AO 120 (Rev. 08/10)

| TO: | Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|---|

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Eastern District of Texas on the following

☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:22-cv-282 | 7/25/2022 | Eastern District of Texas |

| PLAINTIFF | DEFENDANT |
|---|---|
| KONINKLIJKE KPN N.V. | TELEFONAKTIEBOLAGET LM ERICSSON and ERICSSON INC. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 7,092,705 | 8/15/2006 | KONINKLIJKE KPN N.V. |
| 2 | 8,660,560 | 2/25/2014 | KONINKLIJKE KPN N.V. |
| 3 | 8,886,772 | 11/11/2014 | KONINKLIJKE KPN N.V. |
| 4 | | | |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

**Copy 1—Upon initiation of action, mail this copy to Director** **Copy 3—Upon termination of action, mail this copy to Director**
**Copy 2—Upon filing document adding patent(s), mail this copy to Director** **Copy 4—Case file copy**



**Exhibit 1004**
**IPR2023-00583**
**U.S. Patent 7,092,705**

UNITED STATES PATENT AND TRADEMARK OFFICE

# CERTIFICATE OF CORRECTION



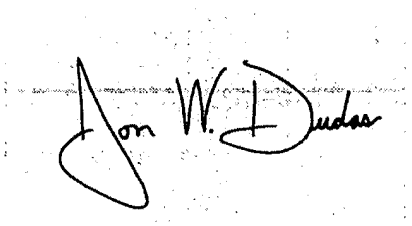
PATENT NO. : 7,092,705 B2
APPLICATION NO. : 10/188538
DATED : August 15, 2006
INVENTOR(S) : Joannes W.M. Oldenburg et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page under the Foreign Application Priority Data item [30] please delete "01203820" and insert --01203820.4-- in its place.

Signed and Sealed this

Third Day of April, 2007



JON W. DUDAS
*Director of the United States Patent and Trademark Office*

# MICHAELSON & ASSOCIATES

Peter L. Michaelson
*NJ, NY, PA, AK Bars*
*Arbitrator, Am. Arb. Assoc.*
*Fellow, Ch. Inst. Arb. (UK)*




February 12, 2007

Attention Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

A minor printing error has been discovered in the following United States patent. A completed form for a certificate of correction which lists and corrects the error is enclosed herewith.

U.S. Patent Number: **7,092,705**

Date Issued: **August 15, 2006**

Serial No.: **10/188,538**

Filed: **July 3, 2002**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc. No.: **PTT-119/APP(402706US)**

Inasmuch as the Applicants submit that the error was introduced through no fault of the Applicants, the Applicants believe that no fee is due for the certificate of correction.

In the event a fee is due, kindly charge that fee to deposit account number 13-3083. To facilitate that charge, a duplicate copy of this letter is enclosed herewith.

*email:*
*pmichaelson@mandw.com*

*web site:*
*www.mandw.com*

NJ Office (Reply to):
P.O. Box 8489
Red Bank, NJ 07701-8489 US
Tel: 732-542-7800
Fax: 732-542-7858

Physical Address:
Revmont Park, South Bldg.
1161 Broad St., Suite 118
Shrewsbury, NJ 07702 US

Office also in:
Santa Clara, California

Certificate
FEB 20 2007
of Correction



FEB 21 2007

USPTO IAP16
FEB 15 2007
PATENT & TRADEMARK OFFICE

Respectfully submitted,

Peter L. Michaelson
Reg. No. 30,090
Customer No. 007265

**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **February 13, 2007** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature

30,090
Reg. No.

(PTT119CERTCORRTRANSM021307/dmd/sitka)

FEB 21 2007

OIPE MP16
FEB 15 2007
PATENT & TRADEMARK OFFICE

# MICHAELSON & ASSOCIATES

Peter L. Michaelson
*NJ, NY, PA, AK Bars*
*Arbitrator, Am. Arb. Assoc.*
*Fellow, Ch. Inst. Arb. (UK)*

February 12, 2007

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*email:*
*pmichaelson@mandw.com*

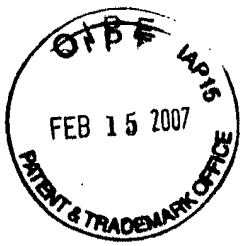
*web site:*
*www.mandw.com*

NJ Office (Reply to):
P.O. Box 8489
Red Bank, NJ 07701-8489 US
Tel: 732-542-7800
Fax: 732-542-7858

Physical Address:
Revmont Park, South Bldg.
1161 Broad St., Suite 118
Shrewsbury, NJ 07702 US

Office also in:
Santa Clara, California

FEB 21 2007




Respectfully submitted,

Peter L. Michaelson
Reg. No. 30,090
Customer No. 007265

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Signature

30,090
Reg. No.

(PTT119CERTCORRTRANSM021307/dmd/sitka)

FEB 21 2007

PTO/SB/44 (04-05)
Approved for use through 04/30/2007. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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(Also Form PTO-1050)

# UNITED STATES PATENT AND TRADEMARK OFFICE
## CERTIFICATE OF CORRECTION



PATENT NO. : 7,092,705

APPLICATION NO.: 10/188,538

ISSUE DATE : August 15, 2006

INVENTOR(S) : Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Under the Foreign Application Priority Data please delete [01203820] and insert --01203820.4-- in its place.

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Michaelson & Associates
P.O. Box 8489
Red Bank, NJ 07701-8489

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

FEB 21 2007

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
**or Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

007265 7590 04/03/2006

MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701




Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| | |
|---|---|
| Peter L. Michaelson | (Depositor's name) |
| [signature] | (Signature) |
| June 26, 2006 | (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP (402706US/1) | 8186 |

TITLE OF INVENTION: SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS

| APPLN. TYPE | SMALL ENTITY | ISSUE FEE | PUBLICATION FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|
| nonprovisional | NO | $1400 | $300 | $1700 | 07/03/2006 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| NGUYEN, LEE | 2618 | 455-423000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Michaelson & Associates
2 Peter L. Michaelson
3 Alberta A. Vitale

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Koninklijke KPN N.V.
(B) RESIDENCE: (CITY and STATE OR COUNTRY): Groningen, the Netherlands

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☑ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:
☑ Issue Fee
☑ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s):
☑ A check in the amount of the fee(s) is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☑ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 13-3083 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature [signature] Date June 23, 2006

Typed or printed name Peter L. Michaelson Registration No. 30,090

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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07/03/2006 HDEMESS2 00000004 10188538
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01 FC:1501
02 FC:1504

# MICHAELSON & ASSOCIATES

Peter L. Michaelson
*NJ, NY, PA, AK Bars*
*Arbitrator, Am. Arb. Assoc.*
*Fellow, Ch. Inst. Arb. (UK)*




June 23, 2006

Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In connection with the following utility patent application, we have enclosed herewith form PTOL-85 (in duplicate) and our check in the amount of **$ 1,700.00** ($1,400 for the issue fee due and $300 for the publication fee).

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDDAL**

Atty. Doc.: **PTT-119/APP(402706US)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2618** Confirmation No.: **8186**

Examiner: **Lee Nguyen**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Respectfully submitted,

Peter L. Michaelson, Attorney
Reg. No. 30,090
Customer No. 007265

**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **June 26, 2006** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to Mail Stop ISSUE FEE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature 30,090
Reg. No.

(PTT119ISSUELTR(062306)/ca:Sitka)

*email:*
*pmichaelson@mandw.com*

*web site:*
*www.mandw.com*

NJ Office (Reply to):
P.O. Box 8489
Red Bank, NJ 07701-8489 US
Tel: 732-542-7800
Fax: 732-542-7858

Physical Address:
Revmont Park, South Bldg.
1161 Broad St., Suite 118
Shrewsbury, NJ 07702 US

Office also in:
Santa Clara, California

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes Willem Maria OLDENBURG, Pierre ARNOLD, Hermann Petrus BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: Filed:

Group Art Unit:

Examiner:

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Commissioner for Patents
**Box Patent Application**
Washington, D. C. 20231

S I R:

**PRELIMINARY AMENDMENT**

Please amend the above-identified patent application which is simultaneously filed herewith, as follows:

IN THE SPECIFICATION-

To facilitate entry of the following changes, the Applicants have submitted herewith marked-up pages of their specification which depict all the following changes along with substitute pages that incorporate these changes.

Map 5-16-06

Page 1, line 13 Insert the following heading and paragraph:

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

007265 7590 04/03/2006

MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701

| EXAMINER | |
|---|---|
| NGUYEN, LEE | |
| ART UNIT | PAPER NUMBER |
| 2618 | |

DATE MAILED: 04/03/2006

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP (402706US/1) | 8186 |

TITLE OF INVENTION: SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS

| APPLN. TYPE | SMALL ENTITY | ISSUE FEE | PUBLICATION FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|
| nonprovisional | NO | $1400 | $300 | $1700 | 07/03/2006 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**



PTOL-85 (Rev. 01/06) Approved for use through 04/30/2007.

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**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

007265 7590 04/03/2006

MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP (402706US/1) | 8186 |

TITLE OF INVENTION: SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS

| APPLN. TYPE | SMALL ENTITY | ISSUE FEE | PUBLICATION FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|
| nonprovisional | NO | $1400 | $300 | $1700 | 07/03/2006 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| NGUYEN, LEE | 2618 | 455-423000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are enclosed:
- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
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- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP (402706US/1) | 8186 |

007265 7590 04/03/2006

MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701

| EXAMINER | |
|---|---|
| NGUYEN, LEE | |
| ART UNIT | PAPER NUMBER |
| 2618 | |

DATE MAILED: 04/03/2006

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 491 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 491 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.



