHY and MAC parameters such as modulation format, FEC coding and message length primarily concerning frame and transmission formatting.,. (EX1006 at 4: 44-53; EX2001 at ¶ 60.) Ahy's start of frame signal includes no information about what scanning beam will

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be used to cover the sector, or when it will be used. This information would be necessary for the signal to include a "beam map" containing scanning beam information in a broadcast beam signal. (EX2001 at ¶ 60.)

Further, as noted by Mr. Humphrey, one of ordinary skill in the art would not and could not assume that that start of frame information disclosed in Ahy would necessarily or inherently include a beam map usable to detect directed scanning beam signals. (Id. at ¶ 61.)

Accordingly, Ahy does not disclose a start of frame beam map containing scanning beam information as required by dependent claims 2, 11 and 20, nor anything equivalent to such a beam map.

D. Newman Does Not Disclose a "Beam Map Containing Scanning Beam Information

Newman does not disclose, and Petitioner does not argue that Newman discloses, the beam map containing scanning beam information required by dependent claims 2, 11 and 20. (EX2001 at ¶ 55.)

E. Claims 2-9, 11-18 and 20-27 of the '931 are Patentable in view of the Cited Prior Art

Given that Petitioner has failed to provide prior art disclosing the claim elements of dependent claims 2, 11 and 20, and because claims 3-9, 12-18 and 21-27 depend from claims 2, 11 and 20, claims 2-9, 11-18 and 20-27 are patentable in view of the cited prior art.

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VIII. PETITONER'S CITED REFERENCES FAIL TO DISCLOSE, TEACH OR SUGGEST TRANSMITTING SECOND DOWNLINK DATA IN THE TDD FRAME TO A DIFFERENT SECTOR USING A DIFFERENT DIRECTED SCANNING BEAM SIGNAL

Dependent claims 28 and 29 (dependent from claims 1 and 19, respectively) include the limitation of transmitting, in the downlink portion of the TDD frame, second downlink data traffic to wireless access devices in a different sector with a different directed scanning beam. The prior art cited by Petitioner does not disclose this claim element.

A. Vornefeld Does Not Disclose Transmitting Second Downlink Data in the TDD Frame to a Different Sector Using a Different Directed Scanning Beam Signal

Petitioner argues that required elements of dependent claims 28 and 29 are disclosed by the "second data link" disclosed in Vornefeld. According to Petitioner, the second downlink data is shown in Figure 3 of the Vornefeld reference, as shown in Petitioner's annotated diagram shown below.

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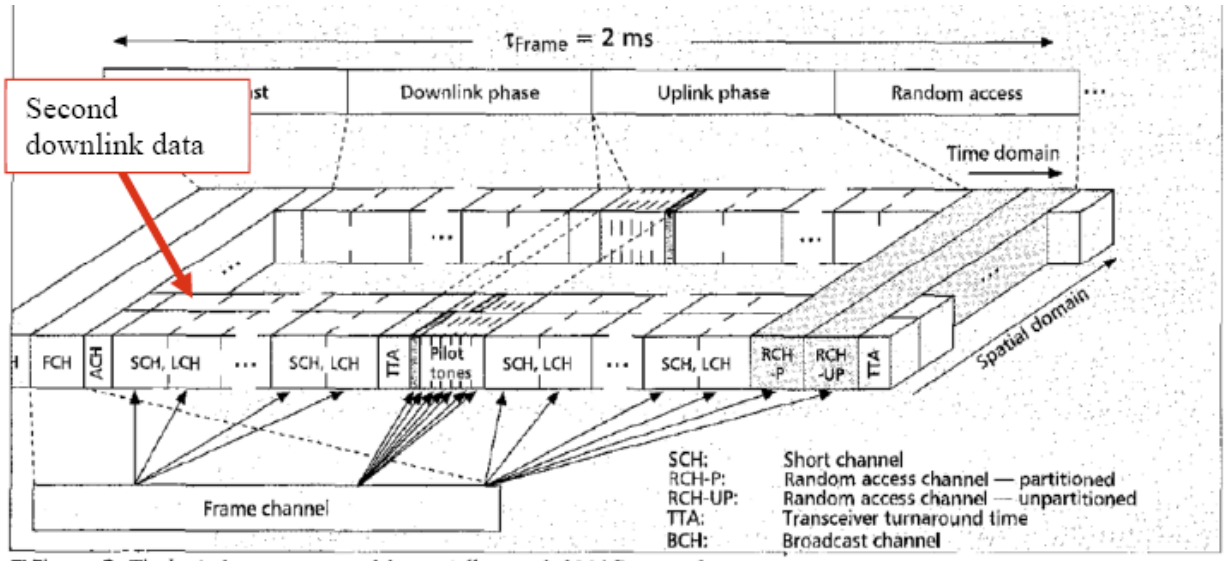

