

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.
NOKIA OF AMERICA CORPORATION
Petitioners,

v.

XR COMMUNICATIONS LLC
Patent Owner.

U.S. PATENT NO. 10,715,235
Title: DIRECTED WIRELESS COMMUNICATION

Inter Partes Review No.: IPR2024-00613

PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE FOR *INTER PARTES* REVIEW OF U.S. PAT. NO. 10,715,235

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Petitioners' Exhibit List

<i>Exhibit #</i>	<i>Description</i>
1001	U.S. Patent No. 10,715,235 (the “‘235 Patent”)
1002	Select portions of prosecution history of the ‘235 Patent (“File History”)
1003	Declaration of Petitioners’ Expert Dr. Mark Mahon
1004	U.S. Pat. No. 7,248,841 (“Agee”)
1005	U.S. Pat. No. 3,255,450 (“Butler”)
1006	[This exhibit number intentionally omitted]
1007	[This exhibit number intentionally omitted]
1008	U.S. Pat. App. 2002/0158801 (“Crilly”)
1009	U.S. Provisional Application No. 60/423,660 (includes “Beamforming for Littlejoe” priority document at page 134)
1010	Preliminary Patent Owners Response, IPR2022-00367, Paper 7, 04/19, 2022
1011	Patent Owner’s Sur-Reply To Petitioner’s Reply, IPR2022-00367, Paper 9, 6/16/2022
1012	Patent Owner’s Response, IPR2022-00367, Paper 14, October 20, 2022.
1013	[This exhibit number intentionally omitted]
1014	Comparison of Crilly language vs ‘235 patent language
1015	XR Claim Construction Brief, <i>XR Comm'ns LLC v. Cisco Sys.</i> , No. 6:21-cv-00623-ADA, Dkt. No. 44 (W.D. Tex. May 6, 2022)
1016	XR Sur-Reply Claim Construction Brief, <i>XR Comm'ns LLC v. Cisco Sys.</i> , No. 6:21-cv-00623-ADA, Dkt. No. 47 (W.D. Tex. June 3, 2022)
1017	Claim Construction Order, <i>XR Comm'ns LLC v. Cisco Sys.</i> , No. 6:21-cv-00623-ADA, Dkt. No. 56 (W.D. Tex. September 30, 2022)

I. INTRODUCTION

The Patent Owner's ("PO") Response ("POR") confirms the Challenged Claims are unpatentable. As the Petition details, the prior art teaches exactly the same components and functionality that PO has repeatedly told the Examiner and this Board correspond to the '235 claims. PO merely seeks to renege on its previous statements. The POR is devoted to arguing unwarranted (and undefined) narrowing constructions of plain terms (such as "data"). The Board should reject PO's unsupported arguments because the Petition overwhelmingly establishes invalidity.

Equally important, the POR is conspicuous for what it does not address.

- **The POR did not address the PO's many prior statements to the Examiner and this Board.** The Petition highlighted that: (1) the Applicant overcame prior art solely based on citations to Butler matrix functionality; and (2) PO reiterated those Butler matrix functionality arguments *to this Board* repeatedly. Pet, §VI.F. PO entirely fails to address these citations, and does not mention the "Littlejoe" priority document a single time because, as the Petition demonstrates, the prior art contains the same Butler matrix functionality used in the same way as in the Challenged Claims and the Littlejoe priority document that provided the sole basis for overcoming prior art.
- **The POR does not cite to any intrinsic support for its restrictive**

interpretations. Conspicuously, PO does not point to any support in the ‘235 patent (or anywhere else) for its attempts to evade prior art.

- **The POR does not dispute that there is a single embodiment in the ‘235 patent that discloses the Challenged Claims:** the ‘235 Weight Embodiment using the Butler matrix. Pet., 20-22, 27-29 (EX-1001, 24:25-27:67).
- **The POR does not dispute that the prior art teaches the “simultaneously received” claim elements in contrast to its arguments in previous IPRs and during prosecution.**

The Challenged Claims must be construed in light of the intrinsic record that includes the specification and prosecution history, both of which contradict PO’s proposed claim interpretations. When read in view of the intrinsic record, the asserted prior art provides overwhelming evidence of invalidity – using exactly the same components (antenna arrays, Butler matrixes, and a processor) with exactly the same functionality (measuring the signal strength levels on the antennas and calculating weights thereon) for exactly the same functionality (beam-formed transmissions with peaks and nulls) that was cited to the Examiner, and is the sole supporting disclosure, for the Challenged Claims.

II. The Challenged Claims are Unpatentable.

The Patent Owner's Response ("POR") confirms that the Challenged Claims should be held unpatentable.

A. Claim 1 Is Unpatentable.

The POR's discussion of claim 1 (POR at 19-22) conflicts with PO's previous statements to the Examiner and Board. PO's two challenges are succinctly stated as:

The Petition fails to show that "Butler output #1" or "Butler output #2" are "signal information" of [1.4] or [1.5] or that such outputs are "signal information" used to determine "weighting values" in [1.6].

