

Petitioner's Demonstratives

Samsung Electronics Co., Ltd., and Samsung
Electronics America, Inc.,

Petitioner

v.

Apex Beam Technologies LLC,
Patent Owner

IPR2023-00601 and IPR2023-00602

Patent No. 10,568,113

Samsung Exhibit 1026

Samsung v. Apex - IPR2023-00601 & IPR2023-00602

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Topics

- Instituted grounds
- High-level summary of '113 patent and prior art
- Disputed issues in *Xia* Grounds (IPR2023-00601)
- Disputed issues in *Liu* Ground (IPR2023-00602)
- Expert qualifications

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- Disputed issues in *Liu* Ground (IPR2023-00602)
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Instituted Grounds

- All claims of the '113 patent are challenged:
 - Claims 1-5: user equipment method
 - Claims 6-10: base station method
 - Claims 11-15: user equipment apparatus
 - Claims 16-20: base station apparatus

Ground	Challenged Claims	Basis	Prior Art
IPR2023-00601, Ground 1	1-20	§ 103	<i>Xia</i>
IPR2023-00601, Ground 2	1-20	§ 103	<i>Xia and Jover</i>
IPR2023-00602, Ground 1	1-20	§ 103	<i>Liu and Jover</i>

Topics

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Exemplary '113 Claim: Beam Failure Recovery Procedure

1. A method in a User Equipment (UE) for wireless communication, comprising:

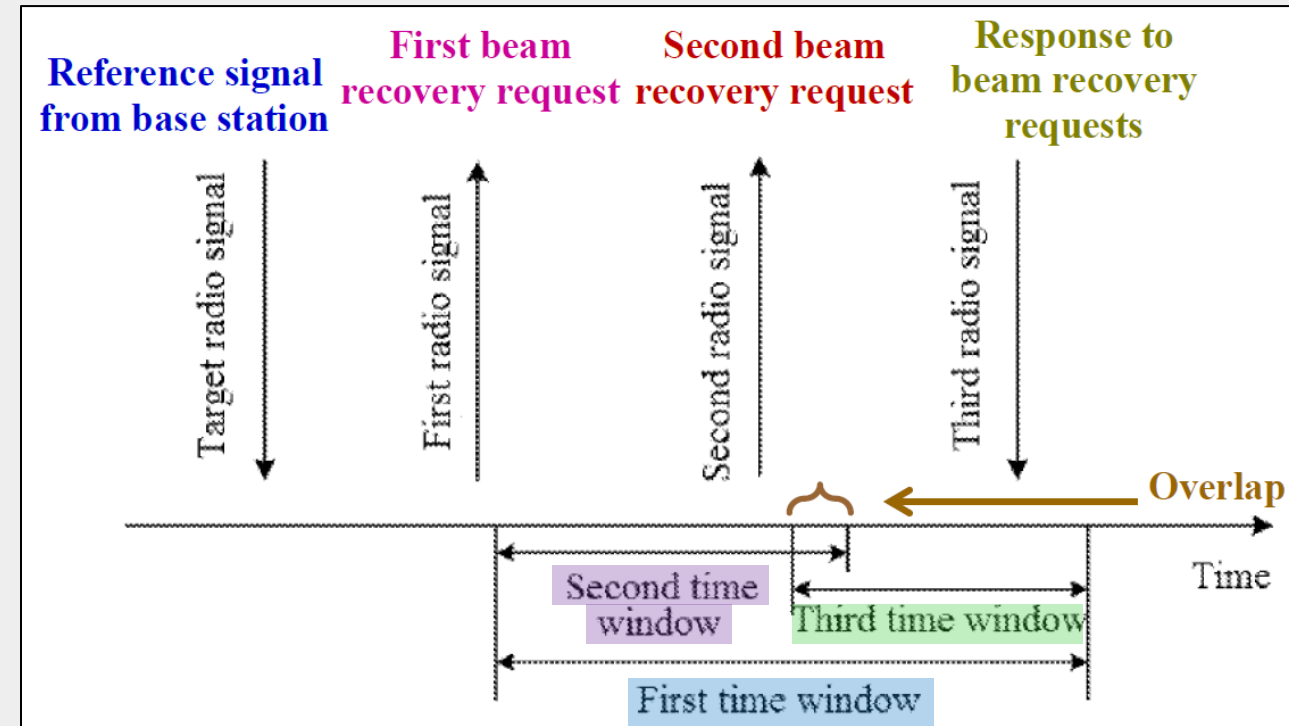
receiving a **target radio signal**;

transmitting a **first radio signal** on a **first channel**;

transmitting a **second radio signal** on a **second channel**; and

monitoring a **third radio signal** in a **first time window**;

wherein a measurement for the **target radio signal** obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the **first radio signal** and the **second radio signal**; a time resource occupied by the **first radio signal** is used for determining the start time of the **first time window**; a time domain resource occupied by the **first radio signal** is used for determining a **second time window**, a time domain resource occupied by the **second radio signal** is within the **second time window**, and the **second time window** is within the **first time window**; a time domain resource occupied by the **second radio signal** is used for determining a **third time window**, and the end time of the **third time window** is the end time of the **first time window**; and the **second time window** and the **third time window** have **overlapped** time domain resource(s).



('113 patent, FIG. 6.)

('113 patent, 13:66-67.)

In one embodiment, the first radio signal and the second radio signal are **beam recovery requests**.

('113 patent, 8:57.)

In one embodiment, the **first channel** is a PUCCH.

('113 patent, 8:64-65.)

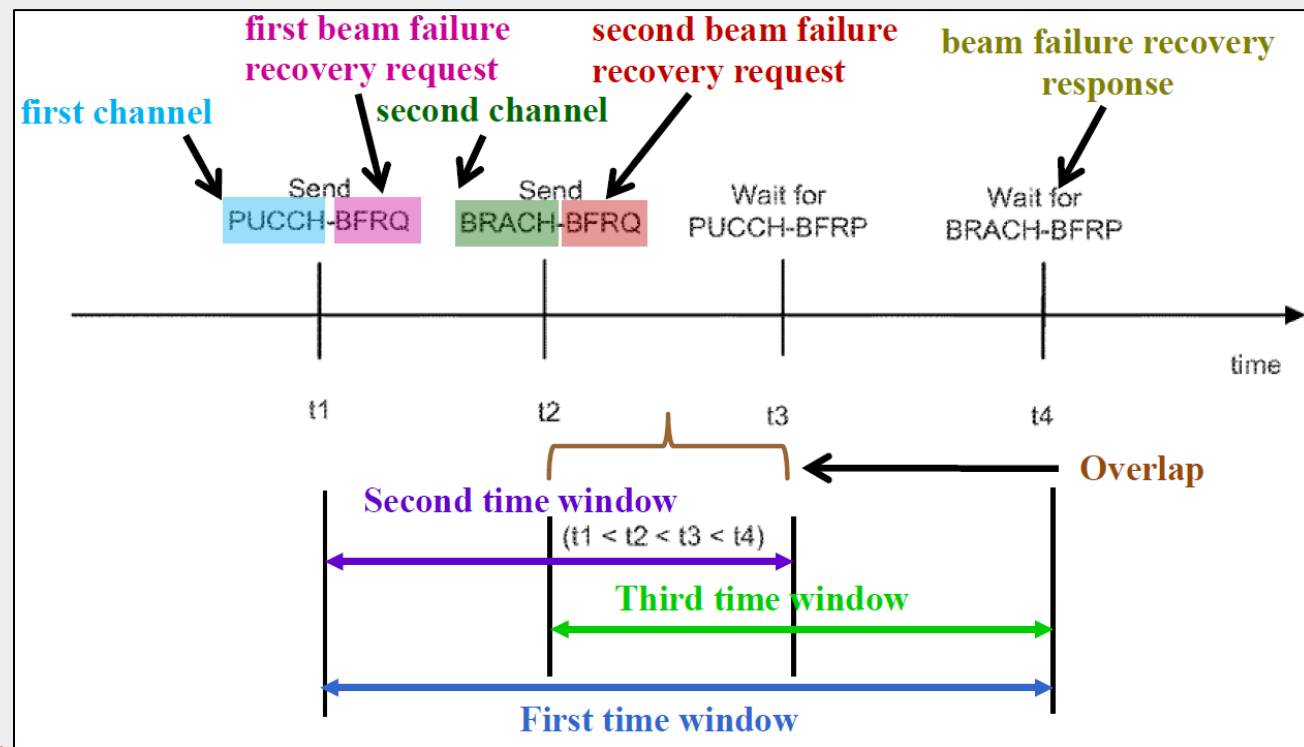
In one embodiment, the **second channel** is a physical layer random access channel.

Xia's Beam Failure Recovery Procedure

1. A method in a User Equipment (UE) for wireless communication, comprising:

- receiving a **target radio signal**;
- transmitting a **first radio signal** on a **first channel**;
- transmitting a **second radio signal** on a **second channel**; and
- monitoring a **third radio signal** in a **first time window**;

wherein a measurement for the **target radio signal** obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the **first radio signal** and the **second radio signal**; a time resource occupied by the **first radio signal** is used for determining the start time of the **first time window**; a time domain resource occupied by the **first radio signal** is used for determining a **second time window**, a time domain resource occupied by the **second radio signal** is within the **second time window**, and the **second time window** is within the **first time window**; a time domain resource occupied by the **second radio signal** is used for determining a **third time window**, and the end time of the **third time window** is the end time of the **first time window**; and the **second time window** and the **third time window** have **overlapped** time domain resource(s).

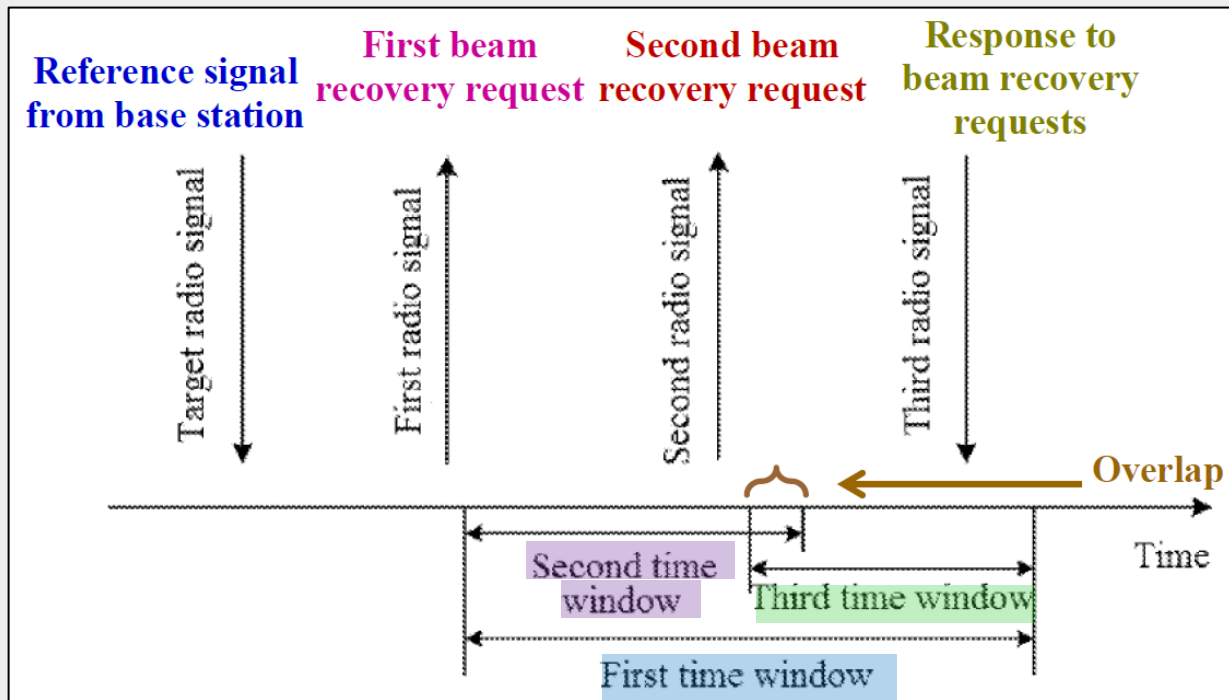


(Xia, FIG. 6B.)

