inform each selected CPE of the PHY and MAC parameters the BSC is using to send messages to that selected CPE, and the PHY and MAC parameters the selected CPE should use to send messages to the BSC during its allocated part of the upstream portion. *Id.* at 15:11–20.

3. Claims 1–3, 6, 7, 10–12, 15, 16, 19–21, 24, 25, 28, and 29

Independent claim 1 recites "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" ("broadcast beam signal" limitation). Petitioner contends that Vornefeld discloses this limitation through its description that each MAC frame starts with two broadcast channels, the broadcast channel (BCH) and the frame channel (FCH), and that the BCH contains signaling information concerning the whole radio cell in the downlink direction. Pet. 23. Petitioner asserts that because the signal concerns "the whole radio cell" it would have to cover multiple sectors and that the information is broadcast to inform all the terminals about their individual transmission and reception schedules for the next MAC frame. *Id.* at 23–24.

We have reviewed the cited evidence and we are not persuaded by Petitioner's contention that Vornefeld discloses the "broadcast beam signal" limitation. We agree with Petitioner that Vornefeld describes that the BCH and FCH are included in each MAC frame and that the BCH conveys information concerning the whole radio cell (i.e., more than one sector). *See* 1004, 52. But the cited sections of Vornefeld do not describe that a MAC frame (with the BCH information) is transmitted via a broadcast *beam* signal to devices in more than one sector. Rather, Vornefeld describes transmission of MAC frames using directive beams to devices in one sector. *See id.* at Fig. 2, 52–53. Although the devices may receive the same

PETITIONER NOKIA
Ex.1012

information, Petitioner does not support adequately its contention that Vornefeld discloses transmittal of a broadcast beam signal to wireless access devices within more than one sector.

We, therefore, determine Petitioner has not established a reasonable likelihood that the "broadcast beam signal" limitation recited in claim 1 (and its dependent claims 2, 3, 6, 7, and 28) is anticipated by Vornefeld. Independent claims 10 and 19 (and their dependent claims 11, 12, 15, 16, 20, 21, 24, 25, and 29) each set forth a similar limitation as the "broadcast beam signal" limitation. Petitioner cites to its analysis of claim 1 to support its contention that Vornefeld discloses these limitations. *See* Pet. 29–31. Thus, its analysis for these claims contains the same deficiencies as its analysis of claim 1.

For the foregoing reasons, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in establishing that claims 1–3, 6, 7, 10–12, 15, 16, 19–21, 24, 25, 28, and 29 are anticipated by Vornefeld.

4. Claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27

Petitioner relies on its analysis of claim 1 to meet the "broadcast beam signal" limitation (or substantially similar limitation) recited in these claims by virtue of their dependency from one of claims 1, 10, and 19. Petitioner does not set forth any analysis or argument why this limitation would have been obvious to one of ordinary skill in the art in view of the teachings of Ahy. Therefore, Petitioner fails to cure the deficiencies in Vornefeld discussed above and has not demonstrated a reasonable likelihood of prevailing in establishing claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 would have been obvious over the combination of Vornefeld and Ahy.

PETITIONER NOKIA
Ex.1012

C. Obviousness over Vornefeld and Andersson, and Obviousness over Vornefeld, Andersson, and Ahy

Petitioner contends that claims 1–3, 6, 7, 10–12, 15, 16, 19–21, 24, 25, 28, and 29 are unpatentable as obvious under 35 U.S.C. § 103(a) over Vornefeld and Andersson. Pet. 44–50. Petitioner further contends that claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 are unpatentable as obvious under 35 U.S.C. § 103(a) over Vornefeld, Andersson, and Ahy. Pet. 50–51. For the reasons that follow, Petitioner has demonstrated a reasonable likelihood of prevailing on its challenges as to claims 1, 3–10, 12–19, and 21–29. Petitioner fails to establish a reasonable likelihood of prevailing in establishing claims 2, 11, and 20 would have been obvious over the combination of Vornefeld and Andersson.

1. Overview of Andersson

Andersson describes adaptive sectorization to solve problems associated with sectorization of cells in cellular communication systems. Ex. 1005, 3:37–40, 4:31–34. A transceiver structure located at a base station is connected to a set of sector antennas and each sector antenna is used to cover a sector of the cell. *Id.* at 4:42–44; *see also* Fig. 2 (depicting an antenna configuration with six sectors). The beacon carrier is also connected to an omni-directional antenna, which provides the same coverage area as all of the sector antennas together. *Id.* at 4:58–60.

2. Claims 1, 3–10, 12–19, and 21–29

Petitioner contends the combination of Vornefeld and Andersson teaches the limitations recited in independent claim 1. Pet. 44–50 (citing *id.* at 19–25 for the analysis of the majority of the limitations of claim 1). In particular, Petitioner asserts Vornefeld discloses all of the limitations in claim 1. *Id.* at 19–25. Petitioner further asserts that to the extent Vornefeld

PETITIONER NOKIA
Ex.1012

does not disclose "a transceiver associated with a first of said plurality of base stations" and "[wherein said transmit circuitry] transmits, at a start of a TDD frame, a broadcast beam signal to wireless access devices within more than one of said sectors," these limitations are taught by Andersson. *Id.* at 44–50.