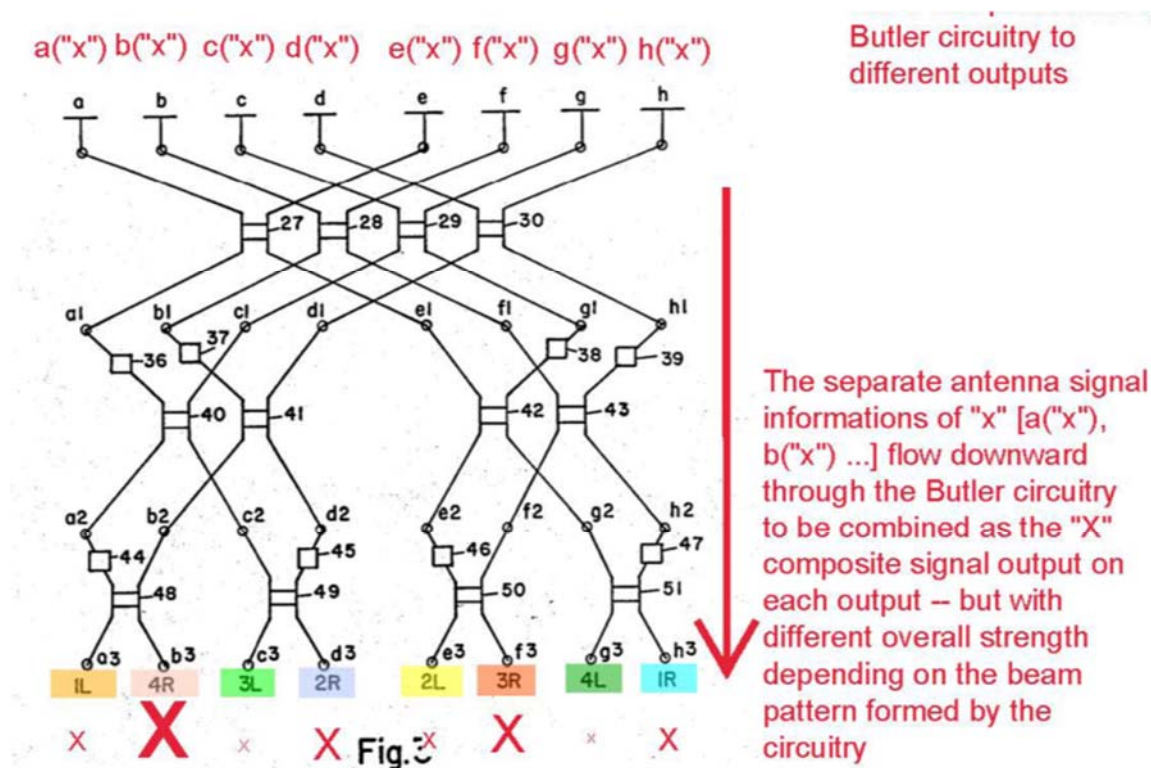
POR at 20.

1. The Intrinsic Record Contradicts PO's Argument That "Signal Information" Necessarily Excludes Butler Matrix Outputs With Combined Signals.

PO first argues that Butler outputs are not "signal information" because "a Butler matrix output is a combined 'signal.'" POR at 20-21. This argument conflicts with the intrinsic record. The term "signal information" does not exclude such information being produced by a combination of received signals. Such a combination of signals (using a Butler matrix) is the *only* disclosed embodiment in the '235 patent. Pet., §V.F.

As the Petition detailed, a Butler matrix (in the '235 patent or in prior art) operates by simultaneously sampling signals received at antennas and then

combining those samples to produce outputs reflecting different combinations of the received signal:



Pet. §V.E.

During prosecution, the Applicant told the Examiner that “signal information” is taught by the Butler matrix combination of signals. Pet., 19-25. For example, PO argued that a Butler Matrix BF operation corresponded to multiple elements. EX-1002, 000130-131; Pet, 23-25.

PO confirmed that “determine ... signal information” encompassed “using” signal strengths from multiple packet receptions (e.g., a combination of signals):

C-4: “The beamforming application uses the **signal strength information** derived from packet receptions by the ‘searcher’

receivers.”

EX-1002, 000131. The Examiner accepted PO arguments. EX-1002, 000091.

The '235 specification explicitly confirms that Butler matrix outputs (used as “signal information”) reflect signal combinations.

Exemplary Butler matrix ... forms... communication beams 214 using signal combiners, signal splitters, and/or signal phase shifters...

After signal processing (e.g., signal combination, signal splitting, signal phase shifting, and the like), Butler matrix 1300 outputs communication signals....

EX-1001, 25:46-26:31. A Butler matrix uses an “inverse process” for transmit and receive. EX-1001, 26:28-31.

PO argued to this Board that Butler matrix (which combines signals) outputs signal levels that corresponded to “signal information.” Pet., 24-27; EX-1010 at 12, 14 (“Butler matrix whose outputs are connected to ... a PC. An application on the PC obtains the received signal levels for each received packet. This signal level information is used to compute the complex weights...”), 18; EX-1011 at 4-5.

Dr. Mahon confirmed each Butler matrix output port (in prior art and the '235 patent) reflects the defined combination of signals received on antennas associated with that output. EX-1003, ¶¶317-352. PO does not dispute this well-known Butler matrix operation.

PO's argument that “signal information” cannot include a combination of

signals (as performed by a Butler matrix) contradicts the intrinsic record as detailed above. PO does not explain its argument, nor does it provide any citation to the intrinsic record for its exclusionary claim construction of “signal information.” POR, 20. In light of the clear (and sole) disclosure in the intrinsic record that Butler matrix outputs correspond to the claimed “signal information,” the Board should reject PO’s ill-explained exclusionary construction argument.

The POR (at 21) appears to make a different but related argument that “the Butler matrix outputs cannot also be ‘signal information’ that is ‘determined’ by the ‘processor....’” POR, 21. This argument apparently disputes the meaning of “determine” even though PO is vague, does not propose any construction, and does not cite any intrinsic evidence for its (undefined) “determine” definition.

As with the “combined signals” argument, the intrinsic record confirms that the prior art “determine[s] signal information” exactly as the ‘235 patent and intrinsic record. As quoted above, PO argued that “determine signal information” was taught by “[t]he beamforming application uses the signal strength information derived from packet receptions” and that “[a]n application ... obtains the received signal levels” from the Butler matrix. EX-1002, 000131; EX-1010, 000016 (quoting EX-1009 at 000134).

As with the ‘235 patent, Agee “determine[s] signal information” when Agee’s application obtains (combined) received signals levels from the Butler

matrix output and uses signal strength information from the Butler matrix output. Pet., 61-64, 23-25. Thus, Agee performs this “determine” action as described in the ‘235 record (and as PO previously argued to this Board). PO does not provide any support for its implicit exclusionary construction.

2. Agee Discloses Using Butler Matrix Outputs To Calculate Weights As Claimed.

The POR’s second argument (at 21-22), i.e., disputing Agee’s calculation of weights based on the Butler matrix outputs (element [1.6]), is similarly unsupported by any cognizable reasoning and conflicts with the intrinsic record. PO’s argument is presented as three meritless sub-arguments.

First, contrary to the intrinsic record, PO argues that a “POSITA would not understand a Butler matrix as ‘determining’ or ‘measuring’ signal strength.” POR at 21. PO merely attempts to mischaracterize the Petition and the undisputed Butler matrix operation.

