

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC.
Petitioners

v.

KONINKLIJKE KPN NV
Patent Owner

Case No. IPR2023-00525
Patent 10,924,500

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,924,500**

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LIST OF EXHIBITS

Exhibit #	Description
EX1001	U.S. Patent No. 10,924,500 to Muller (“the ’500 Patent”)
EX1002	CV of Dr. James Olivier
EX1003	Expert Declaration of Dr. James Olivier
EX1004	International Publication WO2011072719A1 (“ <i>Eisl</i> ”)
EX1005	File History of ’500 Patent
EX1006	Claim Listing
EX1007	Report on the Filing or Determination of an Action Regarding a Patent or Trademark
EX1008	Excerpts from Sesia et al., <u>LTE The UMTS Long Term Evolution from Theory to Practice</u> , Second Edition
EX1009	U.S. Patent No. 6,594,241 to Jim Malmlöf (the “’241 Patent”)
EX1010	<i>Flag</i> , <u>A Dictionary of Computing</u> (6th ed. 2008).
EX1011	Frank Muller’s LinkedIn Page
EX1012	Convergence Technologies for 3G Networks – IP, UMTS, EGPRS, and ATM
EX1013	Amended Redacted Complaint, <i>Koninklijke KPN N.V. v. Telefonaktiebolaget LM Ericsson</i> , No. 2:22-cv-282, (E.D. Tex. July 25, 2022), ECF No. 27
EX1014	<i>Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation</i> (June 21, 2022)
EX1015	Federal Court Management Statistics (Mar. 31, 2022), <i>available at</i> https://www.uscourts.gov/statistics/table/na/federal-court-management-statistics/2022/06/30-2

I. INTRODUCTION

Ericsson Inc. (“Petitioner”) submits this Petition for *Inter Partes* Review (“IPR”) of Claims 1-11 of U.S. Patent No. 10,924,500 (the “’500 Patent”) under 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.* The ’500 Patent relates to detecting behavior of a mobile telecommunications device in a telecommunications network. *See* EX1001, 1:19-21. Specifically, the system claimed in the ’500 Patent counts a certain predetermined signal indicating handover of a mobile telecommunications device in the core network to determine whether the number of occurrences of the predetermined signal exceed a level indicating acceptable behavior. *See id.*, Claim 1. However, this was already a well-known technique for identifying malicious behavior in a mobile telecommunications device by the time of the ’500 Patent. As explained by Dr. James Olivier (33 years’ experience with cellular network equipment design) in his declaration and in Section VIII of this Petition, all limitations of Claims 1-11 (the “Challenged Claims”) were known in the art before the priority date of the ’500 Patent. EX1003, ¶¶93-170; *infra* Section VIII. For example, *Eisl* teaches the following concepts related to the ’500 Patent:

- 1) *Eisl* teaches counting signals such as, for example, signals indicating handover actions. *See* EX1004, [0079] (“Received ***network related data 4-5 may include information related to handover actions***, attach/ detach actions or PDP context activation/modification/ deactivation actions.”); *see also id.*

(“The network related data is processed in the ‘network related parameters’ sub-step 4-11. Generated network related parameters may be the **number of completed actions 4-20** for the total network or parts of the network 4-15, **number of actions** originated in the network or in parts of the network 4-16, **number of actions** targeted to the network or at least to parts of the network 4-17, **number of actions** originated in one cell of the network 4-18 or number of actions targeted to one cell of the network 4-19.”).¹

- 2) *Eisl* teaches that counting “a certain predetermined signal” (*i.e.*, a signal indicating a handover action) is done with respect to a mobile communications device whose behavior is being determined. *See id.*, Abstract (“Disclosed is a method, a device and a computer program product for detecting changes to the connection of a device (***preferably a mobile device***) Those changes could be for example ***frequent handover actions***....”).
- 3) *Eisl* describes counting at least signals indicating handover actions, which Claim 1 specifies as the certain predetermined signal. *See* EX1004, [0077]; *see also* EX1001, Claim 1 (“...wherein ***the certain predetermined signal indicates handover of the mobile telecommunications device*** .”).

¹ All emphasis is added unless otherwise noted.

- 4) *Eisl* teaches that policy rules can be implemented in a core network. *See* EX1004, Abstract (“The changes to the connection are detected by checking if parameters related to the mobile device, or related to network elements, violate defined policy rules. ***The detection itself is done in a network element, which is preferably a core network element.***”); *see also id.*, [0038] (“Policy rules might be used to steer and shape traffic in a network, ***to detect abnormal situation*** or to control/authorize QoS related traffic or requests.... Policy rules can be stored and implemented basically in any network element in the ***core*** or access ***network.***”)
- 5) *Eisl* teaches using policy rules to register when the number of predetermined signals exceeds an acceptable level. *See id.*, [0048] (“If the detected changes of the connection violate one or more defined policy rules related to the connection (for example to detect DOS attacks), measures may be initiated or taken ... ***to inform the users*** of the mobile device(s) or ***to inform the network operator*** (for example via the network management system) about the detected ‘frequent’ changes to the connection.”).

For these and additional reasons discussed in Section VIII, the ’500 Patent represents no novel or non-obvious advance over the prior art. EX1003, ¶¶93-170; *infra* Section VIII. Petitioner respectfully requests institution of IPR and a finding that all Challenged Claims are unpatentable.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(A)(1)

A. Real Party-in-Interest under 37 C.F.R. § 42.8(b)(1)

The real parties in interest are Ericsson Inc. and Telefonaktiebolaget LM Ericsson. Ericsson Inc. is a wholly-owned subsidiary of Telefonaktiebolaget LM Ericsson. No other parties exercised or could have exercised control over this Petition; no other parties funded or directed this Petition. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48759-60.

B. Related Matters under 37 C.F.R. § 42.8(b)(2)

Koninklijke KPN N.V. (“Patent Owner”) has asserted the ’500 Patent against Petitioner in a co-pending litigation, *Koninklijke KPN N.V. v. Telefonaktiebolaget LM Ericsson*, Case No. 2:22-cv-282 (E.D. TEX July 25, 2022). The Original Complaint in that litigation was filed on July 25, 2022. *See* EX1007. The ’500 Patent was first asserted in that litigation in an Amended Complaint filed November 15, 2022. Telefonaktiebolaget LM Ericsson waived service.

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information under 37 C.F.R. § 42.8(b)(4)

A copy of this entire Petition, including all Exhibits, are being served by FEDERAL EXPRESS, costs prepaid, to the address of the attorney or agent of record at the USPTO:

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Petitioner consents to electronic service at the addresses provided above for

lead and back-up counsel. A Power of Attorney is filed concurrently herewith under 37 C.F.R. § 42.10(b).

III. FEES

The Office is authorized to charge any fees that become due in connection with this Petition to Deposit Account No. 02-0384 and any additional fees that are due.

IV. REQUIREMENTS UNDER 37 C.F.R. § 42.104

A. Certification of Grounds for Standing

Petitioners certify that the '500 Patent is eligible for IPR and that Petitioners are not barred or estopped from requesting IPR of the '500 Patent.

B. Priority Date

The '500 Patent was filed as a PCT application on November 22, 2013. EX1001, Code 22. The '500 Patent entered national stage under 35 U.S.C. § 371 from PCT No. PCT/EP2013/074440 filed on May 21, 2015. *Id.*, Code 86. The '500 Patent claims priority on its face to EP12193884 filed November 22, 2012. *Id.*, Code 30. For purposes of this petition, Petitioner takes no position on the pre-AIA status of the '500 Patent. The earliest possible priority date for the '500 Patent is November 12, 2012. The prior art cited in this Petition qualifies as prior art under both 35 U.S.C. §102(a)(1) and pre-AIA 35 U.S.C. §§102(a) and (b).

C. Prior Art

International Application Publication WO 2011/072719 by Eisl (EX1004, “*Eisl*”) – *Eisl* published on June 23, 2011 from a PCT application filed in Europe on December 15, 2009. *Eisl* is prior art under at least 35 U.S.C. §102(a)(1) or pre-AIA 35 U.S.C. §§102(a) and (b).

D. Identification of Challenge & Statement of Precise Relief Requested

Petitioner requests IPR of Claims 1-11 of the ’500 Patent based on the following grounds:

Ground	Type	Summary
1	§102	Claims 1-3, 5-7, and 9-11 are anticipated by <i>Eisl</i>
2	§103	Claims 1-11 are obvious in view of <i>Eisl</i>

Submitted with this Petition is a declaration of Dr. James Olivier (EX1003), who has 33 years of experience in the field of cellular network equipment design. EX1003, ¶¶11-22.

E. Institution is Proper under § 314(a)

The factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (P.T.A.B. Mar. 20, 2020) (“*Fintiv-I*”) (precedential) and the Interim Guidance (EX1014) favor institution. The Board should not exercise its discretion because the merits of this petition are compelling. EX1014, pp. 4-5. Furthermore, Ericsson filed this petition quickly, just three months after KPN first asserted the ’500 Patent against Ericsson Inc. and Telefonaktiebolaget LM Ericsson in the Eastern District of

Texas. EX1013. That litigation is just beginning, and thus the *Fintiv* factors favor institution. EX1014, pp. 3, 8-9; EX1015, p. 35 (showing a median 24.5-month time-to-trial); *Samsung Elecs. Co. v. Staton Techiya, LLC*, IPR2022-00324, Paper 13, at 12 (PTAB July 11, 2022) (applying the median).

In addition to the nascent stage of the case, Petitioner intends to file a motion to stay in the event of institution. The Board has treated related factors as neutral after declining to speculate on the outcome of a stay motion. *See, e.g., HP Inc. v. Slingshot Printing LLC*, IPR2020-01084, Paper 13 at 9 (P.T.A.B. Jan. 14, 2021).

“[I]t is often reasonable for a petitioner to wait to file its petition until it learns which claims are being asserted against it in the parallel proceeding.” *Fintiv-I*, at 11. Here, Petitioner promptly filed this Petition within seven weeks of receiving infringement contentions. Due to Petitioner’s diligence, it would be premature at the time of this Petition to argue regarding the timing of respective milestones in the proceeding versus the litigation. Thus, if Patent Owner raises § 314(a) arguments in a Preliminary Response, Petitioner respectfully requests the opportunity to reply before institution, to address expected schedules and whether a prior art stipulation would be appropriate.

F. Institution is Proper Under § 325(d) and *Advanced Bionics*.

The Board should not exercise its discretion under 35 U.S.C. § 325(d). The application was in prosecution for over four years (from May 10, 2016 to October

30, 2020) largely because of arguments over a single reference—U.S. Patent Pub. 2006/0230450 to *Bu*. EX1005,170-773.

While *Eisl* is prior art of record, *Eisl* was not submitted in an IDS until late in prosecution. EX1005,639-709. The examiner did not mark *Eisl* as considered until October 23, 2020, a week after the examiner and applicant had reached an agreement on an examiner's amendment to advance prosecution over *Bu*. EX1005, 749-750 (Interview Summary); 772-773 (IDS marked by examiner). The examiner never cited *Eisl* as a basis for a rejection of the Challenged Claims. Nor is there any evidence of record that applicant ever pointed the Examiner to the relevant portions of *Eisl*.

The Board has declined to exercise its discretion under § 325(d) based solely on a reference being cited in an IDS. *See, e.g., Microsoft Corp. v. Parallel Networks*, IPR2015-00486, Paper 10 at 15 (PTAB July 15, 2015) (declining to exercise §325(d) discretion where the references were “listed on Information Disclosure Statements initialed by the Examiner” but “the references were not applied against the claims and there is no evidence that the Examiner considered the particular disclosures cited by [Petitioner]”); *HTC Corp. v. Motiva Patents, LLC*, IPR2019-01666, Paper 9 at 6-10 (PTAB Apr. 3, 2020) (declining to exercise §325(d) discretion where references were both examined in depth during reexamination of parent application and cited in IDS of challenged patent).

