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Datasheet for the decision
of 21 June 2016

Case Number: T 1890/13 - 3.5.05

Application Number: 08767152.5

Publication Number: 2191608

IPC: H04L9/08, H04L29/06, H04L9/32,
H04W12/04

Language of the proceedings: EN

Title of invention:
Method and arrangement in a telecommunication system

Patent Proprietor:
Telefonaktiebolaget LM Ericsson (publ)

Opponent:
KELTIE LLP

Headword:
Generation of security keys/ERICSSON

Relevant legal provisions:
EPC Art. 56, 83, 87(1), 100(a), 100(b)
RPBA Art. 13(1)

Keyword:
Sufficiency of disclosure - (yes)
Validity of priority claim - (yes)
Admission of document substantiated only at the oral
proceedings before the board - (no)
Inventive step - (yes)

Decisions cited:

Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: **T 1890/13 - 3.5.05**

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 21 June 2016

Appellant:	KELTIE LLP
(Opponent)	No. 1 London Bridge
	London SE1 9BA (GB)
Representative:	Lawrence, Richard Anthony
	Keltie LLP
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Respondent:	Telefonaktiebolaget LM Ericsson (publ)
(Patent Proprietor)	164 83 Stockholm (SE)
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Decision under appeal:	Decision of the Opposition Division of the European Patent Office posted on 2 July 2013 rejecting the opposition filed against European patent No. 2191608 pursuant to Article 101(2) EPC.

Composition of the Board:

Chair	A. Ritzka
Members:	K. Bengi-Akyuerek
	D. Prietzel-Funk

Summary of Facts and Submissions

I.   The appeal of the opponent is against the decision of
        the opposition division to maintain the present
        European patent as granted, in view of the invoked
        opposition grounds of lack of novelty and inventive
        step (Article 100(a) EPC in conjunction with
        Articles 54 and 56 EPC) and insufficient disclosure
        (Article 100(b) EPC in conjunction with Article 83
        EPC).

II.   The prior-art documents cited in the opposition
        proceedings and in the decision under appeal included
        the following:

        D19:   "Key refresh in SAE/LTE", 3GPP TSG SA WG3
                    Security - SA3#46b, S3-070234, pp. 1-6,
                    March 2007;
        D28:   "Nonce-based key refresh on idle to active and
                    detached to active transitions", 3GPP TSG SA
                    WG3 Security - S3#48, S3-070530, pp. 1-4,
                    July 2007;
        D29:   "Efficient Re-keying in SAE/LTE", 3GPP TSG SA
                    WG3 Security - SA3#48, S3-070573, pp. 1-5,
                    July 2007.

III.   With the statement setting out the grounds of appeal,
        the appellant requested that the decision under appeal
        be set aside and that the patent be revoked in its
        entirety on the grounds of insufficiency of disclosure
        (Article 100(b) EPC) and lack of novelty and inventive
        step (Article 100(a) EPC). Furthermore, it contended
        that the priority from US patent application

        P1:   US 60/972,955

was invalidly claimed with respect to the independent claims of the patent (Article 87(1) EPC).

IV.   With a letter of reply dated 6 March 2014, the respondent filed amended claims according to seven auxiliary requests and requested that the appeal be dismissed (main request) or that the patent be maintained on the basis of the claims of any of the auxiliary requests. Furthermore, it requested that the ground of opposition under Article 100(a) EPC be rejected as inadmissible for lack of substantiation.

V.   With a notice of intervention dated 19 August 2015, an intervener ("Apple Retail Netherlands B.V.") requested that the decision under appeal be set aside and that the patent be revoked in its entirety on the grounds of insufficiency of disclosure (Article 100(b) EPC) and lack of novelty and inventive step (Article 100(a) EPC). The intervener cited *inter alia* the following prior-art documents:

HL3:   3GPP TS 23.401 V1.1.0 (2007-07), Technical Specification, Release 8, pp. 1-77, July 2007;

HL4:   A. Menezes et al.: "Handbook of Applied Cryptography", chapters 9, 10 and 12, CRC Press, 1997.

VI.   By a letter dated 22 December 2015, the intervener withdrew its intervention.

VII.   With a letter dated 12 January 2016, the respondent filed additional sets of amended claims according to five further auxiliary requests (i.e. auxiliary request 7A and eighth to eleventh auxiliary requests).