As detailed in the Petition, and unchallenged in the POR, each Butler matrix output comprises the output of different received signals (e.g., amplitude) on each antenna as defined by associated circuitry (combiners, splitter, shifters) associated with that specific output port. Pet., VI.E; EX-1003, ¶¶330-352. As detailed above, the PO repeatedly argued (consistent with Dr. Mahon’s explanation), that “[t]he beamforming application uses the signal strength information derived from packet receptions” as output by the Butler matrix. EX-1002, 000131; Pet., 23-25, 61-64.

This reflects a Butler matrix output by in prior art (Agee) and in the ‘235 patent.

Thus, PO’s current argument either directly conflicts with the intrinsic record and the known Butler matrix operation or is some unexplained semantical argument.

Moreover, the Petition clearly showed the calculation of weights based on Agee’s Butler matrix outputs – as matching that weight calculation in the ‘235 patent and cited for Littlejoe to the Examiner. The Petition explained that Agee’s antenna array receives incoming signals, and Agee’s Butler matrix processes and outputs “signal information” as described in the intrinsic record for the ‘235 patent and Littlejoe. Pet. §VI.A.3.A[1.4], §V.F. PO does not challenge this.

For element [1.6], the Petition explains that, for one type of Agee’s received signals (the pilot symbols) processed by the Butler matrix (described in previous elements including [1.4]), Agee teaches that “weights” are calculated. Agee’s Fig. 35 depicts this calculation.

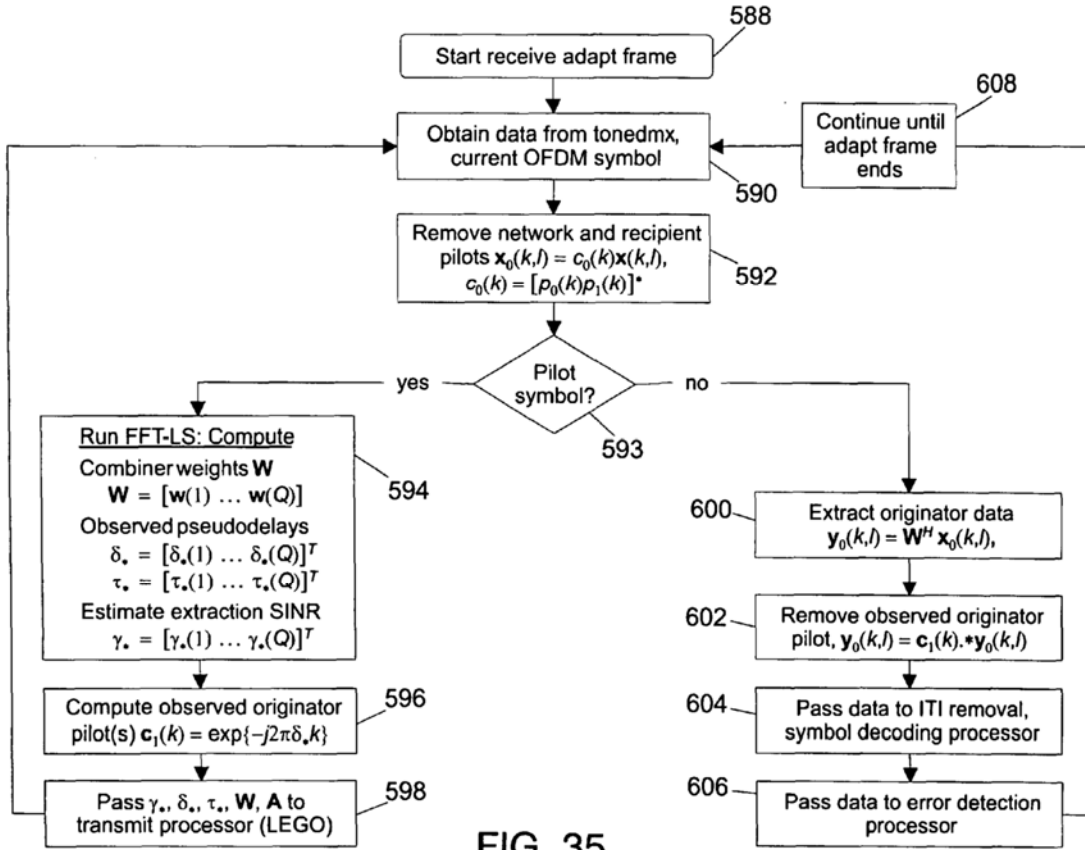


FIG. 35

EX-1004, Fig. 35. In block 593, the received information (from Butler matrix outputs) is checked if it is a “pilot symbol.” If so, then weights are calculated on the left branch. If it is not a pilot symbol, then previously calculated weights are used to process the signal (the right branch). The Petition explains this in detail in element [1.6].

PO’s second sub-argument (disputing that there is “some ‘second [signal] strength information’ which is different than ‘first signal strength information’”) is similarly belied by the Petition. POR, 22. Agee satisfies the “different than” aspect of the claims in multiple ways.

First, because the different antenna elements in the array sample the received signals at different locations, each antenna element will have a different signal transmission resulting in a different signal information. This is detailed in the explanation of the Butler matrix. Pet., 7-18, 31-33, 44-60, 61-68. This corresponds exactly to how the Applicant explained the different signal informations in Littlejoe. Pet., §V.F.

Second, because each Butler matrix output is a separate signal information that is comprised of different combinations of the signals received on the antenna elements, each Butler matrix output port signal information is “different than” the other output ports’ signal information. Pet. V.E, 61-68, EX-1003, 484-508, 517-523, 533-534. The Petition detailed how the “amplitude” of various signals corresponded to the “signal strengths” (also known as signal “levels”) as processed and combined by the Butler matrix and then output on the Butler matrix outputs. Pet. 9-18, 25, 46-48. That reflects the known Butler matrix operation that PO does not challenge (and relied upon during prosecution). Thus, each Butler matrix output comprises a different combination of signal strengths (amplitudes) as received on the antennas. Pet. 7-18, 25, 44-48.

The Petition then explained how Agee’s calculates weights using “s” the different Butler matrix outputs, e.g., Agee’s Multilink Weight Adaptation Algorithm uses the signal strength information derived from the receptions by the

antennas by the Butler matrix outputs. Pet., 61-69. PO does not dispute that processing of Agee. Therefore, Agee's weight calculations plainly use different signal informations – in the same manner as the Applicant argued to the Examiner.

