

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

EMPIRE TECHNOLOGY DEVELOPMENT	§	
LLC,	§	
	§	
Plaintiff,	§	
	§	
v.	§	NO. 2:23-CV-00427-JRG-RSP
	§	
SAMSUNG ELECTRONICS CO., LTD.,	§	
SAMSUNG ELECTRONICS AMERICA,	§	
INC.,	§	
	§	
Defendants.	§	

CLAIM CONSTRUCTION ORDER

In this patent case, Empire Technology Development LLC alleges infringement of U.S. Patents 8,798,120 and 8,565,331 by Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. (together, “Samsung”). Both patents relate to wireless communications. *See* ’120 Patent at 2:12–14 (noting the disclosure concerns “methods, systems, devices, and/or apparatus[es] generally related to selecting a transmit mode in a communications system”); ’331 Patent at [12] (“Inserting and Decoding Replicated Data Symbols in Wireless Communications”).

The parties dispute the scope of 6 terms from the 2 patents. Having considered the parties’ briefing and arguments of counsel at a January 22, 2025 hearing, the Court resolves the disputes as follows.

I. BACKGROUND

A. U.S. Patent 8,798,120

The ’120 Patent concerns “methods, systems, devices, and/or apparatus[es] generally related to selecting a transmit mode in a communications system.” ’120 Patent at 2:12–14. A mobile

station embodying the claims might select between a single-input multiple-output (SIMO) mode and a multiple-input multiple-output mode (MIMO) based on some system parameter. *Id.* at 2:19–24. SIMO systems use one transmit antenna and multiple receive antennas, whereas MIMO systems use multiple transmit and multiple receive antennas. *Id.* at 1:17–27. Generally, MIMO systems have more throughput than SIMO systems. *Id.* at 1:22–24.

Generally, higher transmission rates require more power, so it makes sense to switch to a lower transmission rate if the lower rate works for a particular application. '120 Patent at 2:64–3:2. But switching to too low a rate might also be inefficient because the transmitter circuitry spends time idling, which still consumes power. *Id.* at 3:3–7. Thus, the patent seeks what it calls an “energy-optimized rate”—the optimal ratio of data transmitted to power consumed over some time. *Id.* at 3:11–26.

Empire asserts two independent claims, Claims 25 and 29, which are almost identical. Claim 25 recites:

25. A mobile station for use in a communications system comprising:
- a first antenna and a second antenna;
 - first circuitry coupled to the first antenna and configured to process signals for transmission by the first antenna;
 - second circuitry coupled to the second antenna and configured to process signals for transmission by the second antenna;
 - and
 - a controller coupled to the first and second circuitry, **wherein the controller is configured to receive a control signal and, in accordance with the control signal, to select between a multiple-input multiple-output (MIMO) mode wherein both the first and second antennas transmit data over a communications channel and a single-input multiple-output (SIMO) mode wherein only one of the first and**

second antennas transmit data over a communications channel, wherein the control signal is based, at least in part, on a **power consumption of the first and second circuitry**, wherein the control signal is based, at least in part, on an idle power consumption of the mobile station.

'120 Patent at 19:1–20 (disputed terms in bold). Relative to Claim 25, Claim 29 replaces the last “wherein” clause with “wherein the control signal is based, at least in part, on a number of users of the communications system.” *Id.* at 20:3–23.

B. U.S. Patent 8,565,331

The '331 Patent relates to a method of using “replicated data” from multiple data streams to analyze and compensate for the effects of the communication channel over which the data is transmitted. As shown in Figure 1 (below), various communication devices (110, 115, 116, 117) may communicate with each other over a communication channel characterized by a channel matrix H (105).