VIII.   In an annex to the summons to oral proceedings pursuant
        to Article 15(1) RPBA, the board expressed its
        preliminary opinion on the appeal. In particular, it
        made observations on the ground of insufficiency of
        disclosure, the validity of the priority claim, the
        admissibility of the claims of the auxiliary requests
        on file and the matter of novelty and inventive step,
        mainly having regard to documents D19, D29 and HL4.

IX.   By a letter of reply, the respondent submitted
        observations on the board's communication under
        Article 15(1) RPBA, in particular as regards the issue
        of novelty and inventive step in view of D19, D29 and
        HL4.

X.   Oral proceedings were held on 21 June 2016, during
        which the matter of sufficiency of disclosure, the
        validity of the priority claim, the admission of D28
        into the proceedings and the question of novelty and
        inventive step were discussed.

        The appellant's final request was that the decision
        under appeal be set aside and that the patent be
        revoked.

        The respondent's final request was that the appeal be
        dismissed or, alternatively, that the patent be
        maintained on the basis of the claims of auxiliary
        requests 1 to 7 submitted with the letter dated 6 March
        2014 or of auxiliary requests 7A and 8 to 11 submitted
        with the letter dated 12 January 2016.

        At the end of the oral proceedings, the decision of the
        board was announced.

XI.   **Claim 1** of the patent reads as follows:

"A method in a Mobility Management Entity (13), MME, of
an Evolved Packet System, EPS, of establishing a
security key, K_eNB, for protecting RRC/UP traffic
between a User Equipment (11), UE, and an eNodeB (12)
serving the UE, the method comprising the following
steps:

   - Receiving (32, 52) an NAS Service Request from the
   UE, the request indicating a [sic] NAS uplink
   sequence number, NAS_U_SEQ;
   - Deriving (33, 53) the security key, K_eNB, from at
   least said received NAS_U_SEQ and from a stored
   Access Security Management Entity-key, K_ASME,
   shared with said UE;
   - Forwarding (34) said derived K_eNB to the
   eNodeB (12) serving said UE."

Independent **claim 7** of the patent reads as follows:

"A method in a User Equipment (11), UE, of an Evolved
Packet System, EPS, of establishing a security key,
K_eNB, for protecting RRC/UP traffic exchanged with a
serving eNodeB (12), the method comprising the
following steps:

   - Sending (31, 51) a [sic] NAS Service Request to a
   Mobility Management Entity, MME, the request
   indicating a [sic] NAS uplink sequence number,
   NAS_U_SEQ;
   - Deriving (35, 56) the K_eNB from at least said
   NAS_U_SEQ and from a stored Access Security
   Management Entity-key, K_ASME, shared with said
   MME."

The further independent **claims 13 and 18** of the patent
are directed to corresponding apparatuses.

Reasons for the Decision

1.   Independent claim 7 as granted, having the broadest
        scope among the granted independent claims, comprises
        the following features (as labelled by the board):

        A method in a User Equipment (UE) of an Evolved Packet
        System (EPS) of establishing a security key, K_eNB, for
        protecting Radio Resource Control/User Plane (RRC/UP)
        traffic exchanged with a serving eNodeB, the method
        comprising the following steps:

        A) sending a Non-Access Stratum (NAS) Service Request
           to a Mobility Management Entity (MME), the request
           indicating an NAS uplink sequence number
           NAS_U_SEQ;
        B) deriving the K_eNB from at least said NAS_U_SEQ
           and from a stored Access Security Management
           Entity (ASME) key, K_ASME, shared with said MME.

        The subject-matter of independent apparatus claim 18 as
        granted corresponds to that of claim 7, while
        independent claims 1 and 13 are directed to a method
        and apparatus respectively, further including the step
        of forwarding K_eNB from MME to the serving eNodeB.

        The independent claims are evidently based on the
        "first embodiment" of the opposed patent. That
        embodiment is concerned with generating the same
        security key K_eNB, which is subsequently used for
        securing traffic between UE and eNodeB, at both the
        user side ("UE") and the network side ("MME"), based on

security parameters such as NAS_U_SEQ and K_ASME, and forwarding the generated K_eNB to eNodeB (cf. paragraphs [0031] to [0037] in conjunction with Figures 2 and 3 of the opposed patent). The technical problem to be solved by those independent claims is to prevent replay attacks, without using complex sequence number estimation and synchronisation, or requiring explicit downlink NAS service accept messages from MME to UE (cf. paragraphs [0007] to [0011] of the opposed patent).