We determine that Petitioner demonstrates a reasonable likelihood of prevailing on its challenge based on the combination of Vornefeld and Andersson. Petitioner provides sufficient evidence that Vornefeld is a printed publication that qualifies as prior art. See Pet. 3–4; Ex. 1009, ¶¶ 26–27. Petitioner identifies adequately that Vornefeld teaches "a wireless access network comprising a plurality of base stations, each of said plurality of base stations capable of bidirectional time division duplex (TDD) communication with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network" through its description of a broadband wireless access system with base stations having multiple antenna beams electronically connected to MT locations and that the radio system operates on a TDD channel. *Id.* at 20. Petitioner supports adequately its assertion that one of ordinary skill in the art would understand Vornefeld's uniform linear array (ULA) antennas to be part of a transceiver through testimony of its witness, Mr. Proctor, which we credit. *Id.* at 20–21 (citing *e.g.*, Ex. 1003 ¶¶ 116–117). Additionally, Petitioner establishes sufficiently that Andersson also discloses the recited transceiver. *Id.* at 44–45. Although for the reasons discussed previously, we are not persuaded Vornefeld discloses the "broadcast beam signal limitation," Petitioner adequately shows the combination of Vornefeld and Andersson meets this limitation through Vornefeld's description of the broadcast BCH and FCH channels combined with Anderson's description of

PETITIONER NOKIA
Ex.1012

a broadcast beam signal used to transmit to more than one sector. *See id.* at 23–24, 45–47. Petitioner also sufficiently establishes that Vornefeld teaches the transmit path circuitry capable of transmitting directed scanning beam signals and the transmits, in a downlink portion of said TDD frame limitations set forth in claim 1. *See id.* at 21–26.

Additionally, Petitioner provides a sufficient rationale at this stage, and on the current record, to support its contention that one of ordinary skill in the art would have combined Vornefeld and Andersson. Petitioner asserts combining Andersson's method of beacon signal transmission to transmit Vornefeld's broadcast signals and the use of Andersson's sector based beamforming to transmit Vornefeld's downlink phase would have amounted to nothing more than the use of known techniques to improve similar methods in the same way and that the combination was obvious to try. *See id.* at 47–48 (citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007)). Petitioner supports its assertions with testimony of Mr. Proctor, which we credit. *See* Pet. 47–48 (citing Ex. 1003).

With respect to independent claims 10 and 19, and dependent claims 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25, 28, and 29 (which depend from claim 1, 10, or 19), we have reviewed Petitioner's analysis and determine, for purposes of this Decision and on the current record, that Petitioner establishes a reasonable likelihood it will prevail in demonstrating that the combination of Vornefeld and Andersson teaches the limitations recited in these claims. *See* Pet. 50 (citing *id.* at 25–35 for the analysis of the dependent claims). Petitioner establishes a reasonable likelihood it will prevail in demonstrating that the combination of Vornefeld, Andersson, and Ahy teaches the limitations recited in dependent claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 (which depend from claim 1, 10, or 19), and provides

PETITIONER NOKIA
Ex.1012

sufficient reasoning, on the current record, why one of ordinary skill in the art would have combined Ahy with Vornefeld and Andersson. *See* Pet. 50–51 (citing *id.* at 35–44 for the analysis of these claims).

For the foregoing reasons, we are persuaded Petitioner has demonstrated a reasonable likelihood of prevailing in establishing that claims 1, 3, 6, 7, 10, 12, 15, 16, 19, 21, 24, 25, 28, and 29 would have been obvious over the combination of Vornefeld and Andersson. We are further persuaded Petitioner has demonstrated a reasonable likelihood of prevailing in establishing that claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 would have been obvious over the combination of Vornefeld, Andersson, and Ahy.

3. Claims 2, 11, and 20

Claim 2 recites the broadcast beam signal further comprises "a first beam map containing scanning beam information usable by said wireless access device to detect said directed scanning beam signals." Claims 11 and 20 set forth similar limitations. Petitioner contends Vornefeld discloses this limitation. Pet. 26; *see also id.* at 50 (citing to the analysis of "Ground 1" to support the assertion claims 2, 11, and 20 are obvious over Vornefeld and Andersson). In particular, Petitioner identifies the FCH described in Vornefeld as equivalent to the claimed "first beam map" because Vornefeld describes the FCH is broadcast in the downlink direction and contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive. *Id.* at 26.

We have reviewed Petitioner's analysis and cited evidence and find Petitioner does not establish a reasonable likelihood that Vornefeld discloses the recited "first beam map" usable to detect directed scanning beam signals. Vornefeld describes the FCH is used to transmit information about the structure of the MAC frame. Ex. 1004, 54. We agree with Petitioner the

PETITIONER NOKIA
Ex.1012

FCH includes announcements and reservations of the long and short transport channels for the individual MTs to transmit/receive. *See id.* at 54. However, we find Vornefeld describes the long channels (LCH) and short channels (SCH) as being channel slots in a MAC frame. *See id.* at Fig. 2, 54. Petitioner does not provide 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*. Because Petitioner fails to provide an adequate analysis, we determine Petitioner has not demonstrated a reasonable likelihood of prevailing in establishing claims 2, 11, and 20 would have been obvious over Vornefeld and Andersson.

D. Obviousness over Newman, Andersson, and Ahy

Petitioner contends that claims 1–29 are unpatentable as obvious under 35 U.S.C. § 103(a) over Newman, Ahy, and Andersson. Pet. 51–63. For the reasons that follow, Petitioner has demonstrated a reasonable likelihood of prevailing on this grounds as to claims 1, 3–10, 12–18, and 28. Petitioner fails to establish a reasonable likelihood of prevailing on this ground as to claims 2, 11, 19–27, and 29.

1. Overview of Newman

Newman describes a multi-beam antenna system for communicating with mobile users. *Id.* at 1:4–6. The multi-beam communication system includes a sector antenna having a beamwidth providing sector coverage and a transmitter and a receiver system for receiving user signals from a user located in the sector. Ex. 1007, 2:10–14; *see also id.* at 4:5–6. A sector antenna has a beamwidth effective to provide coverage of a 120 degree azimuth sector. *Id.* at 4:12–15. The antenna system further includes a multi-beam antenna, which may comprise four side-by-side vertical arrays of

PETITIONER NOKIA
Ex.1012

dipoles or other radiating element arrangements suitable for providing four antenna beams, each having a beam width narrower than the 120 degree sector and aligned so that the four beams collectively cover at least a portion of the sector. *Id.* at 4:35–42. The beams may be provided with the inclusion of a suitable beam forming network. *Id.* at 4:47–50. Access to the four beams of the multi-beam antenna is provided by operation of the beam forming network, which may be included as part of the multi-beam antenna. *Id.* at 10:35–38. With this arrangement, communication with a particular user can be enhanced by a significant increase in transmitted signal strength, for example, by transmitting to the user via a narrow beam instead of the sector beam. *Id.* at 38–42.