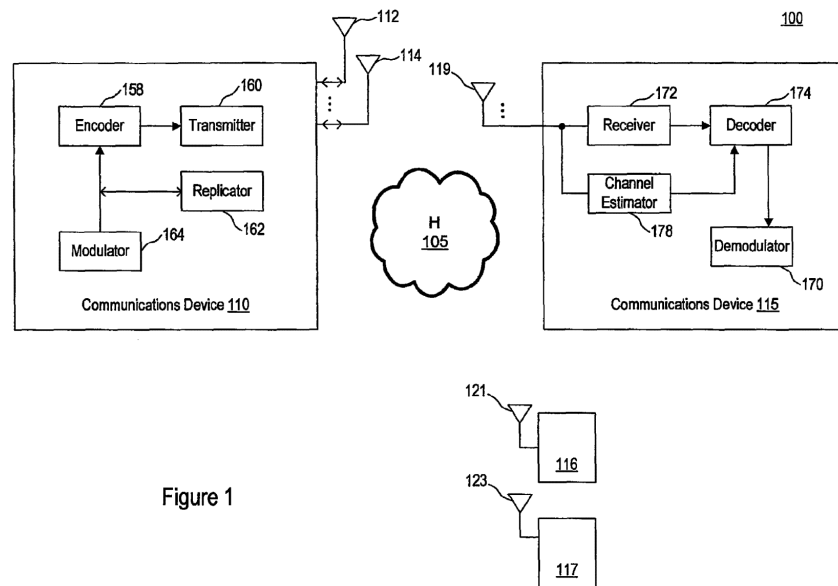


Figure 1

As described in the Background, a “channel matrix” is generally a matrix of data that represents the operation of the channel on the transmitted data symbols. '331 Patent at 1:33–36. Those effects

might include, for example, “non-idealities to the transmitted signal . . . caused by multipath interference, reflections, motion of one or more mobile stations, or other properties of a communications channel.” *Id.* at 1:28–31.

Typical prior-art block coding systems “generally measure one or more properties of the communications channel, such as the channel matrix.” ’331 Patent at 1:64–1:66. One way to do this is “to insert pilot symbols into the transmitted data streams. The pilot symbols [are] known to the receiver and the known pilot symbols may be compared with the received signals to generate an estimate of” the channel matrix. *Id.* at 1:66–2:4. The more pilot symbols inserted into the data streams, the more accurate the estimate. *Id.* at 8:64–9:3. But inserting pilot symbols adversely affect the attainable data rate because blocks that could be used for data are now used for pilot symbols. *Id.* at 2:4–6; *see also id.* at 8:64–67 (“The more pilot symbols are inserted into the data streams, the more the overall data transmission rate of the communications system may decrease.”). In this way, the patent establishes a clear distinction between pilot symbols and data.

To help alleviate the adverse effects of using many pilot symbols, the patent teaches updating the estimate of the channel matrix “based on replicated data.” As shown in Figure 3 (below), for example, a transmitter sends signals (302–305), each of which has encoded multiple data symbols (311–313, 315–317, 318–321) and pilot symbols (310, 314). The data symbols (312, 316) have been replicated to symbol locations at corresponding frequencies at a different location. Additional data symbols (318–321) are included in the signals (303).

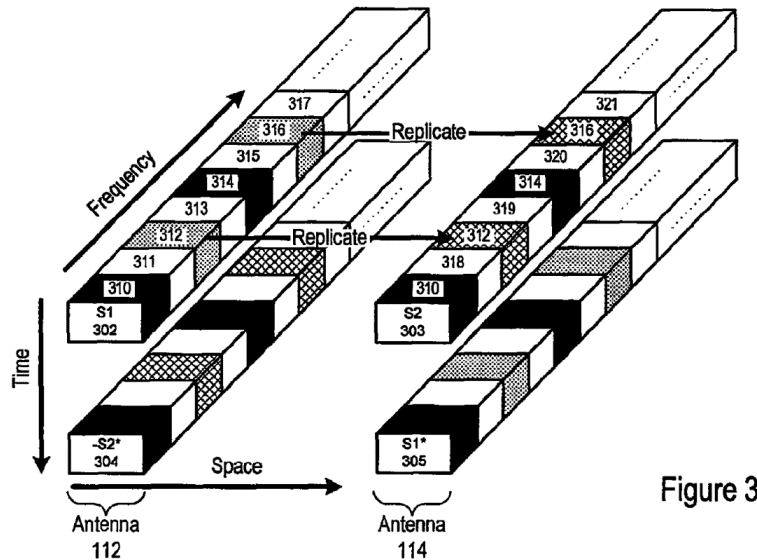


Figure 3

According to the patent, “use of replicated data symbols as pilot symbols may advantageously increase the channel estimation accuracy while not impacting the overall data rate as severely as using more pilot symbols.” ’331 Patent at 9:5–8. But, as with pilot symbols, “as more replicated data is inserted, the overall data rate of the communications system may be reduced, although the reduction may not be as severe as if more known pilot symbols were inserted.” *Id.* at 9:24–27.