A similar outcome should result under the two-step framework established in *Advanced Bionics. Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential). Under the *Advanced Bionics* framework, when deciding whether to institute a petition the Board must consider whether “the same or substantially the same art previously was presented to the Office.” *Id.*, 8. If this requirement is satisfied, the Board must then determine whether “the petitioner has demonstrated that the Office erred in a manner material to the patentability of the Challenged Claims.” *Id.* While *Eisl* was cited in an IDS during prosecution of the ’500 Patent, Petitioner respectfully submits that the Office erred in failing to consider the reference in a manner “material to the patentability of the Challenged Claims” by overlooking “specific teachings of the relevant prior art” that “impact patentability of the Challenged Claims.” *Id.* For example, the Examiner’s proposed amendment to advance prosecution over *Bu* included amending the claims to specify that “the certain predetermined signal” being counted “indicates handover of the mobile telecommunications device.” The Examiner overlooked that *Eisl* teaches that exact concept, along with the other elements of the independent claims. *See infra*. Section VIII.A.1.

In evaluating the second step of the framework, the Board has looked to the *Becton, Dickinson* factors. *See Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (PTAB Dec. 15, 2017) (refusing to institute a

petition where “only a nominally different combination of prior art” was presented along with “the same arguments as were meritoriously overcome ... during prosecution”).² Factors (c), (e), and (f) of *Becton, Dickinson* support a finding of material error by the Office.

Factor (c) considers the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection. *Id.*, 22. *Eisl* was not used alone or in combination with another reference, as a basis for any rejection during prosecution of the ’500 Patent. *Eisl* was merely included in an IDS. Thus, factor (c) weighs heavily in favor of institution.

Factor (e) considers whether Petitioner has pointed out sufficiently how the Examiner erred in evaluating the asserted prior art. *Id.*, 24. As outlined below, Petitioner has pointed to specific teachings of *Eisl* that disclose or render obvious all elements claimed by the ’500 Patent. *See* Section VIII. There is no evidence in the prosecution history of the ’500 Patent that the examiner appreciated any of the teachings of *Eisl* analyzed in this Petition, particularly in light of *Eisl*’s disclosure of the amendments the Examiner proposed to advance prosecution over *Bu*.

²According to the Board in *Advanced Bionics, Becton, Dickinson* factors (a), (b), and (d) are relevant to the first step of the analysis, while factors (c), (e), and (f) are relevant to the second step. *Advanced Bionics*, Paper 6 at 10.

Finally, factor (f) considers the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art. *Becton, Dickinson & Co.*, Paper 8 at 25. Factor (f) favors institution because Petitioner has submitted a declaration by Dr. James Olivier—not considered by the Examiner—that explains why the prior art either anticipates or renders obvious each of the Challenged Claims. *See* EX1003, ¶¶93-170. The Examiner did not have the benefit of this analysis when considering *Eisl* during prosecution.

As such, the Examiner overlooked “specific teachings in [*Eisl*] such that the error by the Office was material to the patentability of the challenged claims.” *Advanced Bionics*, Paper 6 at 8. Accordingly, the Board should decline to exercise its discretion under 35 U.S.C. § 325(d).

V. OVERVIEW OF THE ’500 PATENT

A. Summary of ’500 Patent Subject Matter

The ’500 Patent describes “a system for detecting behavior of a mobile telecommunications device in a telecommunications network.” EX1001, 1:16-18. More specifically, the ’500 Patent is directed to the detection of malicious behaviors from mobile devices, such as the excessive use of network resources or invocation of network functions like handovers. *See id.*, 2:31-44, 2:52-63. The ’500 Patent claims a trivial solution to detect this behavior; it merely proposes to *count* signals indicative of the device’s behavior in the core network, and to register when the

count exceeds a threshold. *See id.*, 2:8-10 (“The claims describe a system for detecting behaviour of a mobile telecommunications device in a telecommunications network.”); *id.*, 2:23-30 (“The system as claimed solves the problem by identifying malicious behaviour in a mobile device, but identifying it from within the telecommunications network itself. This is done according to the arrangement of the invention by monitoring the data streams, or transfers of data, which occur in the network due to the interaction between the network and the mobile. This data is monitored for excessive occurrences of particular signals.”).

The ’500 describes how this procedure takes place, by for example counting network signaling messages arriving at the MME. *Id.*, 4:56-62 (“In a particularly advantageous example the network includes a counter, C, and is arranged to detect a detectable event, X, which occurs within the network, for example the first instance of an attach, or, the transmission of a request for authentication to the AuC, or, the arrival of signaling in the MME indicating that a handover has taken place, and starts the counter.”).

Claim 1 is representative of the claims of the ’500 Patent and is reproduced below:

1. A system comprising:
 - a telecommunications network configured to identify mobile telecommunications device and comprising a core network and a

base station, wherein the base station is configured to receive radio signals from the mobile telecommunications device and further process the radio signals into processed signals and to transmit the processed signals to the core network,
wherein the telecommunications network is arranged to count in the core network a number of occurrences of a certain predetermined signal associated with the mobile telecommunications device, the certain predetermined signal representing an interaction between network devices in the core network for normal processing of signals,
and wherein the telecommunications network is further arranged to register when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behaviour of the mobile telecommunications device in the telecommunications network,
wherein the certain predetermined signal indicates handover of the mobile telecommunications device.

EX1001, Claim 1.

B. Claim Listing

A full claim listing is included as EX1006.

C. Relevant Prosecution History of Application 14/646,554

Application 14/646,554, which issued as the '500 Patent, was first filed in the United States under 371(c) on May 21, 2015. EX1005, 1-3. The Examiner issued a first non-final rejection on May 10, 2016. *Id.*, 170-181. The Examiner issued a final

rejection on December 13, 2016. *Id.*, 356-368. After the applicant filed an RCE on May 09, 2017, *Id.*, 404-405, the Examiner issued a second non-final rejection on June 27, 2017. *Id.*, 413-425. The Examiner issued a second final rejection on November 29, 2017. *Id.*, 451-463. After the applicant filed a second RCE on May 24, 2018, *Id.*, 498-499, the Examiner issued a third non-final rejection on October 29, 2018. *Id.*, 507-517. The Examiner issued a third final rejection on July 5, 2019. *Id.*, 557-568. After the applicant filed a third RCE on December 31, 2019, *Id.* 603-604, the Examiner issued a fourth non-final rejection on February 28, 2020. *Id.*, 610-623.

Eisl was submitted in an IDS on March 27, 2020. The Examiner issued a notice of allowance on October 30, 2020. *Id.*, 736-748. The Examiner did not mark *Eisl* as considered until October 23, 2020, a week after the Examiner and Applicant had reached an agreement to advance prosecution over *Bu* with an examiner's amendment. *Id.*, 749-750 (Interview Summary); 772-773 (IDS marked by examiner). The Examiner's Amendment in the notice of allowance included several changes to the claims. *Id.*, 741-746. For example, Claim 1 was amended as shown below:

Claim 1:

A system comprising:

a telecommunications network configured to identify ~~at least one~~ mobile telecommunications device and comprising a core network and a base station, wherein the base station is configured to receive radio signals from the mobile telecommunications device and further process the radio signals into processed signals and to transmit the processed signals to the core network,

wherein the telecommunications network is arranged to count in the core network a number of occurrences of a certain predetermined signal associated with the mobile telecommunications device, the certain predetermined signal representing an interaction between network devices in the core network for normal processing of signals,

and wherein the telecommunications network is further arranged to register when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behaviour of the mobile telecommunications device in the telecommunications network,

wherein the certain predetermined signal indicates handover of the mobile telecommunications device.

Id., 741-742. In particular, the examiner amendment added a limitation that the predetermined signal that is counted “indicate[] handover of the mobile telecommunications device.” *Id.* Besides the examiner amendment, the notice of allowance also stated that Applicant’s remarks on “pages 9-16 of the Arguments/Remarks filed on 7/28/2020” were persuasive and “[t]herefore, the

claims [were] allowable over the prior arts of records.” *Id.*, 746.

Application 14/646,554 issued as U.S. Patent No. 10,924,500 on February 16, 2021. *Id.*, 780.

D. Level of Ordinary Skill in the Art

As of the earliest claimed priority date, a person of ordinary skill in the art (“POSITA”) would have had a degree in electrical engineering or a similar discipline, with at least two years of relevant industry or research experience, including designing or implementing network systems. A POSITA would also have familiarity with the wireless standards and protocols relating to subscriber management. This definition is approximate, and more education may substitute for industry experience or vice versa. *Id.*

VI. SUMMARY OF PRIOR ART

As explained by Dr. Olivier in the attached expert declaration (EX1003), the subject matter of the claims of the ’500 Patent was well known before the priority date of the ’500 Patent. EX1003, ¶¶93-170. In addition to the background knowledge that a POSITA would have brought to bear on the subject matter discussed in the ’500 Patent, the following prior art demonstrates that the system for detecting malware captured by the Challenged Claims would have been well-known and obvious to a POSITA. *Id.*

A. *Eisl* (EX1004)

Eisl provides a solution to the same problem recognized by the '500 Patent—detecting malicious activities of a mobile device. EX1004, [007] (“user initiated handover may be triggered by . . . malicious mobile device software”); [009] (“Handover actions ... consume network resources which in turn reduces performance of the network, especially if frequent actions occur.”). *Eisl* discloses the same solution claimed by the '500 Patent—“an apparatus and a related computer program product for detecting changes to a network connection.” See EX1004, [0011] (“In particular, the present invention provides a method, an apparatus and a related computer program product for detecting changes to a connection of mobile device(s) to a network.”). Beyond simply detecting and registering a problem, *Eisl* proposes inhibiting the malicious activity. *Id.* (“If changes to the connection, resulting for example from frequent actions without purpose, are detected measures may be applied in order to for example inhibit such frequent actions or inform the user or network operator about it.”).

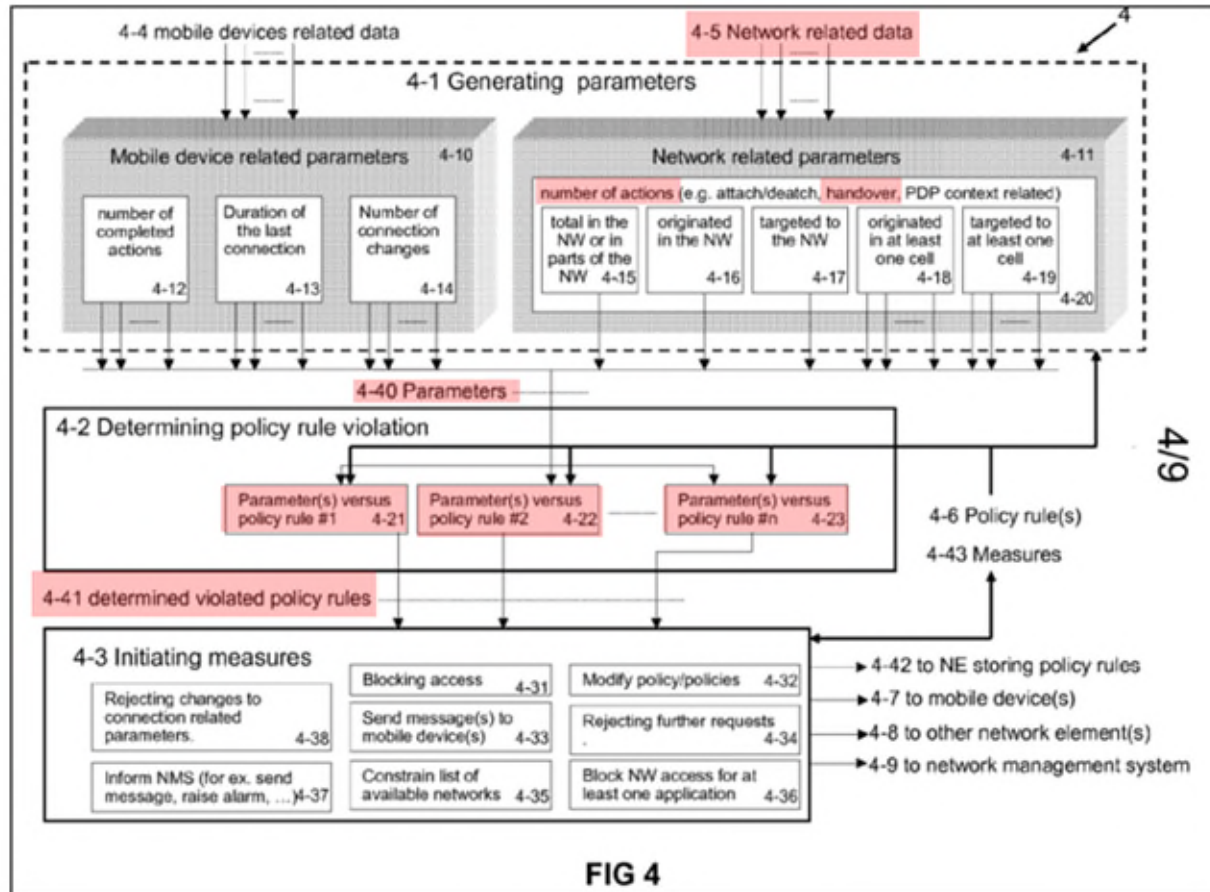
To achieve this solution, *Eisl* teaches that different core network elements involved in changes to connection, such as handover activities, are observed. EX1004 Code 57 (“The changes to the connection are detected by checking if parameters related to the mobile device, or related to network elements, violate defined policy rules. The detection itself is done in a network element, which is

preferably a core network element.”). “Examples for core network elements involved in handover activities are Serving GPRS Support Node (SGSN), Gateway GPRS Support Node (GGSN), Mobility Management Entity (MME), Serving Gateway (SGW) and Packet Data Network Gateway (PGW).” *Id.*, [0037]. Network related data related to handovers is received from these core network elements. *Id.*, [0079] (“Received network related data 4-5 may include information related to handover actions, attach/ detach actions or PDP context activation/modification/ deactivation actions.”). This network related data is processed into network related parameters. *See id.*, [0079].