2.   *Sufficiency of disclosure (Article 83 EPC)*

2.1   The appellant contended that, firstly, the independent claims as granted did not include the essential features of the patent's invention such as reuse of replay protection, integrity protected NAS messages and idle-to-active transitions of UE and that, secondly, the patent's specification did not provide the relevant standardisation information to enable a working implementation of the present invention.

2.2   The board, however, concurs with the opposition division and the respondent that the skilled person in the field of 3GPP-based mobile communications would know, without requiring further technical details, how to actually send transmission-specific parameters such as a sequence number ("NAS_U_SEQ") to another network device ("MME") and derive a security key from that transmission-specific parameter and another security key ("K_ASME") according to the features of the independent claims as granted.

2.3   The appellant did not present any further arguments or comments at the oral proceedings before the board.

3.   *Validity of priority claim (Article 87(1) EPC)*

3.1   It is apparent to the board that priority document **P1** directly and unambiguously discloses feature A), i.e. sending an NAS service request message "Msg" including an NAS uplink sequence number "U_SEQ" (see e.g. Fig. 2: "Msg(U_SEQ, payload)"), and feature B), i.e. deriving a security key "K_eNB" to be used for protecting RRC/UP traffic exchanged between UE and the serving eNodeB from at least U_SEQ and a shared "K_ASME" (see e.g. Fig. 2: "Derive K_eNB = PRF (U_SEQ, K_ASME, ...)").

        Hence, priority document P1 obviously discloses the "same invention" in the sense of Article 87(1) EPC. Consequently, the effective filing date of the opposed patent is taken to be 17 September 2007.

3.2   The appellant did not provide any further arguments or comments at the oral proceedings before the board.

4.   *Novelty and inventive step (Articles 54 and 56 EPC)*

        At the oral proceedings before the board, the appellant did not challenge the novelty of the opposed patent's independent claims (Article 54 EPC). For the purpose of attacking inventive step, the appellant relied essentially on three prior-art documents, namely **D28**, **D19** and **D29**. Since the appellant first requested that D28 be introduced into the appeal proceedings, this issue was discussed and decided first.

4.1   *Admission of D28 as substantiated into the appeal proceedings*

4.1.1   Document **D28** was initially filed with the notice of opposition. Thus, it was filed in due time within the

meaning of Article 114(2) EPC. However, it was
discussed neither during the oral proceedings before
the opposition division nor in the impugned decision.

4.1.2   As regards appeal proceedings, Article 12(2) RPBA
clearly states that the statement setting out the
grounds of appeal or the corresponding reply shall
contain a party's complete case, and in particular
should specify expressly all the facts, arguments and
evidence relied on.

4.1.3   Concerning substantiation of the filing of D28, the
statement setting out the grounds of *opposition* made
the following reference to it (cf. page 11, second
paragraph, third sentence; emphasis added by the
board):

> *"Documents D27, **D28** and D29 provide specific*
> *proposals for consideration. D27 and **D28** develop*
> *the D23 and D24 approaches respectively ..."*,

while the statement setting out the grounds of *appeal*
(cf. page 6, last paragraph, third sentence; emphasis
added by the board) includes the following statement:

> *"D19 provides a worked-out scheme for managing key*
> *refresh in transitions ... and discusses a number*
> *of alternative approaches for providing nonce or*
> *counter (as noted in **D28**, a counter is merely a*
> *specific example of a nonce) data to achieve key*
> *refresh."*

The board concurs with the respondent that this kind of
incidental citation of D28 within a line of argument in
support of lack of patentability amounts to mentioning
a prior-art document merely as background information

for standardisation developments, but fails to deliver
any information as to whether it is intended to be
used, for example, as a starting point for attacking
inventive step or as evidence of common general
knowledge or anything else. Moreover, no specific
passage of D28 had been cited in the written procedure.
Thus, D28 remained unsubstantiated throughout the
entire written proceedings.