PTOL-85 (Rev. 01/06) Approved for use through 04/30/2007.

| Notice of Allowability | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/188,538 | OLDENBURG ET AL. | |
| | Examiner | Art Unit | |
| | LEE NGUYEN | 2682 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *amendment filed 12/29/2005*.

2. ☒ The allowed claim(s) is/are *34-65*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

LEE NGUYEN
PRIMARY EXAMINER

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
Washington, DC 20231
www.uspto.gov

Bib Data Sheet

CONFIRMATION NO. 8186

| SERIAL NUMBER | FILING DATE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002<br>RULE | 455 | 2681 | PTT-119/APP<br>(402706US/1) |

**APPLICANTS**

Joannes Willem Maria Oldenburg, Delft, NETHERLANDS;
Pierre Arnold, Rotterdam, NETHERLANDS;
Hermann Petrus Breurken, Harkstede, NETHERLANDS;
Gijsbert Van Veenendaal, Ede, NETHERLANDS;

** CONTINUING DATA ********** Yes RW

This appln claims benefit of 60/303,933 07/09/2001

** FOREIGN APPLICATIONS ********** Yes RW

EUROPEAN PATENT OFFICE (EPO) 01203820.4 10/09/2001

**IF REQUIRED, FOREIGN FILING LICENSE GRANTED**

** 08/08/2002

| Foreign Priority claimed | STATE OR COUNTRY | SHEETS DRAWING | TOTAL CLAIMS | INDEPENDENT CLAIMS |
|---|---|---|---|---|
| ☑ yes ☐ no | NETHERLANDS | 7 | 33 | 6 |

35 USC 119 (a-d) conditions met: ☑ yes ☐ no ☑ Met after Allowance

Verified and Acknowledged: Examiner's Signature _____ Initials

**ADDRESS**

007265

**TITLE**

System and method for checking parameter settings of radio networks

| FILING FEE RECEIVED | FEES: Authority has been given in Paper |
|---|---|
| 1356 | No. _____ to charge/credit DEPOSIT ACCOUNT<br>No. _____ for following: |

- ☐ All Fees
- ☐ 1.16 Fees ( Filing )
- ☐ 1.17 Fees ( Processing Ext. of time )
- ☐ 1.18 Fees ( Issue )
- ☐ Other _____
- ☐ Credit

| Issue Classification | Application/Control No. | Applicant(s)/Patent under Reexamination | |
|---|---|---|---|
| | 10/188,538 | OLDENBURG ET AL. | |
| | Examiner | Art Unit | |
| | LEE NGUYEN | 2682 | |

# ISSUE CLASSIFICATION

| ORIGINAL | | CROSS REFERENCE(S) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CLASS | SUBCLASS | CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | | |
| 455 | 423 | 455 | 67.11 | | | | | |
| INTERNATIONAL CLASSIFICATION | | | | | | | | |
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(Assistant Examiner) (Date)

Denise Hopkins 3/20/06
(Legal Instruments Examiner) (Date)

LEE NGUYEN
PRIMARY EXAMINER
(Primary Examiner) 3/17/06 (Date)

**Total Claims Allowed: 32**

| O.G. Print Claim(s) | O.G. Print Fig. |
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| 1 | 2 |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
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## Search Notes

| Application/Control No. | Applicant(s)/Patent under Reexamination | |
|---|---|---|
| 10/188,538 | OLDENBURG ET AL. | |
| **Examiner** | **Art Unit** | |
| LEE NGUYEN | 2682 | |

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| Class | Subclass | Date | Examiner |
| 455 | 422 | 8/8/2005 | LN |
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| SEARCH NOTES (INCLUDING SEARCH STRATEGY) | | |
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# Index of Claims

| Application/Control No. | Applicant(s)/Patent under Reexamination |
|---|---|
| 10/188,538 | OLDENBURG ET AL. |
| **Examiner** | **Art Unit** |
| LEE NGUYEN | 2682 |

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# EAST Search History

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 0 | (parameter and modif$5 and verif$4 and (radio or cellular or wireless) and rule and result and deviation and deduc$3 and stor$3).clm. | US-PGPUB | OR | ON | 2006/03/12 13:35 |




IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2683** Confirmation No.: **8186**

Examiner: **NGUYEN, QUYEN VAN**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S I R:

I believe that **no additional claim fee** is required for the accompanying amendment. My belief is based upon the following calculations:

| | Independent | Total claims |
|---|---|---|
| Claims now pending | 5 | 32 |
| Less: Highest number of claims previously paid for | 6 | 33 |

Fee due: -00- x $200.00 + -00- x $50.00 = $ -00-

Fee for newly added multiple dependent claims $ -00-

Reduction in claim fee due to small entity - $ -00-

Total fee due $ -00-

In the event I am mistaken and a fee is due, kindly charge that fee to my deposit account number 13-3083. To facilitate that charge, a duplicate copy of this letter is enclosed herewith.

Respectfully submitted,

December 19, 2005

Peter L. Michaelson, Attorney
Reg. No. 30,090
Customer No. 007265
(732) 530-6671

MICHAELSON & ASSOCIATES
Counselors at Law
Parkway 109 Office Center
328 Newman Springs Road
P.O. Box 8489
Red Bank, New Jersey 07701

**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **December 20, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to the Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature

30,090
Reg. No.

(PTT119NOFEELTR/ca:164)




IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2683** Confirmation No.: **8186**

Examiner: **NGUYEN, QUYEN VAN**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S I R:

**AMENDMENT**

In response to the Office Action mailed August 12, 2005 (Paper No./Mail Date 08082005), please amend the above-identified patent application as follows:

Amendments to the specification begin on page 3 of this paper.

Amendments to the claims are reflected in the listing of claims which begins on page 14 of this paper.

Amendments to the abstract are reflected on page 7 of this paper and are shown in the accompanying new Abstract sheet which is attached to this amendment.

Remarks/Arguments begin on page 22 of this paper.

Amendments to the Specification:

Please replace paragraph on page 1, line 5 with the following amended paragraph:

The invention relates to a method and system for checking parameter settings of a radio network. More specifically, the invention relates to a method and system for checking various parameters of components of ~~a~~ cellular radio networks on the basis of business rules.

Please replace paragraph on page 1, line 13 with the following amended paragraph:

Fig. 1 shows a schematic representation of a contemporary cellular network 1. The architecture of these cellular networks comprises a network subsystem 2, a base station subsystem 3 and a mobile station 4. Examples of these cellular networks are GSM and DCS and extensions of these networks such as GPRS, UMTS etc. The network subsystems main component involves the mobile switching centre 20 (MSC) providing the interface of the cellular network and ~~wire bound~~ wire-bound networks 5 (PSTN, ISDN, ADSL etc.) as well as roaming and call-routing facilities (Home Location Register 21, Visitor Location Register 22, Equipment Identity Register 23 and Authentication Centre 24).

Please replace paragraph on page 2, line 9 with the following amended paragraph:

As the complexity of cellular networks increases, flexible operation of these networks becomes more difficult. Configuration and reconfiguration of a cellular network is complex since the parameter settings of the different components of the cellular radio network affect each other. United States Patent 5,434,798 of Ericsson describes a reconfiguration method and apparatus in which the cell parameters of particular mobile switching centres in a network are copied to a database, and the copied parameters are stored. A set of proposed changes to the stored parameters ~~are~~ is prepared and the consistency of the prepared set of proposed changes is verified. Alterations to the set of proposed changes responsive to the verification are made and the verified set of proposed changes ~~are~~ is copied to the concerned mobile switching centres. The verified set of proposed changes is then introduced into the network. An up-to-date image of the cell parameters in the mobile switching centres in the network is maintained in a system parameter database.

Please replace paragraph on page 2, line 30 through page 3, line 17 with the following amended paragraph:

Typically, a cellular radio network comprises several MSCs and a larger number of base stations. Operation of such cellular radio networks requires a high

degree of flexibility in the sense that configuration and reconfiguration of the cellular network has to be possible within a limited period of time and with a high degree of accuracy. Such a reconfiguration of a radio network can be permanent or ~~temporarily~~ temporary. Reasons for such a reconfiguration are numerous, e.g. a temporary cell split needed to deal with an expected increase in traffic due to an event or the permanent integration of new elements both affecting the settings of already existing elements in the radio network. Therefore, sophisticated methods and systems are required that ~~administrate~~ administer the parameter settings of the various components, e.g. the BTS or BSC, of the cellular radio network and change the parameter settings of ~~said~~ those components. Examples of parameters that can be changed include cell type, cell designation, cell direction, signal strength, signal to noise ratio, etc. Moreover, means have to be provided in order to check the consistency of the proposed parameter changes before the changes are implemented in the cellular network.

Please replace paragraph on page 3, line 22 with the following amended paragraph:

More particularly, an improvement relates to the hierarchical levels that can be checked. The method of the '798 patent checks the consistency of the proposed parameters only with regard to cells and handovers. Thus, only a very limited part of the network hierarchy is checked, resulting in a less reliable and efficient control of the radio network.