[0076] To detect a beam failure, the UE (e.g., UE 404) monitors a reference signal (beam failure detection RS) to assess whether a beam failure trigger condition has been met (e.g., beam signal strength has dropped below a threshold).

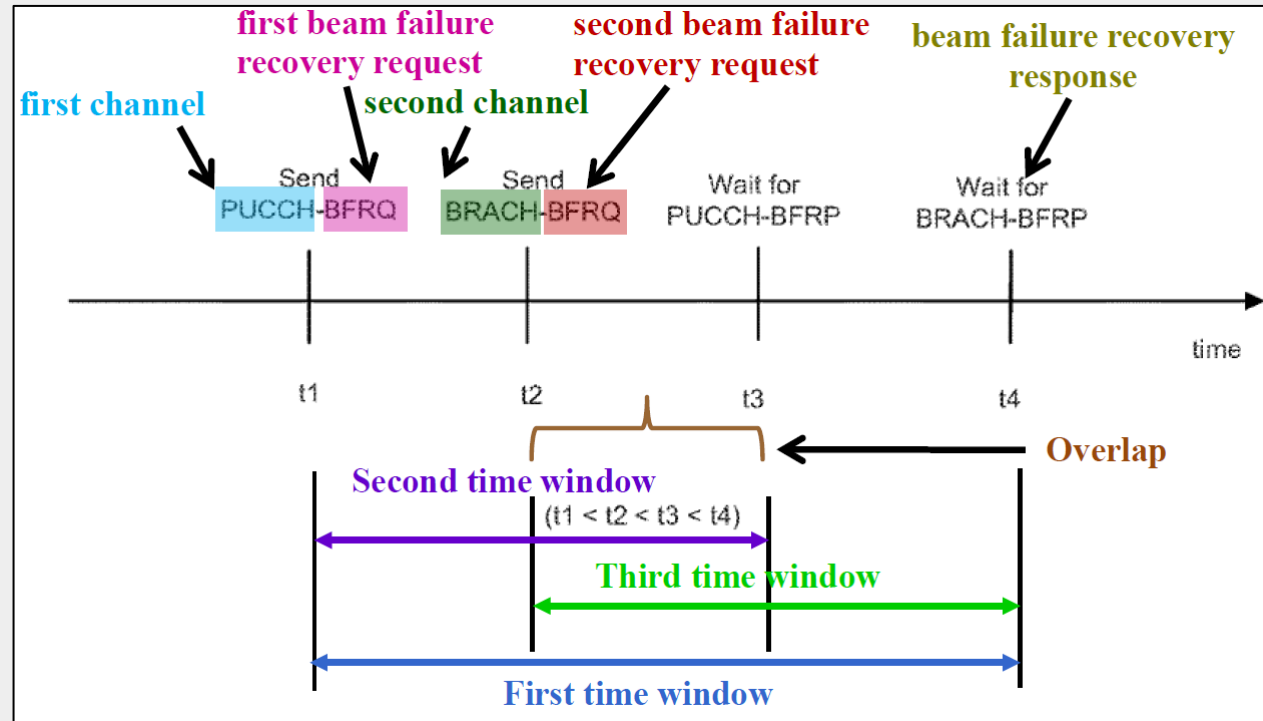
(Xia, [0076].)

'113 Patent's Procedure vs. *Xia*'s Procedure



('113 patent, FIG. 6.)

'113 Patent



(*Xia*, FIG. 6B.)

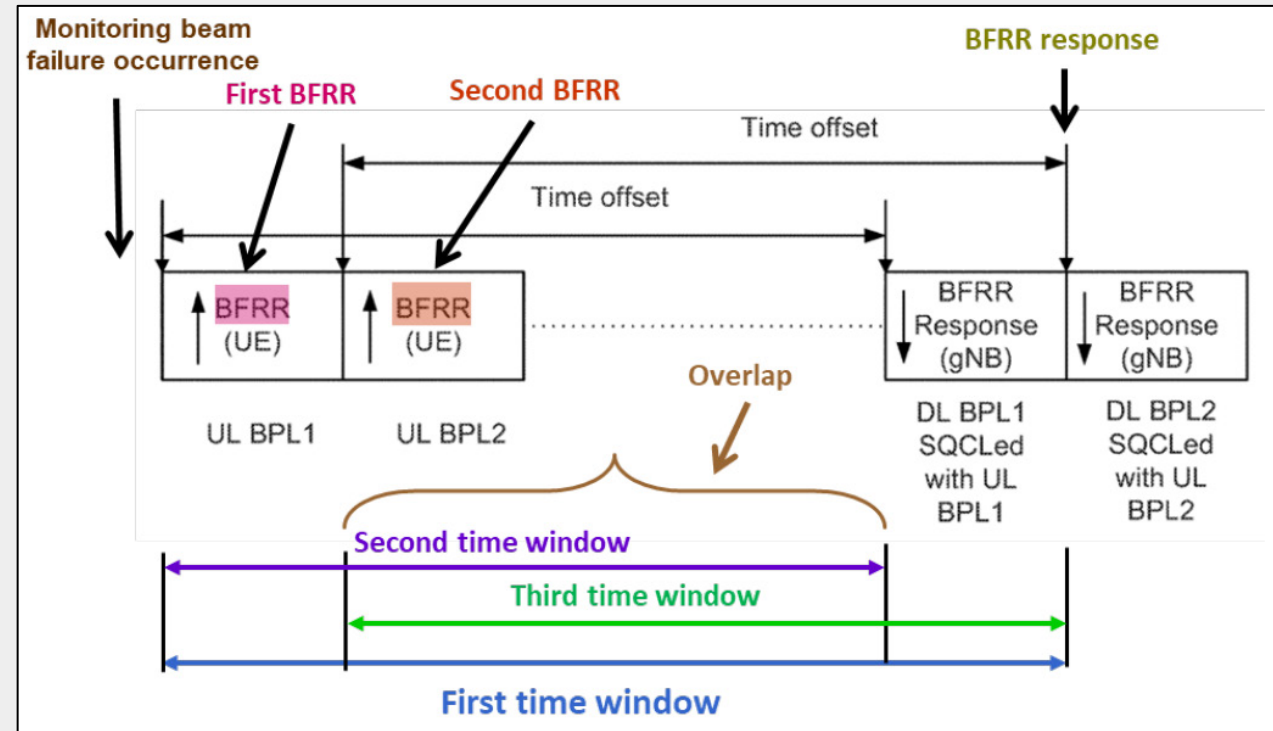
Xia

Liu's Beam Failure Recovery Procedure

1. A method in a User Equipment (UE) for wireless communication, comprising:

- receiving a **target radio signal**;
- transmitting a **first radio signal** on a **first channel**;
- transmitting a **second radio signal** on a **second channel**; and
- monitoring a **third radio signal** in a **first time window**;

wherein a measurement for the **target radio signal** obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the **first radio signal** and the **second radio signal**; a time resource occupied by the **first radio signal** is used for determining the start time of the **first time window**; a time domain resource occupied by the **first radio signal** is used for determining a **second time window**, a time domain resource occupied by the **second radio signal** is within the **second time window**, and the **second time window** is within the **first time window**; a time domain resource occupied by the **second radio signal** is used for determining a **third time window**, and the end time of the **third time window** is the end time of the **first time window**; and the **second time window** and the **third time window** have **overlapped** time domain resource(s).



(Liu, Fig. 5B.)

(Liu, [0084].)

[0069] If the user equipment 110A-110C does not support Rx beamforming, the user equipment 110A-110C measures the channel quality of a reference signal (RS) in each transmission beam and reports the measurements to the base station 202. The station 202 selects the best beam for the

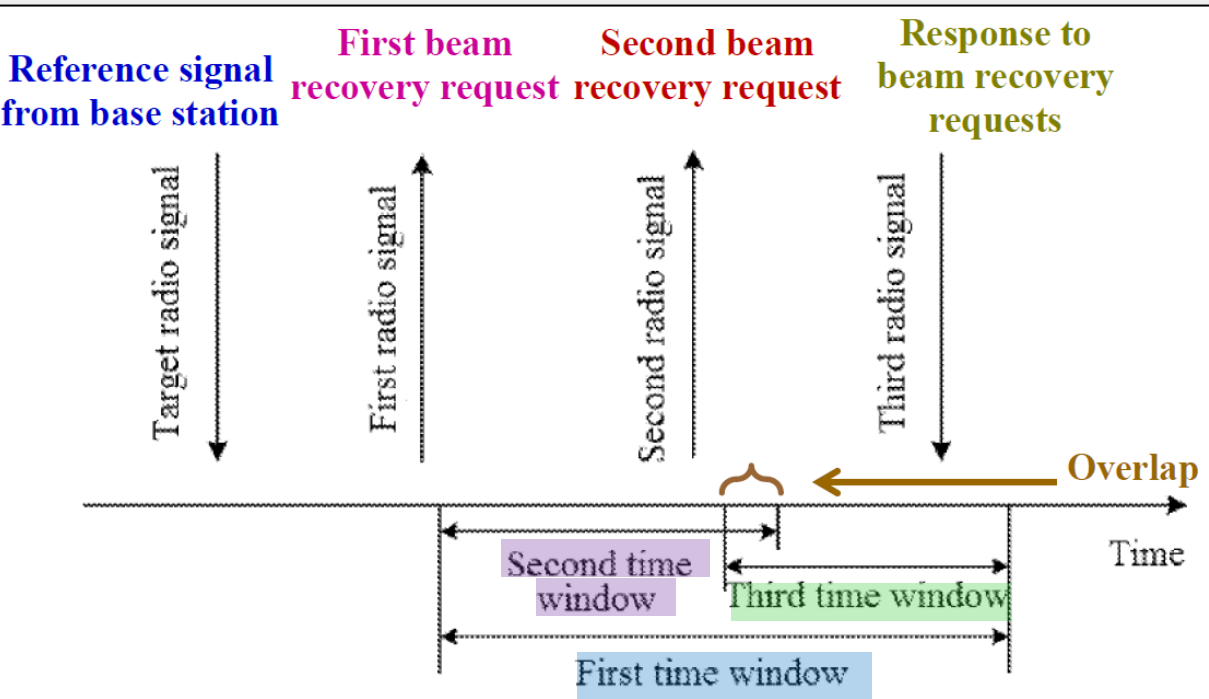
(Liu, [0069].)

(Liu, [0084].)

[0084] In order for the system to recover from such a beam failure, the user equipment 404 sends a beam failure recovery request (BFRR) to the base station 402. In one embodiment, when only the DL beam has failed (FIG. 4A), the user equipment 404 may use the active PUCCH (originally allocated for UCI) to report the beam failure and request recovery from the base station 402, as agreed upon during the 3GPP TSG RAN WG1 #89 meeting. In another embodiment...