It was only at the oral proceedings before the board
that the appellant argued for the very first time that
D28 constituted a development of 3GPP-based
standardisation documents such as D19, and that it was
extremely relevant for the assessment of inventive
step, since it demonstrated on page 2, first paragraph,
that a *number used only once*, i.e. "$Nonce_{UE}$", could
indeed be derived from a counter, i.e. "$Count_{NASint}$"
here. Hence, this new line of argument based on D28 was
submitted *after* the appellant had filed its statement
setting out the grounds of appeal and *after* the board
had arranged oral proceedings, i.e. at a very late
stage in the overall proceedings. Therefore, the
question of admitting the *substantiated* document D28
into the appeal proceedings is subject to Article 13(1)
and (3) RPBA in the present case.

4.1.4   In the light of the above and in accordance with the
respondent's request, the board decided to exercise its
discretionary power to refuse the appellant's request
that D28 be introduced into the appeal proceedings
under Article 13(1) RPBA, for the following reasons:

- the late substantiation of D28 was not an
  appropriate and immediate reaction to
  unforeseeable developments in the proceedings
  which did not lie in the responsibility of the

appellant, rather it was submitted by the
appellant entirely of its own volition;

- the teaching of D28 was not *prima facie* more
relevant than the other prior-art documents on
file or highly likely to prejudice the
maintenance of the opposed patent, since the use
of a counter for NAS integrity protection, i.e.
$Count_{NASint}$, in no way corresponds to a sequence
number associated with uplink transmissions of
NAS service request messages as claimed;

- admitting into the appeal proceedings such a new
line of argument based on D28 would run counter
to the principle of procedural economy and
fairness.

4.2   *Document D19 as closest prior art*

The teaching of **D19** is concerned with key refresh
procedures in 3GPP-based mobile networks such as LTE
(Long-Term Evolution) systems. More specifically, it
discloses UE-initiated updates of K_eNB, which is
derived at least from two random *numbers used only
once*, namely $Nonce_{UE}$ and $Nonce_{SN}$, and K_ASME (see
page 2, section 2.1, fourth item). $Nonce_{UE}$ is supposed
to be generated by UE and sent to MME via eNodeB in an
initial layer-3 message, whereas $Nonce_{SN}$ is generated
by MME (see e.g. Figure 1). The board agrees with the
decision under appeal that the sole difference between
the independent claims as granted and the disclosure of
D19 is that

i) the number used for deriving K_eNB at UE and MME
is an <u>NAS uplink sequence number</u> (rather than a
random number like $Nonce_{UE}$);

ii) the NAS uplink sequence number is indicated to
    MME in an <u>NAS service request</u> sent from UE to MME.

4.2.1   *Technical effect of features i) and ii)*

The board also accepts that the above distinguishing
features yield the technical effect that NAS-based key
security upon idle-to-active transitions is maintained
without the need for any feedback signal from MME, i.e.
from the network side, such as an "NAS service accept"
message or a downlink sequence number (see e.g.
paragraph [0011] of the opposed patent). Hence, the
board sees the objective technical problem to be solved
as "how to maintain replay protection in the 3GPP-based
network of D19, when no explicit feedback from the
network side is foreseen".

4.2.2   *Non-obviousness of the subject-matter claimed*

Firstly, the board concurs with the conclusion in the
appealed decision that the use of an NAS service
request constitutes a typical example of an "initial
layer-3 message" and hence cannot contribute to
inventive step.

Secondly, the board holds that the skilled person in
the field of 3GPP-based mobile communications would
also be aware that a message sequence number *could*, in
principle, be used as a nonce (see e.g. **HL4**, page 398,
item 3: *"To uniquely identify a message or sequence of
messages ..., nonces drawn from a monotonically
increasing sequence may be used ..."* and page 399,
section 10.12(ii), first sentence: *"A sequence
number ... is typically used to detect message
replay ..."*). In this regard, the appellant argued that
the claimed solution was obvious merely because the

possibility of using sequence numbers as a key
derivation parameter already existed at the patent's
effective filing date.