Fig. 4 of Eisl goes into detail, where the network related data is used to create network related parameters, which are then used as inputs to the policy rules. *See id.*, Fig. 4. If there is found to be a violation of a policy rules, measures are initiated to such sending a message to the mobile or block its access. *Id.*

Eisl specifically teaches that network related data including information related to handover actions such as the network area or cells where the action occurred. EX1004, [0079] (“Further on the data may include information about the involved one or more mobile devices, the network area or cell(s) where the actions occurred, the target and the originating networks involved in the actions (for example in case of handover actions) and other related data (for example the amount of transferred data during a connection).”).

Fig. 4 of *Eisl* “illustrates method steps related to the present invention in more detail.” EX1004, [0026]. Fig. 4 is further representative of the disclosure of *Eisl*.



Id., Fig. 4 (annotated).

With reference to Fig. 4, network related data actions (as well as network related parameters) are counted and used as inputs to the policy rules. As seen above, the “number of actions” including handovers are counted, and if the number of actions violate a policy rule, the violation registers specific actions to be taken. EX1004, [0083]-[0084], [0089]-[0090]. If there is found to be a violation of a policy

rules, measures are initiated such as sending a message to the mobile or blocking its access.

Eisl specifically describes that a violation of policy rules may include when a parameter is above a threshold. *Id.*, [0085] (“A policy rule might include one or more thresholds for one or more parameter. A device may be assumed to violate a policy if one or more of those thresholds are crossed.”). *Eisl* gives a specific example of violating a policy when a number of completed handover actions exceeds a threshold:

Example of a policy rule:

Parameters:

- A = number of completed handover actions of mobile one device
- B = Duration of last network connection of the mobile 25 device

Policy rule:

IF ((within TW (A>5)) and (B<10s)) THEN policy rule =VIOLATED

TW = time window = e.g. 1 minute

In the above example “5” is the threshold for the number of the completed handover actions and “10s” is the connection time threshold.

Id., [0086]-[0087].

As seen in the excerpt above, *Eisl* discloses counting the number of handover actions within a single time window, and registering a violation if the number of handover actions is greater than 5 within a single 1-minute time window. It is

important to note that after a time window is exceeded, the value of the variable ‘A’ is set to zero, and a new time window is started. This is how sliding time windows operate. *See* EX1003, ¶¶66-70. If ‘A’ was not reset as the time window slides, then the policy rule could never detect a second occurrence a violation.

VII. CLAIM CONSTRUCTION

Petitioner applies the ordinary and customary meanings of the claim terms.³ Express construction are not needed because the prior art invalidates the claims under any plausible construction.

VIII. ASSERTED GROUNDS OF INVALIDITY

A. Grounds 1-2: Claims 1-3, 5-7 and 9-11 Are Anticipated by *Eisl* Under 35 U.S.C. § 102 (Ground 1) and Claims 1 – 11 Are Rendered Obvious by *Eisl* Under 35 U.S.C. § 103 (Ground 2)

Claims 1-3, 5-7 and 9-11 are anticipated by *Eisl* for the reasons set forth below. Ex.1003, ¶¶93-170. Should the Board or Patent Owner take the position that certain claim limitations of Claims 1-3, 5-7 and 9-11 are not expressly or inherently disclosed by *Eisl*, a POSITA would still have understood those limitations to be rendered obvious by *Eisl*. *Id.*; *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) (“a disclosure that anticipates under § 102 also renders the claim

³ Petitioner reserves all rights to challenge the claims under §112 in district court or any other venue.

invalid under § 103 for anticipation is the epitome of obviousness.”); *Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. Jan. 2019) (affirming *Connell* in the IPR context). A POSITA would have also understood Claims 4 and 8 to be rendered obvious by *Eisl*. EX1003, ¶¶137-142, 152-155.

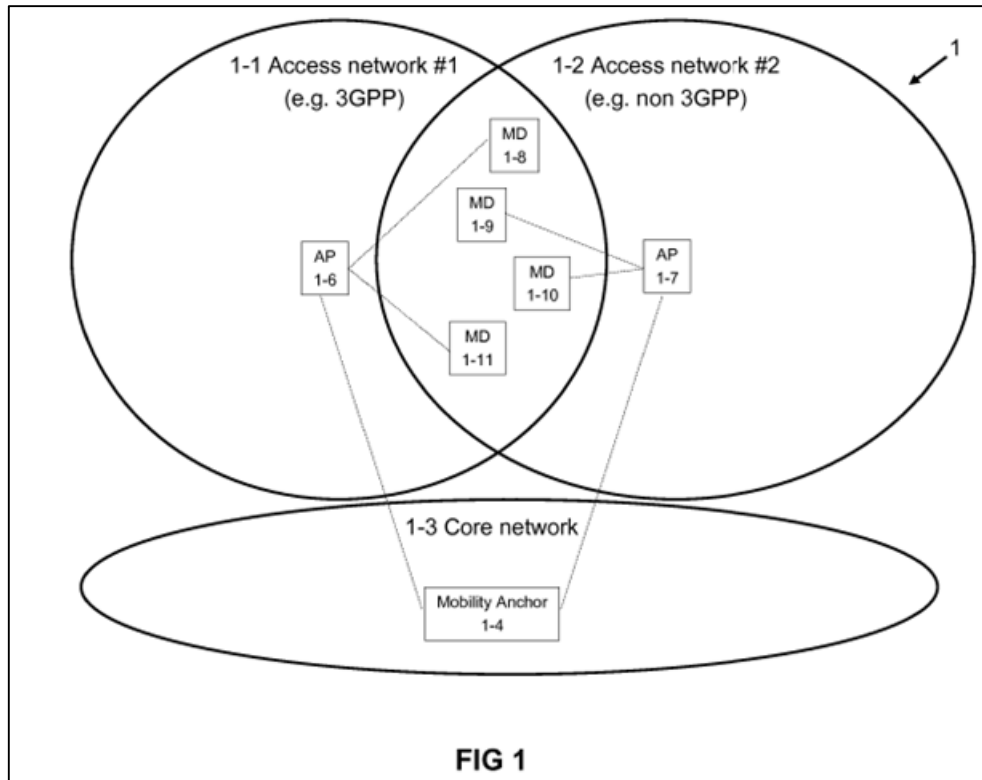
1. Claim 1

Claim 1[p]: “A system comprising:”

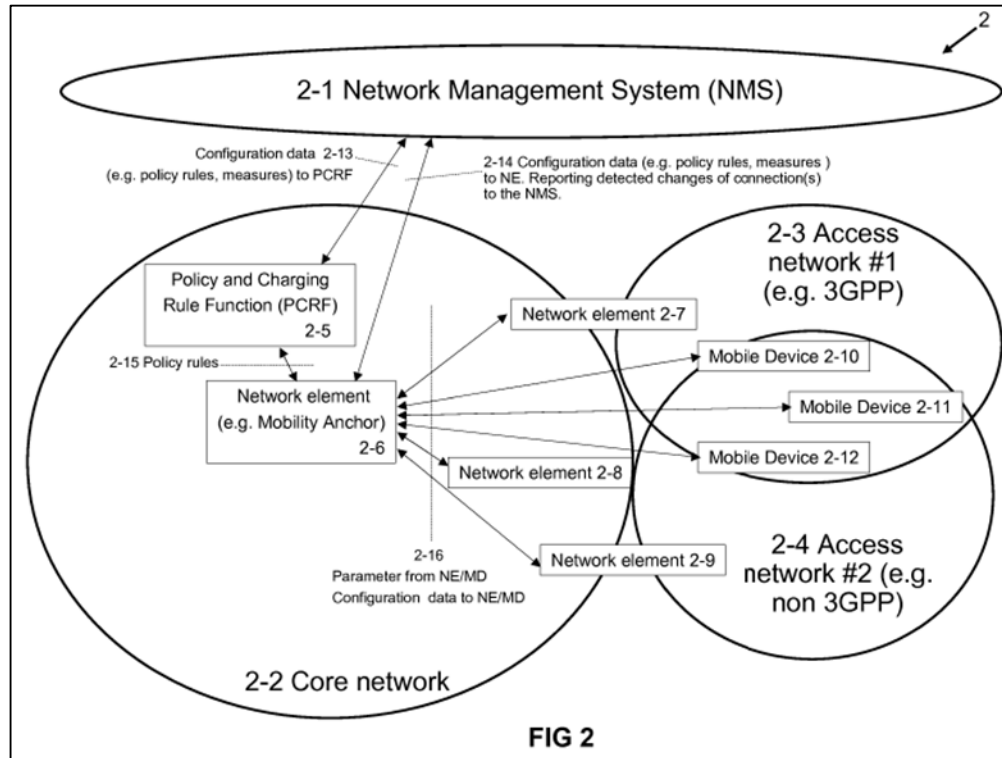
To the extent the preamble is limiting, *Eisl* discloses the preamble. EX1003, ¶¶94-97. *Eisl* describes a system for detecting and mitigating malicious activity from a mobile device. *See* EX1004, [007]. *Eisl*’s solution is described as follows:

Disclosed is a method, a device and a computer program product for detecting changes to the connection of a device (preferably a mobile device) to a network and for initiating at least one measure when changes are detected. Changes might be caused by malicious users or malicious mobile phone SW in order to perform Denial of Service (DoS) attacks to the network. Those changes could be for example frequent handover actions, frequent attach/detach actions or frequent Packet Data Protocol context activation, deactivation or modification actions initiated by a mobile device or a group of mobile devices. The changes to the connection are detected by checking if parameters related to the mobile device, or related to network elements, violate defined policy rules. The detection itself is done in a network element, which is preferably a core network element.

EX1004, Abstract.⁴ *Eisl* specifically discloses example cellular systems in Figures 1 and 2:



⁴ *cf.* EX1001, 2:23-30 (describing the '500 Patents' solution in similar terms).



EX1004 Figures 1-2, [0023], [0024], [0050]-[0052], [0060]-[0063]. *Eisl* discloses that its teachings are applicable to multiple embodiments of wireless systems, including GSM, UMTS, LTE, and other well-known wireless systems. *Id.*, [002].

For at least these reasons, a POSITA would have recognized that *Eisl* discloses the preamble (*i.e.*, “a system”). EX1003, ¶97.

Claim 1[a]: “a telecommunications network configured to identify mobile telecommunications device and comprising a core network and a base station,”

First, *Eisl* discloses a telecommunications network that includes a core network and a base station. EX1003, ¶98. *Eisl* discloses that its teachings are applicable to a variety of telecommunication networks, including GSM, UMTS, LTE, and others. *See e.g.*, EX1004, [002]. GSM, UMTS, and LTE are all examples

of well-known telecommunications networks that include a base station and a core network. EX1003, ¶98.⁵

Eisl describes its system includes access networks. EX1003, ¶99. For example, Eisl's Figure 1 illustrates a telecommunication network that includes access networks with access points (APs) connecting mobile devices to a core network.