2. Claims 1, 3–10, 12–18, and 28

Petitioner contends the combination of Newman, Ahy, and Andersson teaches the limitations set forth in claim 1. Pet. 51–58. In particular, Petitioner relies on Newman to teach the transmit circuitry capable of transmitting directed scanning beam signals limitation. *Id.* at 53–55. Petitioner relies on the combination of Newman and Ahy to meet the preamble and the transmits downlink data traffic using one of the directed scanning beam limitations. *See id.* at 51–53, 57–58. Petitioner asserts combining the teachings of Ahy and Newman with Andersson's description of a broadcast beam signal used to transmit to more than one sector teaches the "broadcast beam signal" limitation. *Id.* at 56–57.

We determine that Petitioner establishes a reasonable likelihood that the combination of Newman, Ahy, and Andersson teaches the limitations recited in claim 1. For example, Petitioner adequately shows the combination of Newman's multi-beam antenna system with Ahy's disclosure of a BSC communicating with CPEs using TDD frames teaches

PETITIONER NOKIA
Ex.1012

the preamble limitation. *See id.* at 51–53. Petitioner shows sufficiently that Newman's description of a multi-beam antenna in a beam forming network for transmission and reception of signals to and from users discloses "transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site." *Id.* at 53–55. Petitioner also establishes sufficiently that the remaining limitations are taught by claim 1. *See id.* at 55–58. Additionally, we determine Petitioner's stated reason for combining Newman, Ahy, and Andersson—use of known techniques to improve a similar device in a similar way to yield predictable results (predictable modification)—is sufficient rationale on the current record and at this stage of the proceeding. *See id.* at 52–53, 56–57. In reaching our determination, we credit the testimony of Petitioner's witness, Mr. Proctor. *See* Ex. 1003 ¶¶ 124, 139–140, 142–143.

With respect to independent claim 10 and dependent claims 3–9, 12–18, and 28 (which depend from claim 1 or 10), we have reviewed Petitioner's analysis and determine, for purposes of this Decision and on the current record, that Petitioner supports sufficiently its contentions that the combination of Newman, Andersson, and Ahy teaches the limitations recited in these claims. *See* Pet. 58–63.

For the foregoing reasons, we are persuaded Petitioner has demonstrated a reasonable likelihood of prevailing in establishing that claims 1, 3–10, 12–18, and 28 would have been obvious over the combination of Newman, Andersson, and Ahy.

3. Claims 19–27 and 29

PETITIONER NOKIA
Ex.1012

Petitioner contends claim 19 is obvious over the combination of Newman, Ahy, and Anderson for the same reasons given with respect to claim 1. *Id.* at 63. However, claim 19 recites "the broadcast beam signal comprising a start of frame field capable of synchronizing receivers in said wireless access devices," a limitation which does not appear in claim 1. Petitioner does not explain in its analysis of claim 1 how the cited references teach a start of frame field capable of synchronizing receivers in said wireless access devices.[2] *See* Pet. 51–58. Accordingly, Petitioner fails to establish a reasonable likelihood of prevailing in establishing claim 19, and its dependent claims 20–27 and 29, would have been obvious over the combination of Newman, Ahy, and Andersson.

4. Claims 2 and 11

Petitioner relies on Ahy to disclose "a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals," as recited in claims 2 and 11. Pet. 58; *see also id.* at 63 (relying on the analysis of claim 2 for the limitations set forth in claim 11). In particular, Petitioner points to Ahy's description that the start of each TDD frame includes a first parameter value for transmission by the BSC and a second parameter value for transmission by the CPE, which allows the BSC and the CPE to transmit using different sets of parameters. *Id.* at 58. Petitioner further points to Ahy's disclosure that the first part of the frame includes a value for the length for subsequent downstream payload elements for each CPE. *Id.* But Petitioner does not

[2] Petitioner does identify Ahy's description of a TDD frame including a time-synchronization portion as disclosing the "start of frame field" recited in claim 1, but does not assert this field is capable of synchronizing receivers in wireless devices as recited in claim 19. *See* Pet. 55–56.

PETITIONER NOKIA
Ex.1012

provide sufficient analysis to explain why one of ordinary skill in the art would understand the transmission of parameter values and the length of the downstream payload element to disclose a *beam map* usable to *detect directed scanning beam signals*. Accordingly, we conclude Petitioner has not demonstrated a reasonable likelihood of prevailing in establishing claims 2 and 11 would have been obvious over Newman, Andersson, and Ahy.

III. CONCLUSION

Petitioner has demonstrated a reasonable likelihood of prevailing on its challenges to claims 1, 3–10, 12–19, and 21–29 of the '931 patent as set forth above. Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenges to claims 2, 11, and 20.

At this stage of the proceeding, we have not made a final determination as to the patentability of any of these challenged claims or the construction of any claim term.

IV. ORDER

It is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted on the following grounds:

(1) Obviousness of claims 1, 3, 6, 7, 10, 12, 15, 16, 19, 21, 24, 25, 28, and 29 over Vornefeld and Andersson;

(2) Obviousness of claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 over Vornefeld, Andersson, and Ahy;

(3) Obviousness of claims 1, 3–10, 12–18, and 28 over Newman, Ahy, and Andersson;

FURTHER ORDERED that no review is instituted based on any other grounds of unpatentability; and

PETITIONER NOKIA
Ex.1012

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this decision.