The disputed terms appear in Claims 1–5. Claim 1, which is representative, recites:

1. A method of decoding a signal transmitted over a communications channel, the method comprising:
 - receiving a **pilot symbol** over the communications channel;
 - estimating a **channel matrix of the communications channel** based, at least in part, on the **pilot symbol**;
 - receiving **replicated data** from multiple data streams transmitted over the communications channel;
 - decoding the **replicated data** using the estimated **channel matrix**;
 - generating an updated estimate of the **channel matrix** based, at least in part, on the **replicated data**; and

decoding subsequently received signals over the communications channel using the updated estimate of the **channel matrix**.

'331 Patent at 15:42–16:7 (disputed terms in bold).

II. LEGAL STANDARDS

“[T]he claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). As such, if the parties dispute the scope of the claims, the court must determine their meaning. *See, e.g., Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1317 (Fed. Cir. 2007) (Gajarsa, J., concurring in part); *see also Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996), *aff'g*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*).

Claim construction, however, “is not an obligatory exercise in redundancy.” *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). Rather, “[c]laim construction is a matter of [resolving] disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims” *Id.* A court need not “repeat or restate every claim term in order to comply with the ruling that claim construction is for the court.” *Id.*

When construing claims, “[t]here is a heavy presumption that claim terms are to be given their ordinary and customary meaning.” *Aventis Pharm. Inc. v. Amino Chems. Ltd.*, 715 F.3d 1363, 1373 (Fed. Cir. 2013) (citing *Phillips*, 415 F.3d at 1312–13). Courts must therefore “look to the words of the claims themselves . . . to define the scope of the patented invention.” *Id.* (citations omitted). The “ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313. This “person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in

which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.*

Intrinsic evidence is the primary resource for claim construction. *See Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1348 (Fed. Cir. 2010) (citing *Phillips*, 415 F.3d at 1312). For certain claim terms, “the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words.” *Phillips*, 415 F.3d at 1314; *see also Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005) (“We cannot look at the ordinary meaning of the term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history.”). But for claim terms with less-apparent meanings, courts consider “those sources available to the public that show what a person of skill in the art would have understood disputed claim language to mean . . . [including] the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Phillips*, 415 F.3d at 1314.

III. THE LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art is the skill level of a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In resolving the appropriate level of ordinary skill, courts consider the types of and solutions to problems encountered in the art, the speed of innovation, the sophistication of the technology, and the education of workers active in the field. *Id.* Importantly, “[a] person of ordinary skill in the art is also a person of ordinary creativity, not an automaton.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

Here, Empire adopts Samsung’s characterizations of a skilled artisan. Dkt. No. 53 at 2. Accordingly, the Court holds the proper skill levels for its claim-construction analysis are:

- (1) for the ’120 Patent, a bachelor’s degree in electrical engineering, computer science, computer engineering, or a related field, and two to three years of experience in the research, design, development, or testing of wireless data communication systems at the physical and media access control (MAC) layer, and
- (2) for the ’331 Patent, a bachelor’s degree in electrical engineering, computer science, computer engineering, or a related field, and two to three years of experience in the research, design, development, or testing of wireless data communication systems at the physical layer.

Id.

IV. THE DISPUTED TERMS

- A. **“wherein the controller is configured to receive a control signal and, in accordance with the control signal, to select between a multiple-input multiple-output (MIMO) mode . . . and a single-input multiple-output (SIMO) mode . . .” (’120 Patent, Claims 25, 29)**

Empire’s Construction	Samsung’s Construction
No construction required; plain and ordinary meaning; not governed by 35 U.S.C. § 112(f)	“wherein the controller is configured to receive a control signal and to select between a MIMO mode and a SIMO mode as indicated by the control signal” Alternatively, the term is indefinite.

Generally, the disputed phrase concerns the controller (475) and encoder (470) shown in the “mobile station” of Figure 4 (below). The controller is coupled to a feedback decoder (477) and the encoder. Based on a mode communicated from the base station (405) through “feedback signals,” the controller configures the encoder for either SIMO or MIMO mode. *See* ’120 Patent

at 11:25–28 (noting the feedback decoder 477 decodes feedback signals received from the base station, which “may include control signals corresponding to a selected mode”); *see also id.* at 11:44–50 (configuring the encoder for SIMO or MIMO mode based on the mode selected by the base station). But sometimes “the controller 475 may not configure the encoder 470 in accordance with the mode selected by the base station 405, but may override that selection based on some other criteria.” *Id.* at 11:50–53.