⁵ The '500 Patent describes that these networks “provide radio telecommunication to users of mobile devices” and that “GSM, UTMS and LTE as would be known by the skilled person.” EX1001, 1:22-25. The '500 Patent also describes that these networks include a core network. *Id.*, 3:54-59 (“In a particularly advantageous embodiment the detection of data streams is performed ***in the core network, and in particular in*** the Mobility Management Entity MME if the network is an ***LTE network***, in the MSC if it is a ***UMTS or GSM network***”).

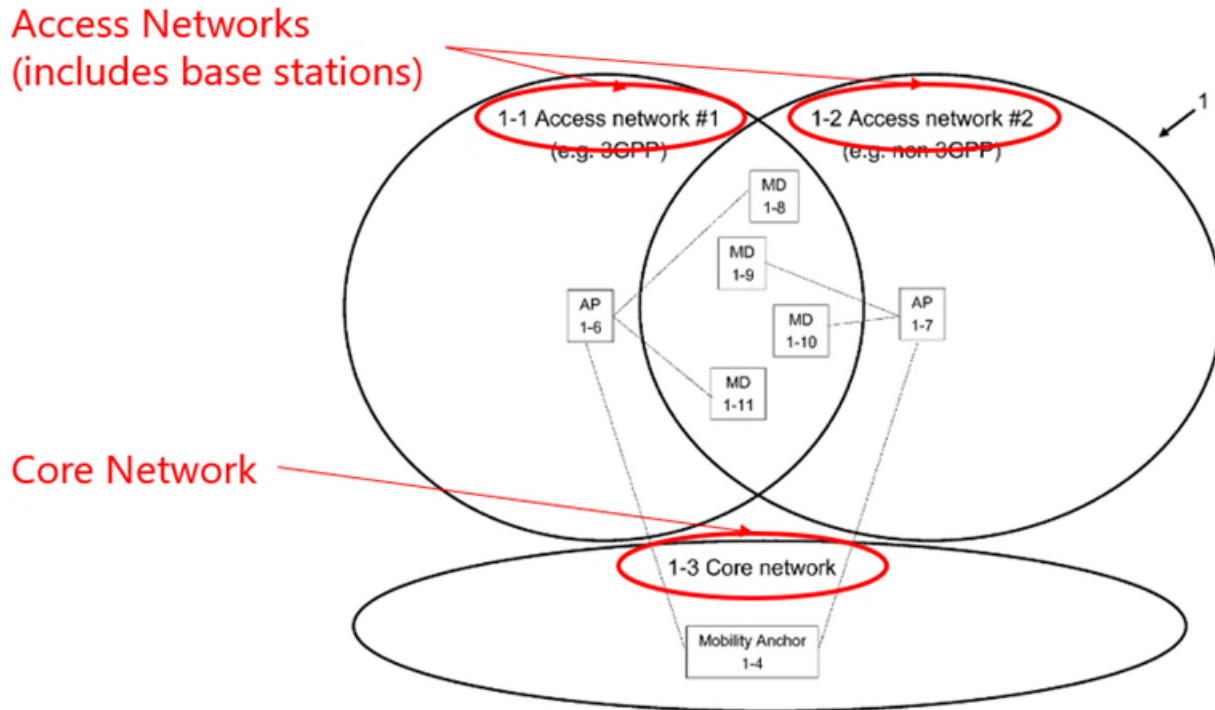


FIG 1

Id., Fig. 1 (annotated). *Eisl* goes on to teach that access networks contain base stations. See [0036] (“An access network is the part of a network including for example access points (like *for example base stations in case of a mobile network*”); [0050] (“Fig. 1 shows a high level example network 1 where mobile devices 1-8 to 1-11 are connected via access networks 1-1 and 1-2 to a core network 1-3.”); [0051] (“Access point 1-6 or 1-7 could be for example a base station.”). Thus, *Eisl* discloses “a telecommunications network” that includes “a core network and a base station” as claimed. See EX1003 ¶100.

Second, *Eisl*’s telecommunication network is configured to identify mobile telecommunications devices. EX1003, ¶101. *Eisl* describes that a PDP context with

identifying parameters will be created when the mobile telecommunications device starts a connection. *See* EX1004, [0041] (“To a PDP context belongs a data structure (or data record) including subscriber session related information for an active session (for example ***subscribers IP address***, Tunnel end point identifier, ***subscriber identifier***, ...”); EX1004, [0056] (“Further on when a mobile device starts for example a GPRS connection, a PDP context will be activated (generated) including parameters related to the GPRS connection between the mobile device and for example a core network element like a SGSN. These parameters related to the GPRS connection may be for example the subscribers IP address, ***subscriber identifier*** like ***International Mobile Subscriber Identity (IMSI)*** or Tunnel Endpoint Identifier(s) (TEIDs)....”). EX1003, ¶101.

In addition, Eisl discloses that the mobile device is authenticated by core network functions. *See* EX1004, [0101] (“In next steps 6-12 and 6-13 the mobile device is ***authenticated***.”); EX1004, [0037] (“Examples of ***core network functions*** are traffic aggregation, ***authentication***....”). After the mobile device has been authenticated, it can attach to the network. *See* EX1004, [00102] (“If ***the authentication and authorization*** was successful the mobile device triggers a layer 3 ***attach action*** 6-14.”). A POSITA would have understood that in the system taught by Eisl, in order to authenticate a mobile in a 3GPP network, its identity must be known. *See* EX1003, Section VI.A.

Eisl also discloses measures taken by the system include blocking a mobile device or sending a message to the mobile device. *See* EX1004, [0090]. A POSITA would have understood that to implement targeted measures (*i.e.*, blocking or sending a message to a specific mobile device), the system must know the identity of the device. EX1003, ¶103.

Thus, *Eisl* discloses “a telecommunications network configured to identify mobile telecommunications device and comprising a core network and a base station” as claimed. *Id.*, ¶104.

To the extent *Eisl* does not expressly disclose Claim 1[a], *Eisl* renders Claim 1[a] obvious. *Id.*, ¶105. It would have been obvious for mobile communications device to provide credentials to the network for the purpose of proving its identity to the network. *Id.* This is a basic aspect of each of the disclosed cellular networks in *Eisl* (*see* EX1004, [002]); the mobile device is identified by the network to accept the requested communication and to allow the network the ability to locate the mobile to receive calls. *See* EX1003, Section VI.A. To the extent this implementation detail is not already taught by *Eisl*, a POSITA would have been motivated to modify *Eisl*’s system in this way at least for the purpose of keeping track of mobile telecommunications devices exhibiting abnormal and/or malicious behavior. EX1003, ¶105. A POSITA would have had a reasonable expectation of success in implementing *Eisl*’s system in this way because it would merely involve

adding well-known functionality to *Eisl*'s system. *Id.* Thus, *Eisl* at least renders obvious “a telecommunications network configured to identify mobile telecommunications device and comprising a core network and a base station” as claimed. *Id.*

Claim 1[b]: “wherein the base station is configured to receive radio signals from the mobile telecommunications device and further process the radio signals into processed signals and to transmit the processed signals to the core network,”

Eisl discloses a base station configured to receive radio signals from a mobile telecommunications device, process them, and transmit them to the core network. EX1003, ¶106. For example, as shown in Figure 1 below, *Eisl* describes a system in which mobile devices are connected to the core network via a radio interface with the APs (*e.g.*, base stations).

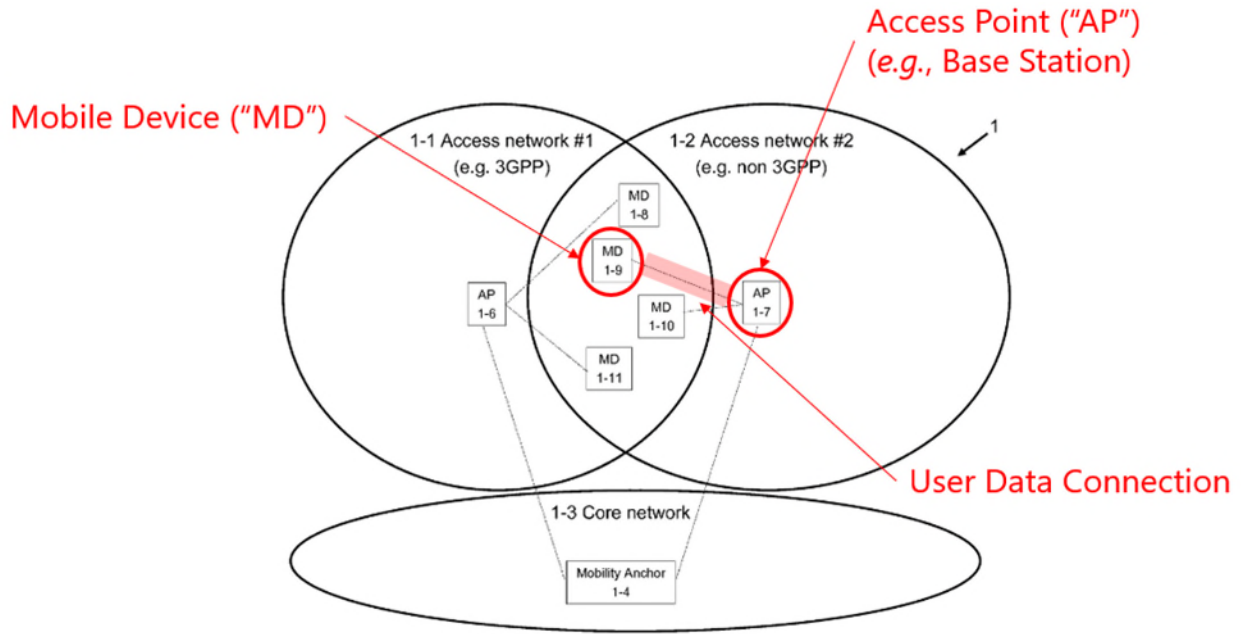


FIG 1

EX1004, Figure 1 (annotated); *see Id.*, [0036], [0050] (“Fig. 1 shows a high level example network 1 where mobile devices 1-8 to 1-11 are connected via access networks 1-1 and 1-2 to a core network 1-3, ... The shown connections between the network elements refer to user data connections.”); [0051] (“Access point 1-6 or 1-7 could be for example a base station....”); [0042] (“mobile device (MD) connects to the base station . . . via a radio interface to the wireless network”).

Base stations in the cellular networks described by *Eisl* receive radio signals sent from mobile telecommunications devices and process those signals for

transmission to the core network.⁶ See EX1003, ¶107; see also *id.*, Section VI.A; EX1004, [0037] (“A core network (or network core) is the central part of a telecom network that provides various services to customers who are connected by the access networks.”). Indeed, the ’500 Patent concedes this was known by a skilled person: “[a]s is known by the skilled person, when *the mobile device transmits signals to the telecommunications network* they are received *in a base station and processed into data streams internal to the telecommunications network.*” EX1001, 3:19-22. Thus *Eisl* discloses a “the base station is configured to receive radio signals from the mobile telecommunications device and further process the radio signals into processed signals and to transmit the processed signals to the core network as claimed. EX1003, ¶107.

Claim 1[c]: “wherein the telecommunications network is arranged to count in the core network a number of occurrences of a certain predetermined signal associated with the mobile telecommunications device,”

Eisl teaches that an expert determines criteria such as thresholds for network related parameters. EX1003, ¶108. These thresholds are used to distinguish normal

⁶ See *id.*, [0036] (“Access networks of different types could be for example GERAN, UTRAN, E-UTRA, CDMA2000 RAN, WLAN or Wimax (note this is just an example list and might not be complete).”).

behavior from abnormal behavior. *Id.* These thresholds are used to define policy rules which can be used to register when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behavior. *See* EX1004, [0047] (“An expert in the art is able to define criteria (for example ***thresholds*** for mobile device or ***network related parameters***) in order to distinguish ***normal changes of a connection between a mobile device and a network from abnormal (frequent) changes*** caused by for example DOS attacks. ***Those criteria (thresholds) can then be used for defining policy rules to detect frequent changes to a connection caused by those frequent (abnormal) actions.*** For example a criteria could be the number of connection changes that happened during a specific time window. Within the description of this patent application the term ‘frequent changes to a connection’ refers to changes caused by abnormal behavior (like for example by DOS attacks).”).

