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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* ANGELO CENTONZA and HAVISH KOORAPATY<sup>1</sup>

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Appeal 2019-000101  
Application 14/890,340  
Technology Center 2400

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Before JEAN R. HOMERE, CARL W. WHITEHEAD JR. and  
MICHAEL J. ENGLE, *Administrative Patent Judges*.

WHITEHEAD, JR., *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE<sup>2</sup>

Pursuant to 35 U.S.C. § 134(a), Appellant appeals from the Examiner's decision to reject claims 66–80, 82–100 and 102–105 (*see* Final Action 1). We have jurisdiction under 35 U.S.C. § 6(b).

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<sup>1</sup> We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Telefonaktiebolaget LM Ericsson (publ), a Swedish company. Appeal Brief 2.

<sup>2</sup> Rather than reiterate Appellant's arguments and the Examiner's determinations, we refer to the Appeal Brief (filed March 30, 2018), the Reply Brief (filed September 27, 2018), the Final Action (mailed August 31,

We AFFIRM-IN-PART.

*Introduction*

According to Appellant, the claimed subject matter is directed to “wireless communication systems, and more specifically relates to techniques for reducing interference to reference signals used for synchronization procedures.” Specification 1.

*Representative Claims<sup>3</sup>*

66. A method, in a base station operating in a wireless communications network, for facilitating over-the-air synchronization with a neighboring base station, the method comprising:

determining that a signal being transmitted by a first neighbor cell of a plurality of neighbor cells is interfering with or is likely to interfere with a signal, from a second neighbor cell, that is used by the base station for synchronization; and

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2017) and the Answers (mailed July 27, 2018; August 3, 2018), for the respective details.

<sup>3</sup> Appellant argues independent claims 66 and 88 as one group, along with dependent claims 69, 75, 78, 95 and 98, focusing on subject matter in claim 66. *See* Appeal Brief 10–14. Appellant argues independent claims 79 and 99 as another group, along with dependent claims 84 and 85, focusing on subject matter in claim 79. *See* Appeal Brief 14–18. Appellant argues independent claims 86 and 104 as another group, along with dependent claim 105, focusing on subject matter in claim 86. *See* Appeal Brief 18–20. The remaining dependent claims are argued in the following groups: 67, 68, 80, 89 and 100; 70, 71, 90 and 91; and 72, 74, 76, 77, 82, 83, 92, 94, 96, 97, 102 and 103. *See* Appeal Brief 20–23. We select independent claims 66 and 79 as representative claims. *See* 37 C.F.R. § 41.37(c)(1)(iv).

sending towards the first neighbor cell, in response to said determining, a request for activation of a reference signal muting pattern by the first neighbor cell.

79. A method, in a base station operating in a wireless communications network, for facilitating over-the-air synchronization by a neighboring base station, the method comprising:

receiving a request for synchronization information;

responding with synchronization information that includes at least an indication that one or more reference signal muting patterns is/are available, the one or more reference signal muting patterns each corresponding to a pattern of subframes in which all reference symbol signals are muted;

receiving a request for activation of a reference signal muting pattern for a cell supported by the base station; and activating the reference signal muting pattern in response to the request.

### *References*

<b>Name<sup>4</sup></b>	<b>Reference</b>	<b>Date</b>
Horn	US 8,374,163 B2	February 12, 2013
Kwun	US 2011/0300807 A1	December 8, 2011
Yi (“Yi ’310”)	US 2016/0007310 A1	January 7, 2019
Yi (“Yi ’304”)	US 2016/0192304 A1	June 30, 2016
Wu	US 2016/0211955 A1	July 21, 2016

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<sup>4</sup> All reference citations are to the first named inventor only.

*Rejections on Appeal*

Claims 66, 69, 75, 78, 79, 84–88, 95, 98, 99, 104 and 105 stand rejected under 35 U.S.C. § 103 as unpatentable over Horn and Yi '304. Final Action 4–11.

Claims 67, 68, 80, 89 and 100 stand rejected under 35 U.S.C. § 103 as unpatentable over Horn, Yi '304 and Kwun. Final Action 4–14.

Claims 70, 71, 90 and 91 stand rejected under 35 U.S.C. § 103 as unpatentable over Horn, Yi '304 and Yi '310. Final Action 14–16.