Third, as the Petition details, Agee describes an OFDM system in which there are 32 different OFDM “tones” that each are at a separate frequency range. Each output of the Butler matrix includes the signal information for each of the 32 individual (and different) tones. Pet. 59-61, 62-63. PO does not dispute this aspect of Agee or the operation of the Butler matrix.

Agee calculates weights **for each tone**. Pet, 67-69. EX-1004, 64:28-32, 65:31-33. EX-1003, ¶512. Thus, because each different tone (frequency) will have different signal informations, Agee teaches using different signal informations in the form of the calculations for the different tones.

a. Sub-Argument 3

PO's third sub-argument merely regurgitates the “different than” argument and is belied by the Petition for the reasons detailed. POR, 22. PO strangely argues that “I note that there is no sufficient reference or discussion to ‘strength’” *Id.* The POR does not explain who the “I” is or analyze what “sufficient” reference would be.

The Petition element [1.6] analysis focuses on the claim language, explains that a specific form of signals (Agee's pilot symbols / signals) received by the

antennas and combined / processed / output by the Butler matrix (as in the ‘235 patent) are used to calculate Agee’s weights.

The Board should reject PO’s incoherent arguments that are unsupported by any citation to the intrinsic record, conflict with the intrinsic record and PO’s prior arguments, and conflict with the known and undisputed operation of a Butler matrix. Agee, with its Butler matrix, discloses the disputed operations of claim 1 in a manner indistinguishable from how the PO described its own invention to the Examiner and to this Board.

B. PO’s Claims 4 and 12 Arguments Are Belied By The Petition And Are Unsupported By The Intrinsic Record.

The POR mischaracterizes the Petition arguments on claims 4 and 12. However, the Petition’s arguments are clear. Each Agee BS transmits data in the form of a pilot symbol and receives other BS’s pilot symbols and use those pilot symbols to calculate weights both for subsequent receptions and transmissions of data (including the BS’s own pilot symbol transmission). Thus, the pilot symbols transmitted by one Agee BS comprise “data [*the pilot symbols*] configured to be used by the remote station [*a second Agee BS*] to modify the placement of one or more transmission peaks and one or more transmission nulls in a subsequent signal transmission [*by calculating the weights at the second/receiving Agee BS used then for its subsequent transmission[s]*]” as claimed. See, Pet. at claim 1 (explaining the usage of the *received* pilot symbols to calculate transmit weights for

transmissions), claim 4 (explaining that *transmitted* pilot symbols correspond to the claimed data).

The POR makes two meritless arguments: (1) that received pilot symbols do not meet claim 4 (POR at 24-26); and (2) that pilot symbols are not “data” as claimed (POR at 26-30).

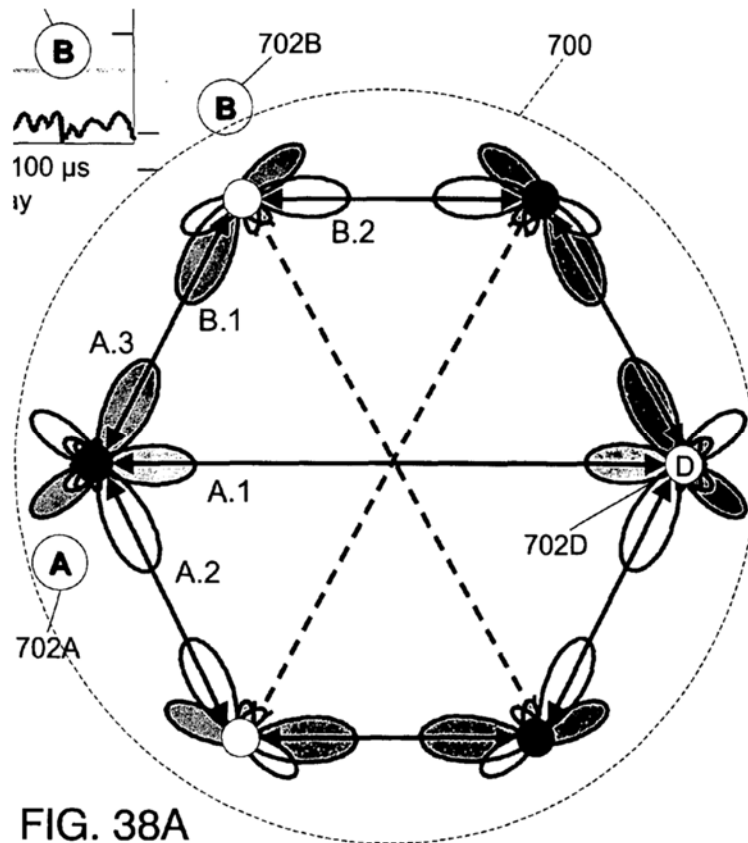
1. The Petition Explained Using *Received* Pilot Symbols For Claim 1 And *Transmitted* Pilot Symbols for Claim 4.

PO’s first argument (at POR 24-26) conflates Agee’s BS *received* pilot symbols (*from* other BS’s) and Agee’s BS *transmitted* pilot symbol (*to* other BS’s). As detailed for claim 1, the Petition and Dr. Mahon explain how the *received* pilot symbols from other BS’s are used by Agee’s BS to calculate weights used both for subsequent reception and transmission. Pet. at [1.6, 1.7, 1.8].

As detailed in [1.7], the weights are used for subsequent transmission of data.

Agee calculates “combiner weights” (“receiver weights”) used to create beams to receive and transmit information. These “combiner weights” are used as “distribution weights” (“transmit weights”) for transmissions or as the basis for calculating distribution / transmit weights. EX-1003, ¶¶573-590. Agee claims “*using at each node the receive combiner weights as transmit distribution weights during subsequent transmission operation.*” EX-1004, claim 17.

Pet., element [1.7] (some citations omitted). The weights form beams and nulls as claimed. *E.g.*, Pet., 69-71 (quoting EX-1004, 67:43-55).



EX-1004, Fig. 38A (depicting beams and nulls).