PETITIONER:

Robert C. Hilton
George B. Davis
MCGUIREWOODS LLP
rhilton@mcguirewoods.com
gdavis@mcguirewoods.com

PATENT OWNER:

Timothy Devlin
Anthony E. Dowell
Devlin Law Firm LLC
tdevlin@devlinlawfirm.com
aedowell@dowellip.com

PETITIONER NOKIA
Ex.1012

Trials@uspto.gov
571.272.7822

Paper 43
Entered: March 7, 2019

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 IPR2017-01889
Patent 7,230,931 B2

Before MELISSA A. HAAPALA, *Acting Vice Chief Administrative Patent Judge,* and KALYAN K. DESHPANDE and DAVID M. KOHUT, *Administrative Patent Judges.*

HAAPALA, *Acting Vice Chief Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

PETITIONER NOKIA
Ex.1012

Sprint Spectrum L.P. ("Petitioner") filed a Petition pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–29 of U.S. Patent No. 7,230,931 B2 ("the '931 patent"). Paper 1 ("Pet."). General Access Solutions, Ltd. ("Patent Owner") did not file a Preliminary Response. Applying the standard set forth in 35 U.S.C. § 314(a), we granted Petitioner's request to institute an *inter partes* review of all challenged claims. Papers 5 ("Dec") (instituting on claims 1, 3–10, 12–19, and 21–29); Paper 8 (instituting on remaining challenged claims 2, 11, and 20 and modifying our initial institution decision to include all of the grounds presented in the Petition).

During the trial, Patent Owner timely filed a Response (Paper 25, "PO Resp."), to which Petitioner timely filed a Reply (Paper 29, "Reply"). Patent Owner further submitted a Sur-Reply (Paper 34, "Sur-Reply") to Petitioner's Reply. An oral hearing was held on December 6, 2018, and a copy of the transcript was entered into the record. Paper 41 ("Tr.").

Following the oral hearing and pursuant to our authorization (Paper 37), both parties each submitted claim construction briefs (Papers 38, 39); each party also submitted a reply to the other party's brief (Papers 40, 41).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of the claims on which we instituted trial. For the reasons that follow, we enter adverse judgement against Patent Owner with respect to independent claims 1, 10, and 19 of the '931 patent and we determine that Petitioner has not shown that dependent claims 2–9, 11–18, and 20–29 are unpatentable.

PETITIONER NOKIA
Ex.1012

I. BACKGROUND

A. The '931 Patent (Ex. 1001)

The '931 patent describes a burst packet transmission media access system using selectively adaptable beam forming in a fixed wireless access network. Ex. 1001, 3:28–31. The fixed wireless network may comprise a plurality of transceiver base stations that transmit forward channel (downlink or downstream) broadband signals to subscriber premises and receive reverse channel (uplink or upstream) broadband signals from subscriber premises. *Id.* at Fig. 1, 11:57–64. Each of the transceiver base stations may cover a cell site that is divided into a plurality of sectors. *Id.* at Fig. 2, 12:25–27. Pre-programmed sets of directed beam patterns are used to cover a cell in an angular fashion, which is referred to as "beam scanning." *Id.* at 28:1–3. The base station establishes a set of beams to cover the cell and based on physical location in the sector, a specific beam is used to communicate with one or more subscribers that lie in that sector. *Id.* at 28:9–12.

Figure 14 of the '931 patent is depicted below:

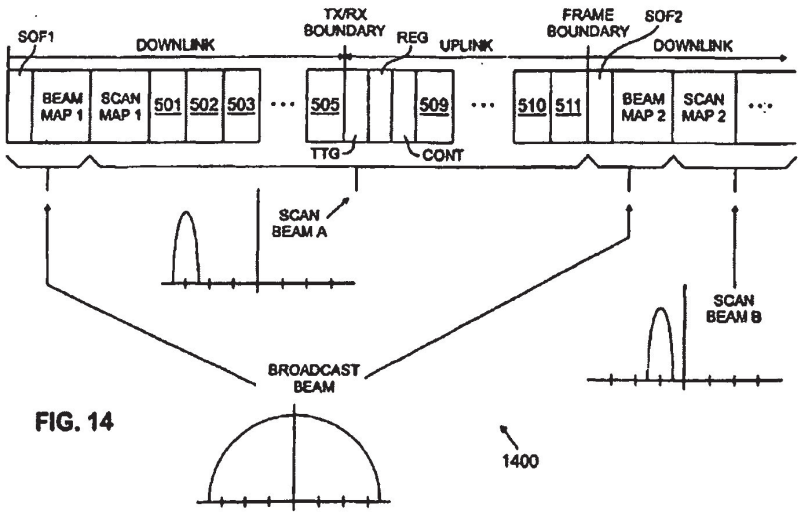


FIG. 14

PETITIONER NOKIA
Ex.1012

Figure 14 illustrates the use of broadcast beams and scanning beams in exemplary time division duplex (TDD) signal 1400. *Id.* at 29:3–5. TDD signal 1400 comprises a first TDD frame having a downlink portion comprising a first start-of-frame field (SOF1), a first beam map field (Beam Map 1), and a first scan map field (Scan Map 1). *Id.* at 29:6–10. The first TDD frame is followed by a second TDD frame, which comprises a second start-of-frame field (SOF2), a second beam map field (Beam Map 2), and a second scan map field (Scan Map 2). *Id.* at 29:21–25. A spread spectrum Broadcast Beam is used to transmit start-of-frame fields SOF1, SOF2 and beam map fields Beam Map 1, Beam Map 2 in each TDD frame. *Id.* at 29:26–30. Distinct scan beams (Scan Beam A and Scan Beam B) are used to transmit the scan map fields (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.

Broadcast Beam Maps 1, 2 provide data indicating which scanning beam (or beams) are used at which time for the frame and also transmits a synchronization field so that all subscribers can maintain synchronization. *Id.* at 29:34–36, 29:47–50. Scanning Beam Maps A, B provides the uplink and downlink map, which state at which time in the frame, using the scanning beam described in the associated Broadcast Beam Map, the downlink modulation groups and specific uplink slots are allocated for the frame using the specific scanning beam. *Id.* at 29:38–43.