Please replace paragraph on page 3, line 29 through page 4, line 5 with the following amended paragraph:

Another problem of the method described in the '798 patent relates to the type of rules used in performing the consistency check. The rules used in performing this check originate solely from technical requirements derived from cellular network technology. There is no possibility to apply rules derived from operational practice as well. Moreover, it is not possible to deviate from the technically sufficient parameter setting requirements if operational practice experience reveals a different more preferable technical parameter setting.

Please replace paragraph on page 4, line 6 with the following amended paragraph:

Still another problem of the method described in the '798 patent is that, in performing the consistency check, only pre-programmed rules are used. This limitation decreases the flexibility of the system for the operator that exploits a cellular radio network. It may be that such an operator is not satisfied with the requirements for the various parameters defined by the supplier of the network. The operator may want to define the requirements, including the technical requirements, himself.

Please replace paragraph on page 4, line 23 with the following amended paragraph:

It is an object of the invention to be able to verify the proposed changes in the parameter settings in all hierarchical levels of the radio network and of substantially every, i.e. any desired, relationship between parameters in the same or different hierarchical level of the radio network. By enabling verification on every hierarchical level, the control and reliability of the network is significantly improved if changes in the parameter setting are to be implemented.

Please replace paragraph on page 4, line 32 through page 5, line 7 with the following amended paragraph:

It is another object of the invention to enable the use of rules developed from operational practice in the verification of the parameter settings in one or more of the levels of the network hierarchy and relationship between elements in the cellular radio network. Hereafter, the rules used to verify the parameter settings will be referred to as business rules. These business rules comprise rules ~~relate~~ related to technically preferable requirements as well as rules derived from operational practice.

Please replace paragraph on page 5, line 8 with the following amended paragraph:

It is still another object of the invention to enable the use of programmable rules in the verification of the proposed changes of the parameter settings in one or more hierarchical levels and relationship of elements in the radio system. These rules may preferably be programmed by the operator of the radio network or at least being ordered or influenced by the operator of the radio network. Moreover, also the error messages, if the rules are not obeyed, may be operator-programmable.

Please replace paragraph on page 6, line 6 with the following amended paragraph:

A radio network 1, as schematically shown in figure 1 may be represented alternatively by a network hierarchy 11,12 comprising different levels. These levels correspond to physical as well as non-physical parts of radio network 1. The hierarchies 11,12 may differ in their representation between several commercial suppliers of these kinds of radio networks 1. As an example, figure 2 shows the network hierarchies of Ericsson 11 and Nokia 12 radio networks 1. It can be observed that the Ericsson and Nokia hierarchies 11 and 12 differ in some aspects, but are equivalent in other aspects.

Please replace paragraph on page 6, line 17 with the following amended paragraph:

The Ericsson hierarchy 11 comprises a MSC level 20. The MSC 20 is coupled to a transcoder 32 (TRC) and a BSC/TRC 33. The next level comprises the BSC 30. This BSC 30 may be linked to the TRC 32 or the BSC/TRC 33. In the case that a GPRS radio network should be represented an additional element, Service GPRS Support Node 34 (SGSN) is introduced. The SGSN 34 may comprise different hierarchical levels itself. Next, the Ericsson hierarchy 11 shows a Radio Base System 35 (RBS) level. The RBS may be linked to a BSC 30 or a BSC/TRC 33. Afterwards, a handover 36 (HO) and the BTS 31 are shown. Finally, the Ericsson hierarchy 11 exhibits a transceiver level 37 (TRX) and a channel level 38 (CH).

Please replace paragraph on page 6, line 30 through page 7, line 3 with the following amended paragraph:

The Nokia hierarchy 12 differs from the Ericsson hierarchy in some aspects. ~~Firstly~~ First, the TRC 32 and BSC/TRC 33 level are replaced by an Operational Maintenance Centre 25 (OMC). Moreover, whereas the Ericsson hierarchy 11 contains TRC and BSC/TRC levels, the Nokia hierarchy implements the OMC-level 25. The Ericsson hierarchy 11 and the Nokia hierarchy 12 are equivalent below the RBS 35 and the BCF 39 respectively.

Please replace paragraph on page 7, line 9 with the following amended paragraph:

It is one of the objects of the invention to provide a method and system to handle the parameter settings in these kinds of hierarchies. More specifically, a method and system are provided to supply operators of cellular radio networks with a control facility on each and every hierarchical level and on relationships between elements of the radio network before changes in the parameter settings are implemented into the network.

Please replace paragraph on page 8, line 16 with the following amended paragraph:

The method and system according to an aspect of the invention relate to the management and control of the various parameters in a cellular radio network. Therefore, the various parameters and/or values can be stored in a database, indicated by 62 in figure 3. This database might be a commercially available database such as MS Access or Oracle. The method and system according to an aspect of the invention for storing the parameters and/or values uses a technique which will be referred to as the compressed row technique. One of the advantages of this technique is a simplification of manipulating data within a given database. Furthermore, this technique limits the number of records to an acceptable level and new parameters may be

added easily. Also, differences between sets of parameters can be obtained quickly by comparison between the relevant strings instead of comparing individual parameters.

Please replace paragraph on page 8, line 33 through page 9, line 6 with the following amended paragraph:

Basically, the compressed row technique involves a convenient database which is linked to a descriptive database. Therefore, a database applying compressed row techniques contains at least two separate parts. The first part may store the real data as strings; the second part may contain the descriptive information needed to process the real data from the first part. The second part will be referred to as the repository.

Please replace paragraph on page 9, line 7 with the following amended paragraph:

A preferable mechanism to apply the compressed row technique comprises the following steps. For every hierarchical level of the radio network 1, a parameter table is formed in the database 62. In this parameter table, all the parameters of all elements in the radio network of that hierarchical level are stored. For each element, the parameters are divided into parameter groups, each parameter group containing a string (compressed row) storing multiple parameters that may be divided by semi-colons. Each group of parameters has a number assigned to

it that indicates the nature of the group. Finally, each group of parameters includes an identifier corresponding to the element. In the repository table for each parameter, the group and the field within that group for that parameter ~~is~~ are stored. To find the relevant element corresponding to an element identifier a hierarchy table is used. Various level-tables link the element identifiers to the parameter strings.

Please replace paragraph on page 10, line 6 with the following amended paragraph:

The example above is a simplified case. There are values of parameters that cannot be obtained in this direct way, but have to be obtained indirectly by means of a translate table. In that case, the parameter has a translate identifier in the repository. By means of a field identifier, uniquely defining the parameter, the value of the parameter can be obtained from the translate table.

Please replace paragraph on page 10, line 13 with the following amended paragraph:

The business rule checker 70 performs a control function before parameters and/or values are implemented in the cellular radio network. In most cases, there is an inter-dependency of the various parameters and values of parameters and therefore checking of new and ~~modulated~~ mutated parameters and values before implementation in the network is preferable. However, not only the bare technical

sufficient requirements set for the various parameters should be checked. Since contemporary cellular radio networks have reached a considerable amount of complexity, several other non-technical requirements, as, e.g., administrative data should preferably be checked as well. As e.g. the operators administration indicates all cells for 900 MHz GSM with a cell_id starting with #1 and all cells for 1800 MHz DCS with cell_id starting with #6, these requirements should be part of the business rule check as well before configuration or reconfiguration of the network takes place.

Please replace paragraph on page 10, line 31 through page 11, line 11 with the following amended paragraph:

Moreover, it is preferable that the bare ~~technical~~ technically sufficient requirements can be altered according to rules obtained from daily operational use of the radio network. It can, e.g., be technically sufficient to have a channel distance of 20 Hz between different cells. All channel distances above this value then will pass the bcc/bcch consistency check. However, in practice it may be that a channel difference of 50 Hz between the cells guarantees a more reliable operation. In that case, according to the invention, it is possible to use the preferred channel distance of 50 Hz as obtained from the operational practice as a business rule instead of

the technically sufficient channel distance. Such a technical requirement will hereinafter be referred to as a preferred technical requirement.

Please replace paragraph on page 11, line 17 through page 12, line 27 with the following amended paragraph:

Figures 4A and 4B show a flow chart to illustrate schematically the application of business rules to parameter changes for the radio network 1 as proposed by the user 69. In the first step 81, a parameter group that is changed in mut 65 is read. Next, the hierarchical level is determined from this parameter group at 82 and subsequently the parameter is found at 83. For this parameter, it may be that no business rule has been defined or programmed. In that case 84, the parameter is put directly into the ref part 64 of database 62 and is ready to be implemented in the radio network 1. If a business rule does exist for the particular parameter, that business rule is read at 85. It is checked whether the parameter does obey the business rule. If the parameter does not obey the business rule an error list is generated and the parameter and corresponding value are put on that list at 86. If the parameter does obey ~~to~~ the business rule defined or programmed for that parameter, the next step is to find out whether other parameters have been changed that belong to the parameter group under consideration. These parameters may run through the same series of steps as described above. If all the changed parameters have been

put to the business rule test as described above, it is determined whether other parameter groups have been changed as well. The same series of steps as described above may be applied to the parameters belonging to that parameter group. Finally if all the parameter groups have been checked, the business rule checker 70 stops at step 87. As a result of the business rule checking process, the parameters that obey the business rules defined or programmed for them are put in the ref part 64 of the database 62 at step 88 and are ready to be implemented in the radio network 1. If the parameters or values do not obey the business rules, the parameters and corresponding values appear on the generated error list and after finalization of the business rule checking of all the parameter groups this error list is put to the user. The user then has to correct the parameters, as shown at step 89. The corrected parameters or values then can be put to the ref part 64 of database 62 as well. Now the complete set of parameters and corresponding values does obey the business rules and is ready to be implemented to the cellular radio network 1. Although in figures 4A and B only individual parameters are checked whether or not they obey a business rule, also relations of parameters can be checked on a business rule (see, e.g., figure 6A as discussed below).