In element [1.8], the Petition explained how the calculated weights are applied to the transmissions in a manner consistent with the intrinsic record and PO's argument. Notably, PO does not dispute that Agee meets element [1.8].

Thus, for claim 1, the Petition discussed Agee's pilot symbols received from other Agee BS's to calculate weights applied to an Agee BS's "*subsequent transmission operation[s]*" on data, including the transmitted pilot symbols. EX-1004, claim 17. The "data" in claim 1 does not have any particular restriction.

For claim 4, the Petition identified the "transmitted" pilot symbols as the "data" because claim 4 further limits the form of "data."

The “data configured to be used by the remote station...” is the pilot signals that each Agee BS transmits to other BSs.

Pet., 74-75. The transmitted pilot symbol (by one BS) is “configured to be used by the remote station” (one or more other BS’s) for peaks and nulls because the other BS uses the pilot symbols as described for claim 1 to calculate its own weights for subsequent transmissions and those weights result in the placement of peaks and nulls. Pet. at [1.6, 1.7, 1.8, claim 2]. PO does not argue, nor does the ‘235 intrinsic record support, that Agee’s transmitted pilot data symbols are excluded from Agee’s general teaching that transmitted data uses Agee’s transmit weights as detailed in [1.7, 1.8].

2. PO’s Attempt To Exclude Agee’s Pilot Data Symbols Is Unsupported And Conflicts With Agee.

The POR argues that claimed “data” necessarily excludes Agee’s pilot symbols. POR at 26-30. PO does not cite to *any* supporting intrinsic record or explain any exclusionary meaning of “data.” PO merely invites the Board to commit legal error with an unsupported construction.

Beyond this proposed legal error, PO mischaracterizes Agee’s pilot data and ignores Agee’s disclosure that pilot data is “data.” First, the pilot data symbol is recognized as a pilot symbol and different actions are taken based on that recognition. *E.g.*, EX-1004, Fig. 35, element 593 (above). Second, pilot data symbol values are used to calculate the weights. As the Petition details, Agee

describes an extensive set of operations using the pilot data symbols to calculate the weights. Pet. at [1.6]; EX-1004, Figs. 21, 30, 35-38; 66:21-67:27, 64:43-50, cols. 64-68; claim 53, 63:58-67; 64:27-32, 46:35-54, Abstract (using “pilot tone data” and “piloting signals containing origination and destination node information”); 58:16-42 (“pilot tone generation”).

PO does not address Agee’s teaching of “weighting elements” (data) in the pilot signal:

The pilot signal elements are passed through a link detection circuit that preferentially uses a FFT-LS algorithm to ... **identif[y] the weighting elements that were contained in the pilot signal**

EX-1004, 58:43-59:21.

Agee teaches many types of information within the pilot symbol used by recipients. Agee details the pilot tone composition:

Information concerning one or more of the originating node, recipient node, and network or group channel organization flow into a pilot signal generator ... Thus the final pilot tone reflects the content signal, modified to uniquely identify both the originating node and its context

EX-1004, 58:16-42, Pet., 67-68. Agee gives specific usages of the information encoded in the pilot data. EX-1004, 32:29-44.

None of PO’s arguments establish that the pilot tone is not a form of claimed “data.” PO argues that Agee’s “pilot signals are also fixed and predefined...”

POR at 27. Whether this is true or not, “fixed and predefined” bits are still “data.” Similarly, PO’s arguments that “pseudorandom sequences” are part of the pilot data does not preclude it from being “data.” POR at 27.

PO argues that pilot signals “are known by both the transmitter and receiver with no data inputs.” POR at 27. This statement manages to be both false and irrelevant. It is false because, as quoted above, various “[i]nformation ... flow into a pilot signal generator” (EX-1004, 58:16-42) – thus clearly showing “data inputs” to the pilot signal. It is irrelevant because there is no requirement that “data” be generated using other “data inputs.”

Moreover, while the PO acknowledges that Agee’s “pilot signals” include “originating node, recipient node, and network or group channel organization,” PO argues that Agee’s pilot signals “do not contain any *other* data....” POR, 28. PO also argues a comparison between Agee’s pilot data symbols and a CPICH in other systems that “does not carry *data from a transport layer*.” POR at 28. The Challenged Claims do not require “data from a transport layer” or “other data” and thus this analysis is irrelevant.

As the Petition details ([1.6]), Agee describes its pilot symbols as “pilot data.” Agee teaches *and claims* that OFDM symbols encode specific data within Agee’s “pilot data.” EX-1004, claim 53, 64:42-68:31. There is no basis to assert that the claimed “data” excludes Agee’s “pilot data.”

C. PO's Claim 5 and 11 Arguments Are Legally And Factually Deficient.

For claims 5 and 11, the POR asserts multiple incorrect arguments. First, PO asserts that the “further based on” claim language requires that “weightings” be based on separate “things.” POR, 30. Such a construction is inconsistent with the claim language and intrinsic record.

The claim language encompasses that “further based on” clarifies the type of “signal informations” used to calculate weights. “Signal information” may include many different forms of data. EX-1001, 15:44-56. Claim 5 should be construed to require merely using one of the recited forms.

Such a construction is the only one consistent with the intrinsic record. As the Petition details (and not challenged by the POR), the ‘235 patent includes only one embodiment supporting the Challenged Claims, (EX-1001, 24:25-27:67, Figs 12-14, “‘235 Weight Embodiment”). Pet., 20-22, 27-29. The ‘235 patent’s only reference to “weights” and the determination thereof is a short passage at 24:49-25:30. There is no disclosure of using multiple different “things” (as PO argues) to determine the weights. To the contrary, the sole ‘235 Weight Embodiment uses the Butler matrix outputs of signal strength information to determine weights (as described throughout the Petition and herein) – and nothing else. PO should be required to cite to written description within the ‘235 patent supporting its construction (that weights are calculated based on two different “things”) before

such construction should be considered.

Thus, the parties offer two interpretations. Petitioners' interpretation is consistent with the specification. PO's interpretation eliminates the preferred embodiment, with its usage of only the signal strength information to calculate weights and has no support in the '235 specification. Petitioners' construction is therefore favored.