Claims 72–74, 76, 77, 82, 83, 92–94, 96, 97, 102 and 103 stand rejected under 35 U.S.C. § 103 as unpatentable over Horn, Yi '304 and Wu. Final Action 16–21.

We have only considered those arguments that Appellant actually raised in the Briefs. Arguments Appellant could have made but chose not to make in the Briefs have not been considered and are deemed to be waived (*see* 37 C.F.R. § 41.37(c)(1)(iv)).

ANALYSIS

*Claims 66, 69, 75, 78, 88 and 95*

Appellant contends the Examiner erred in finding the combination of Horn and Yi '304 teaches, suggests or otherwise renders obvious “determining that a signal being transmitted by a first neighbor cell of a plurality of neighbor cells is interfering with or is likely to interfere with a signal from a second neighbor cell, *that is used by the base station for synchronization*” as recited in claims 66 and as commensurately recited in claim 88. *See* Appeal Brief 11. Appellant argues Horn does not disclose the

signal from the second neighbor cell is used by the base station for synchronization. *See* Appeal Brief 11.

We are not persuaded of Examiner error. Horn discloses “a node of the first cluster may include an interference controller 510 that is configured to determine whether a node of a neighboring asynchronous cluster is interfering with or may interfere with communication at the first cluster.” Horn column 7, lines 9–13. Horn describes a node may be a base station (Horn column 4, lines 24–26; *see* Answer 5; *see also* Reply Brief 4) and a cluster includes two or more nodes (Horn column 4, lines 43–45). Horn further discloses communication between the various clusters may include both data signals and synchronization signals (Horn column 5, lines 16–21, column 6, lines 62–65). Consequently, Horn teaches or at least suggests that a node of a neighboring asynchronous cluster (a signal transmitted by a first neighbor cell) is interfering with or may interfere with communication (including both data signals and synchronization signals) at the first cluster (a second neighbor cell). Horn also discloses a synchronization signal may be interfered with by the second neighbor cell, as claimed. Appellant’s argument that “the nodes within a given cluster are already synchronized with one another” (Appeal Brief 11) is not persuasive of Examiner error as Horn teaches “a neighboring asynchronous cluster is interfering or may interfere.” Horn column 7, lines 9–13.

Appellant further argues Horn fails to disclose “that the node determines whether the neighboring node is interfering with or may interfere with a signal used by a base station for synchronization.” Appeal Brief 12. Horn, however, teaches:

each wireless node (*e.g.*, node **500**) in a system may broadcast various signals in conjunction with establishing or maintaining communication between nodes. For example, a node may broadcast synchronization channel signals and pilot signals (*e.g.*, channel reference signals) that may be used by other nodes for synchronization and related purposes.

Horn column 6, lines 39–44. Thus, a node in Horn’s first cluster can be a base station and can determine if another node is interfering with a signal from a different node. Horn describes interfering with communication at the first cluster. *See* Horn column 7, lines 9–13. Horn further describes signals may include synchronization channel signals used by other nodes for synchronization (*See* Horn column 6, lines 39–44).

Appellant argues Horn’s system “only monitor[s] these synchronization signals to detect whether the nodes transmitting those synchronization signals (*e.g.*, from an asynchronous cluster) might interfere with regular data transmissions among the cluster of the monitoring node” Appeal Br. 12 (citing Horn, column 5, lines 42–46; column 6 line 62–column 7 line 9; column 7, lines 13–16).

We are not persuaded of Examiner error. As quoted above, Horn discloses broadcasting “synchronization channel signals . . . that may be used by other nodes for synchronization” as one example of signals broadcast “in conjunction with establishing *or maintaining* communication between nodes.” Horn column 6, lines 38–44 (emphasis added). Horn further describes “[b]y monitoring these or other signals, a node may determine whether it is receiving or may receive interfering transmissions from an asynchronous neighboring node.” Horn column 7, lines 1–4. Thus, Horn teaches or at least suggests the signals that are being monitoring include synchronization signals. Horn column 6, lines 57–67. Although

Horn describes synchronization signals from the asynchronous node or synchronizing two clusters of nodes, that does not preclude Horn from teaching or suggesting interference of signals including synchronization signals in a second node, as recited.