B. Illustrative Claims

Claims 1, 10, and 19 are independent claims. Claims 1 and 2 are illustrative of the subject matter at issue:

> 1. For use in a wireless access network comprising a plurality of base stations, each of said plurality of base stations

PETITIONER NOKIA
Ex.1012

capable of bidirectional time division duplex (TDD) communications with wireless access devices disposed at a plurality of subscriber premises in an associated cell site of said wireless access network, a transceiver associated with a first of said plurality of base stations comprising:

transmit path circuitry associated with a beam forming network capable of transmitting directed scanning beam signals each directed to substantially only wireless access devices within a different one of a plurality of sectors of a cell site associated with said 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

subsequently transmits in a downlink portion of said TDD frame, first downlink data traffic to substantially only wireless access devices within one of said sectors using one of said directed scanning beam signals.

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.

C. Instituted Grounds of Unpatentability

Petitioner relies on the following references:

1. U. Vornefeld, et al., *SDMA Techniques for Wireless ATM*, IEEE Communications Magazine (Nov. 1999) ("Vornefeld") (Ex. 1004).
2. U.S. Patent No. 6,470,177 B1, issued Oct. 22, 2002 ("Andersson") (Ex. 1005).
3. U.S. Patent No. 7,366,133 B1, issued Apr. 29, 2008 ("Ahy") (Ex. 1006).[1]

[1] We note the first named inventor of U.S. Patent 7,366,133 is Majidi-Ahy. Ex. 1006, 1. However, as both parties refer to this reference as "Ahy" (*see e.g.*, Pet. 17; PO Resp. 18), we use the same shortened form for consistency and to avoid confusion.

PETITIONER NOKIA
Ex.1012

4. U.S. Patent No. 5,684,491, issued Nov. 4, 1997 ("Newman") (Ex. 1007).

We instituted trial under 35 U.S.C. §§ 102(b) and 103(a) over the following combinations of references:

Reference(s)	Basis	Claims
Vornefeld	35 U.S.C. § 102(b)	1–3, 6, 7, 10–12, 15, 16, 19–21, 24, 25, 28, 29
Vornefeld and Ahy	35 U.S.C. § 103(a)	4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27
Vornefeld and Andersson	35 U.S.C. § 103(a)	1–3, 6, 7, 10–12, 15, 16, 19–21, 24, 25, 28, 29
Vornefeld, Andersson, and Ahy	35 U.S.C. § 103(a)	4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27
Newman, Ahy, and Andersson	35 U.S.C. § 103(a)	1–29

In support of its contentions, Petitioner submitted a declaration by its witness, Mr. James A. Proctor, Jr. Ex. 1003. In response, Patent Owner submitted a declaration by its witness, Kurt D. Humphrey. Ex. 2001. Both witnesses were cross-examined during the trial, and transcripts of their depositions are in the record. Ex. 1011 (Proctor deposition); Ex. 1012 (Humphrey deposition).

D. Related Proceedings

Petitioner and Patent Owner identify the following district court litigation involving the '931 patent: *General Access Sol., Ltd. V. Sprint Spectrum L.P.*, Case No. 2:16-cv-465-RWS (E.D. Tx.). Pet. 2; Paper 3, 1.

E. Real Parties in Interest

Petitioner identifies the following additional real parties in interest: Virgin Mobile USA, L.P.; Boost Mobile, LLC; Clearwire Corporation;

PETITIONER NOKIA
Ex.1012

Clearwire Communications LLC; and Clear Wireless LLC. Pet. 1. Petitioner further identifies Sprint Corporation as a real party in interest only for purposes of this proceeding and only to the extent Patent Owner contends the separate legal entity should be named a real party in interest in this proceeding. *Id.* Patent Owner does not identify any additional real parties in interest. *See* Paper 3, 1.

II. ADVERSE JUDGEMENT

Both in its Response and at the oral hearing, Patent Owner conceded the unpatentability of independent claims 1, 10, and 19. PO Resp. 2 n.2 ("Patent Owner does not herein dispute the patentability of the independent claims 1, 10, and 19 of the '931 patent."); Tr. 56:19–57:9 ("[Vornefeld] knocks out our independent claims. We concede that."). A concession of unpatentability is construed as a request for entry of adverse judgement. 37 C.F.R. § 42.73(b)(3). The request is granted.

III. ANALYSIS

A. Legal Principles

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Although the elements must be arranged or combined in the same way as in the claim, "the reference need not satisfy an *ipsissimis verbis* test," i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009).

A claim is unpatentable under § 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

PETITIONER NOKIA
Ex.1012

person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of non-obviousness, i.e., secondary considerations such as commercial success, long felt but unsolved needs, and failure of others.[2] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). The obviousness inquiry further requires an analysis of "whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness")).

B. Level of Ordinary Skill in the Art

Petitioner asserts a person of ordinary skill in the art at the time of the filing date of the '931 patent would have had at least a Bachelor of Science in Computer Science, Computer Engineering, Electrical Engineering, or an equivalent field, and at least two years of academic or industry experience in any type of wireless networking field. Pet. 9–10. Patent Owner asserts a person or ordinary skill would have been a telecommunications engineer or technologist working in the wireless networking sector and have a least a bachelor's degree in engineering and relevant work experience, including at

[2] The record does not include arguments or evidence regarding objective indicia of non-obviousness.

PETITIONER NOKIA
Ex.1012

least two years of academic, practical, or industry experience in the wireless networking and/or telecommunications field. PO Resp. 6.

Our decision does not turn on the minor differences between the definitions. Both Petitioner and Patent Owner advocate a similar level of experience and both agree that a person of ordinary skill would have a bachelor's degree in engineering. We accept the level of skill advocated by Petitioner as the identified undergraduate academic degrees are consistent with the prior art of record.