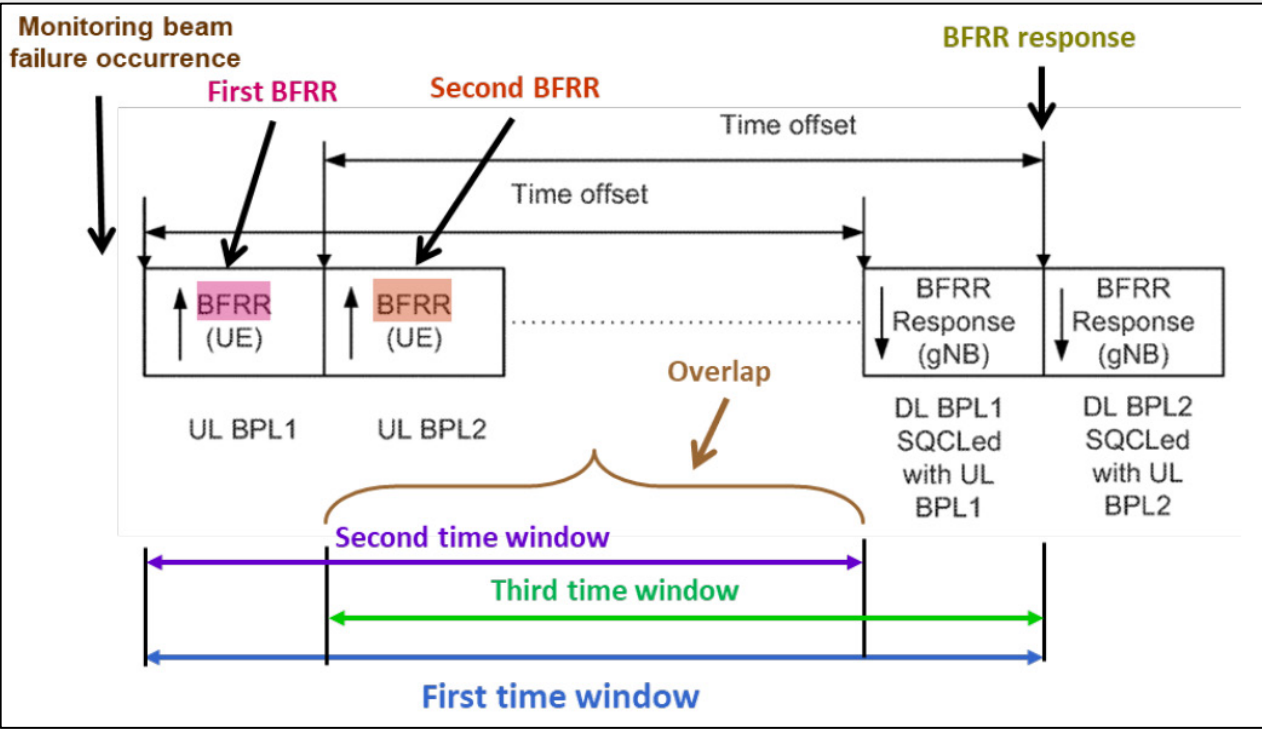
DL beams have failed. In still another embodiment, when the DL and UL beams have failed, the user equipment 404 may also attempt to use the PRACH or PRACH-like channel for BFRR. The PRACH or PRACH-like resource is directly

'113 Patent's Procedure vs. *Liu*'s Procedure



(’113 patent, FIG. 6.)

’113 Patent



(*Liu*, Fig. 5B.)

Liu

Jover's Triggering Condition

1. A method in a User Equipment (UE) for wireless communication, comprising:
 - receiving a target radio signal;
 - transmitting a first radio signal on a first channel;
 - transmitting a second radio signal on a second channel; and
 - monitoring a third radio signal in a first time window;wherein a measurement for the target radio signal obtains a target measurement value, the target measurement value, when higher than a target threshold is used for triggering the transmission of the first radio signal and the second radio signal; a time resource occupied by the first radio signal is used for determining the start time of the first time window; a time domain resource occupied by the first radio signal is used for determining a second time window, a time domain resource occupied by the second radio signal is within the second time window, and the second time window is within the first time window; a time domain resource occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window; and the second time window and the third time window have overlapped time domain resource(s).

[0040] The wireless channel sensing engine 320 is for determining the SNR, SNIR, RSSI, BER, and the like as the beam-forming engine 310 sweeps a beam around an imaginary sphere surrounding the endpoint device 300. Using parameters such as the SNR, SINR, RSSI and BER, the wireless channel sensing engine 320 is able to determine the direction of the source of the communication impairment as well as the direction(s) of one or more desired signals; for example, a line-of-sight communication path with a base station, one or more multipaths to/from the base station, and so forth. In one embodiment, the wireless channel sensing engine 320 is also for detecting a communication impairment in the first instance. For example, wireless channel sensing engine 320 may detect a threshold drop in the SNR or SINR (e.g., a 20 percent drop as compared to a preceding time period) an increase in the BER (e.g., when the BER increases beyond one percent), and so forth. In one embodiment, when the wireless channel sensing engine 320 determines that one or more of such threshold conditions are met, the wireless channel sensing engine 320 may signal to the beam-forming engine 310 to begin the beam sweeping procedure.

(Jover, [0040].)

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Disputed Issues in *Xia* Grounds (IPR2023-00601)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Xia* and *Jover* (*only applies to Ground 2)

Disputed Issues in *Xia* Grounds (IPR2023-00601)

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 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Xia* and *Jover* (*only applies to Ground 2)

Construction of “Triggering the Transmission”

Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“triggering the transmission”	plain and ordinary meaning	not disputed	“causing the transmission”

****Apex did not offer a construction for “triggering the transmission” in the related district court case.**

Apex Wrongly Alleges the Petition Reads Out the Word “Triggering”

Ground 1: *Xia* discloses that, “[t]o detect a beam failure, the UE (e.g., UE 404) monitors a reference signal (beam failure detection RS) to assess whether a beam failure trigger condition has been met.” *Xia*, [0076]; *Xia Provisional*, [0062]. That is, *Xia* uses an indicator of beam failure (“target measurement value”) for triggering the transmission of the first and second BFRQs (“the first radio signal and the second radio signal”). Bims, ¶97.

(Petition 23.)

Apex Cannot Point to Any Evidence to Support its Construction

A person of ordinary skill in the art would understand that the patent specification points to no specific meaning of the word “triggering” other than the plain and ordinary meaning of the term, which can be ascertained from any dictionary:

“cause to happen”

Ex. 2005, ¶ 34 (citing <https://www.thesaurus.com/browse/triggering>).

“to cause something to start”

Id. (citing <https://dictionary.cambridge.org/us/dictionary/english/trigger>).



(POR 9.)



37 CFR § 42.63 - Form of evidence.

(a) Exhibits required. Evidence consists of affidavits, transcripts of depositions, documents, and things. All evidence must be filed in the form of an exhibit.

Xia Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied

[0076] To detect a beam failure, the UE (e.g., UE 404) monitors a reference signal (beam failure detection RS) to assess whether a beam failure trigger condition has been met (e.g., beam signal strength has dropped below a threshold). The beam failure detection RS includes, in one embodiment, a periodic CSI-RS for beam management, where an SS-block within the serving cell can be considered if the SS-block is also employed in beam management.

(Xia, [0076].)

[0066] In order for the system to recover from such a beam failure, the user equipment (UE) 404 sends a beam failure recovery request (BFRQ) to the base station (gNB) 402. In

(Xia, [0066].)

[0078] After the UE 404 detects the beam failure; a beam failure recovery request (BFRQ) transmission is performed. The BFRQ contains information that includes at least the following: explicit/implicit information that identifies the UE 404 and new gNB TX beam information, and explicit/implicit information that identifies the UE 404 and whether a new candidate beam exists. For example, the BFRQ may

(Xia, [0078].)

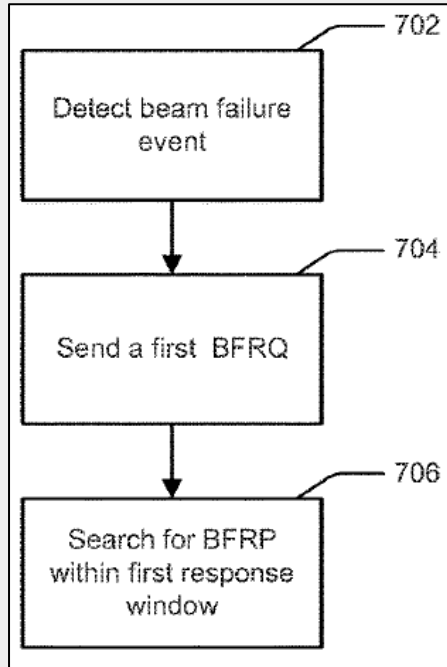
sending a first beam failure recovery request (BFRQ) to the base station upon detection of the beam failure event; and

(Xia, claim 1.)

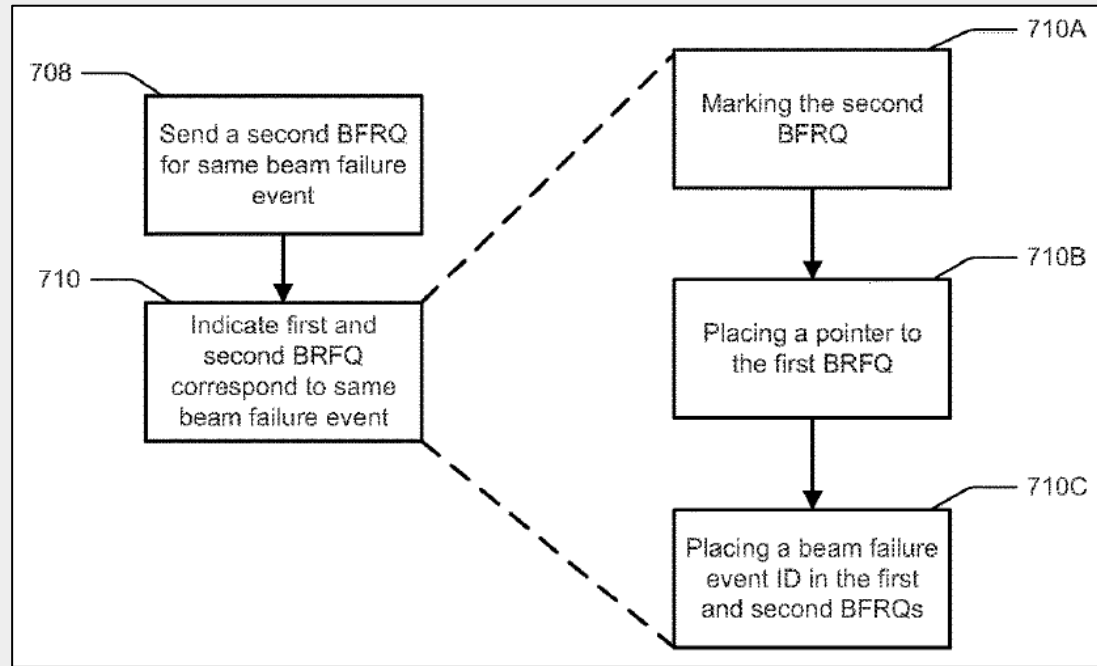
sending a second BFRQ to the base station for a same beam failure event; and

(Xia, claim 10.)

Xia Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied



(Xia, FIG. 7A.)



(Xia, FIG. 7B.)

[0105] With reference to FIG. 7A, user equipment (e.g., UE 110) detects a beam failure event between the UE 110 and the base station (e.g., gNB 202) at 702. A beam failure event may be defined, for example, as a beam failure occurring between the UE 110 and gNB 202 (i.e., when a communication link established between the UE and gNB fans, for example, due to misalignment). At 604, and in response to detecting the beam failure event, the UE 110 sends a first beam failure recovery request (BFRQ) (i.e., a request from the UE 110 to reestablish communication with the gNB 202) to the gNB 202 and then searches for a beam failure recovery response (BFRP) (i.e., a response from the gNB 202 to begin reestablishing the beam with the UE 110) within a first response time window at 706. In one embodi-

(Xia, [0105].)

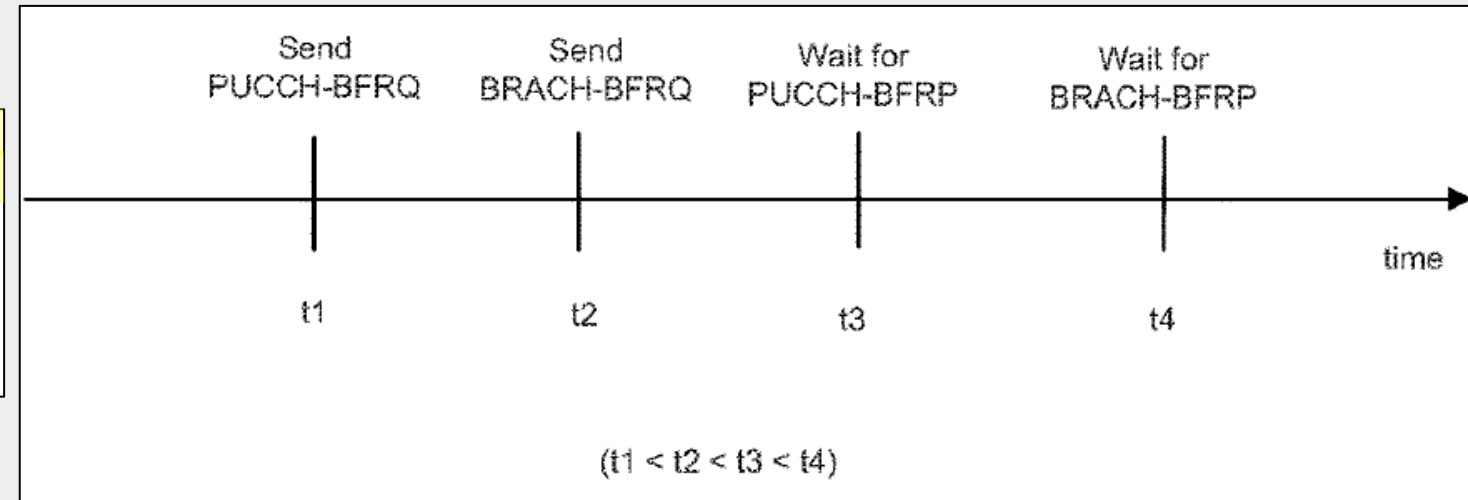
[0106] Turning to FIG. 7B, at 708 the UE 110 sends a second BFRQ from the UE 110 to the gNB 202 for a same beam failure event which indicates, at 710, that the first and second BFRQ correspond to the same beam failure event.