Thus, we are not persuaded by Appellant that Horn only teaches or suggests interference from “data communications,” not synchronization signals. Reply Brief 6–7.

Appellant further argues because Horn allegedly discloses the nodes are “already synchronized,” Horn fails to disclose “any interference with the signals used by first node for synchronization.” Appeal Brief 12. The claim does not preclude nodes already being synchronized. Further, as discussed above, Horn discloses “maintaining” communication between nodes and provides an example of “synchronization channel signals . . . that may be used by other nodes for synchronization.” Horn column 6, lines 38–44.

Additionally, Appellant’s argument that Horn, despite disclosing that nodes may transmit a variety of signal useful for, for example, synchronization signals, “[t]here is no suggestion, however, that ‘maintaining communication’ requires the continued broadcasting of synchronization signals.” Reply Brief 5. However, as discussed above, Horn teaches or suggests both that synchronization signals are sent and a synchronization signal may be interfered with by a different node. *See* Horn, column 5, lines 16–21; column 6, lines 39–44, 62–65.

Accordingly, we are not persuaded the Examiner erred in finding the combination of Horn and Yi ’304 teaches, suggests or otherwise renders obvious the limitations as recited in claim 66 and commensurately recited independent claim 88, not separately argued. Claims 69, 75 and 78 depend



from claim 66 and claim 95 depends from claim 88; therefore, these claims fall with their respective independent claims. Thus, we sustain the rejection of claims 66, 69, 75, 78, 88 and 95 under 35 U.S.C. § 103(a) for obviousness over Horn and Yi '304.

*Claims 79, 84, 85 and 99*

Appellant contends the Examiner erred in finding the combination of Horn and Yi '304 teaches, suggests or otherwise renders obvious “receiving a request for synchronization information; responding with synchronization information that includes at least an indication that one or more reference signal muting patterns is/are available” as recited in claim 79 and as commensurately recited in claim 99. Appeal Brief 15. In particular, Appellant argues the Examiner did not make any explicit findings that Yi '304 teaches “receiving a request for synchronization information” and rather, the Examiner states “for such information to have been provided, it must have been requested.” Appeal Brief 15 (citing Final Action 8). Further, according to Appellant, “the synchronization signals and pilot signals discussed in Horn are transmitted as a matter of course, without any request.” Appeal Brief 16 (citing Yi '304 ¶ 95).

The Examiner cites Yi '304's Figure 7 and ¶¶ 170 and 172–174. See Final Action 8–9. The Examiner finds Horn teaches “methods of a base station facilitating over-the-air synchronization by a neighboring base station where a node determines whether and how to synchronize with another node.” Advisory Action 2 (citing Horn, column 6, lines 19–37). The Examiner further finds Horn's Figure 4 teaches “a node receives a reference signal and advertises a new synchronization metric” and therefore, according to the Examiner “the reference signal may be understood as a request for

synchronization information because synchronization information is transmitted at least partially because of the node receiving the reference signal.” Advisory Action 2 (citing Horn, Figure 4).

Appellant contends an ordinarily skilled artisan would not have found it obvious to modify a node in Horn to request the synchronization signals “because the synchronization signals were already being broadcast by Horn’s nodes.” Appeal Brief 17. Appellant argues, “While Horn’s col. 6 (lines 42-44) describes a node that broadcasts synchronization signals that other nodes can use for synchronization, Horn does not disclose or suggest that this broadcasting node received a request to broadcast the synchronization signals.” Appeal Brief 17. The Examiner further relies on Yi ’304’s teaching of “eNBs using received SINRs [signal-to-interference-and-noise ratio] received from each neighbor eNB for selecting a source eNB for synchronization.” Advisory Action 2. The Examiner has not, however, set forth with sufficient specificity where Horn or Yi ’304, taken alone or in combination, teaches or suggests the disputed limitation. Indeed, we are not persuaded an ordinarily skilled artisan, based on Horn’s teaching of broadcasting a synchronization signal (Horn, column 6, lines 42–44), and Yi ’304’s teaching of synchronization among nodes of a wireless network (Yi ’304 ¶¶ 170, 172–174, Figure 7), would have found it obvious to modify Horn’s system to receive a request and respond, as recited in claim 79. Nor has the Examiner shown such a feature is *necessarily present* in either Horn or Yi ’304 and therefore, has not shown the feature is inherent (*See* Advisory Action 2; *see also Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991) (“Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result

from a given set of circumstances is not sufficient”); *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002) (quoting *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999)) (“Inherent anticipation requires that the missing descriptive material is ‘necessarily present,’ not merely probably or possibly present, in the prior art”).