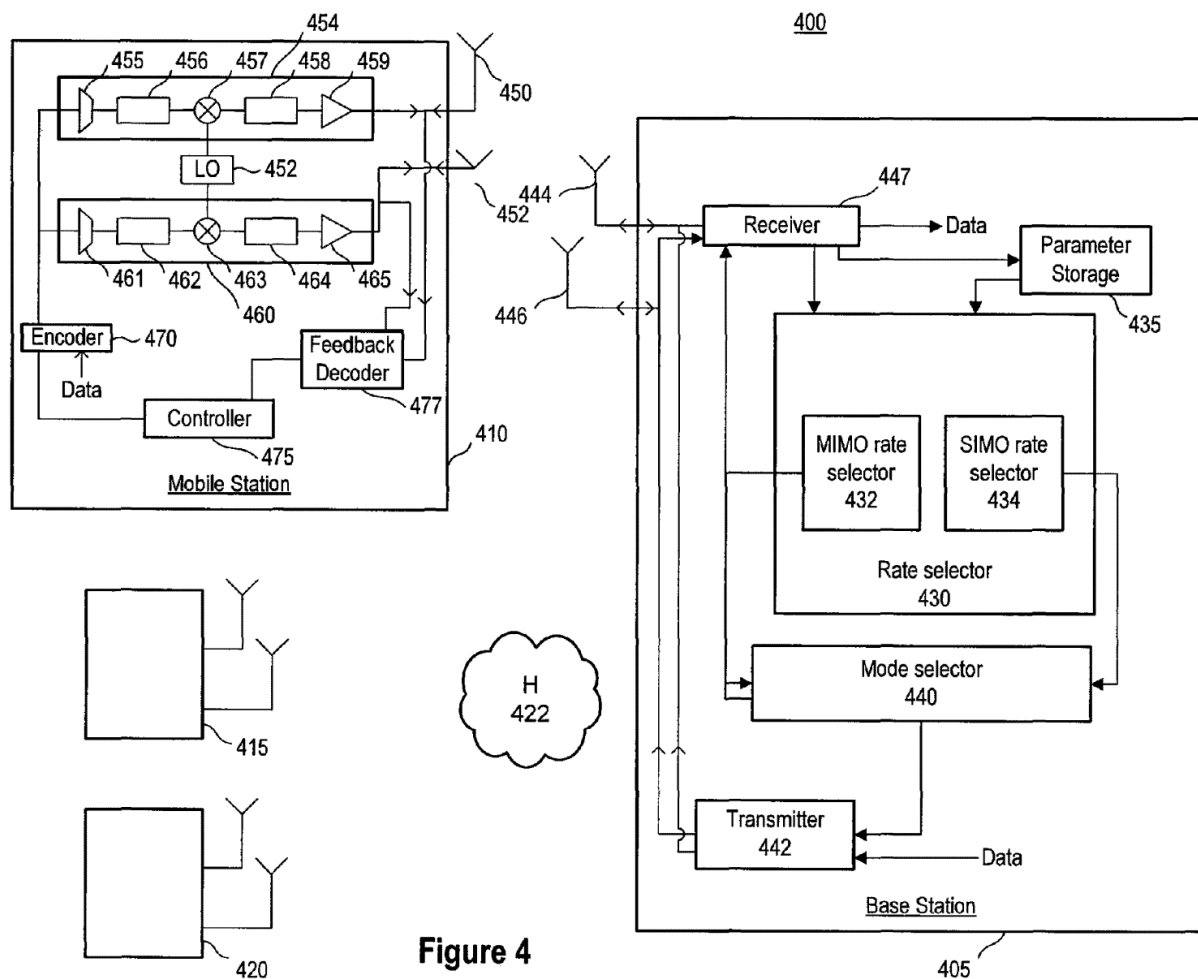


Figure 4

This dispute focuses on the phrase “in accordance with the control signal,” and each party accuses the other of rewriting the claim term. In Empire’s view, Samsung’s construction “eliminat[es] ‘in accordance with’ from the claim language and reassign[s] the role of mode selection to

the control signal.” Dkt. No. 63 at 1. Specifically, Samsung’s construction would require the controller to select a mode based only on the control signal, which is one of many signals processed by the controller, and would thus improperly exclude an embodiment. *Id.* at 6. In its view, “in accordance with” means something like “contributes to” or “based in part on.” *See* Hr’g Tr., Dkt. No. 116 at 12:8–12 (asserting “‘in accordance with’ contemplates that the control signal comes in and that it would contribute to whether or not the mode is selected as” SIMO or MIMO).