(Xia, [0106].)

Xia Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied

[0091] In the depicted embodiment, more than one BFRQ (e.g., PUCCH-BFRQ, PRACH-BFRQ) is transmitted by a UE 404 for a single beam failure (BFR) event. Since more than one BFRQ may be transmitted by the UE 404, different channels (e.g., PUCCH and PRACH) may be used to send the BFRQ (and receive the BFRP). In order for the gNB 402

(Xia, [0091].)



(Xia, FIG. 6B.)

Xia Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied

Ground 1: *Xia* discloses that, “[t]o detect a beam failure, the UE (e.g., UE 404) monitors a reference signal (beam failure detection RS) to assess whether a beam failure trigger condition has been met.” *Xia*, [0076]; *Xia Provisional*, [0062]. That is, *Xia* uses an indicator of beam failure (“target measurement value”) for triggering the transmission of the first and second BFRQs (“the first radio signal and the second radio signal”).

(Bims (Ex. 1002) ¶97.)

“We hold that where a patent owner in an IPR first proposes a claim construction in a patent owner response, a petitioner must be given the opportunity in its reply to argue and present evidence of anticipation or obviousness under the new construction, at least where it relies on the same embodiments for each invalidity ground as were relied on in the petition.”

Axonics, Inc. v. Medtronic, Inc., 75 F.4th 1374, 1384 (Fed. Cir. 2023).

Disputed Issues in *Xia* Grounds (IPR2023-00601)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Xia* and *Jover* (*only applies to Ground 2)

Constructions of the “Time Window” Limitations

Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“first time window”	plain and ordinary meaning (“first period of time”)	not disputed	“a period of time from the first radio signal in which to receive a third radio signal (i.e., a response to either the first or second radio signals)”
“second time window”	plain and ordinary meaning (“second period of time”)	not disputed	“a period of time from the first radio signal in which to transmit the second radio signal”
“third time window”	plain and ordinary meaning (“third period of time”)	not disputed	“a period of time from the second radio signal in which to receive a third radio signal (i.e., a response to either the first or second radio signals)”

****Apex’s district court construction for “time window”: “the time allocated to respond to a signal request.”**

Apex's Constructions Defy Basic Claim Construction Principles

- The same claim terms should be construed in the same manner



"[A] claim term should be construed consistently with its appearance in other places in the same claim or in other claims of the same patent."

Rexnord Corp. v. Laitram Corp., 274 F.3d 1336, 1342 (Fed. Cir. 2001).

- The intended purpose of a particular claim limitation carries no patentable weight



"We agree with [Appellant] that the district court improperly read a 'purpose' requirement into claim 1."

Toshiba Corp. v. Imation Corp., 681 F.3d 1358, 1368 (Fed. Cir. 2012).

- Not necessary or proper to construe one claim term to repeat other claim limitations



"Ideally, claim constructions give meaning to all of a claim's terms. Construing a claim term to include features of that term already recited in the claims would make those expressly recited features redundant."

Apple, Inc. v. Ameranth, Inc., 842 F.3d 1229, 1237 (Fed. Cir. 2016).

Apex Admits the Plain and Ordinary Meaning of “Time Window” is “A Period of Time”

A person of ordinary skill in the art would understand that each of the claimed time windows are “a period time,” as Petitioner’s own expert admits:

Q. Right, and Figure 6 shows time windows; my question is what is a time window?

A. A time window as shown in Figure 6 is *a period of time* on the time axis.

Ex. 2006, 75:6-11 (emphases added); Ex. 2005, ¶ 37.

(IPR2023-00601 POR 11.)



“The words of a claim are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history. There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.”

Thorner v. Sony Comput. Ent. Am. LLC, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Apex Does Not Cite Any Lexicography or Clear Disavowal to Support its Constructions

C. Patent Owner's Correct Construction Stems from Lexicography

As noted above, Petitioner's faulty apparent constructions stem from viewing the claimed first time window, second time window, and third time window as three arbitrary periods of time. But that does not provide any meaning to a person of ordinary skill in the art since signals are necessarily transmitted and received over periods of time. As Patent Owner does, the meaning of these three terms must be derived from the lexicography of the '113 Patent specification.

(IPR2023-00601 PO Sur-Reply 13.)



“To act as its own lexicographer, a patentee must ‘clearly set forth a definition of the disputed claim term’ other than its plain and ordinary meaning. It is not enough for a patentee to simply disclose a single embodiment or use a word in the same manner in all embodiments, the patentee must ‘clearly express an intent’ to redefine the term.”

Thorner v. Sony Comput. Ent. Am. LLC, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

Apex Does Not Cite Any Lexicography or Clear Disavowal to Support its Constructions

Embodiment 6

Embodiment 6 illustrates an example of a first time window, a second time window and a third time window, as shown in FIG. 6.

In Embodiment 6, a time domain resource occupied by a first radio signal is used for determining the start time of a second time window, and a time domain resource occupied by a second radio signal is used for determining the start time of a third time window. The start time of the first time window and the start time of the second time window are the same. The time domain resource occupied by the second radio signal is within the second time window. The end time of the first time window and the end time of the third time window are the same. The UE conducts monitoring of the third radio signal in a time interval between the start time of the first time window and the time domain resource occupied by the second radio signal, but does not detect the third radio signal. The third radio signal is transmitted after the second radio signal.

(’113 patent, 22:42-61.)

The inventor finds through researches that: if a UE, after using one channel to transmit a beam recovery request, cannot transmit the beam recovery request again during the time window of waiting a response, then a time-frequency resource configured within the time window of waiting the response to transmit a beam recovery request cannot be used by the UE to transmit a beam recovery request, which consequently results in a low utilization of the time-frequency resource configured for transmitting the beam recovery request.

(’113 patent, 1:43-52.)

Apex’s “First Time Window” Construction is Unsupported

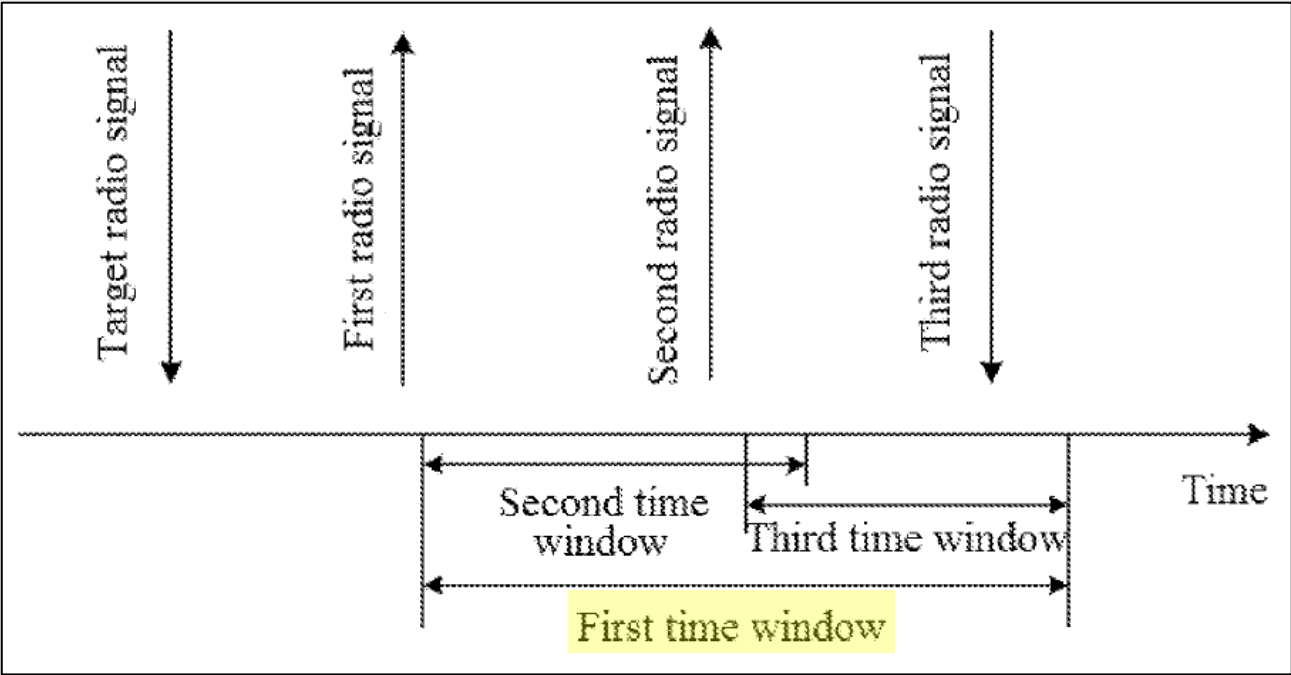
Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“first time window”	plain and ordinary meaning (“first period of time”)	not disputed	“a period of time from the first radio signal in which to receive a third radio signal (i.e., a response to either the first or second radio signals)”

monitoring a third radio signal in a first time window;

(’113 patent, claim 1.)

The inventor finds through researches that: if a UE, after using one channel to transmit a beam recovery request, cannot transmit the beam recovery request again during the time window of waiting a response, then a time-frequency resource configured within the time window of waiting the response to transmit a beam recovery request cannot be used by the UE to transmit a beam recovery request, which consequently results in a low utilization of the time-frequency resource configured for transmitting the beam recovery request.

(’113 patent, 1:43-52.)



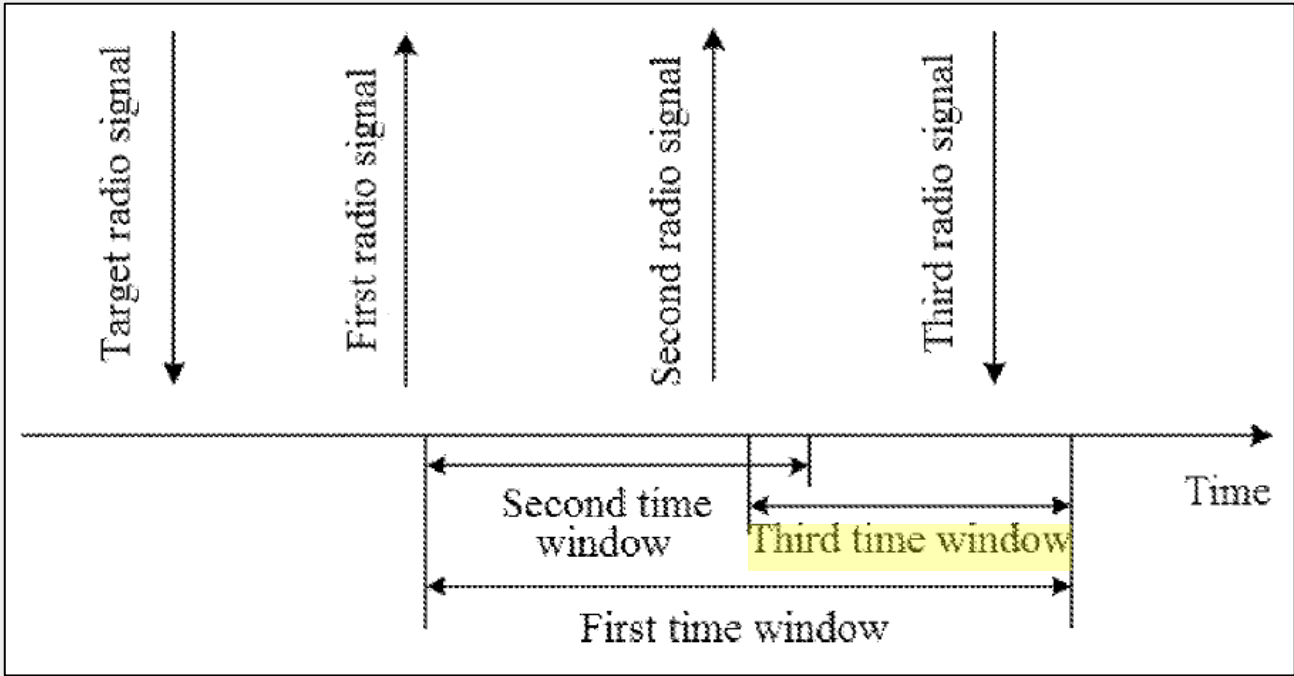
(’113 patent, FIG. 6.)