Accordingly, we are persuaded the Examiner erred in finding the combination of Horn and Yi ’304 teaches, suggests, or otherwise renders obvious the limitations as recited in claim 79 and commensurately recited independent claim 99. Claims 84 and 85 depend from claim 79 and thus, stand with claim 79. Therefore, we do not sustain the rejection of claims 79, 84, 85 and 99 under 35 U.S.C. § 103(a) for obviousness over Horn and Yi ’304.

*Claims 86, 87, 104 and 105*

Appellant contends the Examiner erred in finding the combination of Horn and Yi ’304 teaches, suggests or otherwise renders obvious “receiving a first message from the first base station, the first message indicating that reference signal muting by at least a second neighbor cell of the plurality of neighbor cells is needed,” as recited in claims 86 and 104. *See* Appeal Brief 18–20. Appellant argues “rather than needing to mute reference signals, Horn’s receiving node indicates to the transmitting nodes to refrain from data transmissions entirely during the timeslot(s) when the receiving node is receiving data.” Appeal Brief 19.

Horn teaches “an interfering node’s output at least mutes its reference symbol signals during the requested timeslot, wherein a timeslot is understood to comprise more than one subframe, because abstaining from

transmission is understood to require all signals to be muted/silenced during the abstention.” Advisory Action 2 (citing Horn, column 8, lines 5–36; Figure 3). Appellant argues there is no reason to believe Horn’s control indication, “which request[s] that other nodes should stop transmitting anything, during certain time slots, would be understood by the person of ordinary skill to be an ‘indication that a reference signal muting pattern [is needed].” Reply Brief 13. The claim, however, does not preclude silence of all transmissions. Moreover, as noted by the Examiner, Horn teaches limiting transmission may include “*abstaining from performing some other related operation.*” Answer 11 (citing Horn column 8, lines 9–15).

Appellant further argues no evidence or reason exists “to believe, for example, that a ‘reference signal muting pattern,’ which would silence the transmission of reference signals but not other transmissions, would be of any benefit at all to Horn’s receiving node.” Reply Brief 13–14. Appellant additionally argues Horn does not describe use of a reference signal muting pattern and “Yi ’304’s disclosure of the existence of a reference muting pattern” does not teach the limitation. Reply Br. 14–15.

Yi ’304 teaches a signal (i.e., the claimed “first message”), indicating a radio synchronization failure (RSF) has occurred due to an excessive signal-to-interference-and-noise-ratio (SNIR/SINR), may be transmitted to neighboring nodes (Yi ’304 ¶¶ 179–181). In response, a neighboring node which receives the message may activate a muting pattern to stop the interference (Yi ’304 ¶ 181 (“One example of action can include activation of muting where a muting pattern is given/exchanged via X2/Xn signaling which can be activated via radio-interface.”); Final Action 6). Thus, Yi ’304 teaches activation of a muting pattern in response to interference.

Appellant further argues the Examiner uses improper hindsight in combining the teachings of Horn and Yi '304. Reply Brief 14–15. We are not persuaded of Examiner error. Horn teaches determining whether another node is interfering with or may interfere with communication of a first node. *See* Horn column 7, lines 9–13. Yi '304 teaches activation of a muting pattern in response to interference. *See* Yi '304 ¶ 181. Appellant has not persuaded us of error in the determination that an ordinarily skilled artisan would have found it obvious to combine the teachings of Horn and Yi '304 to arrive at the recited limitations.

Accordingly, we are not persuaded the Examiner erred in finding the combination of Horn and Yi '304 teaches, suggests, or otherwise renders obvious the limitations as recited in claim 86 and commensurately recited independent claim 104, not separately argued. Claim 87 depends from claim 86 and claim 105 from claim 104 and thus, these claims fall with their respective independent claims. Therefore, we sustain the rejection of claims 86, 87, 104 and 105 under 35 U.S.C. § 103(a) for obviousness over Horn and Yi '304.