The board notes however that the decisive question is
rather whether the skilled person *would* indeed apply a
sequence number for uplink NAS messages as a nonce
generated by UE, i.e. Nonce$_{UE}$, in the system described
in D19. Put differently, the pivotal question for the
present inventive-step assessment is not whether a
nonce could under certain circumstances be a counter,
as the appellant repeatedly argued, but whether it
would be obvious that this nonce corresponds to a very
specific message sequence number, namely NAS_U_SEQ. In
this context, it is first apparent to the board that
D19 - despite expressly mentioning that encryption and
integrity protection relied *inter alia* on "counters or
sequence numbers" (see page 1, first paragraph, second
sentence) - fails to provide an explicit or implicit
indication as to the usability of such a sequence
number as Nonce$_{UE}$. On the contrary, it stresses that it
is desirable that counters are to be stored only on the
network side, i.e. at MME (see page 2, first paragraph,
second sentence).

Furthermore, when analysing Figure 1 of D19, the
skilled person would immediately discern that the main
feedback provided by MME is formed by a "security mode
command" message, which in turn carries the relevant
NAS security context parameters. Accordingly,
confronted with the above-identified objective problem,
the skilled person would be well aware - regardless of
whether or not the security mode command of D19 can be
equated with any "NAS service accept" message
whatsoever as quoted in the opposed patent - that, if
no security mode command is sent as feedback signal

from MME, no nonce (such as $Nonce_{SN}$) generated by MME
and required for deriving K_eNB could self-evidently be
sent from MME either. The board agrees with the
respondent that in such a situation the skilled person
would rather dispense with the second nonce (i.e.
$Nonce_{SN}$) produced by MME than resort to the use of a
counter associated with an uplink sequence number at
the user side. Thus, the skilled person would apply
only a single nonce, namely $Nonce_{UE}$, as an input
parameter for the generation of K_eNB, particularly
since using counters (for counting message sequence
numbers) is generally construed to be a more complex
solution and thus a technical drawback according to the
teaching of D19 (see e.g. page 1, last paragraph,
second sentence). In summary, the board concludes that
arriving at the derivation of K_eNB from an uplink
sequence number of NAS service request messages as
claimed would be possible only by extrapolating the
teaching of D19 with impermissible hindsight.

4.3   *Document D29 as closest prior art*

The disclosure of **D29** is directed to a more efficient
re-keying scheme proposed for 3GPP-based mobile
networks (LTE networks). In particular, it relies on
network-initiated updates of K_eNB to be derived at UE
and MME at least from a newly proposed key K_{MME} and a
counter value relating to downlink transmissions of NAS
messages, named "LSB_NAS_counter" (see page 2, last
paragraph). That counter is sent from MME to UE via
eNodeB in a security mode command message ("NAS SMC").
Contrary to the finding in the decision under appeal
(see reasons 2.3.4), the board agrees with the
appellant that D29 also teaches that an NAS service
request message is to be sent from UE to MME (see D29,
page 4, section entitled "Effect of proposal on Service

Request message", last sentence). In addition, according to D29, a counter for transmissions of uplink NAS messages, i.e. "LSB_NAS_counter (uplink)", is only sent in an NAS *response* message (see page 3, third full paragraph: *"The response part of the NAS SMC consists of the LSB_NAS_counter (uplink) and the NAS_MAC ..."*). Hence, the board takes the view that the independent claims as granted differ from the disclosure of D29 in that

   iii) the counter value used for deriving K_eNB at UE and MME is an NAS <u>uplink</u> sequence number (rather than an NAS *downlink* sequence number);
   iv) the NAS uplink sequence number is indicated to MME in an NAS <u>service request</u> message (rather than in an NAS SMC *response* message) sent from UE to MME.

4.3.1   *Technical effect of features iii) and iv)*

As regards the technical effect of those distinguishing features, the opposed patent (cf. paragraph [0007]) contains the following teaching in relation to the conventional 3GPP-based key generation scheme as depicted in Figure 5.3.4-1 on page 40 of **HL3** and in Figure 1 of the patent:

   "According to an exemplary known solution, the K_eNB is derived by the MME from the K_ASME and the NAS_D_SEQ used by the MME in the NAS SERVICE ACCEPT message, and the UE derives the same K_eNB by retrieving the sequence number, NAS_D_SEQ, from the NAS SERVICE ACCEPT message and performing the same K_eNB derivation as the MME ... However, a drawback with this known solution is that if no explicit NAS SERVICE ACCEPT message is defined from the MME to

> *the UE, as in the exemplary conventional EPS*
> *signalling flow in figure 1, it is not possible for*
> *the UE to derive the same K_eNB as the MME."*

The board concludes that the objective problem as
formulated in point 4.2.1 above still applies when
starting from D29 as closest prior art. A formulation
of the objective problem such as "how to provide an
efficient key exchange based on sequence numbers", as
invoked by the appellant at the oral proceedings before
the board, cannot be accepted since it evidently
includes a pointer towards its actual solution.