Apex’s “Third Time Window” Construction is Unsupported

Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“third time window”	plain and ordinary meaning (“third period of time”)	not disputed	“a period of time from the second radio signal in which to receive a third radio signal (i.e., a response to either the first or second radio signals)”

within the first time window; a time domain resource occupied by the second radio signal is used for determining a third time window, and the end time of the third time window is the end time of the first time window; and the second time window and the third

(’113 patent, claim 1.)



(’113 patent, FIG. 6.)

Apex’s “Second Time Window” Construction is Unsupported

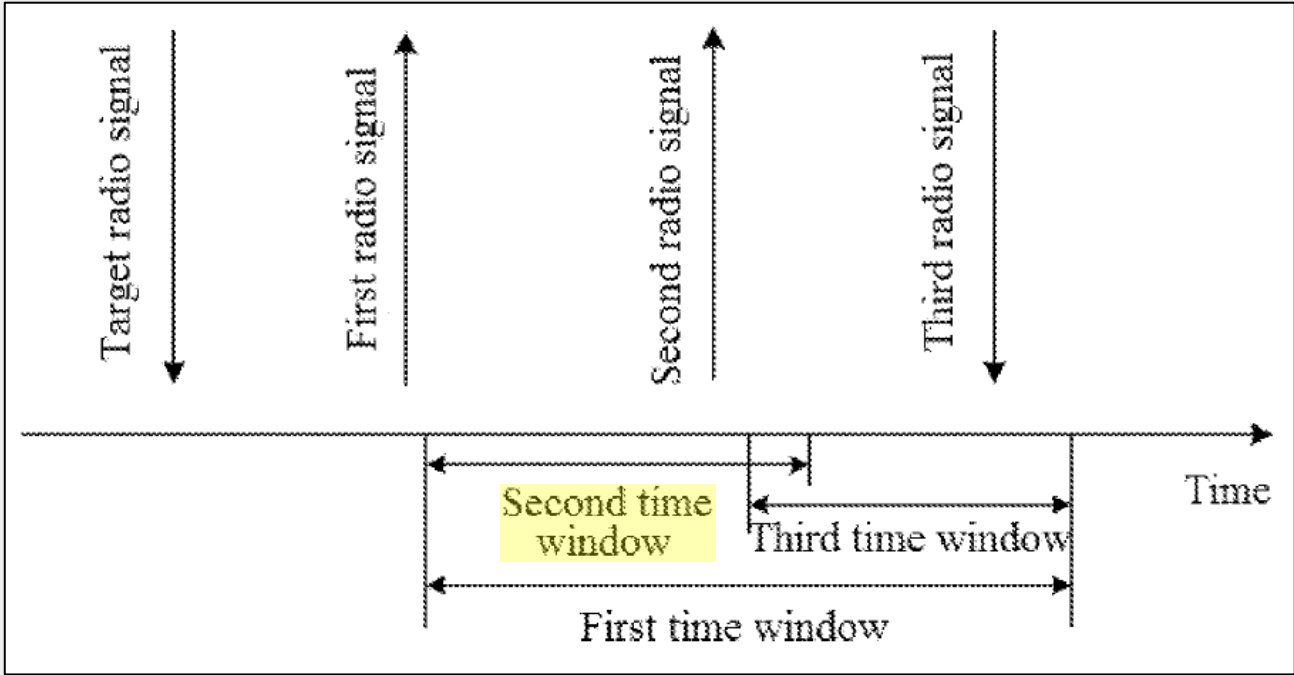
Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“second time window”	plain and ordinary meaning (“second period of time”)	not disputed	“a period of time from the first radio signal in which to transmit the second radio signal”

of the first time window; a time domain resource occupied by the first radio signal is used for determining a second time window, a time domain resource occupied by the second radio signal is within the second time window, and the second time window is

(’113 patent, claim 1.)

same. The time domain resource occupied by the second radio signal is within the second time window. The end time of the first time window and the end time of the third time window are the same. The UE conducts monitoring of the third radio signal in a time interval between the start time of the first time window and the time domain resource occupied by the second radio signal, but does not detect the third radio signal. The third radio signal is transmitted after the second radio signal.

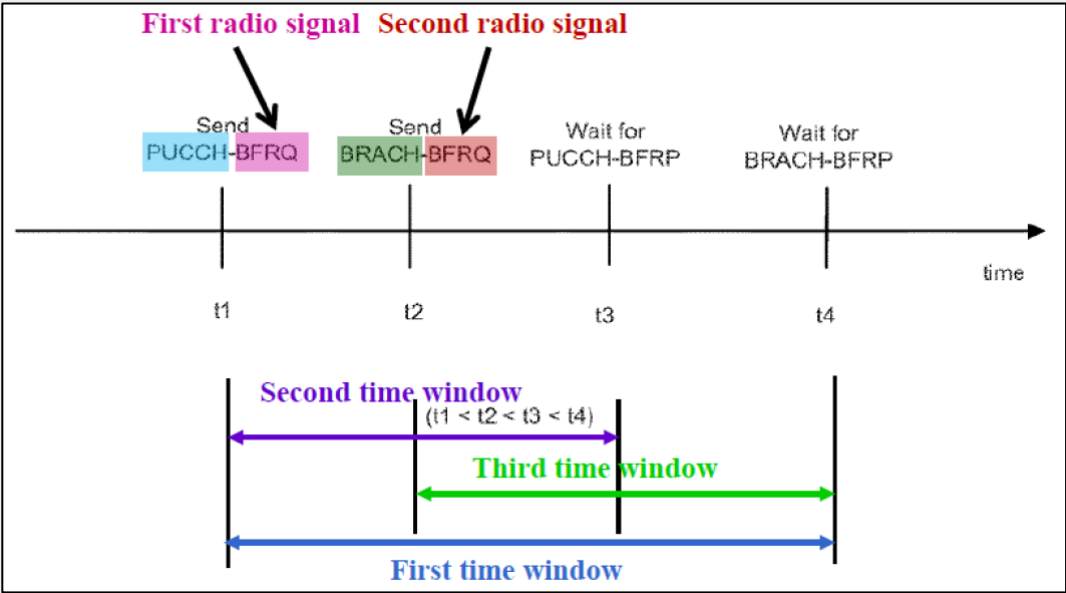
(’113 patent, 22:42-61.)



(’113 patent, FIG. 6.)

Xia Discloses the “Second Time Window”, Regardless of Whether Apex’s Construction is Applied

Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“second time window”	plain and ordinary meaning (“second period of time”)	not disputed	“a period of time from the first radio signal in which to transmit the second radio signal”



(Xia, FIG. 6B.)

****Apex does not dispute that Xia discloses the “first time window” or the “third time window” even under its proposed constructions.**

Disputed Issues in *Xia* Grounds (IPR2023-00601)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Xia* and *Jover* (*only applies to Ground 2)

Apex Does Not Separately Attack Ground 1

1004 ¶ 76. Petitioner contends, and we agree on this record, that it would have been obvious to modify Xia to monitor an indicator such as BER or BLER that would instead trigger a failure condition when the indicator is higher, rather than lower, than a target threshold. Pet. 24–26. Patent

(Institution Decision, 25.)

****Motivation to combine argument only applies to Ground 2, not Ground 1 (*Xia* alone renders the claims obvious).**

Patent Owner may file—
a. A response to the petition (37 C.F.R. § 42.120). If Patent Owner elects not to file a response, Patent Owner must arrange a conference call with the parties and the Board. Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.

(Scheduling Order, 9.)

The Petition Establishes Motivation to Combine *Xia* and *Jover*

It would have been obvious to implement *Jover*'s teachings in *Xia*'s method such that *Xia*'s beam failure triggering condition uses BER as the target measurement value, as taught by *Jover*. *Jover*, [0039]-[0040]. Both *Xia* and *Jover* involve wireless communications between a UE and a base station. *Xia*, FIGS. 1, 8A-8B; *Xia Provisional*, FIGS. 1, 8A-8B; *Jover*, FIG. 1. And both references are also specifically directed to detecting a communication failure between the UE and the base station. *Xia*, [0091]-[0093], [0097]-[0103], [0105]-[0106], FIGS. 6B, 7A-7B; *Xia Provisional*, [0084]-[0085], FIG. 6; *Jover*, [0039]-[0040], FIG. 3. And *Jover* provides using a target measurement value (BER) that is higher than a target threshold (1%) as a triggering condition. *Jover*, [0039]-[0040].

(Bims (Ex. 1002) ¶105.)

A POSITA would have been motivated to adopt *Jover*'s specific triggering condition in *Xia*'s method. *Xia* already discloses that the transmission of the first and second BFRQs to the base station in response to the detection of a communication failure. And *Jover* simply provides further details about a specific way to implement *Xia*'s teachings regarding the detection of the communication failure, and a POSITA would have been motivated and found it obvious to look to *Jover* to understand and implement its additional teachings. A POSITA thus would have been motivated to implement *Jover*'s triggering condition in *Xia*'s method to improve the accuracy and reliability of the beam failure determination. For example, the addition of a triggering condition based on BER would have provided additional measurements to ensure a beam failure detection is appropriate. Ex. 1013 (*Vembu*), 7:25-32

...

change modes when appropriate.”). Further, a POSITA would have been motivated to implement *Jover*'s triggering condition, because of the known benefits of evaluating BER. Ex. 1009 (*Pandey*), 463 (disclosing that “[t]he most meaningful criterion for evaluation of performance of communication systems is the bit error rate (BER)”); Ex. 1013 (*Vembu*), 7:25-32, 7:37-47.

(Bims (Ex. 1002) ¶106.)

Apex Fails to Show that *Jover* Teaches Away from *Xia*

54. In my opinion, a person of ordinary skill in the art would have found that where *Xia* looks to resolve a beam failure due to attenuation, misalignment and other channel deficiencies (Ex. 1004, at [0003]-[0004]), *Jover* looks to solve a channel impairment specific to a region in space, such as jamming, by steering beams to ignore signals from a certain area (*i.e.*, “beam steering and null generation”):

In particular, the present disclosure relates to any cellular network suitable for use with endpoint devices having multiple antennas/directional antennas for beam steering and null generation.

Ex. 1005, at [0033]. As another example, I note that *Jover*’s exemplary embodiment includes a method that “detects the communication impairment, performs a sweep to locate a direction of the source of the communication impairment, wherein the sweep is performed in response to the detecting the communication impairment at the endpoint device, and generates a null in the direction of the source of the communication impairment.” Ex. 1005, [0003].

(Gomez (Ex. 2005), ¶54.)

55. In my opinion, a person of ordinary skill in the art would not understand *Jover* to describe, or be related to, the beam recovery request methodology of the ’113 Patent. Instead, a person of ordinary skill in the art would understand that *Jover* teaches away from the methods related to Beam Recovery Requests disclosed in the ’113 Patent, which seek to maximize aerial resources by transmitting multiple beam recovery requests within the same time window to increase signal strength. ’113 Patent, 1:25-59. In my opinion, *Jover* provides no attempt to improve the beam strength, but rather ignores it through beam sweeping or nullify it, in contrast to the purpose of the ’113 Patent.