Even if PO's construction is adopted, Agee shows using pilot symbol timing data to calculate weights. The '235 patent uses "timing" in only two passages – neither with any particular limitation. EX-1001, 15:51 ("timing information"), 31:44 ("timing data"). Thus, "timing data" has its plain and ordinary meaning.

Agee uses "timing data" "in the ability to locate[] the observed time offset for the pseudodelay to detect the specific node from which data is being received." Pet, claim 5. As acknowledged by the POR at 33, the Petition details that the pseudodelay is part of the weight processing. For example,

Agee relies upon specific timing for the receiver to detect the specific 'pilot signals' from each transmitter. ...

Agee uses "pseudodelays" that are "unique to each transmit node" and include specific time offsets for each different transmitting node. EX-1004, 65:24-46. The "pseudodelays" provide specific timing for the receiver to detect the pilot signals from each transmitting node. EX-1003, ¶¶476-477.

Agee's BS compares that observed pilot signal to a "known" pilot

signal (which reflects the “target pseudodelay”). EX-1004, 66:13-67:4. This matching to the target pilot signal uses the “actual observed timing offset for that [received] link (observed pseudodelay).” EX-1004, 66:14-16.

...The timing of the pseudodelays (target and “observed”) is shown in Figs. 38A and B below.

Pet., 51-54.

The Petition notes the weight determination uses the pilot signal pseudodelays:

As detailed in Section **Error! Reference source not found.**, Agee’s measured signals provide the pilot signal’s “observed timing offset” – **which is used to provide “timing information” for Agee’s system to properly detect and use the pilot signal to calculate weights to receive (and transmit) data.** EX-1003, ¶529.

Pet., 63 (emphasis added).

The Petition explained the FFT-LS algorithm calculates weights and included Fig. 35 which shows the “observed pseudodelays” used by the “FFT-LS” algorithm (box 594):

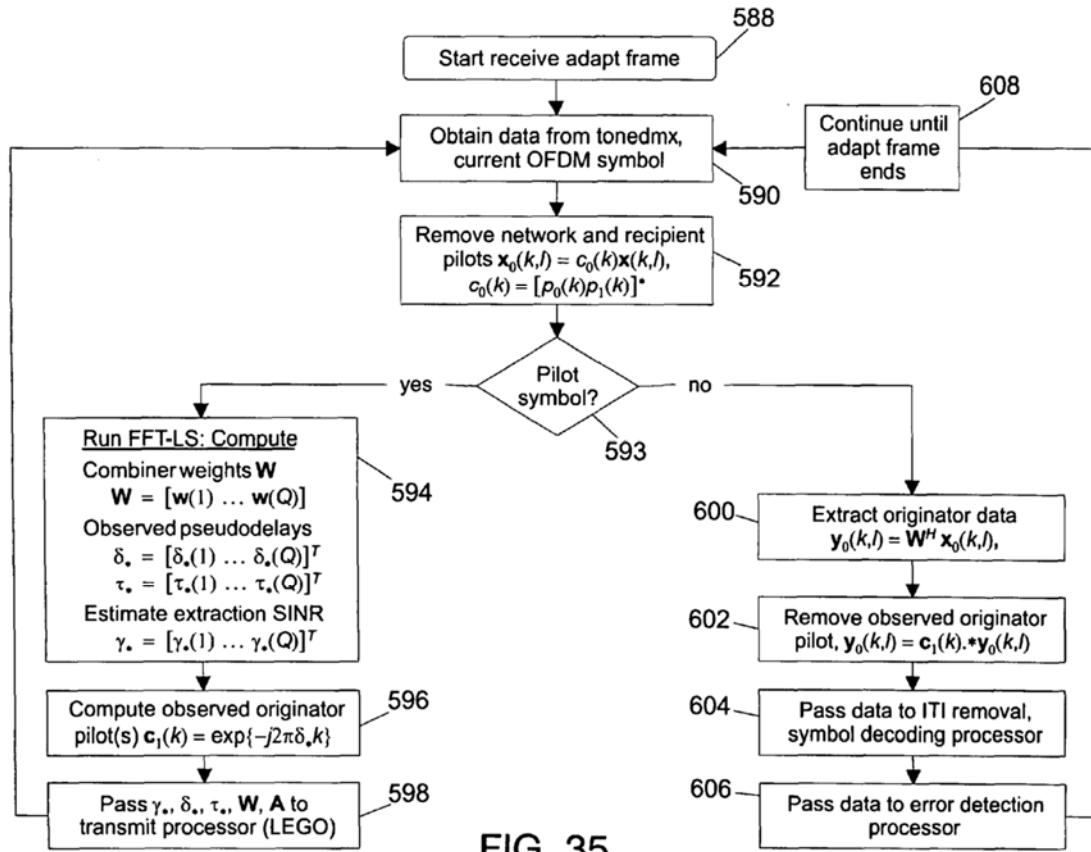


FIG. 35

EX-1004, Fig. 35. Pet., 65-69 (explaining FFT-LS and citing to 66:21-67:15 showing extensive use of the pilot signal pseudodelays); 45-46 (“Agee’s Butler matrix provides the data for the ‘FFT-LS’ algorithm ...;”).

The ‘235 patent does not require any specific form of “timing data” for claim 5. As detailed above and in the Petition, Agee’s weight calculations use Agee’s pilot data “pseudodelays” which reflects timing offsets and is therefore timing data. Thus, even under PO’s (improper) limiting construction, Agee discloses weights determined based on the signal strength information and timing data.

D. PO's Claim 8 Arguments Contradict The Intrinsic Record.

As the Petition details (at 76-79), the prior art corresponds exactly to the '235 patent disclosure of [8.4] that PO cited to the Examiner and this Board (both intrinsic record citations) and to the WDTX District Court. PO's fundamental problem is that the '235 patent does not expressly disclose determining weights "configured to be used by the remote station" as claimed. PO ignores and avoids this problem. Conspicuously, the POR argument (at 34-37) is bereft of any citation to any intrinsic record, must less the specification, disclosing this element or supporting PO's position.

Because this proceeding does not include Section 112 determinations, the proper approach is to understand this term in light of the intrinsic record and PO's own statements – of which there is extensive evidence.