Please replace paragraph on page 13, line 7 with the following amended paragraph:

The state of a business rule establishes whether that business rule is taken into consideration when the business rule checking is performed. It is not necessary that all the business rules have to be checked in a particular configuration or reconfiguration project with regard to the radio network. It may be up to the user to select the business rules he wants to apply. However, it may, be that some business rules have to be checked at all times and therefore cannot be put aside by the user. Business rules can, e.g., be applied by running a main script calling the separate business rule modules selected by the user or imposed by the system.

Please replace paragraph on page 13, line 19 with the following amended paragraph:

The iteration level relates to the hierarchical level of the elements of the cellular radio network to be checked. Generally, if the business rule is defined or programmed for another element at the same or a higher hierarchical ~~level the~~ level, then the iteration level will be higher than the highest of the hierarchical levels of all the elements involved for that specific business rule. An example of such a business rule is shown in figure 5 and 6B as module bts013.br. If the business rule is defined for the element internally, the iteration level and the hierarchical level are the same. An example of such a

business rule is shown in figure 5 and 6A as module bcf002.br.

Please replace paragraph on page 14, line 16 with the following amended paragraph:

Figures 6A-D show a few examples of business rule modules that are also mentioned in the table of figure 5. Figure 6A shows the script of the business rule module bcf002.br, which is a business rule of the administrative kind as mentioned previously. It checks whether the requirement that a BCF 29 of type DE21 has more than 3 BTSs 31 connected according to, e.g., the Nokia hierarchy 12 of figure 2. If it does, a blocking message appears on the error list indicating to the user 69 that that particular BCF does have more than 3 BTSs.

Please replace paragraph on page 14, line 31 through page 15, line 5 with the following amended paragraph:

Figure 6C shows the script of the business rule module bts015.br, which is a business rule of the technical kind, as mentioned above. This module checks the number of TRXs for each ~~LABD link~~LABD link. A LABD link basically represents a direct or indirect physical link between two or more BSCs. For a bit rate of 16 respectively 64 a maximum of 12 respectively 10 TRXs is allowed for each LABD link. If this requirement is not obeyed, a blocking message appears on the error list.

Please replace paragraph on page 15, line 30 through page 16, line 5 with the following amended paragraph:

Another modification may be that proposals can be stored instead of being implemented immediately. This option is particularly relevant in the framework of more projects. Several projects can be identified, e.g., mass-updates involving future optimization of large numbers of parameters or the pre-integration of new network elements. More projects may be planned simultaneously based on the same set of data. In order to avoid conflicts between projects, it is possible to establish a 'frozen state' for a limited period.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-33 (canceled)

Claim 34 (new): A method for verifying a modified parameter obtained from changing an operational parameter of a component of a radio network, the method comprising the steps of:

before the modified parameter is implemented in the network, checking the modified parameter on the basis of a rule so as to yield a result, said rule comprising both a technically sufficient parameter setting requirement and a deviation from the setting requirement based on an operational requirement deduced from use of the radio network; and

if the result indicates that the rule has been obeyed, storing the modified parameter in the network such that subsequent network operation will respond to the modified parameter.

Claim 35 (new): The method recited in claim 34 wherein the checking step comprises the steps of:

copying the operational parameter from the radio network to a database; and

changing the operational parameter to the modified parameter.

Claim 36 (new): The method recited in claim 35 further comprising the step of generating a non-compliance signal if the modified parameter does not obey the operational requirement.

Claim 37 (new): The method recited in claim 35 further comprising the steps of:

storing the operational parameter in a first part of the database; and

storing the modified parameter in a second part of the database.

Claim 38 (new): The method recited in claim 37 wherein the first and second parts of the database are separate databases.

Claim 39 (new): The method recited in claim 34 further comprising the step of storing the operational parameter or the modified parameter in a database using a compressed row technique.

Claim 40 (new): The method recited in claim 35 wherein the database comprises a hierarchy table that stores and provides access to the operational parameter and the modified parameter.

Claim 41 (new): The method recited in claim 40 further comprising the step of using the hierarchy table in checking whether the modified parameter obeys the rule.

Claim 42 (new): The method recited in claim 34 wherein the modified parameter relates to a level of a GSM or DCS network hierarchy.

Claim 43 (new): The method recited in claim 42 wherein the GSM network hierarchy has multiple levels, the levels being MSC, OMC, BSC, BCF and/or BTS.

Claim 44 (new): The method recited in claim 42 wherein the GSM network hierarchy has multiple levels, the levels being TRX, HO and/or CH.

Claim 45 (new): The method recited in claim 34 wherein the modified parameter relates to a GPRS hierarchy.

Claim 46 (new): The method recited in claim 45 wherein the GPRS hierarchy has multiple levels, the levels being MSC, OMC, BSC, SGSN, BCF and/or BTS.

Claim 47 (new): The method recited in claim 45 wherein the GPRS hierarchy has multiple levels, the levels being TRX, HO and/or CH.

Claim 48 (new): The method recited in claim 42 wherein the modified parameter checking step comprises the step of applying the rule to a level of the GSM, DCS or GPRS

hierarchy so as to determine whether the rule has been obeyed.

Claim 49 (new): The method recited in claim 42 further comprising the step of checking relationships between different operational and/or modified parameters in the same or different hierarchical levels of the radio network.

Claim 50 (new): The method recited in claim 34 wherein the rule is programmed, ordered or influenced by an operator of the radio network.

Claim 51 (new): The method recited in claim 34 wherein the operational requirement comprises an administrative requirement.

Claim 52 (new): The method recited in claim 50 wherein the operational requirement comprises a technically preferable requirement programmed, ordered and/or influenced by the operator.

Claim 53 (new): The method recited in claim 36 wherein the non-compliance signal is a file or message displayed to an operator.

Claim 54 (new): The method recited in claim 36 wherein the non-compliance signal is programmable.

Claim 55 (new): A system for verifying a modified parameter obtained from changing an operational parameter of a component of a radio network, wherein the system comprises:

a rule checker which, before the modified parameter is implemented in the network, checks the modified parameter on the basis of a rule so as to yield a result, said rule comprising both a technically sufficient parameter setting requirement and a deviation from the setting requirement based on an operational requirement deduced from use of the radio network; and

a data transferrer which, if the result indicates that the rule has been obeyed, stores the modified parameter in the network such that subsequent network operation will respond to the modified parameter.

Claim 56 (new): The system recited in claim 55 further comprising:

a first part of a database for storing the operational parameter from the radio network; and

a second part of the database for storing the modified parameter.

Claim 57 (new): The system recited in claim 56 further comprising a signal generator which generates a non-compliance signal if the modified parameter does not obey the operational requirement.

Claim 58 (new): The system recited in claim 56 further comprising scripting means which define rules and/or error messages that are to be used by the rule checker.

Claim 59 (new): A radio network comprising a component having an operational parameter that can be changed to a modified parameter, the network comprising:

a rule checker which, before the modified parameter is implemented in the network, checks the modified parameter on the basis of a rule so as to yield a result, said rule comprising both a technically sufficient parameter setting requirement and a deviation from the setting requirement based on an operational requirement deduced from use of the radio network; and

a data transferrer which, if the result indicates that the rule has been obeyed, stores the modified parameter in the network such that subsequent network operation will respond to the modified parameter.

Claim 60 (new): The radio network recited in claim 59 wherein the operational parameter and the modified parameter relate to a level of a GSM, DCS or GPRS hierarchy of the radio network.

Claim 61 (new): A computer program recorded on a computer readable media and containing computer executable instructions for execution on a computer system, the program comprising software code portions for verifying a modified parameter obtained from changing an operational parameter of a component of a radio network, wherein the instructions when executed cause the computer to:

check, before the modified parameter is implemented in the network, the modified parameter on the basis of a rule

so as to yield a result, said rule comprising both a technically sufficient parameter setting requirement and a deviation from the setting requirement based on an operational requirement deduced from use of the radio network; and

if the result indicates that the rule has been obeyed, store the modified parameter in the network such that subsequent network operation will respond to the modified parameter.

Claim 62 (new): The computer program recited in claim 61 wherein the instructions, when executed, further cause the computer to:

copy the operational parameter from the radio network to a database; and

change the operational parameter to the modified parameter.

Claim 63 (new): The computer program recited in claim 61 wherein the operational parameter or the modified parameter is stored in a database using a compressed row technique.

Claim 64 (new): A data carrier having a computer program recorded thereon, the program containing computer executable instructions for execution on a computer system, the program comprising software code portions for verifying a modified parameter obtained from changing an operational parameter of a component of a radio network, wherein the instructions when executed cause the computer to:

check, before the modified parameter is implemented in the network, the modified parameter on the basis of a rule so as to yield a result, said rule comprising both a technically sufficient parameter setting requirement and a deviation from the setting requirement based on an operational requirement deduced from use of the radio network; and

if the result indicates that the rule has been obeyed, store the modified parameter in the network such that subsequent network operation will respond to the modified parameter.