C. Claim Construction

In an *inter partes* review, based on a petition filed before November 13, 2018, claims of an unexpired patent are interpreted using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b) (2017);[3] *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, "words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history." *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016).

1. "a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals"

This limitation is recited by dependent claims 2, 11, and 20. After review of the parties' briefing and based on arguments made at the oral hearing, we determined the meaning of the recited "beam map" is at issue in

[3] A recent amendment to this rule does not apply here because the Petition was filed before November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018).

PETITIONER NOKIA
Ex.1012

this proceeding. Because neither party had set forth an explicit construction for this term, during the oral hearing we authorized each party to file an additional brief setting forth the party's proposed construction and also authorized each party to file a response brief to the other party's proposed construction. Paper 37. Both parties submitted the additional briefs and response briefs. *See* Papers 39, 40 (Petitioner's briefs); Papers 38, 41 (Patent Owner's briefs).

Petitioner asserts we should construe "a first beam map" as "scheduling information for one or more beams." Paper 39, 1. In support of its construction, Petitioner asserts the beam map is part of the broadcast beam shown in Figure 14 and the description of a beam map in the corresponding portion of the specification references scheduling information associated with the beam map. *Id.* at 2 (citing Ex. 1001, 29:34–36). Petitioner asserts the scheduling information that forms a beam map comprises information about one or more beams that are transmitted in the frame and that the beam maps "provide data indicating which beam (or beams) are used at which time." *Id.* at 3 (citing Ex. 1001, 29:34–36).

Patent Owner initially proposes we construe "a first beam map" as "scanning beam information contained in the broadcast beam signal that enables wireless access devices to detect a particular directed scanning beam signal." Paper 38, 1. In its Opposition, Patent Owner states it does not disagree with Petitioner's proposed construction and that it is suitable for the claimed "beam map." Paper 41, 1. Patent Owner further asserts that the "first beam map" at issue in claims 2, 11, and 20 is significantly narrower, and requires that the beam map enable devices to detect a particular scanning beam. *Id.*

PETITIONER NOKIA
Ex.1012

Petitioner does not dispute that claims 2, 11, and 20 require the elements of Patent Owner's proposed construction because those elements are already found in the claims. Paper 40, 1. Petitioner asserts the problem with Patent Owner's initial construction is that it is redundant and renders the remaining terms of the claims superfluous. *Id.*

The '931 patent describes two different types of beam maps: broadcast beam maps and scanning beam maps. Ex. 1001, 29:26–43. A broadcast beam is used to transmit the broadcast beam map (Beam Map 1 and Beam Map 2) and distinct scan beams are used to transmit the scan map fields (Scan Beam A, Scan Beam B). *Id.* at Fig. 14, 29:26–33. Both parties assert that the "first beam map" recited in claims 2, 11, and 20 refers to the broadcast beam map. *See* Paper 38, 2 (Patent Owner's assertion that the first beam map "clearly means the Broadcast Beam Map portion of the definition of a generic "beam map."); Paper 39, 2 (Petitioner's assertion that the beam map "is a part of the broadcast beam (see Fig. 14), and the description of a beam map in the corresponding portion of the specification also references the scheduling information associated with the beam map."). Because claims 2, 11, and 20 all set forth the "first beam map" is a component of the "broadcast beam signal," we agree with the parties that the "first beam map" refers to a broadcast beam map.

We are persuaded that Petitioner's proposed construction of a "first beam map" is consistent with the plain meaning of a broadcast beam map in the context of the disclosure of the '931 patent. The '931 patent describes transmission of map information for beam scheduling via a spread spectrum broadcast beam. *See* Ex. 1001, 28:56; 29:34–35. Patent Owner agrees that Petitioner's proposed construction for "a first beam map" is a suitable

PETITIONER NOKIA
Ex.1012

definition. Paper 41, 1. Accordingly, we construe "first beam map" as "scheduling information for one or more beams."

As noted by both parties, claims 2, 11, and 20 further require that the "first beam map" contain "scanning beam information usable by said wireless access device to detect said directed scanning beam." *See* Papers 40, 2; 41, 1. Petitioner argues the scanning beam information

> may include information that 'identifies a downlink time slot during which one of said directed scanning beam signals transmits said downlink data traffic,' (claim 3), information that 'identifies at least one modulation format associated with one of said directed scanning beam signals' (claim 4), or information that 'identifies at least one forward error correction code level associated with one of said directed scanning beam signals' (claim 5).

Paper 40, 2–3. Petitioner asserts that Patent Owner's arguments limit "beam map" to a specific embodiment (such as the "Frame Beam map and Super-Frame Beam Map embodiment) and this provides reason to reject Patent Owner's construction. *Id.* at 3; *see also* Reply 9–11 (similarly asserting that Patent Owner's arguments that a first beam map necessary includes information about what scanning beam will be used improperly confine the claim to a specific embodiment). Petitioner argues that the '931 patent includes description of another embodiment in which the scanning beam information identifies a downlink time slot in the downlink portion during which the at least one directed scanning beam transmits the downlink traffic. Reply 11 (citing Ex. 1001, 9:40–44).

Patent Owner asserts that scanning beam detection information is different from scanning beam uplink/downlink/modulation information. *Id.* Patent Owner cites to several examples in the disclosure that provide data to enable a device to detect a particular scanning beam signal. Paper 38, 3

PETITIONER NOKIA
Ex.1012

(citing Ex. 1001, 29:34–36, 29:51–55, 29:66–30:2). Patent Owner argues that information about which scanning beam will be used to cover the sector and when it will be used is necessary for a signal to serve as a beam map. PO Resp. 21, 24 (citing Ex. 2001 ¶ 44). Patent Owner argues that timeslot reservations do not constitute beam map information including the specific beam(s) and their precise start times in the frames which are useable by the wireless access devices to detect the directed scanning beam signals. *Id.* at 25 (citing Ex. 2001 ¶ 45).