According to Samsung, Empire “absurdly” interprets this phrase such that it “eviscerates the very essence of the purported invention.” Dkt. No. 58 at 3. Samsung points to two different embodiments—one of which describes the controller as being “provided with a signal indicative of the selected mode,” and the other that describes overriding the selection based on other parameters related to the mobile station’s power consumption. Samsung says Claims 25 and 29 are directed to the first embodiment, but not the second. *Id.* at 5–6.

Although neither party submits a definition or otherwise explains the ordinary meaning of “accordance,” one dictionary defines the words as “agreement” or “conformity.” *accordance*, <https://www.yourdictionary.com/accordance> (last visited Mar. 25, 2025); *see also accord*, Black’s Law Dictionary 17 (7th ed. 1999) (“To agree”). Thus, if the controller selects a transmission mode “in accordance with” a control signal, the selection must agree with or conform to the signal.

The specification supports this definition. Empire stresses the controller might override the mode selected by the base station based on other criteria, which the patent describes as “*not . . . in accordance with the mode selected by the base station.*” ’120 Patent at 11:50–56 (emphasis added). Although this part of the specification relates to “the mode selected by the base station,” not the “control signal” received by the controller recited in the claims, it nonetheless strongly informs the meaning of “in accordance with.”

Empire’s position requires the Court to read “in accordance with” as something like “considering” or “based in part on.” But Empire’s only support for that position is that it would exclude an embodiment. Even if that’s true, “the mere fact that there is an alternative embodiment disclosed . . . does not outweigh the language of the claim.” *TIP Sys., LLC v. Phillips & Brooks/Gladwin, Inc.*, 529 F.3d 1364, 1373 (Fed. Cir. 2008). And here, the specification uses the term to mean “agreement with” or “indicated by,” which is the ordinary meaning of the term. Accordingly, the Court construes “in accordance with” as “as indicated by.”

B. “a power consumption of the first and second circuitry” (’120 Patent, Claim 25, 29)

Empire’s Construction	Samsung’s Construction
No construction required; plain and ordinary meaning; not governed by 35 U.S.C. § 112(f)	“power used by the first and second physical transceiver circuitry, not the signal energy”

Although the parties’ briefing disputed whether this phrase can refer to the “signal energy” emitted by the transceiver of the mobile station, the dispute shifted at the hearing. The Court indicated its inclination to give this term a “plain and ordinary meaning” construction, while also clarifying that that meaning excludes signal energy emitted by the antennas, as Samsung’s construction suggests. Empire agreed, and clarified its concern was that Samsung’s construction might exclude *measuring* the power consumption of the first and second circuitry *using* the signal energy. Hr’g Tr., Dkt. No. 116 at 21:15–22:8. The Court noted that that’s a different issue not addressed by the construction. *Id.* at 22:9–15. Accordingly, the Court adopts its preliminary construction of “plain and ordinary meaning,” and reiterates that the meaning does not include signal energy emitted by the antennas.

C. “an idle power consumption of the mobile station” (’120 Patent, Claim 25)

Empire’s Construction	Samsung’s Construction
No construction required; plain and ordinary meaning; not governed by 35 U.S.C. § 112(f)	“power used by the mobile station when it is not sending data over the communications channel”

This dispute relates somewhat to the dispute over the previous term. Empire says this phrase refers to the times when the device is powered on and waiting to transmit data over the communications channel. Dkt. No. 53 at 15. It attacks Samsung’s construction as “improperly captur[ing] situations where the mobile station is fully powered off.” *Id.* at 16. According to Samsung, however, the specification defines “idle” to mean when the mobile station is not sending data over the communications channel. Dkt. No. 58 at 14. Samsung criticizes Empire’s position as “requiring that *all* the circuitry of the mobile station to be turned on for it to be ‘idle.’” *Id.*