Eisl teaches an example of using a threshold for the number of handover actions in a policy rule:

```
[0086] Example of a policy rule:
20
Parameters:
    • A = number of completed handover actions of mobile one
      device
    • B = Duration of last network connection of the mobile
25      device

Policy rule:
IF ((within TW (A>5)) and (B<10s)) THEN policy_rule =
VIOLATED
30

TW = time window = e.g. 1 minute

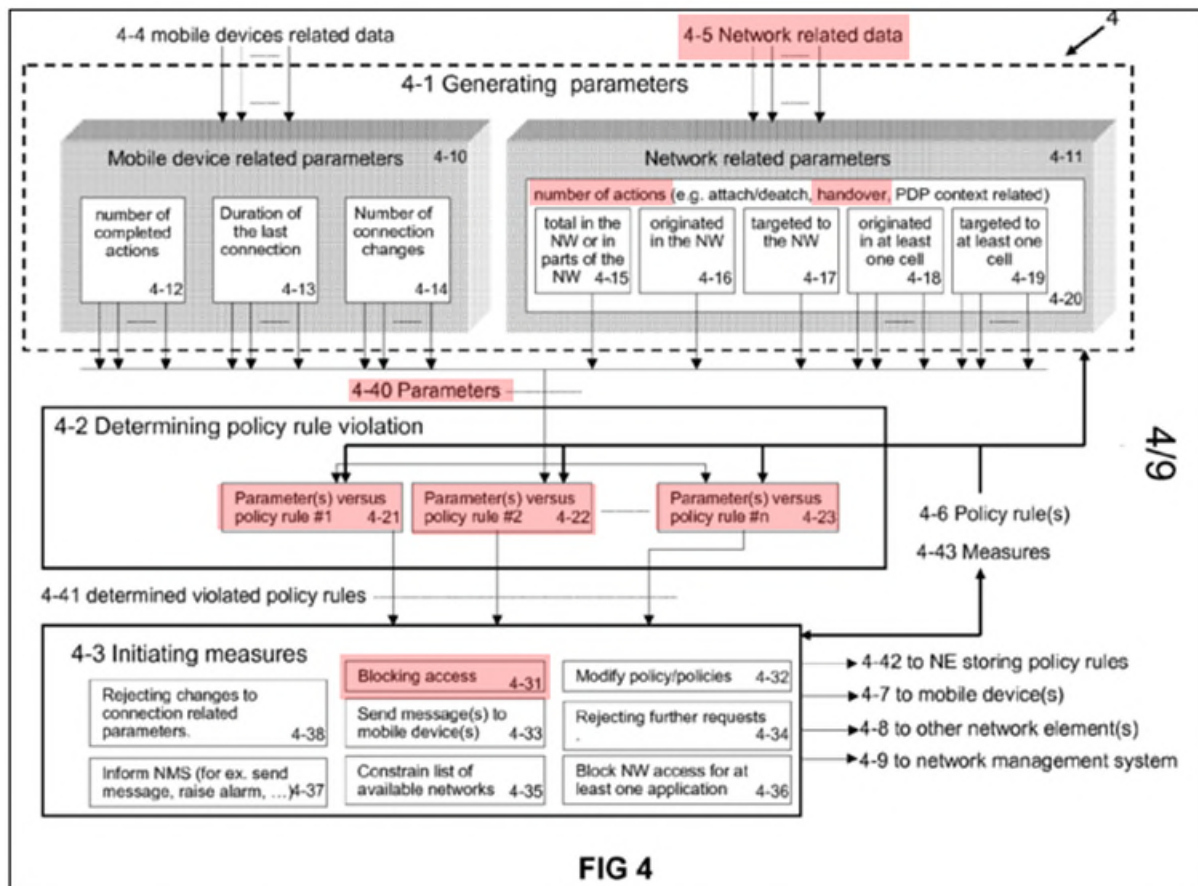
[0087] In the above example "5" is the threshold for the
35 number of the completed handover actions and "10s" is the
connection time threshold.
```

EX1004, [0086]-[0087] (annotated).

Eisl describes the use of policy rules which may be implemented in the core network, to detect abnormal behavior of mobile telecommunications devices—including embodiments where the system counts instances of connection changes and/or handover actions by generating parameters from data indicating the connection changes and/or handover actions (*i.e.*, predetermined signals) associated with the mobile device and compares them to a threshold. *See* EX1004, [0038] (“**Policy rules** might be used to . . . **to detect abnormal situation[s]**. . . .”); [0038] (stating policy rules “can be stored and implemented basically in any network

element *in the core* or access *network*.”); [0076] (“Received mobile device related data 4-4 may be for example *indications of a performed or planned handover . . .*”); [0077] (“*parameters like for example the number of* completed actions 4-12 (for example *handover actions . . .*), . . . and *the number of connection changes 4-14 of a mobile device* to a network are generated.”); (“Further on the parameters might be generated for a defined time window, which means that only *events falling into the sliding time window are counted*”); *see also* EX1004, [0079]-[0080].

Figure 4 shows that the network device data (*i.e.*, signals) is used to generate network related parameters (4-10) including the number of completed actions (4-20) such as handovers, which are used for determining if policy rules are violated (4-2):



Id., Fig. 4 (annotated).

As seen above, the number of signals indicating “the number of actions” are counted to create a parameter, and if the number of these actions violate a policy rule, the violation registers specific actions to be taken (4-3). *See* EX1004, [0083]-[0084]; [0089]-[0090]. *Eis!* specifically explains that Network related data related to handovers is received from these core network elements. EX1004, [0079] (“Received **network related data 4-5** may include information related to handover actions, attach/ detach actions or PDP context activation/modification/ deactivation

actions.”). If there is found to be a violation of a policy rules (4-2), the “result of the different policy rule checks 4-21 to 4-23 may be transferred to the initiating measures step 4-3.” EX1004, [0089]. Within step 4-3, measures are initiated such as sending a message to the mobile device or blocking its access (4-33 and 4-31 respectively). EX1004, Figure 4; [0090]-[0091]; *see* EX1003, ¶112.

Eisl specifically explains that the “number” of completed actions or connection changes are determined because they are “counted.” EX1004, [0078] (“Further on the parameters might be generated for a defined time window, which means that only *events falling into the sliding time window are counted*.”). Thus, Eisl discloses that “the telecommunications network is arranged to count in the core network a number of occurrences of a certain predetermined signal associated with the mobile telecommunications device” as claimed. EX1003, ¶113.

To the extent “counting” is not explicitly disclosed by *Eisl*, counting is an implementation detail that would have been obvious to a POSITA at the time of the ’500 Patent. EX1003, ¶114. A POSITA would have been motivated to use counting to generate the number of, for example, signals indicating completed actions to reliably generate that information. *Id.* Other methods such as estimating the number of signals indicating an action would be less reliable and introduce unnecessary complication. *Id.* A POSITA would further have had a reasonable expectation of success in generating the number of actions through counting signals

indicating associated actions because counting is a routine and well-known practice. *Id.* Further, a POSITA would have understood that counting would have been the most obvious and natural way to arrive at a “number” of performed or planned events such as handovers. EX1003, ¶114; *see also* EX1004, [0077] (“The mobile device related data is processed in the ‘mobile device related parameters’ sub-step 4-10, and parameters like for example ***the number of completed actions 4-12 (for example handover actions,***⁷ ***attach/detach actions, PDP context activation/modification/deactivation actions)***, the duration of the last connection of a mobile device to a network 4-13 and ***the number of connection changes 4-14 of a mobile device*** to a network are generated.”); *id.*, [0079] (“Generated network related parameters may be the ***number of completed actions 4-20*** for the total network or parts of the network 4-15, ***number*** of actions originated in the network or in parts of the network 4-16, ***number*** of actions targeted to the network or at least to parts of the network 4-17, ***number*** of actions originated in one cell of the network 4-18 or number of actions targeted to one cell of the network 4-19.”).

⁷ Notably, a later claim element identifies a “signal indicat[ing] handover of the mobile telecommunications device” as the “predetermined signal” in Claim 1. *See* EX1001, Claim 1.

Claim 1[d]: “the certain predetermined signal representing an interaction between network devices in the core network for normal processing of signals,”

Eisl teaches monitoring signals in the core network that indicate/represent normal behavior (such as handover of mobile telecommunications devices)⁸ and are monitored for abnormal frequency, which according to *Eisl*, represent abnormal or malicious behavior. EX1003, ¶116; *see also* EX1004, [0047] (“***Frequent*** handover, ***frequent*** attach or detach or ***frequent*** PDP context activation, modification or deactivation actions mean in the context of this application ***abnormal frequent actions*** caused by for example a malicious user or malicious software performing a DOS attack to the network. Such actions will cause ‘***frequent***’ changes to a connection between a mobile device and a network.”). *Eisl* teaches that “only malicious ***frequent*** changes to mobile device connections are detected and inhibited, ***while still allowing normal actions like normal handover, attach/detach*** or PDP context.” *Id.*, [0021]; *see id.*, [0047] (An expert in the art is able to define criteria

⁸ *Eisl* teaches that a handover is a normal process for shifting a mobile device from one base station to another. EX1004, [0040] (“A handover action means the shifting of a mobile device connection from one base station or access point to another one.”).

(for example thresholds for mobile device or network related parameters) *in order to distinguish normal changes of a connection between a mobile device and a network from abnormal (frequent) changes* caused by for example DOS attacks. Those criteria (thresholds) can then be used for defining policy rules to detect frequent changes to a connection caused by those frequent (abnormal) actions.”). The ’500 Patent similarly describes an example where the signals used to determine “excessive attaches” are likewise normally processed:

FIG. 2 shows a flow diagram of an embodiment of the invention suitable for detecting excessive attaches of a mobile device to a telecommunications network. In an advantageous embodiment a device attaches 201 to the network at time $t_{sub.1}$ through a base station and the network registers the attach, identifies the mobile device and begins authentication procedures. In parallel with the normal processing of the attach request the network performs the following steps.

EX1001, 7:24-30. The ’500 Patent goes on to explain additional steps for “detecting excessive attaches” including counting attach requests. *Id.*, 7:30-54. Thus, the signals that *Eisl* counts to generate parameters used to determine whether a policy rule has been violated represent normal processing of signals. *See* EX1003, ¶116.

During prosecution, the applicant distinguished the *Bu* reference, arguing that it “does not teach counting in the core network, but estimates the number of messages exchanged between a different mobile device and the core network, which

includes messages between the base station and the different mobile device.” EX1005, 730. In particular, the applicant criticized the prior art for “tak[ing] into account all signaling messages related to a RAB setup and therefore also includ[ing] the signaling messages exchanged between the base station and the different mobile device.” *Id.*, 731. The applicant argued that such messages are not included in the counting in the core network recited in Claim 1 because they reflect signaling messages exchanged outside the core network. *Id.*

To the extent this argument was a basis to distinguish *Bu*, *Eisl* specifically explains that the counted signals may be data from a mobile device, or may instead be “network related data 4-5” including “information relating to handover actions.” EX1004, [0079]. The “generated network related parameters may be number of completed actions 4-20 for the total network or parts of the network 4-15, [or] ***number of actions originated in the network or in parts of the network 4-16.***” EX1004 [0079]. *Eisl* further describes that the signals need not come from the mobile, but can come from other network elements in the core network that are aware of, for example, handover actions:

One network element (for example the mobility anchor 1-4 shown in fig 1) ***collects information about changes to the connection of one or more mobile device.*** The information might be collected from data received or requested for example from the mobile devices, or from data received or requested ***from other network elements which are***

aware about changes to the connection of a mobile device to a network (for example aware of attach/detach, handover or PDP context activation/modification/deactivation related actions). This network element might be either located in one of the access networks *or in the core network*. Alternatively the collection functionality might be distributed to two or more network elements, however a central network element for the collection of this kind of information is the preferred solution.

EX1004, [0058]. Thus, *Eisl* discloses that “the certain predetermined signal represent[s] an interaction between network devices in the core network for normal processing of signals” as claimed. EX1003 ¶118.