(Gomez (Ex. 2005), ¶55.)

“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure **does not criticize, discredit, or otherwise discourage the solution claimed.**” (emphasis added)

In re Fulton, 391 F.3d 1195, 1201 (Fed. Cir. 2004).



Topics

- Instituted grounds
- High-level summary of '113 patent and prior art
- Disputed issues in *Xia* Grounds (IPR2023-00601)
- Disputed issues in *Liu* Ground (IPR2023-00602)
- Expert qualifications

Disputed Issues in *Liu* Ground (IPR2023-00602)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Liu* and *Jover*
- Transmitting Two Radio Signals on Two Channels

****Unique to *Liu* Ground**

Disputed Issues in *Liu* Ground (IPR2023-00602)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Liu* and *Jover*
- Transmitting Two Radio Signals on Two Channels

Apex’s Construction of “Triggering the Transmission” Fails for the Same Reasons as in the *Xia* Grounds (IPR2023-00601)

Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“triggering the transmission”	plain and ordinary meaning	not disputed	“causing the transmission”

Liu discloses that a detection of a beam failure triggers transmission of the first and second BFRs (“first radio signal” and “second radio signal”) to the base station. *Liu*, [0005], [0078], [0084], [0114]; *Liu Provisional*, [0004], [0056], [0062], [0090]. *Liu* also discloses that the UE measures “the channel quality” of the reference signal, such as a CSI-RS or a synchronization signal (“target radio signal”). *Liu*, [0069], [0076]-[0077], [0087], [0091]; *Liu Provisional*, [0047], [0054]-[0055], [0091].

(Petition 23-24.)

A person of ordinary skill in the art would understand that the patent specification points to no specific meaning of the word “triggering” other than the plain and ordinary meaning of the term, which can be ascertained from any dictionary:

“cause to happen”

Ex. 2005, ¶ 34 (<https://www.thesaurus.com/browse/triggering>).

“to cause something to start”



Id. (<https://dictionary.cambridge.org/us/dictionary/english/trigger>).

(POR 12-13.)

Liu Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied

[0005] According to one aspect of the present disclosure, there is provided a method for beam failure recovery in user equipment, including sending a beam failure recovery request (BFRR) to the base station upon detection of a beam failure between the base station and the user equipment; and monitoring one or more candidate beams in which to receive a BFRR response from the base station, based on an association between a beam failure recovery request (BFRR) response and the BFRR.

(*Liu*, [0005].)

[0084] In order for the system to recover from such a beam failure, the user equipment 404 sends a beam failure recovery request (BFRR) to the base station 402. In one embodi-

(*Liu*, [0084].)

sending a beam failure recovery request (BFRR) to a base station upon detection of a beam failure between the base station and the user equipment; and

(*Liu*, claim 1.)

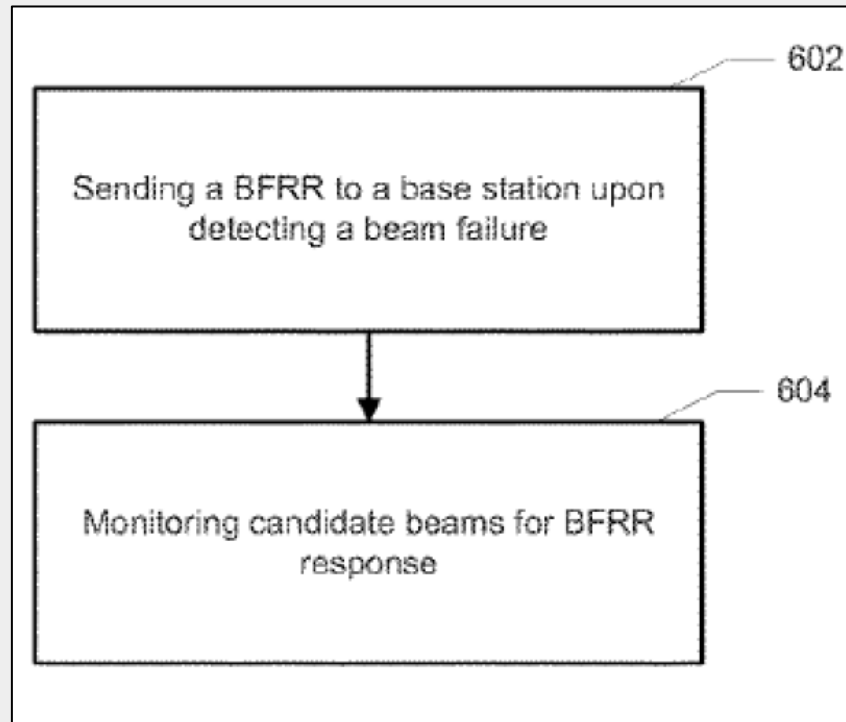
5. The method of claim 1, wherein upon detection of the beam failure, the BFRR is sent using a physical uplink control channel (PUCCH) in the uplink beam pair.

(*Liu*, claim 5.)

7. The method of claim 1, wherein upon detection of the beam failure, the BFRR is sent using a physical random access channel (PRACH) or a PRACH-like channel in the uplink beam pair.

(*Liu*, claim 7.)

Liu Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied

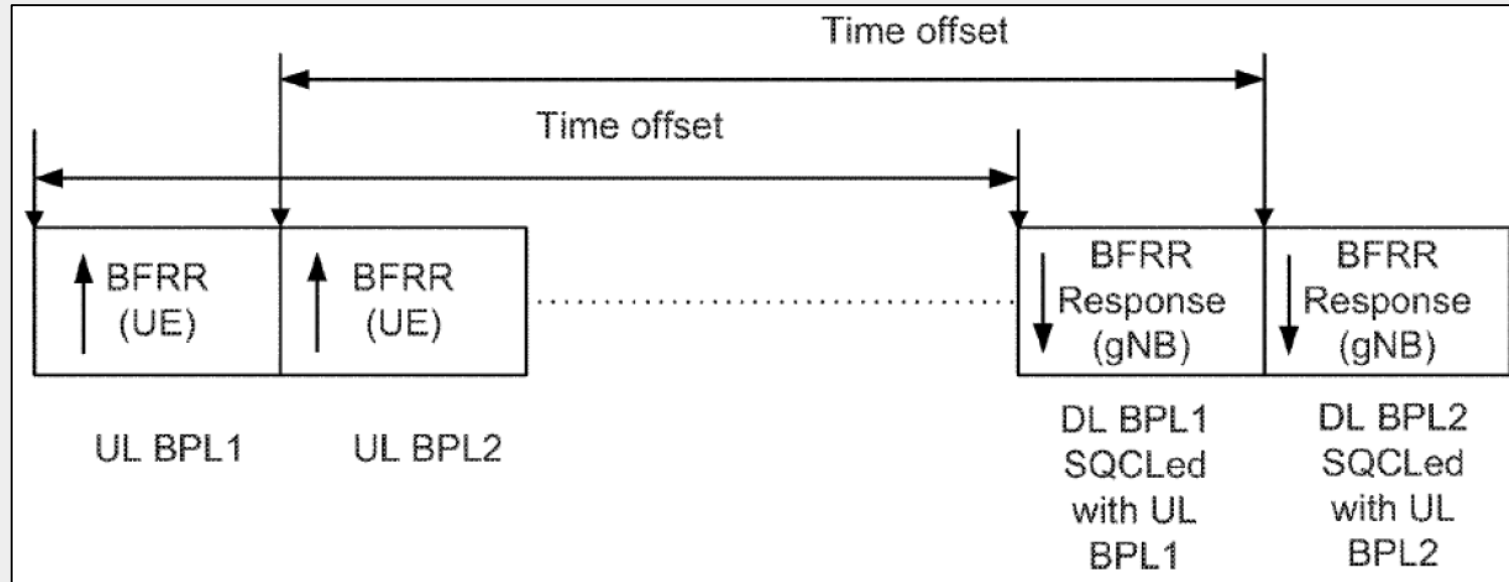


(*Liu*, FIG. 6A.)

[0103] With reference to FIG. 6A, when a beam failure is detected by the user equipment 110A-110C, the user equipment 110A-110B sends a beam failure recovery request (BFRR) to the servicing base station 170A-170B. In one

(*Liu*, [0103].)

Liu Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied



(*Liu*, FIG. 5B.)

[0099] In one embodiment, when multiple UL beam pairs are available, and each beam pair has a corresponding SQCL'ed DL beam pair, the user equipment 404 may transmit multiple BFRRs in UL beam pairs (e.g., [UL BPL1, UL BPL2]) simultaneously. Simultaneous transmission may

(*Liu*, [0099].)

Liu Discloses the “Triggering” Limitation, Regardless of Whether Apex’s Construction is Applied

Liu discloses that a detection of a beam failure triggers transmission of the first and second BFRRs (“first radio signal” and “second radio signal”) to the base station. *Liu*, [0005], [0078], [0084], [0114]; *Liu Provisional*, [0004], [0056], [0062], [0090]. *Liu* also discloses that the UE measures “the channel quality” of the reference signal, such as a CSI-RS or a synchronization signal (“target radio signal”). *Liu*, [0069], [0076]-[0077], [0087], [0091]; *Liu Provisional*, [0047], [0054]-[0055], [0091].

(Bims (Ex. 1002), ¶99.)

“We hold that where a patent owner in an IPR first proposes a claim construction in a patent owner response, a petitioner must be given the opportunity in its reply to argue and present evidence of anticipation or obviousness under the new construction, at least where it relies on the same embodiments for each invalidity ground as were relied on in the petition.”

Axonics, Inc. v. Medtronic, Inc., 75 F.4th 1374, 1384 (Fed. Cir. 2023).

Disputed Issues in *Liu* Ground (IPR2023-00602)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Liu* and *Jover*
- Transmitting Two Radio Signals on Two Channels

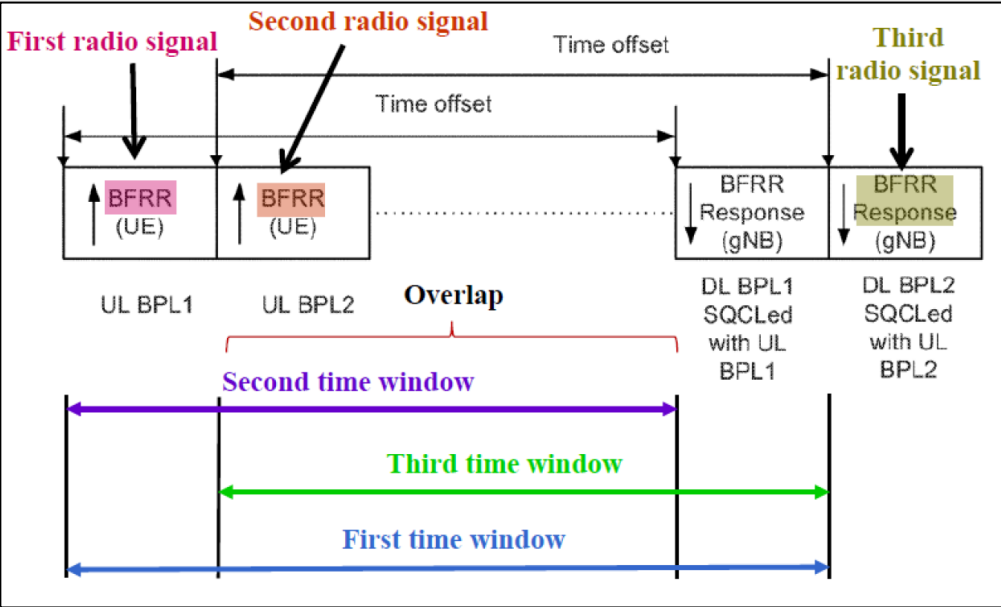
Apex's Constructions of the "Time Window" Limitations Fail for the Same Reasons as in the *Xia* Grounds (IPR2023-00601)

Claim Term	Samsung's Construction	Apex's POPR	Apex's POR
"first time window"	plain and ordinary meaning ("first period of time")	not disputed	"a period of time from the first radio signal in which to receive a third radio signal (i.e., a response to either the first or second radio signals)"
"second time window"	plain and ordinary meaning ("second period of time")	not disputed	"a period of time from the first radio signal in which to transmit the second radio signal"
"third time window"	plain and ordinary meaning ("third period of time")	not disputed	"a period of time from the second radio signal in which to receive a third radio signal (i.e., a response to either the first or second radio signals)"

****Apex's district court construction for "time window": "the time allocated to respond to a signal request."**

Liu Discloses the “Second Time Window”, Regardless of Whether Apex’s Construction is Applied

Claim Term	Samsung’s Construction	Apex’s POPR	Apex’s POR
“second time window”	plain and ordinary meaning (“second period of time”)	not disputed	“a period of time from the first radio signal in which to transmit the second radio signal”



(Liu, FIG. 5B.)