4.3.2 *Non-obviousness of the subject-matter claimed*

As to distinguishing feature iii), the appellant argued
that the following teaching of D29 provided a clear
hint towards using an uplink sequence number as an
input parameter for the subsequent derivation of K_eNB
(see page 4, sub-section "General", second paragraph;
emphasis added by the board):

> *"The proposed method also allows a simple method of*
> *a **UE initiated** key change, if such a case is*
> *desired in SAE/LTE. The UE would send a **message***
> *consisting of the KSI of its current K_{ASME} and*
> ***UE_nonce** to the MME and the MME can then*
> *initiated[sic] a security mode command to change*
> *the keys. It also provides a method of generating a*
> *new K_{eNB} from a K_{MME} during an eNode handover with*
> *an MME change."*

However, the appellant failed in the written and oral
proceedings to convincingly and cogently demonstrate
that

- a "UE-initiated key change" according to D29
  necessarily implies that a sequence number for
  uplink messages is sent for key derivation
  purposes from UE to MME;
- the sent "message" in D29 constituted an NAS
  service request message;
- the "UE_nonce" sent together with the KSI (Key
  Set Identifier) of K_ASME from UE to MME in that
  message had to include NAS_U_SEQ by analogy with
  the network-initiated case (where the sequence
  number for downlink messages, i.e. NAS_D_SEQ, is
  transferred and used for the derivation of
  K_eNB).

Instead, the board believes that the skilled person
would understand from the above passage in combination
with the overall teaching of D29 that a user-initiated
key change merely implies sending a first message
(whose equivalence with an NAS service request message,
in the absence of any further details about the type or
purpose of such a message, is mere speculation) from UE
to MME rather than from MME to UE upon an
idle-to-active transition, and that it is still the
network side (i.e. the MME) which has to initiate a
refresh of K_eNB via a security mode command (SMC)
message based on the relevant input parameters
NAS_D_SEQ and K_{MME}.

Concerning distinguishing feature iv), D29 teaches that
the service request message may contain a message
authentication code "NAS_MAC" for integrity protection
purposes and an "associated counter" (cf. page 4,
penultimate paragraph). However, the board subscribes
to the respondent's view that said associated counter
relates in fact to the current state of the counter for
NAS integrity protection rather than to a counter for

sequentially sent uplink NAS messages, i.e. NAS_U_SEQ
(see also appealed decision, reasons 2.3.5).

The appellant's further argument that the skilled
person would readily apply the transmission of
NAS_U_SEQ within NAS service request messages, if the
size constraints with regard to such messages according
to D29 (see e.g. sections entitled "Effect of proposal
on Service Request message" and "Conclusion") no longer
applied, must likewise fail. In fact, D29 merely
proposes to dispense with the transmission of the UE
security capabilities and the corresponding Key Set
Identifiers (KSIs) in order to comply with the
requirement of reduced message size (see in particular
the section entitled "Effect of proposal on Service
Request message", fourth and fifth paragraphs). In view
of the above, the board concludes that the skilled
person would in fact be dissuaded from applying the
claimed solution in the system of D29, especially given
that D29 likewise points out that the use of counters
is considered a complicated implementation measure
because it introduces possible error cases in keeping
them synchronised (see page 1, first paragraph, last
sentence).

4.4   In view of the analysis made in points 4.2 and 4.3
        above, the board holds that, even if the teachings of
        D19 and D29 were combined, the skilled person would not
        arrive at the solution claimed. Hence, in the light of
        the prior art cited and discussed, the subject-matter
        of the independent claims as granted is new and
        involves an inventive step within the meaning of
        Articles 54 and 56 EPC.

5.   In conclusion, since none of the opposition grounds
        invoked is found to prejudice the maintenance of the

patent as granted, the appeal has to be dismissed, and the present auxiliary claim requests need not be considered further.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

P. Martorana   A. Ritzka

Decision electronically authenticated