As the Petition details, PO unequivocally stated that Littlejoe disclosed this element with:

The beamforming algorithm computes weights for a particular client...
and stores in in a table which is made available to the application
running the modified (polling) MAC protocol on 'card 13.'
EX-1002, 000132-133. The Examiner accepted this statement to overcome the
rejection. Pet., 23-25. PO is estopped from challenging that the prior art with the
same disclosure also meets this element.

PO expressly argued *to this Board* that this same language disclosed element

[8.4]. EX-1010, 000021-000023.

the scope of the challenged element must include the disclosures in Document C cited by Applicant for this element during patent prosecution. ... Accordingly, the limitation [8.4] **must include within its scope the disclosure** providing “[quoting Littlejoe passage quoted to the Examiner].”

EX-1010, 000023 (emphasis added).

As PO (successfully) argued to the District Court, this element requires merely that the BS

prepares the set of weighting values for use by a remote access station ... by computing the weighting values that are associated with received signals from that remote access station.

EX-1016, 000013-000014, Pet., 77-78.

The POR does not dispute that Agee prepares and stores weights “by computing the weighting values that are associated with received signals from that remote access station” using other BSs’ pilot symbol(s) as detailed in element [1.6]. EX-1016, 000013-000014, Pet., 77-78. Thus, Agee discloses at least as much as the PO/Applicant stated were sufficient to meet this element.

The Petition went beyond what PO successfully argued to the Examiner, to this Board and to the District Court by explaining *why* Agee’s weight calculation was “configured” to be used by the remote station: the principal of reciprocity disclosed in Agee. With reciprocity, the receive and transmit weights calculated

for a particular remote station (other BS) as detailed in [1.6], [1.7] are “configured to be used by the remote station” because the receive weight mirrors the remote station transmit weight and the transmit weight mirrors the remote station receive weight. Pet., 78-79.

The POR refuses to acknowledge or discuss PO’s many statements. Instead, the POR incorrectly states these are “inaccurate and out-of-context characterization of the prosecution history.” POR, 36.

The Board can easily decipher which side is being faithful to the intrinsic record (Petitioners) and which side is trying to betray the intrinsic record (PO) regarding element [8.4].

E. PO’s Claim 15 Arguments Contradict The Claim Language.

For Claim 15, PO reprises many of the same arguments as for claims 1 and 5 addressed above. The POR contains further critical errors.

PO asserts that “Claim 15 contains the same requirements of limitations [1.3]-[1.6].” POR, 37. This is incorrect. Among many differences, element [1.6] requires that “the second signal information is different than the first signal information.” Claim 15 does not have this “different than” requirement. Moreover, while claim 1 requires different “signal transmissions” received via different “antenna elements” and requires receipt “simultaneously” (element [1.3]), claim 15 does not require different antenna elements or simultaneous receipt.

Thus, while Agee's disclosure of the more exacting requirements in claim 1 also discloses claim 15, the claims have different limitations that directly conflict with PO's arguments.

In particular, PO argues that claim 15 requires:

that the determination of a set of weighting values is based two things:

(1) "signal strength" as the alleged second signal information and (2) *something else* as the alleged first signal information.

POR, 38. This statement conflicts with claim 15 which does not have a "different than" element (or the other elements above) from claim 1. Rather, claim 15 merely requires a "first signal information" out of a particular category of possibilities and any "second signal information" with no further requirement (not even that it be "different than" the first signal information).

Thus, because the POR improperly reads nonexistent limitations into claim 15, the Board should reject PO's entire argument. The Petition explains that Agee's weights are based upon first / second signal informations as detailed in claim 1. Moreover, as the Petition details and further explained above for claim 5, at least one of the signal informations includes one from the category recited in claim 15 including the transmit power level and timing data.

Finally, the POR makes a throwaway argument on page 39 regarding "transmit power level" including the peculiar assertion of "I also disagree..." without explaining the "I." One fundamental problem for this argument is that it is

unsupported by the ‘235 patent. As detailed in the Petition and above for claim 5, the sole disclosure of calculating weights in the ‘235 patent is the 235 Weight Embodiment which calculates weights based on the signal strength information based on the receptions by the antennas and output by the Butler matrix outputs. Pet., 20-22, 27-29. Thus, the only permissible interpretation of “transmit power levels” that is consistent with the specification is one that encompasses the sole embodiment’s disclosure. The POR does not explain why the Board should construe the claims to exclude the sole 235 Weight Embodiment (and the Board should not make this erroneous construction).

F. PO’s Claim 17 Arguments Conflict With Agee’s Disclosure.

For claim 17, the POR incorrectly disputes that Agee’s BS’s store identifying information of other BS’s (from which they receive transmissions). POR at 39-41. Claim 17 recites “identifying information.” The POR does not cite to any intrinsic record requiring any specific further limitation to this element.

Agee describes that each pilot tone includes a specific node identification for directed transmissions to that node. For example, in Agee’s “pilot tone generation”:

the final pilot tone reflects the content signal, **modified to uniquely identify both the originating node** and its context, and **the receiving node** and its context

EX-1004, 58:16-67, Pet., 82-83. Agee’s nodes store information that allows the

node to transmit to other BS's. For example, Agee teaches that each BS stores (and uses):

$p_{21}(k;n_2)$ is a pseudorandom, constant modulus uplink "recipient" pilot **that is known and used by every node intending to transmit data to node n2** during uplink transmission intervals;

$p_{12}(k;n_1)$ is a pseudorandom, constant modulus downlink "recipient" pilot **that is known and used by every node intending to transmit data to node n1** during downlink transmission intervals;

EX-1004, 65:9-21. Information identifying other nodes that is "known and used by every node intending to transmit data" to each BS falls within the "store identifying information" for that BS for other nodes. Pet., 82-83 (explaining use of identifying information to direct transmissions to specific nodes). Thus, as the Petition details, Agee's BS stores at least node identification information for other nodes used for transmissions to those nodes.

Agee's "pseudodelays" unique to each BS are determined, stored, and used to calculate the weights. As the Petition explains, each BS is receiving pilot signals from the other BS's which are "interfering source." Pet., 83 (explaining relationship between links and BS's for interference).

Fig. 38 shows how each interfering source is identified based on its link which is identified based on its pseudodelay.