****Apex does not dispute that *Liu* discloses the “first time window” or the “third time window” even under its proposed constructions.**

Disputed Issues in *Liu* Ground (IPR2023-00602)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Liu* and *Jover*
- Transmitting Two Radio Signals on Two Channels

The Petition Establishes Motivation to Combine *Liu* and *Jover*

It would have been obvious to implement *Jover*'s teachings in *Liu*'s method to use a beam failure triggering condition with BER as the target measurement value, as taught by *Jover*. *Jover*, [0039]-[0040]. Both *Liu* and *Jover* involve wireless communications between a UE and a base station. *Liu*, FIG. 1; *Liu Provisional*, FIG. 1; *Jover*, FIG. 1. Both references are also specifically directed to detecting a communication failure between the UE and the base station. *Liu*, [0005], [0069], [0076]-[0078], [0084], [0087], [0091], [0114], FIG. 1; *Liu Provisional*, [0004], [0047], [0054]-[0056], [0062], [0090], FIG. 1; *Jover*, [0039]-[0040], FIG. 3. And *Jover* provides further detail about how the communication failure is determined, explaining that it may be determined by using a target measurement value (BER) that is higher than a target threshold (1%) as a triggering condition. *Jover*, [0039]-[0040].

(Bims (Ex. 1002), ¶101.)

A POSITA would have been motivated to adopt *Jover*'s triggering condition in *Liu*'s method to determine when to send the first and second BFRRs. *Liu* already discloses that the transmission of the first and second BFRRs to the base station are triggered by the detection of a communication failure. And *Jover* simply provides further details about how and when to implement *Liu*'s teachings regarding the detection of the communication failure, and a POSITA would have been motivated and found it obvious to look to *Jover* to understand and implement its additional teachings. A POSITA also would have been motivated to implement *Jover*'s triggering condition in *Liu*'s method to improve the accuracy and reliability of the beam failure determination. For example, a triggering condition based on BER would have provided threshold measurements to ensure a beam failure detection is appropriate. Ex. 1013 (*Vembu*), 7:25-32 ("[i]f the BER rises above threshold

...

Further, a POSITA would have been motivated to implement *Jover*'s triggering condition because of the known benefits of evaluating BER. Ex.

(Bims (Ex. 1002), ¶102.)

Apex Fails to Show that *Jover* Teaches Away from *Liu*

65. In my opinion, a person of ordinary skill in the art would have found that where Liu looks to employ a beam failure reporting and recovery mechanism that entails finding the best beam pair from all possible beam pairs (Ex. 1007, at [0004]-[0006]), Jover looks to solve a channel impairment specific to a region in space, such as jamming, by steering beams to ignore signals from a certain area (*i.e.*, “beam steering and null generation”):

In particular, the present disclosure relates to any cellular network suitable for use with endpoint devices having multiple antennas/directional antennas for beam steering and null generation.

Ex. 1005, at [0033]. As another example, I note that Jover’s exemplary embodiment includes a method that “detects the communication impairment, performs a sweep to locate a direction of the source of the communication impairment, wherein the sweep is performed in response to the detecting the communication impairment at the endpoint device, and generates a null in the direction of the source of the communication impairment.” Ex. 1005, [0003].

(Gomez (Ex. 2005), ¶65.)

66. In my opinion, a person of ordinary skill in the art would not understand Jover to describe, or be related to, the beam recovery request methodology of the ’113 Patent. Instead, a person of ordinary skill in the art would understand that Jover teaches away from the methods related to Beam Recovery Requests disclosed in the ’113 Patent, which seek to maximize aerial resources by transmitting multiple beam recovery requests within the same time window to increase signal strength. ’113 Patent, 1:25-59. In my opinion, Jover provides no attempt to improve the beam strength, but rather ignores it through beam sweeping or nullify it, in contrast to the purpose of the ’113 Patent.

(Gomez (Ex. 2005), ¶66.)



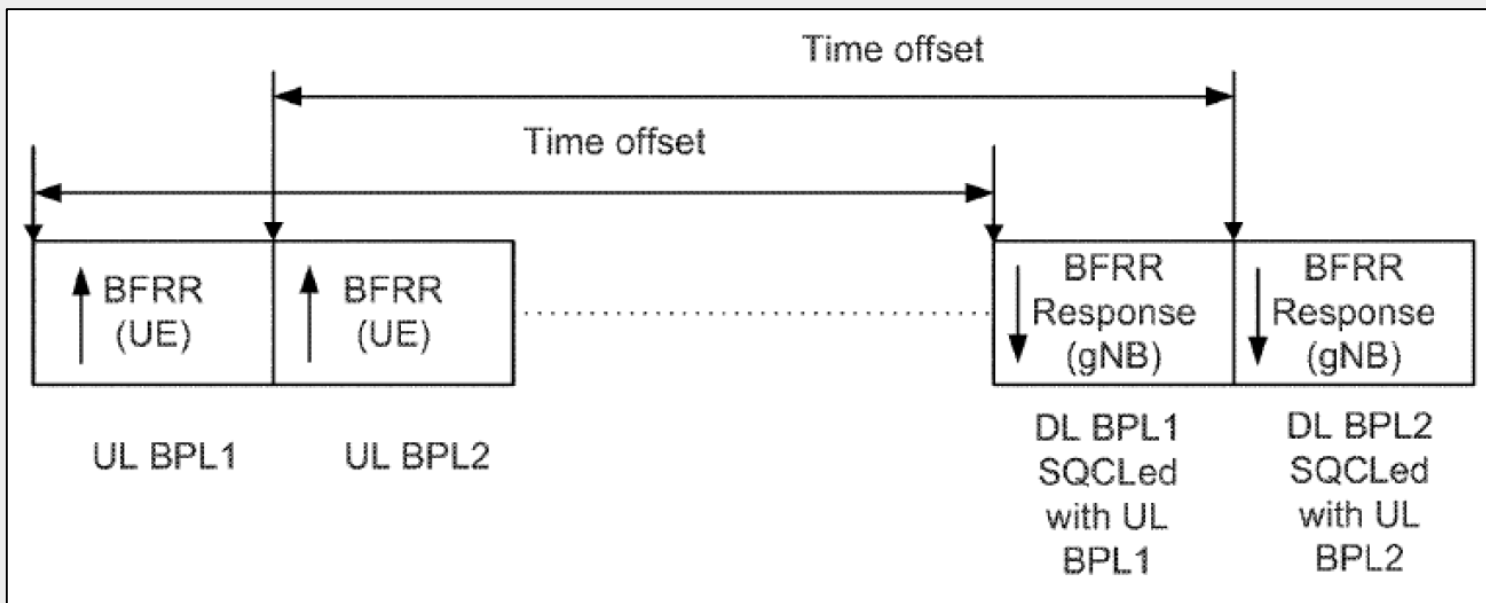
“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure **does not criticize, discredit, or otherwise discourage the solution claimed.**” (emphasis added)

In re Fulton, 391 F.3d 1195, 1201 (Fed. Cir. 2004).

Disputed Issues in *Liu* Ground (IPR2023-00602)

- “triggering the transmission” (claim 1)
 - Claim construction of “triggering the transmission”
 - Comparison to prior art
- “first time window”/“second time window”/“third time window” (claim 1)
 - Claim construction of “first time window”/“second time window”/“third time window”
 - Comparison to prior art
- Motivation to Combine *Liu* and *Jover*
- Transmitting Two Radio Signals on Two Channels

Liu Discloses Transmitting Two Radio Signals Over Two Different Channels



[0099] In one embodiment, when multiple UL beam pairs are available, and each beam pair has a corresponding SQCL'ed DL beam pair, the user equipment 404 may transmit multiple BFRRs in UL beam pairs (e.g., [UL BPL1, UL BPL2]) simultaneously. Simultaneous transmission may

(Liu, FIG. 5B.)

... configured downlink beam pairs. Although only two simultaneous transmissions are illustrated in FIG. 5B, it is appreciated that any number of simultaneous transmissions may occur.

(Liu, [0099].)

employed to report and recover from the failure. During the 3GPP TSG RAN WG1 #89, it was agreed upon to support a non-contention based PRACH-like channel based on the Physical Random Access Channel (PRACH) and the Physical Uplink Control Channel (PUCCH) for beam failure recovery request transmission. PRACH denotes uplink

(Liu, [0004].)

ery request (BFRR) to the base station 402. In one embodiment, when only the DL beam has failed (FIG. 4A), the user equipment 404 may use the active PUCCH (originally allocated for UCI) to report the beam failure and request recovery from the base station 402, as agreed upon during the 3GPP TSG RAN WG1 #89 meeting. In another embodiment, when the DL and UL beams have failed, the user equipment 404 may also attempt to use the PUCCH for BFRR, since user equipment has no knowledge of the status of the UL beam pair. However, beam failure recovery in this instance is less likely to be successful since both the UL and DL beams have failed. In still another embodiment, when the DL and UL beams have failed, the user equipment 404 may also attempt to use the PRACH or PRACH-like channel for BFRR. The PRACH or PRACH-like resource is directly

(Liu, [0084].)

Liu Also Renders Obvious Transmitting Two Radio Signals Over Two Different Channels

To the extent Patent Owner argues that *Liu* does not expressly disclose that the first BFRR is sent through a PUCCH and the second BFRR is sent through a PRACH, it would have been obvious. Indeed, *Liu* discloses sending multiple BFRRs and the ability to use both PUCCH and PRACH channels for a given BFRR. *Liu*, [0004], [0084], [0092], [0099]; *Liu Provisional*, [0003], [0062], [0069], [0074]. Thus, it would have been a matter of simple design choice between two known alternatives (using a PUCCH channel or a PRACH channel), which was well within the skill of a POSITA.

(Bims (Ex. 1002), ¶126.)

A POSITA would have been motivated to use different channels for the first and second BFRRs to ensure greater reliability of the base station's response. For example, if the PUCCH is being used to send the first BFRR and await a subsequent response, the second BFRR can be sent through the PRACH. Further, different channels may be used so that both BFRRs can be sent simultaneously. Sending a request through multiple, different channels increases the chances that the base station will receive the request and respond accordingly. It also may decrease the response time from the base station because one channel may be processed faster than another at a given time.

(Bims (Ex. 1002), ¶127.)

It Would Have Been a Straightforward Modification to Transmit Two Radio Signals Over Two Different Channels

A POSITA would have had a reasonable expectation of success as it would have been straightforward for a POSITA to modify *Liu*'s method so that the first BFRR is sent through a PUCCH and the second BFRR is sent through a PRACH. As mentioned above, *Liu* already discloses sending multiple BFRRs and the ability to use both PUCCH and PRACH channels for a given BFRR. *Liu*, [0004], [0084], [0092], [0099]; *Liu Provisional*, [0003], [0062], [0069], [0074]. Thus, it would have been straightforward for a POSITA to use one channel for the first BFRR and another channel for the second BFRR.

(Bims (Ex. 1002), ¶128.)

Q. Okay, you're representing that it's obvious to me and I'm saying what are the design implementations that would occur to make that a reality?

A. The way to design such a system would be to make a very tiny change in the implementation so that information sent through the PUCCH could alternatively be sent on the PRACH.

Q. What is that tiny change?

A. The tiny change would be, for example, let's say that the implementation was performed in software, although this example could apply in hardware as well, then what would be required is a modification to the source code that would send the information on the PUCCH to instead designate the information be sent on the PRACH, which may be something as simple as changing the function that gets called to transmit the message.