We are not persuaded by Petitioner's arguments that the embodiment in which the scanning beam information identifies a downlink portion for transmission relates to the claimed scanning beam information useable to *detect* said directed scanning beam. Rather, the '931 patent discloses explicitly that the embodiment in which the scanning beam information identifies a downlink time slot is "another embodiment" than the embodiment set forth in claims 2, 9, and 11 in which the beam map contains scanning beam information usable to detect the directed scanning beam. *See* Ex. 1001, 9:35–44 (first describing the embodiment recited in claims 2, 9, and 11, and then describing "another embodiment" in which the scanning beam information identifies a downlink time slot). Thus, although as set forth in claim 3 (by virtue of its dependency from claim 2) the scanning beam information can include both types of information (information usable to detect directed scanning beam signals and identification of a downlink time slot), the disclosure of the '931 patent makes clear the information that identifies a downlink time slot is different than the information usable to detect directed scanning beam signals.

Furthermore, we determine Patent Owner's arguments—that the scanning beam information usable to detect the scanning beam signals must

PETITIONER NOKIA
Ex.1012

include information about which scanning beam will be used—are not an improper attempt to limit the claim language to a specific embodiment. As explained above and undisputed by the parties, the "first beam map" is a broadcast beam map. The '931 patent describes the information contained in the broadcast beam map as "data indicating which scanning beam (or beams) are used at which time." *See* Ex. 1001, 29:34–36. Petitioner cites to the same disclosure in support of its construction that a beam map is scheduling information for one or more beams. *See* Paper 39, 3 (citing Ex. 1001, 29:34–36). The other sections in the '931 patent describing the broadcast beam map all explain that the map contains information that informs the subscriber (wireless access) device which scanning beam is used and when (frame time) in which each beam starts. *See* Ex. 1001, 29:51–55, 29:66–30:2. We agree with Patent Owner that this information is what enables a device to detect a particular scanning beam. *See* Paper 38, 3.

We are mindful that claims must be interpreted in view of the specification without importing limitations from the specification unnecessarily. *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369 (Fed. Cir. 2003). However, the disclosure of the '931 patent consistently describes that the broadcast beam map is scheduling information that indicates which scanning beam is used at which time. *See* Ex. 1001, 29:34–36, 29:51–55, 29:66–30:2. The correct inquiry in giving a claim term its broadest reasonable interpretation in light of the specification is an interpretation that corresponds with what and how the inventor describes his invention in the specification. *In re Smith Int'l*, 871 F.3d 1375, 1382–83 (Fed. Cir. 2017). Consistent with the description set forth in the '931 patent, our complete construction of "a first beam map containing scanning beam information usable by said wireless access devices to detect said directed

PETITIONER NOKIA
Ex.1012

scanning beam signals" is "scheduling information for one or more beams that provides data indicating which scanning beam is used at which time."

2. Other Terms

Petitioner proposes constructions for "sector" and "directed scanning beam signal(s)," both terms which appear in independent claims 1, 10, and 19. Pet. 10–13. Patent Owner asserts that the meaning of these terms do not appear to be in dispute and construction of these terms would not resolve any controversy. PO Resp. 15.

We agree with Patent Owner that these terms are not in controversy and, accordingly, determine that we need not explicitly construe these terms to resolve the issues before us. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that "only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy").

D. Anticipation by Vornefeld and Obviousness over Vornefeld and Andersson

Petitioner challenges claims 1–3, 6, 7, 10–12, 15, 16, 19–21, 24, 25, 28, and 29 as anticipated under 35 U.S.C. § 102(b) by Vornefeld. Pet. 19–35. Petitioner further challenges these claims as obvious under 35 U.S.C. § 103(a) over Vornefeld and Andersson. *Id.* at 44–50.

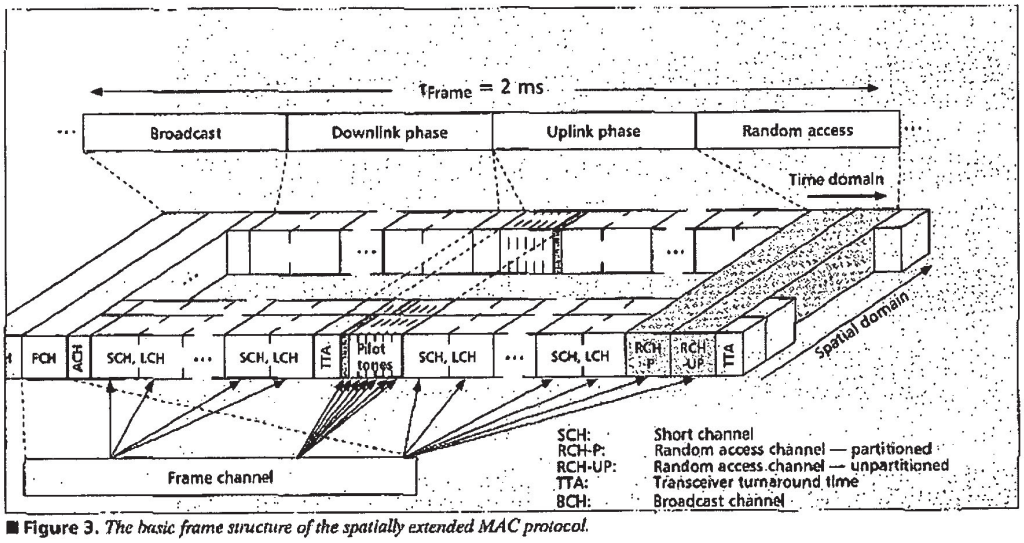
1. Scope and Content of Vornefeld

Vornefeld describes space-division multiple access (SDMA) techniques in the context of the HIPERLAN/2 system, which provides wireless network broadband services with guaranteed quality of service. Ex. 1004, 52. The system deploys a smart array antenna with several antenna systems that provides the ability to set up multiple antenna beams, which can be directed adaptively to the mobile terminal (MT) locations and

PETITIONER NOKIA
Ex.1012

allows different users to be served on the same frequency channel at the same time. *Id.* Depending on the number of antenna elements and the applied beamforming algorithm, array antennas are able to simultaneously direct several beams conveying individual user signals to different positions. *Id.* at Fig. 2, 53. The system uses a Medium Access Control (MAC) protocol to coordinate the access of MTs to the shared radio channel. *Id.* at 54.