■ **Figure 3.** *The basic frame structure of the spatially extended MAC protocol.*

(Petition at 35 and 50; EX1003 at ¶ 218.) The second downlink data identified by Petitioner, however, is in a different, spatially-separated, simultaneous TDD frame but not necessarily in a different sector as required by Claims 28 and 29. Claims 28 and 29 require that the second downlink data traffic be transmitted in "said TDD frame," to wireless devices within another sector. This is not shown or disclosed in Vornefeld. (EX2001 at ¶ 51.)

In addition, Vornefeld does not disclose or teach using a different directed scanning beam signal within a TDD frame to transmit downlink data to a wireless device in another sector, as also required by dependent claims 28 and 29. Although Vornefeld discloses directive beams, Vornefeld does not discuss or disclose using different or multiple beams in the same TDD frame to transmit to devices in another sector. (EX2001 at ¶ 52.)

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Accordingly, Vornefeld does not disclose transmitting second downlink data traffic, in the downlink portion of the TDD frame, to wireless access devices in a different ("an other of said") sector using a different ("an other of said") directed scanning beam signal, as required by dependent claims 28 and 29.

B. Andersson Does Not Disclose Transmitting Second Downlink Data in the TDD Frame to a Different Sector Using a Different Directed Scanning Beam Signal

Anderson does not disclose, and Petitioner does not argue that Andersson discloses, the second downlink data limitations required by dependent claims 28 and 29. (EX2001 at ¶ 56.)

C. Ahy Does Not Disclose Transmitting Second Downlink Data in the TDD Frame to a Different Sector Using a Different Directed Scanning Beam Signal

Ahy also does not disclose, and Petitioner does not argue that Ahy discloses, the second downlink data limitations required by dependent claims 28 and 29. (EX2001 at ¶ 62.)

D. Newman Does Not Disclose Transmitting Second Downlink Data in the TDD Frame to a Different Sector Using a Different Directed Scanning Beam Signal

Newman does not disclose, and Petitioner does not argue that Newman discloses, the second downlink data limitations required by dependent claims 28 and 29.

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Under Ground 5, Petitioner states the following regarding claims 11-18 and 20-29: "For the same reasons given above with respect to claims 2-9, claims 11-18 and 20-29 are obvious over the combination of Newman, Ahy and Andersson." Claims 29 and 29, however, do not have the elements as any of claims 2-9. In addition, in his declaration, Mr. Proctor lists only Vornefeld as potentially disclosing the elements of claims 28 and 29. (See EX1003 at ¶¶ 218-19.) Thus, Petitioner has relied on only Vornefeld in its attempt to invalidate claims 28 and 29.

E. Claims 28 and 29 of the '931 Patent are Patentable in view of the Cited Prior Art

Given that Petitioner has failed to provide prior art disclosing the claim elements of dependent claims 28 and 29, these claims are patentable in view of the cited prior art.

IX. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board find claims 2-9, 11-18 and 20-29 of the '931 patent to be patentable in view of the prior art relied on by Petitioner.

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DATED: August 3, 2018

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that there are 4,661 words in this paper, excluding any table of contents, table of authorities, mandatory notices under 37 C.F.R. § 42.8, certificate of word count, certificate of service, or appendix of exhibits. This certification relies on the word count of the word-processing system used to prepare this paper.

DATED: August 3, 2018

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CERTIFICATE OF SERVICE

I hereby certify that on August 3, 2018, I caused a true and correct copy of the foregoing materials to be served via the Patent Office electronic filing system, and electronic service via email to the following attorneys of record pursuant to Petitioner's consent.

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