(Bims Tr. (Ex. 2006), 69:13-70:9.)

Apex Fails to Rebut the Obviousness of Transmitting Two Radio Signals Over Two Different Channels

46. In my opinion, a person of ordinary skill in the art would not have found it obvious to modify the system of Liu to have one BFRR sent by PUCCH and one sent by PRACH because the disclosed advantage of Liu is sending multiple beam pairs (transmitting and receiving beams) on the same channel to determine the best beam pair from all possible beam pairs for maximum beamforming efficiency on that specific channel, as indicated by the patent specification of Liu.

A misalignment between transmitting (Tx) and receiving (Rx) beams may cause a significant loss in the received power, especially for systems with narrow beams, and result in beam failure. To avoid such beam failure, beam alignment in mm-wave communication systems is necessary to *find the best beam pair from all possible beam pairs for maximum beamforming efficiency*.

Ex. 1007, [0004].

(Gomez (Ex. 2005), ¶46.)

employed to report and recover from the failure. During the 3GPP TSG RAN WG1 #89, it was agreed upon to support a non-contention based PRACH-like channel based on the Physical Random Access Channel (PRACH) and the Physical Uplink Control Channel (PUCCH) for beam failure recovery request transmission. PRACH denotes uplink

(Liu, [0004].)

51. In my opinion, a person of ordinary skill in the art would have understood Liu to not disclose sending two BFRRs, each BFRR on a different channel, and would not have been motivated to combine the system of Liu with their knowledge of the existence of two channels in order to create a system where each BFRR was transmitted on a different channel in view of the deep technical expertise required to re-design the system of Liu in either hardware, software, or a mix of both. In my opinion, Petitioner's expert's inability to articulate design implementations with specificity demonstrates this point, as noted above.

(Gomez (Ex. 2005), ¶51.)

straightforward" with "a reasonable expectation of success." As Petitioner's expert acknowledges, several design modifications would have to be made that would require a level beyond that of a person of ordinary skill in the art. For example, the design modification (obtained only through hindsight) could take place on either the hardware or software side.

(Gomez (Ex. 2005), ¶47.)

Apex Fails to Rebut the Obviousness of Transmitting Two Radio Signals Over Two Different Channels

52. In my opinion, a person of ordinary skill in the art at the time of the invention of the '113 Patent would have known that using two BFRs, each from PUCCH and PRACH, is also not traditionally done as the two protocols, PUCCH and PRACH are used at different times and for somewhat different purposes. PRACH generally has lower reliability, and is intended to be used during initial network entry whereas PUCCH is used once PUCCH resources are allocated. Therefore, in my opinion, a person of ordinary skill in the art would not find it obvious to use a channel intended to setup resources in place of a channel that requires allocated resources or the two channels in conjunction with each other. At

(Gomez (Ex. 2005), ¶52.)

described in Liu. In my opinion, a person of ordinary skill in the art would have found that the '113 patent teaches a different mechanism than Liu because the '113 Patent is trying to solve a resource utilization problem in a different way (i.e., transmitting a beam recovery request on a different channel than another beam recovery request within a common time window) than envisioned by the conventional systems, such as Liu.

(Gomez (Ex. 2005), ¶52.)

employed to report and recover from the failure. During the 3GPP TSG RAN WG1 #89, it was agreed upon to support a non-contention based PRACH-like channel based on the Physical Random Access Channel (PRACH) and the Physical Uplink Control Channel (PUCCH) for beam failure recovery request transmission. PRACH denotes uplink

(Liu, [0004].)



“When a claimed invention involves a combination of elements, however, any need or problem known in the relevant field of endeavor at the time of invention can provide a reason to combine. Moreover, the prior art need not address the exact problem that the patentee sought to resolve.”

Tyco Healthcare Grp. LP v. Ethicon Endo-Surgery, Inc., 774 F.3d 968, 977 (Fed. Cir. 2014).

Topics

- Instituted grounds
- High-level summary of '113 patent and prior art
- Disputed issues in *Xia* Grounds (IPR2023-00601)
- Disputed issues in *Liu* Ground (IPR2023-00602)
- Expert qualifications

Law Regarding Experts



“To offer expert testimony from the perspective of a skilled artisan in a patent case—like for claim construction, validity, or infringement—a witness must at least have ordinary skill in the art. Without that skill, the witness’ opinions are neither relevant nor reliable.”

Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n, 22 F.4th 1369, 1376-77 (Fed. Cir. 2022).

Disputed Level of Ordinary Skill

Samsung's Definition

V. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (POSITA) would have had at least a master's degree in electrical engineering or a similar field and at least two years of experience working with telecommunications systems, including multiple-input multiple-output (MIMO) technology. Additional relevant work experience can compensate for less education, and *vice versa*. Bims, Section IX.

(IPR2023-00601 Petition 14.)

Apex's Definition

guidance, Patent Owner proposes that a POSITA would have had either (i) at least a master's degree in electrical engineering or a similar field and at least two years of experience working with telecommunications systems; or (ii) at least a bachelor's degree in electrical engineering or a similar field and at least five years of experience working with telecommunications systems. Ex. 2005, ¶ 27.

(IPR2023-00601 POR 15.)

'113 patent and prior art of record. We adopt Petitioner's definition of the level of skill for the purposes of this Decision, except that we do not include in our definition Petitioner's last sentence regarding additional relevant work experience compensating for less education and *vice versa*, as this sentence is vague.

(IPR2023-00601 Institution Decision, 10-11.)

Mr. Gomez (Apex) Fails to Meet Samsung's Definition of a POSITA

Gomez (Apex) ❌

- No master's degree
- No MIMO experience.

2. I received my Bachelor's degree in Electrical Engineering from Yale University in 1983.

(Gomez (Ex. 2005), ¶2.)

Curriculum Vitae of Miguel Gomez

2178 Sirah Ct., Livermore CA 94550
miguel@rockslideanalytics.com
ph. 415.793.4103

Education

Year	College or University	Degree
1983	Yale University	BSEE

(Gomez (Ex. 2005), Ex. A, 2.)

10 Q. Are you familiar with multiple-input/
11 multiple-output technologies? 10:14
12 A. MIMO, yes.
13 Q. What's your understanding of MIMO?
14 A. MIMO is a way to provide various
15 different services, including diversity, as well 10:14
16 as beamforming so that, you know, you can get
17 either -- you can get a more reliable signal to
18 the receiver that you're intending to target.
19 Q. Which of the engineering experiences
20 listed on your CV involved MIMO? 10:15
21 A. Well, I have a fair amount of
22 experience developing antenna systems in general
23 and, you know, I'm very familiar with all of the
24 technologies involved in MIMO, mostly on the
25 receiver side when I was looking at building a 10:15

1 phased array antenna. But I haven't actually
2 specifically built a product related to those
3 technologies.

(Gomez Tr. (Ex. 1025), 51:10-52:3.)

Mr. Gomez (Apex) Also Fails to Meet Apex's Definition of a POSITA

Gomez (Apex) ❌

17 Which of those engineering
18 experiences involved wireless networking?
19 A. There was quite a few that involved
20 wireless networking. The Philips environment
21 required wireless local area networking, as well
22 as working with Microsoft, to understand their
23 early smartphone implementations that they were
24 coming out with on CE.
25 Also the ActSolar required
1 transmission of data from the rooftops down to
2 the -- down to the receivers. And so we were
3 using a protocol called Zigbee. I think it was
4 802.11.15 was the underlying technology to that
5 -- to that -- to Zigbee. And so, you know, I
6 built a number of radio systems over the years
7 related to transmitting various types of data.
8 Q. Are there any others besides those
9 that you just called out?
10 A. Those are the two primary ones that I
11 -- that I recall.

2 Q. Did any of the engineering
3 experiences listed on your CV involve 4G
4 cellular network communications?
5 A. From the engineering experiences,
6 most of the work was done either on the -- on
7 the 2G or the local area network protocols like
8 802.11a and some of the other protocols that had
9 to do with technology similar to 4G.
10 Q. But none of them directly involved
11 4G?
12 A. (Witness indicating.)
13 MR. PYMENTO: Objection.
14 THE STENOGRAPHER: I didn't get an
15 answer. I'm sorry.
16 THE WITNESS: Like I said, the
17 technologies included some of the same
18 elements of the 4G, like, you know, the
19 OFDM -- OF -- the orthogonal
20 frequency-division multiplexing.
21 (Stenographer clarification.)
22 THE WITNESS: Orthogonal
23 frequency-division multiplexing.
24 Some of the same technologies.

1 BY MR. HIGH:
2 Q. But none of them directly involved
3 4G?
4 MR. PYMENTO: Objection.
5 THE WITNESS: No.
6 BY MR. HIGH:
7 Q. Did any of the engineering
8 experiences involve 5G?
9 A. No.

(Gomez Tr. (Ex. 1025), 50:2-51:9.)

(Gomez Tr. (Ex. 1025), 47:17-48:11.)

Dr. Bims (Samsung) Satisfies Either Party’s Definition of a POSITA

Bims (Samsung) ✓

9. I received a B.S. in Computer and Systems Engineering from Rensselaer Polytechnic Institute in 1985. I received an M.S. in Electrical Engineering in 1988 and a Ph.D. in Electrical Engineering in 1993, both from Stanford University. As a graduate student, I studied the principle of Digital Communications theory, including data modulation and demodulation, signal constellations and lattices, channel estimation, equalization, filtering, precoding, synchronization, and trellis coding. My Ph.D. thesis addressed the application of trellis coding and precoding to a digital modulation system, and was titled “Trellis Coding for Multi-Level, Partial Response Continuous Phase Modulation with Precoding.”

(Bims (Ex. 1002), ¶9.)

10/2009 – 1/2017 **IEEE 802.16 Working Group**

Position: *Task Group Secretary, Task Group Vice-Chair, Task Group Chair, Working Group Vice-Chair & Secretary, IEEE 802.16 Expert*

Served in several leadership capacities within this group that is working on improvements to the IEEE 802.16 standard, otherwise known as WiMAX. The 802.16 Working Group entered hibernation on March 2018. From that time until the present, I am on the roster of Experts designated by the Chair to answer questions and provide clarification about the 802.16 standards.

(Bims (Ex. 1002), Ex. A-3.)

07/1992 - 12/1998 **Glenayre Technologies-Wireless Access Group • San Jose, California**

Position: *Member of Technical Staff; Sr. Member of Technical Staff; Manager of NOC Systems*

Employee #6 at the company, which was acquired by Glenayre Technologies, Nov 1997. Designed and built a 4-channel ReFLEX50 pager demonstration in 1 week. Participated in early field trials and feasibility studies, culminating in a Pioneer’s Preference license award from the FCC to SkyTel Corporation for Narrowband PCS development.

(Bims (Ex. 1002), Ex. A-2.)

Dr. Bims (Samsung) Satisfies Either Party's Definition of a POSITA

Bims (Samsung) ✓

Q. Do you have experience working with MIMO telecommunications systems?

A. Yes, I have experience with MIMO technology.

Q. About how many years?

A. So that experience began when I was a Ph.D. student at Stanford working in the information systems laboratory and interacting with professors there, such as Professor Paul Raj, who is one of the pioneers in MIMO technology.

Q. Approximately when was that?

A. This was starting in the early 1990s, between 1990 and 1993.

(Bims Tr. (Ex. 2006), 16:24-17:13.)

Q. Are there any other experiences related to MIMO telecommunications systems?

A. On page A-2 of my CV it lists as a work experience a time in which I was a member of technical staff at --

(Witness perusing document.)

A. -- sorry, that's page A-4 of my CV, I list work experience at a company called Gigabit Wireless.

(Bims Tr. (Ex. 2006), 18:2-11.)

(Bims Tr. (Ex. 2006), 18:19-19:5.)

Q. Are there any other experiences listed under your employment history related to MIMO telecommunications systems.

(Witness perusing document.)

A. On page A-3 of my CV it lists my involvement in the IEEE 802.16 working group, which developed the WiMAX standard; the WiMAX standard is a version of cellular communications that includes within it MIMO technology.