Claim 1[e]: “and wherein the telecommunications network is further arranged to register when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behaviour of the mobile telecommunications device in the telecommunications network,”

Eisl teaches that its policy rules may include a threshold of counted parameters to distinguish normal behavior from abnormal behavior. EX1004, [0047]. *Eisl* states:

Frequent handover, frequent attach or detach or frequent PDP context activation, modification or deactivation actions mean in the context of this application abnormal frequent actions caused by for example a malicious user or malicious software performing a DOS attack to the network. Such actions will cause “frequent” changes to a connection between a mobile device and a network. An expert in the art is able to define criteria (for example *thresholds for mobile device* or network related parameters) in order to distinguish *normal changes of a*

connection between a mobile device and a network from abnormal (frequent) changes caused by for example DOS attacks. *Those criteria (thresholds) can then be used for defining policy rules to detect frequent changes to a connection caused by those frequent (abnormal) actions.* For example a criteria could be the number of connection changes that happened during a specific time window. Within the description of this patent application the term “frequent changes to a connection” refers to changes caused by abnormal behavior (like for example by DOS attacks).

EX1004, [0047].

Eisl specifically describes that the policy rules shown in Figure 4 may include a threshold related to handover actions. *See id.*, [0085] (“A policy rule might include one or more thresholds for one or more parameter. A device may be assumed to violate a policy if one or more of those thresholds are crossed.”). *Eisl* goes on to give an example of violating a policy rule when a number of completed handovers exceeds a threshold:

Example of a policy rule:

Parameters:

- A = number of completed handover actions of mobile one device
- B = Duration of last network connection of the mobile 25 device

Policy rule:

IF ((within TW (A>5)) and (B<10s)) THEN policy rule =VIOLATED

TW = time window = e.g. 1 minute

In the above example “5” is the threshold for the number of the completed handover actions and “10s” is the connection time threshold.

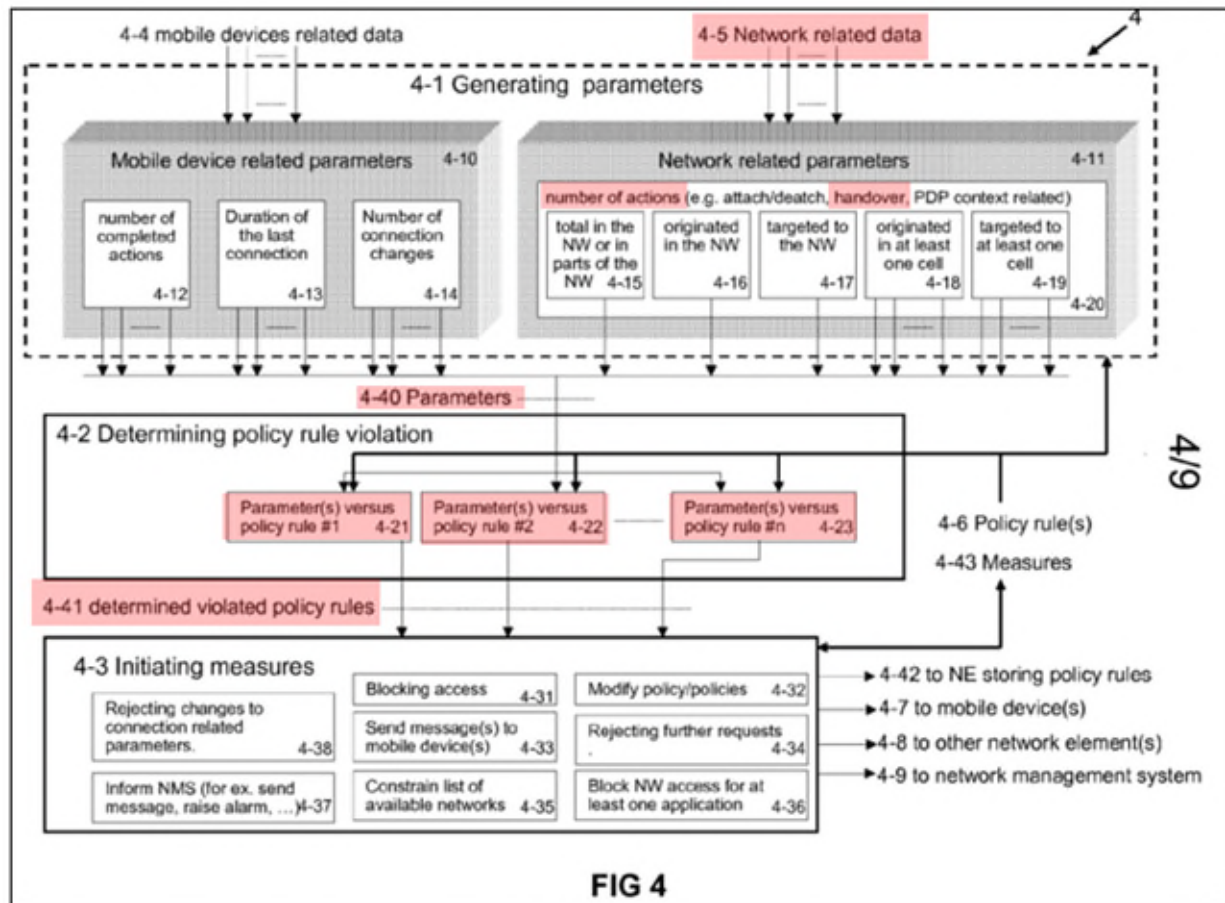
EX1004, [0086]-[0087].

As seen in the excerpt above, *Eisl* discloses counting the number of handover actions within a time window and registering a violation if the number of handover actions is greater than 5 within a 1-minute time window. EX1003, ¶121. In this example, “5” is the number of occurrences of the certain predetermined signal within the 1-minute window that exceeds a level indicating acceptable behavior of the mobile telecommunications device in the telecommunications network, and thus results in the system registering that the policy rule is “VIOLATED.” *See id.*, [0086].

Additionally, it would have been understood that the system of *Eisl*, when implemented as a “computer program” (*see* EX1004, [0019]), would register the violation by setting a variable or flag associated with the policy rule to “VIOLATED.” EX1003, ¶122. The example in paragraph [0086] of *Eisl* would have been understood to be pseudo-code, which would teach a POSITA to implement a computer program with the following conditional statement “IF ((within TW (A>5)) and (3<10s)) THEN policy rule =VIOLATED.” EX1003, ¶122. The POSITA would have readily understood this pseudocode to describe setting a variable in memory associated with the “policy rule” to the value “VIOLATED.” This would have been understood by a POSITA to be registering the violation in a computer memory.

EX1003, ¶122.

As a result of the system registering a violation of a policy rule (e.g., when a count of handovers is above a threshold), remedial actions may be taken as shown in Element 4-3 of Figure 4:



EX1004, Figure 4 (annotated).

Within step 4-3, after the system registers a violation, measures are initiated such as sending a message to the mobile, or block its access (4-31, 4-33).

EX1004, (Fig. 4); [0090]-[0091], as by crossing the threshold in a policy rule

indicates exceeding a level of acceptable behavior by the mobile telecommunications device. EX1003, ¶124. As described by *Eisl*:

The measure(s) a network element involved in the action(s) causing the frequent changes to a connection 4-8 (for example to a base station or base station controller for blocking mobile device access to the network 4-31), a network 30 element storing the policy rules 4-42 (for example the PCRF in fig 2 or the network element performing the determining step 4-2 if the policy rules are stored there), a network management system (NMS) 4-9 or to at least one mobile device 4-7 (for example sending a message to the mobile device(s)). If coordinated frequent actions of a group of mobile devices are detected then also the measure(s) may be initiated or applied for/to the whole group of mobile devices.

EX1004, [0090]; *see also* [0091] (additional measures described).

Thus, *Eisl* discloses “wherein the telecommunications network is further arranged to register when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behaviour of the mobile telecommunications device in the telecommunications network” as claimed.

EX1003, ¶105.

To the extent “registering” is not explicitly disclosed by *Eisl*, it is an implementation detail that would have been obvious to a POSITA at the time of the ’500 Patent. EX1003, ¶126. A POSITA would have been motivated to register

when the number of occurrences of a signal indicated abnormal or malicious behavior to become aware of or store that the count exceeded a threshold (*i.e.*, a violation took place) to better initiate measures. *Id.* For example, by registering when a violation took place, the system could implement measure immediately or wait for a future connection by the offending mobile telecommunications device. *See* EX1004, [00101]. A POSITA would further have had a reasonable expectation of success registering when the number of occurrences of a signal indicated abnormal or malicious behavior because it merely involves the fundamental and well known technique of storing information. EX1003, ¶126. Thus, *Eisl* at least renders obvious “wherein the telecommunications network is further arranged to register when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behaviour of the mobile telecommunications device in the telecommunications network” as claimed. *Id.*

Claim 1[f]: “wherein the certain predetermined signal indicates handover of the mobile telecommunications device.”

Eisl discloses using certain predetermined signals indicating handover of the mobile telecommunications device to determine the behavior of the same. *See* Claims 1[a]-1[e] discussed above. For example, *Eisl* teaches that a certain type of network related data is counted and these signals indicate handover actions. EX1004, [0079] (“Received *network related data 4-5* may include information *related to*

handover actions, attach/ detach actions or PDP context activation/modification/deactivation actions.”). Eisl also discloses that these signals may be counted for a time window. [0078] (“Further on the parameters might be generated for a defined time window, which means that only *events falling into the sliding time window are counted*”). Thus, Eisl discloses “wherein the certain predetermined signal indicates handover of the mobile telecommunications device” as claimed. EX1003, ¶127.

2. Claim 2

Claim 2[a]: “The system according to claim 1, wherein the telecommunications network is arranged to count in the core network the number of occurrences of the certain predetermined signal by counting a number of times occurrence of the certain predetermined signal is detected when the number of occurrences exceed a predetermined temporal rate,”

Eisl discloses that generated parameters are used to determine the frequency of the number of events of handover actions, which includes determining whether the number of events exceeds a threshold within a specific time window (*i.e.*, a temporal rate). *See id.*, [0072] (“Further on the parameters may include a time dimension, which means that the parameters are generated for data or events falling into a specific time window.”); [0073] (“A time dimension (*which might be part of the policy rule*) may be taken into account when doing the evaluation (note, this is optional for step 3-2).”). A POSITA would have understood that counting the number of actions within a specific one-minute time window is equivalent to a

temporal rate. EX1003, ¶128. *Eisl* provides an example policy rule determining whether the number of occurrences of handover action exceeds a predetermined temporal rate (*i.e.* a rate determined in the policy rule):

Example of a policy rule:

Parameters:

- A = number of completed handover actions of mobile one device
- B = Duration of last network connection of the mobile 25 device

Policy rule:

IF ((within TW (A>5)) and (B<10s)) THEN policy rule =VIOLATED

TW = time window = e.g. 1 minute

EX1004, [0086]. In the above example, the number of occurrences that would exceed the predetermined temporal rate is 5 handover actions per minute. *Id.* If the number of handovers exceeds rate of 5 over 1 minute, the policy rule is violated.

EX1003, ¶129.

Eisl further discloses that the number of occurrences of the predetermined signal, for example a handover action, may be counted when the policy rule is violated. *See* EX1004, [0089] (“In addition information about which policy rule is violated, ***which threshold*** are when crossed ***and how much it is exceeded*** might be transferred in 4-41 together with the result(s) from the policy rule check to step 4-3.”). Thus, *Eisl* discloses “wherein the telecommunications network is arranged to

count in the core network the number of occurrences of the certain predetermined signal by counting a number of times occurrence of the certain predetermined signal is detected when the number of occurrences exceed a predetermined temporal rate” as claimed. EX1003, ¶131.⁹

Claim 2[b]: “and wherein the telecommunications network is further arranged to register when the number of times the occurrence of the certain predetermined signal detected exceeds a predetermined threshold.”

As discussed with respect to Claim 1[e] above (explaining that the network is arranged to register when the predetermined signal detected exceeds a predetermined threshold), *Eisl* discloses “register[ing] when the number of times the occurrence of the certain predetermined signal detected exceeds a predetermined threshold” as claimed at least for the reasons stated above. *Supra* Section VIII.A.1.Claim 1[e]; *see* EX1003, ¶¶132-133.

⁹ As discussed with respect to Claim 1[c] and incorporated herein by reference, to the extent “counting” is not explicitly disclosed by *Eisl*, counting is an implementation detail that would have been obvious to a POSITA at the time of the ’500 Patent. EX1003, ¶114, 131; *see* Section VIII.A.1.Claim 1[c].