*35 U.S.C. § 103: Claims 67, 68, 80, 89 and 100*

The issue presented by Appellant's arguments is whether the Examiner erred in concluding the combination of Horn, Yi '304 and Kwun teaches, suggests or otherwise renders obvious “subsequently determining that the signal from the second neighbor cell is not needed or is unavailable for synchronization and, in response, *sending a message*, towards the first neighbor cell, indicating that the reference signal muting pattern may be deactivated,” as recited in claims 67 and 89. *See* Appeal Brief 20–22.

Appellant argues Kwun does not teach or suggest “a base station sending a message to an interfering neighbor cell indicating that a RSMP (reference signal muting pattern) may be deactivated, much less in response to determining that a signal from a second neighbor cell is not needed or is unavailable for synchronization.” Appeal Brief 21. The Examiner cites ¶¶ 47, 51, 110, 56, 65, and 74 of Kwun to teach the argued features. *See* Final Action 12. The Examiner further states “[o]ne having ordinary skill in the art before the effective filing date of the claimed invention would have found it obvious to use [Kwun] to modify [Horn-Yi ’304] to stop unnecessary synchronization, because stopping synchronization may increase cell capacity of the base station/node/cell.” *See* Examiner Answer 12. We find that while the cited paragraphs teach wherein a “blanking operation” (which presumably is being equated to the claimed “reference signal muting pattern”) may be stopped when it is no longer needed, we are unable to find that Kwun teaches “sending a message” towards the first neighbor cell indicating the reference signal muting pattern may be deactivated.

Accordingly, we are persuaded the Examiner erred in finding the combination of Horn, Yi ’304 and Kwun teaches, suggests or otherwise renders obvious the limitations as recited in claim 67 and claim 89, not separately argued. Claims 80 and 100 depend from independent claims 79 and 99 respectively, and thus, stand with their respective independent claims.

Therefore, we reverse the rejection of claims 67, 80, 89 and 100 under 35 U.S.C. § 103(a) for obviousness over Horn, Yi ’304 and Kwun.

Claim 68, which depends from independent claim 66, was not separately argued; therefore, claim 68 falls with claim 66 and we sustain the rejection of claim 68 under 35 U.S.C. § 103.

*35 U.S.C. § 103: Claims 70, 71, 90 and 91*

Claims 70, 71, 90 and 91 depend from independent claims 66 and 88, respectively. Appellant did not separately argue these claims (Appeal Brief 14); therefore, these claims fall with their respective independent claims. Accordingly, we sustain the Examiner's rejections of claims 70, 71, 90 and 91 under 35 U.S.C. § 103.

*35 U.S.C. § 103: Claims 72–74, 76, 77, 82, 83, 92–94, 96, 97, 102  
and 103*

Claims 72–74, 76 and 77 depend from independent claim 66 and claims 92–94, 96 and 97 depend from independent claim 88. These claims were not separately argued; therefore, these claims fall with their respective independent claims. Accordingly, we sustain the Examiner's rejections of claims 72–74, 76, 77, 92–94, 96 and 97 under 35 U.S.C. § 103.

Claims 82 and 83 depend from independent claim 79 and claims 102 and 103 depend from independent claim 99. These claims stand with their respective independent claims for the reasons set forth above. Accordingly, we do not sustain the Examiner's rejections of claims 82, 83, 102 and 103 under 35 U.S.C. § 103.

CONCLUSION

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
66, 69, 75, 78, 79, 84–88, 95, 98, 99, 104, 105	103	Horn, Yi '304	66, 69, 75, 78, 86–88, 95, 98, 104, 105	79, 84, 85, 99
67, 68, 80, 89, 100	103	Horn, Yi '304, Kwun	68	67, 80, 89, 100
70, 71, 90, 91	103	Horn, Yi '304, Yi '310	70, 71, 90, 91	
72–74, 76, 77, 82, 83, 92–94, 96, 97, 102, 103	103	Horn, Yi '304, Wu	72–74, 76, 77, 92–94, 96, 97	82, 83, 102, 103
<b>Overall Outcome:</b>			66, 68–78, 86–88, 90–98, 104, 105	67, 79, 80, 82–85, 89, 99, 100, 102, 103

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2010).

AFFIRMED-IN-PART