The Court agrees with Empire that a fully powered-off mobile station does not have “idle power consumption” within the meaning of the claims. Nor must all the circuitry of the mobile station be turned on for it to be “idle.” Rather, the specification shows the “idle” time is simply the time in which the device is on and waiting to transmit. ’120 Patent at 3:3–5 (“[I]f the transmission rate is too slow, a greater number of transceivers may become idle, waiting to send transmissions over the communication channel.”). In the equation set forth by the Detailed Description for the energy-optimized rate, $v_i(t)$ is a fraction of the time the user i is transmitting, and $1-v_i(t)$ is a fraction of the time the user is idle. *Id.* at 3:11–26. A skilled artisan would not calculate the energy-optimized rate using the time during which the mobile station is powered off. Accordingly, the Court construes this phrase as “a power consumed by the mobile station when the mobile station is powered on and waiting to send.”

D. “pilot symbol” (’331 Patent, Claims 1, 5)

Empire’s Construction	Samsung’s Construction
No construction required; plain and ordinary meaning; not governed by 35 U.S.C. § 112(f) “a [data] symbol known to the receiver” (Dkt. No. 53 at 18; <i>see also</i> Dkt. No. 63 at 8.	“a reference symbol that does not represent data known by the transmitting and receiving devices of a communications system”

In the briefing, Samsung accuses Empire of conflating “pilot symbol” with another disputed term, “replicated data,” which Samsung says defeats the goal of the invention. Dkt. No. 58 at 16. Empire, however, identifies two problems with Samsung’s construction. First, it “requir[es] a pilot symbol to be known to the transmitter.” Dkt. No. 63 at 7. Second, it “inject[s] the unsupported term ‘reference.’” *Id.* at 7.

At the hearing, the parties reached agreement on a construction. The Court proposed “symbol that is known to the transmitter and receiver.” Empire accepted that construction “primarily because it does not include the term ‘reference.’” Hr’g Tr., Dkt. No. 116 at 29:9–17. Samsung also indicated its acceptance. *Id.* at 31:21–32:6. Accordingly, the Court adopts that construction for this term.

E. “a channel matrix of the communications channel” (’331 Patent, Claims 1, 5)

Empire’s Construction	Samsung’s Construction
No construction required; plain and ordinary meaning; not governed by 35 U.S.C. § 112(f) “a matrix that relates a transmitted signal to a received signal” (Dkt. No. 63 at 9).	“a matrix of data representing the operation of the communications channel on the transmitted data symbols”

In its briefing, Empire criticizes Samsung’s construction as unduly narrowing because it recites a function of the matrix and “improperly incorporates isolated statements from the specification.” Dkt. No. 53 at 24. Samsung asserts lexicography, Dkt. No. 58 at 21 (citing ’331 Patent at

1:31–36), but Empire says the passage on which Samsung relies does not have the requisite clarity, deliberateness, or precision, Dkt. No. 63 at 8.

A channel matrix is shown only once in the figures, as a cloud between multiple communication devices. ’331 Patent fig.1 (item 105). In the Background, the patent explains:

The communications channel, however, may introduce a variety of non-idealities to a transmitted signal, such as may be caused by multipath interference, reflections, motion of one or more mobile stations, or other properties of a communications channel. The signals received by a receiver over the communications channel may be related to the transmitted signals by a channel matrix H . *The channel matrix generally refers to a matrix of data which may represent the operation of the communications channel on the transmitted data symbols, including representations of such effects as reflections.*

’331 Patent at 1:27–36 (emphasis added). In other words, the channel matrix is simply a matrix of data showing the effect on the transmission signal of using the channel due to that channel’s properties. This comports with Samsung’s construction.

At the hearing, the Court tentatively construed this term as “a matrix of data representing the operation of the communications channel on the transmitted data symbols” based on the language quoted and emphasized *supra*. Empire generally agreed with the scope of that tentative construction, but questioned the use of “operation” as perhaps too technical for a jury. Hr’g Tr., Dkt. No. 116 at 37:7–11 (agreeing with the Court’s conclusion that “all the channel matrix is trying to capture is the effect of the communication channel, not any other issues relating to the transmission,” but questioning “operation of the communications channel” as more involved language a skilled artisan wouldn’t use). Empire indicated its preference for some other term, like “effect” or “impact.” *Id.* at 37:12–18. Samsung had no objection to using either of those terms. *See id.* at 38:11–39:3. Nor does the Court see any underlying change in scope by using those terms instead of the more mathematical and awkward (to a jury) “operation.” Accordingly, the Court construes

this term as “a matrix of data representing the effect of the communications channel on the transmitted data symbols.”