Claim 65 (new): The data carrier recited in claim 64 wherein the instructions, when executed, further cause the computer system to:

copy the operational parameter from the radio network to a database; and

change the operational parameter to the modified parameter.

Amendments to the Abstract:

Delete the abstract, as it currently exists, and substitute the abstract provided on the separate sheet enclosed herewith.

**REMARKS**

In view of both the amendments presented above and the following discussion, the Applicants submit that all of the claims now pending in the application are directed to statutory subject matter under the provisions of 35 USC § 101. Further, the Applicants submit that none of these claims is anticipated under the provisions of 35 USC § 102 or obvious under the provisions of 35 USC § 103. Thus, the Applicants believe that all of these claims are now in allowable form.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, the Examiner should telephone Mr. Peter L. Michaelson, Esq. at (732) 530-6671 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Specification and abstract amendments

Various amendments have been made to the specification to correct minor inadvertent grammatical, punctuation and formal errors that remained in the specification. The Applicants have also corrected two minor formal errors in their abstract and have provided a replacement abstract.

Drawings

The Applicants have noticed a minor inadvertent error in Fig 4B. Specifically, to conform this figure to the specification at page 12, lines 18-20, block 85 should be numbered as block 89. Accordingly, the Applicants have enclosed a red-lined drawing sheet showing their proposed correction, and, to expedite prosecution, a corrected formal drawing sheet which incorporates this correction. The Applicants now solicit the Examiner's approval of this correction.

Status of claims

To simplify entry of the claim amendments -- in light of the number of separate changes that would otherwise have needed to be made to the claims, the Applicants, rather than re-writing their claims to depict all these changes, have simply canceled their existing claims 1-32 (claim 33 being previously canceled) and replaced them with new claims 34-65.

Each of new claims 34-65 corresponds on a 1:1 basis with a corresponding one of prior claims 1-32, respectively, specifically claim 34 corresponds with prior claim 1, claim 35 corresponds with prior claim 2, and so forth, as indicated in the following table.

| Prior | New | Prior | New | Prior | New |
|---|---|---|---|---|---|
| 1 | 34 | 13 | 46 | 25 | 58 |
| 2 | 35 | 14 | 47 | 26 | 59 |
| 3 | 36 | 15 | 48 | 27 | 60 |
| 4 | 37 | 16 | 49 | 28 | 61 |
| 5 | 38 | 17 | 50 | 29 | 62 |
| 6 | 39 | 18 | 51 | 30 | 63 |
| 7 | 40 | 19 | 52 | 31 | 64 |
| 8 | 41 | 20 | 53 | 32 | 65 |
| 9 | 42 | 21 | 54 | | |
| 10 | 43 | 22 | 55 | | |
| 11 | 44 | 23 | 56 | | |
| 12 | 45 | 24 | 57 | | |

The new claims more precisely define the present invention and also more closely conform to proper US claim practice and idiomatic usage than did the prior claims.

Rejections

A. Rejection under 35 USC § 101

The Examiner has rejected claims 1-32 under the provisions of 35 USC § 101 as reciting non-statutory subject matter.

In particular, the Examiner takes the view that the prior claims merely recited data gathering without reciting either pre- or post-computer process activity.

In response, the Applicants, to expedite prosecution, now present new independent claims 34, 55, 59, 61 and 64 (which correspond to prior independent claims 1, 22, 26, 28 and 31). None of these new claims merely recites data gathering. Specifically, new method claim 34 recites two steps: (a) the first of which checks a modified parameter (which will possibly be used in a component of a radio network) on the basis of a rule, with the rule comprising two components: a technically sufficient parameter setting and a deviation from that setting deduced from operational use of the network; and (b) if the modified parameter satisfies the rule, then that parameter is stored in the network so the parameter will govern subsequent operation of the network.

As is plainly evident, these steps are an integral part of the operation of a radio network and specifically in directing proper operation of that network, i.e., checking parameters that are proposed for use in governing subsequent operation of the network and, if those parameters meet certain rules, then storing those parameters in the network such that network operation will in fact actually be governed (transformed) by those parameters. Because these parameters as expressly recited in the claim transform a physical manifestation, i.e., operation of a radio network, the two steps in this claim do not recite data gathering.

Accordingly, method claim 34 recites statutory subject matter under the provisions of 35 USC § 101.

Parallel limitations to those appearing in claim 34 exist in each of the Applicants' other independent claims, to wit 55, 59, 61 and 64, though couched in a form suitable for an apparatus, computer program or data carrier claim.

Inasmuch as all the independent claims recite statutory subject matter, then all the dependent claims (35-54, 56-58, 60, 62-63 and 65), which incorporate the provisions of their corresponding independent claims, recite statutory subject matter for the same exact reason as set forth above.

Thus, the Applicants submit that all their pending claims comply with the provisions of 35 USC § 101 and are patentable there under.

B. Rejection under 35 USC § 102

The Examiner rejected prior independent claim 29 under the provisions of 35 USC § 102(b) as being anticipated by the teachings of the Madebrink et al patent (United States patent 5,434,798 issued to M. B. K. Madebrink et al on July 18, 1995).

Upon review, claim 29 should have been formulated to depend from claim 28 rather than having been independent. Claim 28 has not been rejected as anticipated by the Madebrink et al patent. New claim 62, which

corresponds to and contains similar recitations to claim 29, now depends from claim 61, which itself corresponds to and contains similar limitations as did claim 28.

Hence, by virtue of the present dependency of corresponding claim 62 on a corresponding claim to one that has not been rejected as anticipated, this rejection under 35 USC § 102 is now moot.

C. Rejections under 35 USC § 103

1. Claims 1-5, 7-8, 17-24, 26, 28 and 31-32 -- Madebrink in view of Djoko et al

The Examiner has rejected claims 1-5, 7-8, 17-24, 26, 28 and 31-32 under the provisions of 35 USC § 103 as being obvious over the Madebrink et al patent taken in view of the Djoko et al patent (United States patent 6,085,335 issued to S. Djoko et al on July 4, 2000). Inasmuch as all these claims have been canceled, this rejection is moot. Nevertheless, to expedite prosecution, this rejection will be discussed with respect to new corresponding claims 34-38, 40-41, 50-57, 59, 61 and 64-65 and principally, for the sake of brevity, new independent claim 34. In that context, this rejection is respectfully traversed.

The Examiner takes the position that the Madebrink et al patent discloses several elements recited

in prior claim 1. The Examiner concedes that this patent does not teach the concept of a "business rule comprising deviating from at least one technically sufficient parameter setting requirement." With that in mind, the Examiner turns to the Djoko et al patent which, the Examiner notes, discloses with reference to col. 3, lines 15-55 and col. 4, lines 48-58 and in an analogous art area, an operation of checking at least one modified parameter through use of a business rule that comprises rules regarding parameter assignments under different possible system conditions based on current operating data and current parameters of a communications system. Given these teachings, the Examiner concludes that it would have been obvious to one of ordinary skill in the art, at the time the present invention was made, to incorporate the teachings of the Djoko et al patent into the system taught by the Madebrink et al patent in order to optimize performance of that system by compensating for changing system conditions and hence, by doing so, arrive at the Applicant's invention as recited in claim 1. As the Examiner will shortly see, this conclusion is incorrect with respect to claim 34.

Generally speaking, the Madebrink et al patent teaches an approach for reconfiguring a cellular network. As discussed in col. 3, line 30 et seq and col. 4, line 20 et seq thereof, this approach involves several steps: copying network (here, cell) parameters of an affected portion of a communication network from the pertinent mobile switching centers (MSCs) into a database; preparing

proposed changes to those parameters either manually or automatically and then entering those changes into the database; verifying those changes for consistency with any necessary corrections then being made again either manually or automatically; and finally, copying those changes, once verified, into the corresponding MSCs such that those changes are introduced into the network in order to govern its ensuing operation. The proposed changes involve, e.g., as listed in col. 3, line 15-25:

(a) cell splitting and cell combining due to changes in traffic;

(b) cell reassignment to MSCs due to changes in the number of MSCs;

(c) temporary or permanent cell reassignments due to malfunctioning units, e.g., base stations or MSCs; and

(d) cell parameter changes due to engineering changes, e.g., changes in the frequency plan.

Such changes, as the Applicants view them and as discussed on page 3, line 29 - page 4, line 5 of their present specification, are solely technical in nature, i.e., they result from changes in the technical requirements of the network topology itself. None of these changes results from actual operational practice, i.e., where actual daily network operation "in the field" dictates a change in a network parameter. An example of an operationally induced change may involve varying inter-channel frequency spacing. As discussed in page 10, line 34 et seq, a 20 Hz inter-channel spacing may be technically sufficient and specified by an MSC

manufacturer; however, actual conditions in the field for a particular cellular MSC installation may dictate that enhanced reliability arises from using a 50 Hz spacing instead. Hence, for that installation, a 50 Hz spacing would be preferred over a technically sufficient 20 Hz spacing.