Figure 3 of Vornefeld is depicted below:



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

Figure 3 illustrates the basic MAC frame structure of the spatially extended MAC protocol. *Id.* at Fig. 3. MAC frame starts with broadcast channel (BCH), followed by frame channel (FCH), then a downlink phase, an uplink phase, and random access channels (partitioned, RCH-P, and unpartitioned, RCH-UP). *Id.* at 54. BCH conveys signaling information concerning the whole radio cell in the downlink direction and announces the location of the FCH and RCH within the actual MAC frame. *Id.* FCH is broadcast in the downlink direction and transmits information about the structure of the

PETITIONER NOKIA
Ex.1012

MAC frame for the up- and downlink phases; it contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive. *Id.* Short Channel (SCH) conveys data link control information and Long Channel (LCH) serves to transmit user data bi-directionally on the up- and downlink. *Id.* RCH-P and RCH-UP are contention channels. *Id.* As depicted in Figure 3, a number of MAC frames can be transmitted concurrently by extension into the space domain using the smart antenna system. *See id.* at Fig. 3, 53, 55. A space-time scheduler is used to determine the temporal transmission sequence of MAC PDUs (protocol data unit) as well as the MTs that can simultaneously be addressed or allowed to concurrently transmit their bursts. *Id.* at 55.

2. Scope and Content of Andersson

Andersson describes adaptive sectorization to solve problems associated with sectorization of cells in cellular communication systems. Ex. 1005, 3:37–40, 4:31–34. A transceiver structure located at a base station is connected to a set of sector antennas and each sector antenna is used to cover a sector of the cell. *Id.* at 4:42–44; *see also* Fig. 2 (depicting an antenna configuration with six sectors). The beacon carrier is also connected to an omni-directional antenna, which provides the same coverage area as all of the sector antennas together. *Id.* at 4:58–60.

3. Claims 2, 11, and 20

Claim 2 depends from claim 1 and recites "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." Claims 11 and 20 depend from claims 10 and 19, respectively, and recite the same limitation set forth in claim 2.

PETITIONER NOKIA
Ex.1012

Petitioner contends "Vornefeld discloses that the 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 signal." Pet. 26 (citing Ex. 1003 ¶¶ 151–152); *see also id.* at 50 (citing to the analysis of "Ground 1" to support the assertion that claims 2, 11, and 20 are obvious over Vornefeld and Andersson). Specifically, Petitioner asserts the frame channel (FCH) described in Vornefeld is equivalent to the claimed 'first beam map" because Vornefeld discloses the FCH is broadcast in the downlink direction, transmits information about the structure of the MAC frame for the up-and downlink phases and contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive in. *Id.* at 26 (citing Ex. 1004, 54–55; Ex. 1003 ¶ 152).

Petitioner further asserts that because each of the SCH and LCH portions of the frame are transmitted in different signals (or directed beams) in the spatial domain, the base station must inform each subscriber unit when it should listen for its specific directive beam signal. Reply 5 (citing Ex. 1011, 29:12–30:3 (testimony of Mr. Proctor)). Mr. Proctor testifies that the FCH, which is broadcast to all users, will have a map in it that describes which time slots particular mobile terminals should decode on the downlink phase. Ex 1011, 30:15–19. Mr. Proctor further testifies that this information sent in Vornefeld would be sufficient to demodulate or detect the downlink signal and that downlink is a directed beam signal. *See id* at 47:18–48:2; *see also* Tr. 31 (Petitioner's assertion that the FCH includes information sufficient to allow the subscriber units to detect the directed scanning beam signal that is sent out). Petitioner further asserts, citing the testimony of Mr. Proctor, that one would not need to include information about the beams

PETITIONER NOKIA
Ex.1012

themselves to be a beam map as the claim only requires information be usable to demodulate a directed signal. Reply 12–13 (citing Ex. 1011, 47:2–11).

Patent Owner contends that Vornefeld does not disclose a beam map containing scanning beam information and asserts that the FCH signal cited by Petitioner is not "equivalent" to the recited "first beam map." PO Resp. 20–21. Patent Owner asserts the FCH signal includes only information about the structure of the frame (when the base station will be sending and receiving information) and does not include information about what scanning beam signal will be used to cover the sector, or when it will be used. *Id.* at 21. Patent Owner further asserts that Vornefeld accomplishes beam forming with the use of algorithms and says nothing about using beam maps in a broadcast beam signal. *Id.* at 21–22 (citing Ex. 1004, 53; Ex. 2001 ¶ 43); *see also* Tr. 61:2–4 (asserting the reason Vornefeld does not disclose a beam map is because Vornefeld discloses an algorithm for determining where beams would be directed and it does not need to send maps). Patent Owner asserts that Vornefeld also does not inherently disclose the recited beam map because a beam forming station may inform each subscriber unit when it should listen for its specific directive beam signal in any number of ways. Sur-Reply 4. Mr. Humphrey testifies that one of ordinary skill in the art would not assume that the start of frame information would include beam map information because beam maps are unnecessary in schemes that broadcast with beams cycled in round robin rotation as noted in the '931 patent or using various multiple antenna diversity techniques. *See* Ex. 2001 ¶¶ 46–47.

In our Institution Decision, we were not persuaded Petitioner established a reasonable likelihood that Vornefeld discloses the recited first

PETITIONER NOKIA
Ex.1012