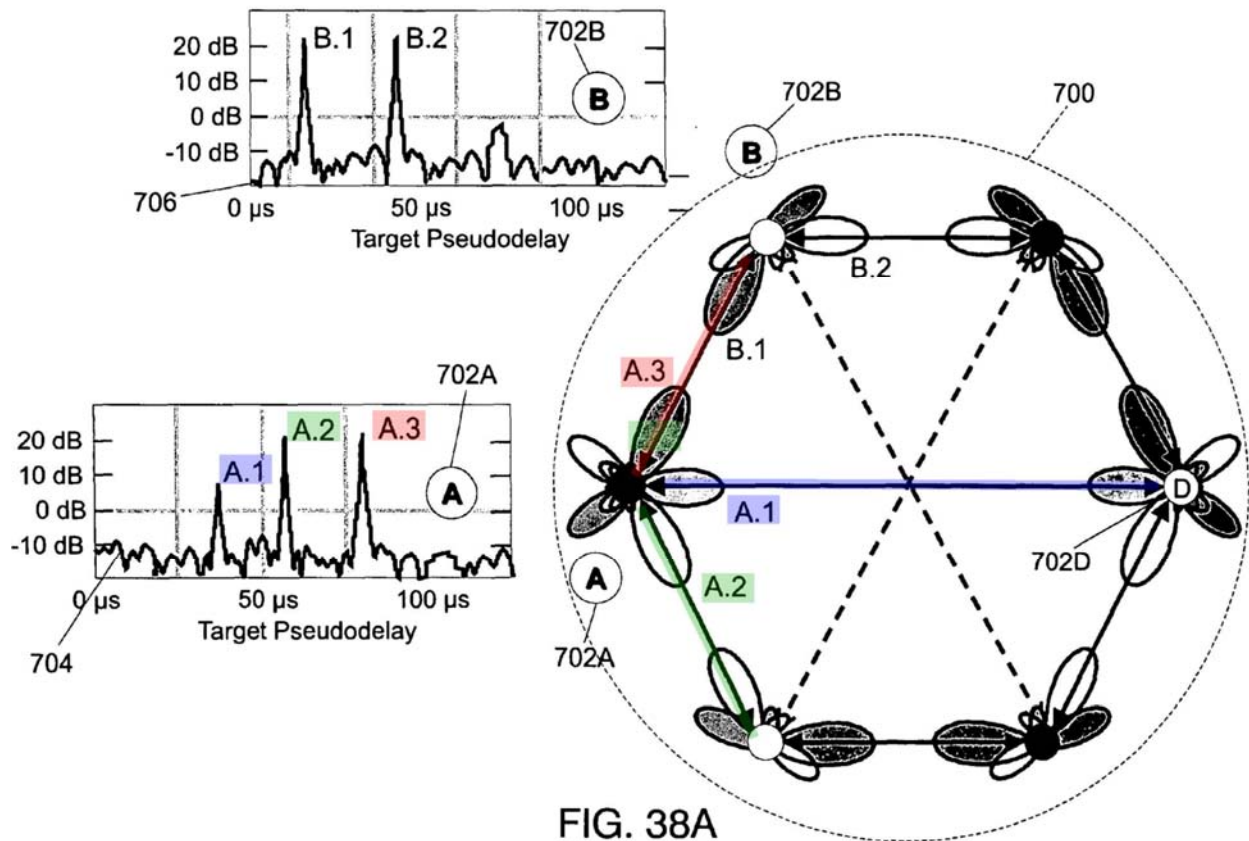


FIG. 38A

EX-1004, Fig. 38A. See also EX-1004, Figs. 13, 16, 18-19, 39-40.

As shown in Figure 38A, each link to each other BS's (A.1, A.2, A.3) is identified by the pseudodelay identified by its "peak" in the "target pseudodelay" diagram. Agee's "pseudodelays" $\delta 1(n_1)$ and $\delta 2(n_2)$ **can be unique to each transmit node** with n_1 and n_2 being for specific "nodes" (BS's). EX-EX-1004, 65:24-46; 58:29-42, 66:21-67:15 ("target pseudodelay").

Agee's weight calculation uses "pseudodelays" for different BS's by calculating pseudodelays with a "valley" or "peak" finding algorithm and then using pseudodelays to calculate the weights. EX-1004, 67: 3-28; 65:24-46. One purpose of Agee's pseudodelay teaching is to specifically identify transmissions

from other nodes so that weights can be calculated to transmit to a specific node and that interference can be removed. This reflects the “link detection circuit.” EX-1004, 58:43-59:21.

Claim 17 recites “*store identifying information concerning the undesired interferer source.*” Claim 17 does not require: (1) “storage” for any defined period, (2) any form of “identifying information” or (3) storage for more than a single “interferer.” Agee’s disclosure of storing both target and received pseudodelays for multiple BS’s (at least one of which would be an “interferer source” for a particular link) for use in the weight calculation discloses, or renders obvious, this element.

G. PO’s Claim 18 Arguments Are Unsupported By The Intrinsic Record.

For claim 18, PO makes two arguments unsupported by the intrinsic record. First, PO argues that the term “prevent” requires some form of specific, but unspecified, meaning. POR, 42. In Agee’s TDD system, the BS cannot transmit during its “receive” time slots. EX-1004, Fig. 41, 5:43-51, 30:7-9. PO insinuates the claimed “prevent” requires further specific conditions or processing. POR, 42. Claim 17 has no such further requirement.

Second, PO seeks a restrictive interpretation of “receive” requiring that the BS must be “sampling and using the energy induced on the antenna” during

transmission of “*a sixth signal transmission.*” POR, 42-43. Claim 18 recites
“*reception of the further interferer signal transmission.*” Claim 18 has no such
“sample and using” requirement.

Respectfully submitted,

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Dated: April 2, 2025

CERTIFICATION OF SERVICE ON PATENT OWNER

Pursuant to 37 C.F.R. §§ 42.6(e), 42.8(b)(4) and 42.105, the undersigned certifies that on the 2nd of April, 2025, a complete and entire copy of this Petitioners' Reply To Patent Owners Statement and all supporting exhibits were served via email and/or electronic download by agreement of Patent Owner, to the Patent Owner's counsel of record in this manner.

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 *et seq.*, the undersigned certifies that this document complies with the type-volume limitations. This document contains 5,587 words as calculated by the “Word Count” feature of Microsoft Word, the word processing program used to create it.

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