The Madebrink et al patent, being limited to handling pre-defined technical changes, is completely oblivious to any operationally-induced change. The Madebrink et al approach simply has no ability to alter any of the proposed changes, i.e., cause a deviation in any such change, based on actual field conditions. Furthermore, the changes which this approach can handle appear to be limited to those related to cells and handovers -- which only constitute a rather limited part of a cellular network and it hierarchy. In addition, while the Madebrink et al patent does teach, as discussed in col. 13, line 30 et seq and with specific reference to block 350 in FIG. 6, the use of rules in determining proposed changes to cells, these rules are known and solely mandated by predefined technical characteristics of the cellular network topology. As examples, the patentee points to one rule which mandates that the base station power level must correspond, via a known table, to a size of the cell. Another illustrative rule specifies that the "thresholds of neighboring cells must be such as to avoid handoff oscillation back and forth between two cells". See col. 13, lines 36-45. Neither of these rules, or any other such rule reasonably envisioned for use with the Madebrink

et al approach, accommodates any deviation to the parameter setting associated with that rule based on actual network operation. The rules, being predefined, are static: once they are formulated, they do not change. Consequently, while the Madebrink et al approach certainly aids in re-configuring a cellular network, that approach is rather limited and inflexible, thus yielding less reliable and less efficient network management than might otherwise arise.

While the Applicants' approach is also generally directed to the problem of reconfiguring a cellular network, their present inventive teachings extend far beyond the limited teachings in the Madebrink et al patent.

In particular, the Applicants recognize that a wide range of operational characteristics, in practice, may influence the settings of network parameters that govern the operation of various components of a cellular network.

In light of that recognition, the Applicants' present invention involves rules that not only include technically sufficient parameter settings but also deviations from those settings, as necessary. Such deviations are implemented, for each technical setting, by inclusion of an operational requirement there for and which has been deduced from actual network operation. Hence, each of the Applicants' rules involves two distinct components: a technically sufficient parameter setting which effectively provides a baseline parameter value, and

a deviation from that value where the extent of the deviation is deduced from actual network operation. Each proposed (modified) network parameter is then verified by checking it against its corresponding rule to determine whether a proposed change to that parameter is consistent with the rule and hence actual network operation, before that parameter is then stored within the network and used in governing subsequent network operation. Incorporating operationally deduced deviations into a rule set for verifying proposed network parameters, as the Applicants now teach, advantageously results in significantly improved network reliability and efficiency.

The Madebrink et al patent, as the Examiner acknowledges with respect to claim 1, fails to teach or even suggest such two-part rules.

As to the Djoko et al patent, a close scrutiny of this patent reveals that its teachings, while certainly relevant to self-configuration of a cellular network, are not directed to verifying network parameters -- as the Applicants' invention is -- but rather to producing new modified parameter settings themselves. Producing such new parameters occurs prior to verifying their settings. It the verification of existing parameter settings (i.e., those already in existence and operational use) to which the present invention, as claimed, is directed, not their initial production.

In particular, the Djoko et al patent addresses a self-engineering system for use in a communication system, such as a wireless network.

The patentee recognizes, in col. 2, line 11 et seq of this patent, that, with respect to a wireless communication system, assumptions made regarding customer and/or system behavior either do not constantly represent the system with sufficient accuracy or only do so for relatively short periods of time. Moreover, simulation models, which are used in setting network parameters, make assumptions that are idealized and consequently yield operating parameters that are not optimal for a specific system. As such, engineers continuously monitor actual operational changes and derive new network parameters that are intended to optimize system efficiency. But since such systems continually experience operational changes, such as in, e.g., call traffic, RF conditions, subscriber mobility, weather and other unexpected contingencies, continuous monitoring, simulation and tuning have proven to be virtually impossible to accomplish and quite expensive. Thus, in practice, fabricating a set of optimal network parameters has become extremely difficult to achieve. The patentee attempts to overcome this obstacle through use of a self-engineering system connected to the wireless communication system.

As discussed in col. 2, line 66 et seq, and broadly shown in FIG. 1 of this patent and discussed in the accompanying text in col. 5, line 41 et seq, the self-engineering system comprises data acquisition

module 104, self-engineering engine 106 and control module 108. The self-engineering system interacts with the communication system to alter network parameters used in the system.

In use, the data acquisition module interfaces with and collects information from the communication system that is pertinent to adjusting the operation of that system. This module may be distributed throughout the system and interact with various components of the system, or be centrally located. Based on current operating data and current operating parameters, as determined by the data acquisition module, the self-engineering module determines new operating parameters which are intended to improve and enhance operation of the system. The control system then receives the new operating parameters from the self-engineering module and implements those parameters within the network. As discussed in col. 6, line 41 et seq, the self-engineering module contains a core unit, which may be an expert system or a neural network, and an optional unit which is simulator. FIG. 4, as discussed in col. 10, line 9 et seq, shows one implementation of the self-engineering engine. Here, the engine contains expert system 402, fact library 404, knowledge base 406 and inference engine 408. The inference engine, given network configuration data and historical operating data both stored in the fact engine, and rules (specifically condition-action pairs) stored in knowledge base 406, produces, inter alia, proposed new operating parameters. Once these proposed new parameters are produced, they are

evaluated through simulator 408 prior to their being deemed "new operating" parameters suitable for actual network use. See also, col. 11, lines 41-47. As indicated in col. 13, line 29-34, the rules are used in setting initial values for various parameters. As field conditions change, the system automatically modifies affected new parameter values based on field data, i.e., operating data, and will then iteratively, through the simulator, evaluate merits of those new parameters. Once a stable set of new parameters is achieved, the results are implemented in the wireless system and set in place for re-evaluations by the self-engineering system. The effects of these parameters on field operation are then observed and used to calibrate both the simulator and the rules in the expert system.

As is clearly evident from FIG. 6 particularly blocks 606-614, as discussed in col. 11, lines 37-47, the rules are used, in conjunction with the knowledge base, to produce new operating parameters, but not verifying, checking or simulating any existing parameters. Specifically, block 612 expressly recites the operation of "SELECT NEW OPERATING PARAMETERS". This block is performed, as expressly stated in col. 11, lines 41-45:

> "If there is any rule left to be executed at step 610, operation proceeds to step 606. Otherwise, operation proceeds *to step 612 where new operating parameters are selected.*" [emphasis added]

Once all the new parameters are selected, then their use is evaluated, via block 614, through simulation by simulator 408:

> "Then, the communication system simulator 408 is executed to evaluate the proposed operation parameters at step 614."

Thereafter, via execution of block 620, these proposed, new and now simulated parameters, are implemented, via control module 108, in the communications system. Hence, simulation is only performed on the new parameters, and seemingly nothing else. Specific simulation functions are discussed in col. 14, line 57 - column 15, line 3.

Given this, it should be quite clear that the rule-based processing and simulation shown in FIG. 6 is not used for any parameters that have already been implemented in the communication system, i.e., existing parameters. However, not only will changed network operating conditions, oftentimes necessitate additional, i.e., new, network parameters, invariably such changes will affect certain existing parameters. These latter parameters too must be changed if the communication system, in light of these changed conditions, is to efficiently and reliably operate. Teaching that rule-based processing is just used to fabricate new parameters, without more, completely ignores the fact that some existing network parameters must also be changed as well. Thus, the approach taught by the

Djoko et al patent, while beneficial, is quite inadequate in practice as is it oblivious to any changes necessary to the existing network parameters already in service.

This glaring omission is a fundamental deficiency inherent in the Djoko et al patent -- a deficiency which the present invention advantageously overcomes.

Thus, it has remained for the Applicants and only the Applicants to teach, through their present invention, a rule-based approach for verifying proposed values for network parameters that are already in use in a communication system.

To accomplish this and as discussed above, the present inventive approach verifies modified parameter settings, particularly for existing parameters, for all hierarchical levels of an existing communications network, such as a radio network, using a two-part rule approach. Each rule not only includes a technically sufficient setting for a given parameter but also, and of critical importance, a deviation from that setting which has been deduced from actual operational use. Each modified network parameter is then verified by checking it against its corresponding rule to determine whether the proposed modification to that parameter is consistent with the rule and hence actual network operation, before the modified setting for that parameter is stored within the network and

used in governing subsequent network operation. This inventive approach is aimed at verifying all network parameters then in use.

The Djoko et al patent contains no teachings as to how existing parameters should be verified; the Madebrink et al patent teaches an approach that uses static, predefined rules, and hence ignores any operationally-induced change. Consequently, then, any one of ordinary skill in the art, when faced with these two patents, would quite likely combine their teachings to implement a static rule-based approach for verifying existing network parameter settings, as taught by the Madebrink et al patent, but modify those rules to take account of operational changes, as the Djoko et al patent teaches, only when new parameters are proposed and only for those new parameters. Such a combination would simply apply the static rule-based approach, which fails to take operational changes into account, taught by the Madebrink et al patent, and nothing more, to handle existing network parameters. Disadvantageously, the resulting approach would not provide proper settings for existing parameters, i.e., "operational parameters" as recited in claim 34, that, in light of changed operational conditions, would produce sufficiently reliable and efficient network operation.

As such and contrary to the Examiner' view, the resulting combined approach stops far short of the present invention.

Independent claim 34 contains suitable recitations directed to the distinguishing aspects of the present invention. In that regard, this claim is as follows with those recitations being shown in a bolded typeface:

> "A method for **verifying a modified parameter obtained from changing an operational parameter of a component of a radio network,** the method comprising the steps of:
> **before the modified parameter is implemented in the network, checking the modified parameter on the basis of a rule so as to yield a result, said rule comprising both a technically sufficient parameter setting requirement and a deviation from the setting requirement based on an operational requirement deduced from use of the radio network;** and
> **if the result indicates that the rule has been obeyed, storing the modified parameter in the network such that subsequent network operation will respond to the modified parameter.**" [emphasis added]

Consequently, the Applicants submit that independent claim 34 is not rendered obvious by the teachings in the Madebrink et al or Djoko et al patents, whether taken singly or in any combination including that posed by the Examiner. Hence, this claim is patentable under the provisions of 35 USC § 103.