3. Claim 3

“The system according to claim 2, wherein the telecommunications network is arranged to count the number of occurrences of the certain predetermined signal when a time between a detected occurrence and a previously detected occurrence is within a predetermined time interval.”

Eisl discloses counting instances of events that fall within a sliding time window. *See id.*, [0078] (“Further on the parameters might be generated for defined time window, which means that only *events falling into the sliding time window are counted.*”). A POSITA would have understood that the time between each occurrence of these events must be within the window to be counted, including the detected event and the previously counted event(s). EX1003, ¶134. For example, in the policy rule below each handover action within the predetermined time window of 1 minute is counted to determine if there is a violation.

Example of a policy rule:

Parameters:

- A = number of completed handover actions of mobile one device
- B = Duration of last network connection of the mobile 25 device

Policy rule:

IF ((within TW (A>5)) and (B<10s)) THEN policy rule =VIOLATED

TW = time window = e.g. 1 minute

EX1004, [0086]. *Eisl* teaches counting the number of occurrences of completed handover actions (*i.e.*, the certain predetermined signal) when an occurrence of a

completed handover action (*i.e.*, a detected occurrence) and at least one previously detected completed handover action (*i.e.*, a previously detected occurrence) fall within a sliding time window (*i.e.*, the time between the occurrences is within a predetermined time window). EX1003, ¶135.

These occurrences could be consecutive, but there may be additional occurrences between the detected occurrence and previously detected occurrence recited in the claim depending on the length of the sliding time window. *Id.* For example by way of illustration: in the policy rule illustrated above, the time window is one minute. *Id.* If the “detected occurrence” happens at time 0s, and the claimed “previously detected occurrence” happens at time -58s, *Eisl’s* Policy Rule would count both and the claim language is satisfied because the time between occurrences is within the “predetermined time interval” of one minute. *Id.* However, if occurrences happened at 0s, -5s, -34s, -51, and -58s, each of these occurrences would also be counted by *Eisl’s* policy rules and the claim language would still be satisfied because the time between the “detected occurrence” at 0s and the claimed “previously detected occurrence” at -58s is still within the predetermined time interval of one minute. *Id.* Thus, *Eisl* discloses “wherein the telecommunications network is arranged to count the number of occurrences of the certain predetermined signal when a time between a detected occurrence and a previously detected

occurrence is within a predetermined time interval” as claimed.¹⁰

4. Claim 4

Claim 4[a]: “The system according to claim 3, wherein the telecommunications network includes a counter and a timer,”

Eisl renders these limitations obvious. As explained above with respect to at least Claim 1, 2, and 3, when generating parameters *Eisl* teaches counting the number of, for example, signals (in the form of network data) indicating handover actions that fall within a time window. *See* EX1004, [0086] (showing an example policy rule based on a ***number*** of handover actions and a timer); *see also* Section X.A.1-3. A POSITA would understand a counter is would be used count the number signals indicating handover. Also, as previously explained, *Eisl* teaches that parameters may be generated for a sliding time window. *See* Section VII.A.3; *see also id.*, [0078] (“Further on the parameters might be generated for defined time window, which means that ***only events falling into the sliding time window are counted.***”). A POSITA would understand that a timer would be used to implement

¹⁰ As discussed with respect to Claim 1[c] and incorporated herein by reference, to the extent “counting” is not explicitly disclosed by *Eisl*, counting is an implementation detail that would have been obvious to a POSITA at the time of the ’500 Patent. EX1003, ¶114, 136; *see* Section VIII.A.1 Claim 1[c].

a time window. However, to the extent that the Patent Owner contends that a counter and a timer are not explicitly disclosed by *Eisl*, inclusion of counter and timer is an implementation detail that would have been obvious to a POSITA at the time of the '500 Patent.

A POSITA would have been motivated to include a counter and a timer when implementing *Eisl*'s parameter generation and policy rules to efficiently implement the same. *Id.* For example, *Eisl*'s parameter generation generates the number of certain activities by processing mobile or network related data (*i.e.*, signals); a counter provides an efficient mechanism to do this. *Id.* Likewise *Eisl*'s policy rules involve comparing the number of actions within a time window; a timer provides an efficient mechanism for measuring time. *Id.* A POSITA would further have had a reasonable expectation of success in implementing a counter and a timer because they are fundamental and well-known techniques of measuring the number of things and measuring time respectively. *Id.* Thus, *Eisl* at least renders obvious “wherein the telecommunications network includes a counter and a timer” as claimed. EX1003, ¶138.

Claim 4[b]: “and wherein the telecommunications network is arranged to start the counter upon detection of the occurrence and further to start the timer,”

It would have been obvious to start counting and to start the sliding time window at the first occurrence of a monitored event/parameter for a particular

mobile telecommunications device. EX1003, ¶139. A POSITA seeking to implement *Eisl*'s sliding time window, would have needed to create programming to start the sliding time window based on an occurrence of some event. *Id.* The most natural event to start the time window on would have been the occurrence of a first event that the system began counting. *Id.* To do otherwise would waste system resources such as timers when they are not needed. *Id.*

To the extent this implementation detail is not already taught by *Eisl*, a POSITA would have been motivated to modify *Eisl* in this way to save processing resources. EX1003, ¶139. A POSITA would recognize it is unnecessary to spend processing resources counting the occurrences of an event in a given time window until the first event occurs. *Id.* A POSITA would have had a reasonable expectation of success in implementing *Eisl*'s policy rules in this way because it would merely involve adding an additional condition—starting the counting and sliding time window on first occurrence of an event—to an existing policy rule. *Id.* Thus, *Eisl* at least renders obvious “wherein the telecommunications network is arranged to start the counter upon detection of the occurrence and further to start the timer” as claimed. *Id.*

Claim 4[c]: “and wherein the telecommunications network is further arranged to increase the counter by one unit if a following occurrence is within the predetermined time interval as measured by the timer.”

As explained above with respect to at least Claim 1, 2, and 3, implementation

of *Eisl*'s policy rules requires counting the number of, for example, handover actions within the predetermined time window of, for example, 1 minute. EX1004, [0086], [0078], [0089]; *see also* Section VIII.A.1-3. A POSITA would have understood as a matter of basic mathematics that the counter would be incremented by one each time an instance of the action being counted occurred. EX1003, ¶141. Increasing a count by one is the most rudimentary and well-understood form of counting. Thus, *Eisl* renders obvious "wherein the telecommunications network is further arranged to increase the counter by one unit if a following occurrence is within the predetermined time interval as measured by the timer" as claimed.

A POSITA seeking to implement *Eisl*'s counting functionality would have had to go out of his way to implement a system incrementing by anything other than 1. EX1003, ¶142. A POSITA would have been motivated to use this implementation detail to maintain simplicity and avoid undue effort due to setting up another counting system. *Id.* A POSITA would have had a reasonable expectation of success because incrementing by 1 is the most rudimentary and routine form of counting known in the art. *Id.*

5. Claim 5

"The system according to claim 1, wherein the telecommunications network is further configured to detect when the number of occurrences of the certain predetermined signal exceeds a predetermined rate."

Eisl discloses these limitations. *See* Section VIII.A.2.Claim 2[a].

6. Claim 6

Claim 6[a]: “The system according to claim 5, wherein the telecommunications network includes a counter and a timer,”

Eisl discloses these limitations. *See* Section VIII.A.4.Claim 4[a].

Claim 6[b]: “and wherein the telecommunications network is arranged to start the counter upon detection of the occurrence and further to start the timer,”

Eisl discloses these limitations. *See* Section VIII.A.4.Claim 4[b].

Claim 6[c]: “and wherein the telecommunications network is further arranged to calculate a rate as a ratio of a counted number of detected occurrences to time as measured by the timer.”

A POSITA would have understood that that counting the number of actions within a time window is equivalent to a rate. *See* EX1003, ¶146; *see also* Section VIII.A.2.Claim 2[a]. *Eisl* provides an example policy rule determining whether the number of occurrences of handover action exceeds a predetermined temporal rate (*i.e.* a rate determined in the policy rule):

Example of a policy rule:

Parameters:

- A = number of completed handover actions of mobile one device
- B = Duration of last network connection of the mobile 25 device

Policy rule:

IF ((within TW (A>5)) and (B<10s)) THEN policy rule =VIOLATED

TW = time window = e.g. 1 minute

EX1004, [0086]. In the above example, the variable ‘A’ counts the number of

handovers in a time window of 1 minute. EX1003, ¶147. Therefore, the value of ‘A’ is a rate, as it is a ratio of a counted number of detected occurrences to time as measured by the timer, *e.g.* 1 minute. *Id.* Thus, *Eisl* discloses “wherein the telecommunications network is further arranged to calculate a rate as a ratio of a counted number of detected occurrences to time as measured by the timer,” as claimed. *Id.*

7. Claim 7

“The system according to claim 1, wherein the telecommunications network is arranged to register when the number of occurrences of the certain predetermined signal exceeds the level for acceptable behaviour by setting a flag and/or starting a back off timer.”

Eisl discloses checking whether its defined policy rules are violated in order to detect frequent changes of the connection. *See e.g.*, EX1004, [0066]. As discussed above with respect to Claim 1[e], it would have been understood that the system of *Eisl* would register the violation by setting a variable (*i.e.*, flag) associated with the policy rule to VIOLATED.¹¹ *See* EX1004, [0086]; *see also* EX1003, ¶148; Section

¹¹ *See* EX1010 (giving the definition of flag as “[a] variable whose value indicates the attainment of some designated state or condition by an item of equipment or a program. The flag is subsequently used as a basis for conditional branching and similar decision processes.”)

VIII.A.1.Claim 1[e].

Eisl further discloses that if frequent changes are detected (*i.e.* a policy rule is violated), this can be reported as an alarm, which is another form of a “flag.” *See e.g.*, EX1004, [0066]. (“If frequent changes are detected this might be reported to the NMS 2-1 (for example *in form of an alarm* or performance data information which will be fetched from the NMS 2-1.”). A POSITA would have understood that an alarm is a variable (*i.e.*, a flag) that indicates the state of the policy rule violation. *See* EX1003, ¶149; *see also supra* fn.8. *Eisl* describes raising an alarm as an example of a possible measure that can be taken during its “imitating measures” step once frequent changes to a connection are detected. *See* EX1004, [0091] (“Possible measures may ... informing the network management system (NMS) 4-37 (for example by raising an alarm or providing status information which can be read by the NMS)...”).

Eisl also discloses that the system registers when the number of occurrences of the certain predetermined signal exceeds the level for acceptable behavior by starting a back off timer. *See* EX1003, ¶150. For example, when the network registers a violation has occurred, it initiates remedial measures as disclosed in Figure 4 (element 4-3) and as explained above for Claim 1. *See also* Figure 4, [0090], [0091]. *Eisl* explains that a time window may be applied to these measures, stating that “time window for applying the measure(s) might be defined, thus for example

the *blocking of network access for one or more mobile devices might be limited to a certain time.*” The ’500 Patent similarly describes its back off timer: “starting a back off timer to stop the mobile device from making another connection request within a certain time period.” EX 1001, 5:66-6:1. Thus, a POSITA would have understood that blocking network access for a limited amount of certain time discloses implementing and starting a back-off timer. *See* EX1003, ¶150.

Thus, *Eisl* discloses “wherein the telecommunications network is arranged to register when the number of occurrences of the certain predetermined signal exceeds the level for acceptable behaviour by setting a flag and/or starting a back off time” as claimed. *Id.*, ¶151.

8. Claim 8

Claim 8[a]: “The system according to claim 1, wherein the telecommunications network is further arranged to monitor a tracking area of the mobile telecommunications device”

A POSITA would have recognized that a “tracking area” merely refers to a group of one or more cells within a cellular system. *See* EX1003, ¶152. Indeed, the ’500 Patent describes using tracking area to determine when the mobile device is moving between parts of the network. *See* EX1001, 5:41-44 (“The network maintains a record of the tracking area of the mobile device and also an indication of when the tracking area changes. This allows the network to know when device is moving.”). Moreover, it was well known to a POSITA that cellular systems needed

to monitor the tracking area of a mobile device to locate that device within the network for the purpose of routing calls. EX1003, ¶150. As discussed with respect to Claim 1, *Eisl* discloses that its teachings are applicable to a variety of telecommunication networks, including GSM, UMTS, WiMAX, CDMA, WLAN, LTE, and others. *See e.g.*, EX1004, [002]. These are examples of well-known telecommunications networks that monitor the tracking area (or equivalent) of a mobile telecommunications device. EX1003, ¶152.