F. “replicated data ” (’331 Patent, Claim 1–5)

Empire’s Construction	Samsung’s Construction
“duplicated data”	“copied, non-pilot symbols” Alternatively, indefinite under 35 U.S.C. § 112

This dispute relates to the dispute *supra* about “pilot symbol.” Samsung points to a definition of “replicate” that requires “do[ing] or mak[ing] something again so you get the same result or make an exact copy” Dkt. No. 58 at 27 (quoting Longman Dict. of Am. English (4th ed.), Dkt. No. 54-17 at 859). In its view, Empire’s construction simply means two things are the same and does not require any action by the transmitting device. *Id.* at 28. Empire, however, criticizes Samsung’s construction as adding two limitations not found in the claims—“copied” and “non-pilot.” Dkt. No. 63 at 9.

The hearing simplified the dispute. For one, despite the parties’ use of different language in their respective constructions, they agreed “replicated data” is an exact copy of the data. Hr’g Tr., Dkt. No. 116 at 45:18–46:1. Also, both parties agreed “pilot symbols” and “replicated data” are not the same thing. *See id.* at 57:3–11 (reflecting Empire’s agreement that pilot symbols and replicated data “cannot be the same . . . but the patent allows for some overlap”); *id.* at 62:8–13 (noting Samsung’s agreement “that a pilot symbol cannot be replicated data and vice versa”). The Court also agrees.

The rest of the discussion related to whether there can be any overlap between pilot symbols and replicated data. For example, calling it “a bit more complicated,” Empire suggested “a replicated data block could . . . also have something that is otherwise part of a pilot symbol.” Hr’g

Tr., Dkt. No. 116 at 45:7–12. In response, Samsung cited Empire’s infringement contentions and alleged Empire “identif[ies] the same thing, the DMRS signal, . . . as being both the pilot symbol and the replicated data.” *Id.* at 49:19–22. Samsung also disputed the notion that “overlap” is even possible given each block contains one symbol, and that symbol is either a pilot symbol or replicated data. *Id.* at 61:21–62:7.

Samsung’s position makes sense based on the specification, and the Court struggles to see how, within discrete blocks where there is one symbol per block, there could be “overlap” between a pilot symbol and replicated data. Regardless, that’s an infringement issue the Court will consider in due course. For now, the Court confirms the parties’ agreement and its own understanding that a pilot symbol cannot be replicated data and vice versa. Otherwise, the Court will give this term a “plain and ordinary meaning” construction.

V. CONCLUSION

Disputed Term	The Court’s Construction
“wherein the controller is configured to receive a control signal and, in accordance with the control signal, to select between a multiple-input multiple- output (MIMO) mode . . . and a single-input multiple-output (SIMO) mode . . .” (’120 Patent, Claims 25, 29)	“in accordance with” : “as indicated by”
“a power consumption of the first and second circuitry” (’120 Patent, Claims 25, 29)	Plain and ordinary meaning
“an idle power consumption of the mobile station” (’120 Patent, Claim 25)	“a power consumed by the mobile station when the mobile station is powered on and waiting to send”

“pilot symbol” (’331 Patent, Claims 1, 5)	“symbol that is known to the transmitter and receiver”
“a channel matrix of the communications channel” (’331 Patent, Claims 1, 5)	“a matrix of data representing the effect of the communications channel on the transmitted data symbols”
“replicated data” (’331 Patent, Claims 1–5)	Plain and ordinary meaning

The Court **ORDERS** each party not to refer, directly or indirectly, to its own or any other party’s claim-construction positions in the presence of the jury. Likewise, the Court **ORDERS** the parties to refrain from mentioning any part of this opinion, other than the actual positions adopted by the Court, in the presence of the jury. Neither party may take a position before the jury that contradicts the Court’s reasoning in this opinion. Any reference to claim construction proceedings is limited to informing the jury of the positions adopted by the Court.

SIGNED this 30th day of March, 2025.


 ROY S. PAYNE
 UNITED STATES MAGISTRATE JUDGE