Each of the Applicants' other independent claims, specifically 55, 59 and 61, contains very similar limitations, though parallel and couched in a form suitable for an apparatus, computer program or data carrier claim, to those recited in claim 34.

As such, each of these other independent claims is not rendered obvious by the teachings in the applied references for the exact same reasons set forth above and, as a result, is patentable under the provisions of 35 USC § 103.

Each of the remaining claims 35-38, 40-41, 50-54, 56-57 and 64-65 depends, either directly or indirectly, from a corresponding one of independent claims 34, 55 or 61 and recites further distinguishing features of the present invention. Accordingly, the Applicants submit that each of these dependent claims is not rendered obvious, by the teachings in the applied references, for the exact same reasons set forth above and thus is patentable under the provisions of 35 USC § 103.

2. Claims 9-11, 15, 16 and 25
-- Madebrink in view of Djoko et al and Kauhanen

The Examiner has rejected dependent claims 9-11, 15, 16 and 25 under the provisions of 35 USC § 103 as being obvious over the Madebrink et al patent taken in view of the Djoko et al patent, as applied to prior independent claims 1 and 22, and further in view of the Kauhanen application (United States patent application 2003/0157935 published on August 21, 2003). Inasmuch as all these claims have also been canceled, this rejection is moot. Nevertheless, to expedite prosecution, this rejection will

be discussed with respect to new corresponding claims 42-44, 48, 49 and 58. In that context, this rejection is respectfully traversed.

Each of claims 42-44, 48 and 49 depends, either directly or indirectly, from new independent claim 34. Claim 58 indirectly depends from new independent claim 55.

The Examiner states, with respect to dependent claims 9-11, 15, 16 and 25, that the Madebrink et al and Djoko et al patents fail to teach various specific aspects recited in these claims, but that those aspects are disclosed in the Kauhanen application. Given that, the Examiner concludes that each of these dependent claims would be obvious to one of ordinary skill in the art when the teachings in the Kauhanen application are included into those formed by combining the teachings of both the Madebrink et al and Djoko et al patents.

The Kauhanen application is directed to implementing a handover of a connection between differing radio communication systems, including GSM, GPRS and/or UMTS. Succinctly stated and as discussed in, e.g., paragraphs 38-43 of that application, the Kauhanen application teaches the concept of: establishing a connection between first and second nodes based on predefined network parameters, the first node being a mobile station and the second node being a mobile switching center of one network; initiating a handover so the connection may continue between the first node and a third

node with a default value being used for one of the network parameters required for this connection, the third node being the other network; and finally modifying the value for that parameter after the connection between the first and third nodes has been established. As indicated in paragraph 9, the reason underlying use of a default value is simply that, owing to a difference in the parameters between the different communication systems involved in the two connections, the subsequent connection can not be properly established otherwise.

The Kauhanen application is not directed to and contains no teachings whatsoever that address the concept of verifying modified settings of operational parameters for subsequent implementation in a communications network, let alone through use of a rule-based approach.

Consequently, any combination of the teachings in the Kauhanen application with those in the Madebrink et al and Djoko et al patents would not result in an approach that lies any closer to the Applicants' invention, as now recited in claims 34 and 55, than the approach formed by just combining the teachings in the latter two references. The same deficiencies, as discussed above, inherent in the latter approach would still remain -- undiminished.

Thus, the present invention as recited in Applicants' independent claims 34 and 55 is not rendered obvious by the teachings in any of the three applied references, regardless of how those teachings are combined

-- including that posed by the Examiner, for the exact same reasons set forth above with respect to the Madebrink et al and Djoko et al patents.

Inasmuch as each of claims 42-44, 48, 49 and 58 recites further distinguishing features over those recited in either claim 34 or 55, the Applicants submit that each of these dependent claims is not rendered obvious by any combination of the teachings in these three applied references. As such, all of these dependent claims are also patentable under the provisions of 35 USC § 103.

3. Claims 12-14, 27 -- Madebrink in view of Djoko et al and Amirijoo et al

The Examiner has rejected dependent claims 12-14 and 27 under the provisions of 35 USC § 103 as being obvious over the Madebrink et al patent taken in view of the Djoko et al patent, as applied to prior independent claims 1 and 22, and further in view of the Amirijoo et al application (United States patent application 2001/0041575 published on November 15, 2001). Inasmuch as all these claims have been canceled, this rejection is moot. Nevertheless, to expedite prosecution, this rejection will be discussed with respect to new corresponding claims 45-47 and 60. In that context, this rejection is respectfully traversed.

Each of claims 45-47 depends, either directly or indirectly, from new independent claim 34. Claim 60 directly depends from new independent claim 59.

The Examiner states, with respect to these dependent claims 12-14 and 27, that the Madebrink et al and Djoko et al patents fail to teach various specific aspects recited in these claims, but that those aspects are disclosed in the Amirijoo et al application. Given that, the Examiner concludes that each of these dependent claims would be obvious to one of ordinary skill in the art when the teachings in the Amirijoo et al application are included into those formed by combining the teachings of both the Madebrink et al and Djoko et al patents.

The Amirijoo et al application is directed to a method of positioning a GPRS mobile station in a GSM network using time of arrival (TOA) methodology.

The Amirijoo et al application, just like the Kauhanen application, is not directed to and contains no teachings whatsoever that address the concept of verifying modified settings of operational parameters for subsequent implementation in a communications network, let alone through use of a rule-based approach.

Consequently, any combination of the teachings in the Amirijoo et al application with those in the Madebrink et al and Djoko et al patents would also not result in an approach that lies any closer to the Applicants' invention,

as now recited in claims 34 and 59, than the approach formed by just combining the teachings in the latter two references. Again, the same deficiencies, as discussed above, inherent in the latter approach would still remain -- undiminished.

Thus, the present invention as recited in each of Applicants' independent claims 34 and 59 is not rendered obvious by the teachings in any of the three applied references, regardless of how those teachings are combined -- including the combinations posed by the Examiner, for the exact same reasons set forth above with respect to the Madebrink et al and Djoko et al patents.

Inasmuch as each of claims 45-47 and 60 recites further distinguishing features over those respectively recited in claims 34 or 59, the Applicants submit that each of these dependent claims is not rendered obvious by any combination of the teachings in these three applied references. As such, all of these dependent claims are also patentable under the provisions of 35 USC § 103.

4. Claim 6 -- Madebrink in view of Djoko et al and Burrows et al

The Examiner has rejected dependent claim 6 under the provisions of 35 USC § 103 as being obvious over the Madebrink et al patent taken in view of the Djoko et al patent, as applied to prior independent claim 1, and further in view of the Burrows et al application (United

States patent application 2002/0138509 published on September 26, 2002). Inasmuch as this claim has also been canceled, this rejection is moot. Nevertheless, to expedite prosecution, this rejection will be discussed with respect to new corresponding claim 39. In that context, this rejection is respectfully traversed.

Claim 39 indirectly depends from new independent claim 34.

The Burrows et al application is directed to a web crawler system for accessing pages stored on remotely located networked computers, where retrieved page link information is encoded using a row-based compression scheme.

That application is not directed to and contains no teachings whatsoever that address the concept of verifying modified settings of operational parameters for subsequent implementation in a communications network, let alone through use of a rule-based approach.

Consequently, any combination of the teachings in the Burrows et al application with those in the Madebrink et al and Djoko et al patents would also not result in an approach that lies any closer to the Applicants' invention, as now recited in independent claim 34, than the approach formed by just combining the teachings in the latter two references. Again, the same deficiencies inherent in the latter approach would still remain -- undiminished.

Thus, the present invention as recited in Applicants' independent claim 34 is not rendered obvious by the teachings in any of the three applied references, regardless of how those teachings are combined -- including the combinations posed by the Examiner, for the exact same reasons set forth above with respect to the Madebrink et al and Djoko et al patents.

Inasmuch as claim 39 recites further distinguishing features over those recited in claim 34, the Applicants submit that this dependent claim is not rendered obvious by any combination of the teachings in these three applied references. As such, this dependent claim is also patentable under the provisions of 35 USC § 103.

5. Claim 30 -- Madebrink in view of Burrows et al

The Examiner has rejected dependent claim 30 under the provisions of 35 USC § 103 as being obvious over the Madebrink et al patent taken in view of the Burrows et al application. Inasmuch as this claim has also been canceled, this rejection is moot. Nevertheless, to expedite prosecution, this rejection will be discussed with respect to new corresponding claim 63. In that context, this rejection is respectfully traversed.

Claim 63 directly depends from new independent claim 61.

As discussed above, the Burrows et al application is not directed to and contains no teachings whatsoever that address the concept of verifying modified settings of operational parameters for subsequent implementation in a communications network, let alone through use of a rule-based approach.

Consequently, any combination of the teachings in the Burrows et al application with those in the Madebrink et al patent would also not overcome the deficiencies, as discussed above, inherent in the approach taught by the Madebrink patent itself.