Thus, to the extent that the Patent Owner contends that *Eisl* does not explicitly disclose “wherein the telecommunications network is further arranged to monitor a tracking area of the mobile telecommunications device”, it would have been obvious for a POSITA to modify *Eisl* to monitor a tracking area. EX1003, ¶152. *Eisl* discloses network parameters can be based on parts of a network, including a group of cells. *See* EX1004, [0072] (“The generated parameters may be specific parameters for a dedicated mobile device, for a group of mobile devices, for the whole network or for a part of the network (for example one or *more cells of the network.*)”). It would have been obvious for a POSITA to make this parameter relating a group of cells a tracking area, so that the system could monitor the mobile behavior in a tracking area. EX1003, ¶153. Thus, *Eisl* renders obvious “The system according to claim 1, wherein the telecommunications network is further arranged to monitor a tracking area of the mobile telecommunications device” as claimed.

Claim 8[b]: “and to register the number of occurrences of the certain predetermined signal only when the monitoring of tracking area shows that the mobile telecommunications device remains within a single tracking area.”

Eisl teaches that its policy rules can be based on parts of the network, which a POSITA would understand to include tracking areas comprising sets of cells. *See* EX1003, ¶153; *see also* EX1004, [0038] (“A policy rule in the context of this application is a rule which might be applied to a whole network, parts of a network, one or more network elements, one or more mobile devices or one or more mobile subscribers.”). *Eisl* goes on to explain that different policies may apply to different *areas*, and that within one area, one or more criteria might be used within a policy rule:

Different policy rules might apply for different areas or groups (for example for detecting frequent changes of a connection of a single mobile device or of a group of mobile devices, or for detecting frequent changes of one or more connections in a network or in parts of a network or might be related to a combination of those. Within one area or group one or more criteria . . . might be used within one policy rule.

EX1004, [0084]. It would have been apparent that a particular mobile device’s activities would only be counted when the mobile device’s tracking area coincided with the area to which the policy rule is applied. *Id.* If the mobile device moved outside of the tracking area to which the policy applies, the POSITA would have understood that the mobile device’s activities would no longer be applied against the

policy rule for that area. EX1003, ¶155. The '500 Patent specifically describes that a “particularly advantageous embodiment of the invention would be performed in the MME of the Network.” EX1001, 8:9-10. MME’s are used to manage mobility within one or more tracking area(s). EX1003, ¶155. *Eisl* also describes that its policy rules can be implemented in an MME. *See* EX1004, [0068] (“The mobility anchor 1. . . is just a preferred network element for detecting frequent changes of the connection of at least one mobile device to the network); *see also id.*, [0037] (“Examples for core network elements involved in handover activities are Serving GPRS Support Node (SGSN), Gateway GPRS Support Node (GGSN), Mobility Management Entity (MME), Serving Gateway (SGW) and Packet Data Network Gateway (PGW).”). Given *Eisl*’s disclosure of monitoring parts of the network including sets of cells, and its disclosure of using an MME, it would have been natural for the POSITA to select one or more tracking areas managed by the MME to monitor. EX1003, ¶155. It would have been obvious for the POSITA to make monitoring selectively enabled within parts of the network, including in one or more tracking areas. *Id.* If the user selected one tracking area to monitor, the monitoring of a mobile telecommunications would cease if the mobile telecommunications device leaves the tracking area. *Id.* A POSITA would have been motivated to do so to conserve and precisely target processing resources (*e.g.*, targeting the portions of the network from which the malicious behavior is originating). *Id.* A POSITA would

have had a reasonable likelihood of success in implementing this because it merely involves applying *Eisl*'s teachings to an existing and well-known division of the cells in the network. *Id.*

Thus, *Eisl* renders obvious “to register the number of occurrences of the certain predetermined signal only when the monitoring of tracking area shows that the mobile telecommunications device remains within a single tracking area” as claimed.

9. Claim 9

“The system according to claim 1, wherein the telecommunications network is arranged to count the number of occurrences of the certain predetermined signal in a Mobility Management Entity or Serving Gateway Support Node or Mobile Switching Center of the telecommunications network.”

Eisl teaches that policy rules may be implemented in any core network element, and that the preferred network element is the mobility anchor (another name for the claimed mobility management entity). *See* EX1004, [0068] (“The mobility anchor 1. . . is just a preferred network element for detecting frequent changes of the connection of at least one mobile device to the network); [0038] (“Policy rules can be stored and implemented basically in any network element in the core or access network.”). *Eisl* also teaches that Mobility Management Entity or Serving Gateway Support Node are part of the network elements in the core network. *See id.*, [0037] (“Examples for core network elements involved in handover

activities are *Serving GPRS Support Node (SGSN)*, Gateway GPRS Support Node (GGSN), *Mobility Management Entity (MME)*, Serving Gateway (SGW) and Packet Data Network Gateway (PGW).”). Thus, *Eisl* discloses “wherein the telecommunications network is arranged to count the number of occurrences of the certain predetermined signal in a Mobility Management Entity or Serving Gateway Support Node or Mobile Switching Center of the telecommunications network” as claimed. EX1003, ¶156.

10. Claim 10

Claim 10[p]: “The system according to claim 1, wherein the telecommunications network is further configured to:”

Eisl discloses these limitations. *See supra* Section VIII.A.1.

Claim 10[a]: “identify at least one additional mobile telecommunications device,”

As explained with respect to at least Claim 1[a], *Eisl* describes a telecommunications network configured to identify a mobile telecommunications device. *See supra* Section VIII.A.1.Claim 1[a]. *Eisl* further teaches that its system applies to mobile devices (*plural*). *See* EX1004, [0011] (“In consideration of the above, it is an object of the present invention to overcome the above mentioned problem of possible changes to a connection of device(s) (preferable *mobile devices*) to a network caused by for example a malicious user or mobile device.”); *see also id.*, [0090] (“If coordinated frequent actions of a *group of mobile devices* are

detected then also the measure(s) may be initiated or applied for/to the **whole group of mobile devices**.”). Thus, *Eisl* discloses a telecommunications network configured to “identify at least one additional mobile telecommunications device” as claimed.

Claim 10[b]: “receive radio signals from the at least one additional mobile telecommunications device and to process these radio signals into processed signals and to transmit the processed signals to the core network,”

As explained with respect to at least Claim 1[b], *Eisl* discloses base stations that receives radio signals from a mobile telecommunications device, process them, and transmit them to the core network. *See supra* Section VIII.A.1.Claim 1[b]. *Eisl* further teaches that its system applies to mobile devices (*plural*). *See* EX1004, [0011]; *see also id.*, [0090]. Thus, *Eisl* discloses a telecommunications network configured to “receive radio signals from the at least one additional mobile telecommunications device and to process these radio signals into processed signals and to transmit the processed signals to the core network” as claimed. EX1003, ¶159.

Claim 10[c]: “count in the core network a number of occurrences of a certain predetermined signal associated with the at least one additional mobile telecommunications device, the certain predetermined processed signal representing an interaction between network devices for normal processing of signals”

As explained with respect to at least Claim 1[c] and 1[d], *Eisl* discloses policy rules used to detect abnormal behavior of mobile devices which may be implemented in the core network, and the predetermined signal representing an interaction between network devices for normal processing of signals. *See supra* Section

VIII.A.1.Claim 1[c] and Claim 1[d]. *Eisl* further teaches that its system applies to mobile devices (*plural*). *See supra* Section VIII.A.1.Claim 1[a] and Claim 1[b]. EX1003, ¶160.

Claim 10[d]: “register when the number of occurrences of a certain predetermined signal associated with the at least one additional mobile telecommunications device exceeds a level indicating acceptable behaviour of the at least one additional mobile telecommunications device within the telecommunications network,”

As explained with respect to at least Claim 1[d], *Eisl* discloses monitoring signals for abnormal behavior that are signals that are normally processed in the core network. *See supra* Section VIII.A.1.Claim 1[d]. *Eisl* further teaches that its system applies to mobile devices (*plural*). *See* EX1004, [0011]; *see also id.*, [0090]. Thus, *Eisl* discloses a telecommunications network configured to “register when the number of occurrences of a certain predetermined signal associated with the at least one additional mobile telecommunications device exceeds a level indicating acceptable behaviour of the at least one additional mobile telecommunications device within the telecommunications network” as claimed. EX1003, ¶161.

Claim 10[e]: “wherein the telecommunications network is further arranged to aggregate registered data of the mobile telecommunications device and the at least one additional mobile telecommunications device,”

Eisl discloses that the generated parameters evaluated with its policy rules may include parameters for a group of mobile devices (*i.e.* a mobile telecommunications device and the at least one additional mobile

telecommunications device). *See* EX1004, [0072] (“The generated parameters may be specific parameters ... *for a group of mobile devices....*”); [0078] (“Mobile device related parameters 4-10 might be generated for a single mobile device or a group of mobile device.”). *Eisl* likewise discloses that both policy rules and measure initiated for policy rule violations may be applied to groups of mobile devices. *See id.*, [0084] (“Different policy rules might apply for different areas or groups (for example for detecting frequent changes of a connection of a single mobile device *or of a group of mobile devices....*”); [0090] (“If coordinated frequent actions of a group of mobile devices are detected then also the measure(s) may be initiated or applied for/to *the whole group of mobile devices.*”). Thus, *Eisl* discloses “wherein the telecommunications network is further arranged to aggregate registered data of the mobile telecommunications device and the at least one additional mobile telecommunications device” as claimed. EX1003, ¶162.

Claim 10[f]: “and wherein the certain predetermined signal associated with the at least one additional mobile telecommunications device indicates handover of the at least one additional mobile telecommunications device.”

As explained with respect to at least Claim 1[f], *Eisl* discloses using handover actions to determine the behavior of the mobile telecommunications device. *See supra* Section VIII.A.1.Claim 1[f]. EX1003, ¶163.

11. Claim 11

Claim 11[pre]: “A method for detecting behaviour of a mobile telecommunications device in a telecommunications network comprising a core network, the telecommunications network including a base station, the method comprising:”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[a].

Claim 11[a]: “at the base station, receiving radio signals from the mobile telecommunications device, and processing the radio signals into processed signals and transmitting the processed signals to the core network;”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[b].

Claim 11[b]: “in the telecommunications network, identifying the mobile telecommunications device;”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[a].

Claim 11[c]: “the telecommunications network counting, in the core network, a number of occurrences of a certain predetermined signal associated with the mobile telecommunications device,”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[c].

Claim 11[d]: “the certain predetermined signal representing an interaction between network devices in the core network for normal processing of signals; and”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[d].

Claim 11[e]: “registering when the number of occurrences of the certain predetermined signal exceeds a level indicating acceptable behaviour of the mobile telecommunications device in the telecommunications network,”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[e].

Claim 11[f]: “wherein the certain predetermined signal indicates handover of the mobile telecommunications device.”

Eisl discloses these limitations. *See supra* Section VIII.A.1.Claim 1[f].

IX. CONCLUSION

Petitioners respectfully request that *inter partes* review of the '500 Patent be instituted and that Claims 1-11 be cancelled as unpatentable under 35 U.S.C. § 318(b).

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition, exclusive of the exempted portions as provided in 37 C.F.R. § 42.24(a), contains no more than 13,566 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(a). The word count was calculated by starting with Microsoft Word's total document word count and subtracting the words for the Table of Contents, the Exhibit List, the Mandatory Notices, the Certificate of Compliance, and the Certificate of Service.

Respectfully submitted,

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on the 22nd day of February 2023, a complete and entire copy of this Petition for *Inter Partes* Review under 35 U.S.C. § 311 and 37 C.F.R. § 42.104, and all supporting exhibits were provided via Federal Express, postage prepaid, to the Patent Owner and its known representatives by serving the correspondence address of record for the '500 Patent holder and the patent holder's counsel:

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The undersigned further certifies that a courtesy copy of the complete and entire Petition, and all supporting exhibits, were provided by electronic service to counsel retained by Patent Owner in the Related Matters identified herein:

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