Thus, the present invention as recited in Applicants' independent claim 61 is not rendered obvious by the teachings in any of the Madebrink patent and the Burrows et al application, regardless of how those teachings are combined -- including the combination posed by the Examiner, for the exact same reasons set forth above with respect to the Madebrink patent alone.

Inasmuch as claim 63 recites further distinguishing features over those recited in claim 61, the Applicants submit that this dependent claim is not rendered obvious by any combination of the teachings in these two applied references. As such, this dependent claim is also patentable under the provisions of 35 USC § 103.

Conclusion

Thus, the Applicants submit that all of their claims now pending in the application are directed to statutory subject matter under the provisions of 35 USC § 101. The Applicants also submit that none of these claims is anticipated under the provisions of 35 USC § 102 or obvious under the provisions of 35 USC § 103.

Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

Respectfully submitted,

December 19, 2005

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**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **December 20, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature

30,090
Reg. No.

(PTT119AMEND2/ca:164)

4/7

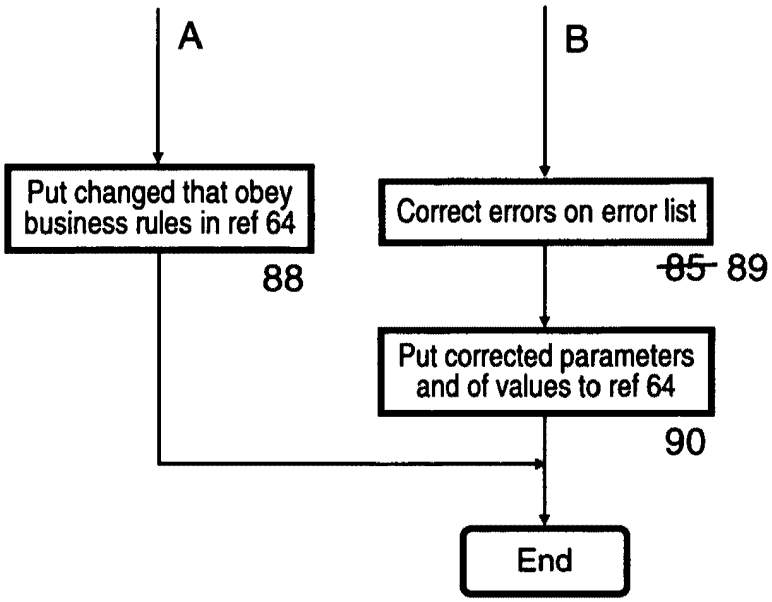

A
B
Put changed that obey business rules in ref 64
88
Correct errors on error list
~~85~~ 89
Put corrected parameters and of values to ref 64
90
End

FIG. 4B

## ABSTRACT

A method and system for checking modified parameters of components of a radio network. Operational parameters that have been modified are checked on obeying business rules comprising requirements that have been deduced from operational use of the radio network, preferably before they are implemented in the network. The method and system allow application of compressed row techniques in databases comprising the parameters.

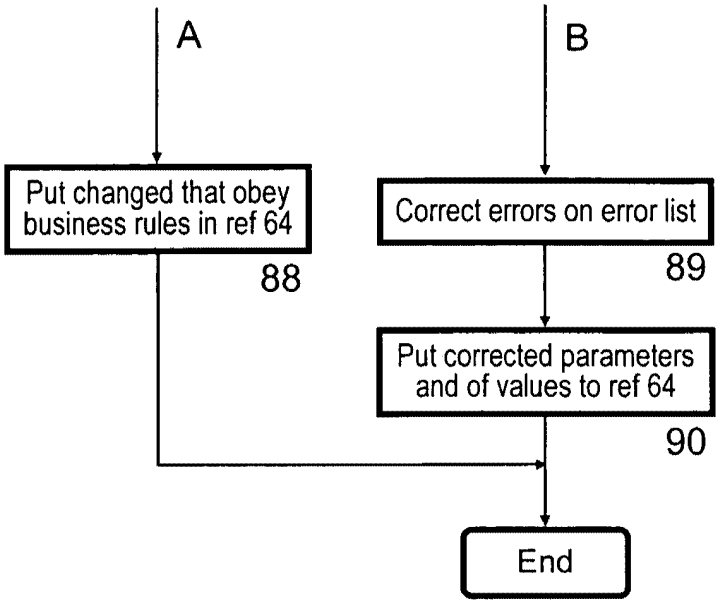

A
B
Put changed that obey business rules in ref 64
88
Correct errors on error list
89
Put corrected parameters and of values to ref 64
90
End

FIG. 4B

TFW / 2683




IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2683** Confirmation No.: **8186**

Examiner: **NGUYEN, QUYEN VAN**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S I R:

**PETITION FOR EXTENSION OF TIME TO RESPOND UNDER 37 C.F.R. 1.136(a)**

Applicant hereby respectfully petitions the Commissioner of Patents and Trademarks to extend the time to respond to the Office Action (Paper No. 08082005) dated **August 12, 2005** for a period of **two** (1) months from **November 12, 2005** to and including **January 12, 2006.**

Attached hereto is a responsive amendment and our check payable to the Commissioner of Patents and Trademarks in the amount of **$ 450.00** to cover the cost of the extension.

12/30/2005 LWONDIM1 00000008 10188538
01 FC:1252 450.00 OP

In the event this check is unacceptable, insufficient or is omitted, kindly charge the additional or entire cost, as appropriate, of this extension to my deposit account number 13-3083. To facilitate that charge, a duplicate copy of this letter is enclosed herewith.

Respectfully submitted,

December 19, 2005

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**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **December 20, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Signature

30,090
Reg. No.

(PTT119EXTENSION/ca:164)

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# PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number
10/168 536

## CLAIMS AS FILED - PART I

| | (Column 1) | (Column 2) |
|---|---|---|
| TOTAL CLAIMS | 33 | |
| FOR | NUMBER FILED | NUMBER EXTRA |
| TOTAL CHARGEABLE CLAIMS | 33 minus 20= | * 13 |
| INDEPENDENT CLAIMS | 6 minus 3 = | * 3 |
| MULTIPLE DEPENDENT CLAIM PRESENT | | ☐ |

* If the difference in column 1 is less than zero, enter "0" in column 2

| SMALL ENTITY TYPE ☐ | | OR | OTHER THAN SMALL ENTITY | |
|---|---|---|---|---|
| RATE | FEE | | RATE | FEE |
| BASIC FEE | 370.00 | OR | BASIC FEE | 740.00 |
| X$ 9= | | OR | X$18= | 234.00 |
| X42= | | OR | X84= | 252.00 |
| +140= | | OR | +280= | |
| TOTAL | | OR | TOTAL | 1226.00 |

## CLAIMS AS AMENDED - PART II

AMENDMENT A

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * 32 | Minus | ** 33 | = — |
| Independent | * 6 | Minus | *** 3 | = 3 |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | | | | ☐ |

| SMALL ENTITY | | OR | OTHER THAN SMALL ENTITY | |
|---|---|---|---|---|
| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

12/29/05

AMENDMENT B

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * 32 | Minus | ** 33 | = — |
| Independent | * 6 | Minus | *** 6 | = — |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | | | | ☐ |

| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
|---|---|---|---|---|
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

AMENDMENT C

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * | Minus | ** | = |
| Independent | * | Minus | *** | = |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | | | | ☐ |

| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
|---|---|---|---|---|
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP (402706US/1) | 8186 |

7265 7590 08/12/2005

MICHAELSON AND WALLACE
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328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701

| EXAMINER | |
|---|---|
| NGUYEN, LEE | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2682 | |

DATE MAILED: 08/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/188,538 | OLDENBURG ET AL. | |
| | Examiner | Art Unit | |
| | LEE NGUYEN | 2682 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 26 May 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-32 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-32 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. This action is responsive to the communication filed 5/26/2005.

### *Claim Rejections - 35 USC § 101*

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

the claimed invention is directed to non-statutory subject matter.

Regarding claims 1-32, the claims do not either contain post-computer process activity or pre-computer process activity. Neither physical acts to perform outside the computer nor measurements or activities to be transformed from the outside of computer into computer data. Rather, it is just data gathering. Therefore, the claims are directed to non-statutory subject matter (see MPEP, section 2106).

### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 29 is rejected under 35 U.S.C. 102(b) as being anticipated by Madebrink et al. (US 5,434,798).

Regarding claim 29, Madebrink discloses computer program for running on a computer system comprising software code portions for checking the at least one modified parameter before implementation in the radio network (see Col. 6, line 24-28) comprising the steps of copying to a database the at least one operational parameter from the radio network (see Col. 6, lines 38-40); changing the at least one operational parameter to the at least one modified parameter (see Col. 6, lines 28-33); checking the at least one modified parameter (see Col. 6, lines 30-33) by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed (see Col. 6, lines 34-37).

***Claim Rejections - 35 USC § 103***

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the

time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-5, 7-8, 17-24, 26, 28, 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (U.S 5,434,798) in view of Djoko et al. (US 6,085,335).

Regarding to claim 1, Madebrink discloses a method for checking at least one modified parameter (see Col. 3, lines 39-40) obtained from changing at least one operational parameter (see Col. 3, lines 16-20) of at least one component of a radio network (see Col. 3, lines 48-50) wherein said checking is performed on the basis of at least one business rule (see Col. 3, line 24-25) comprising at least one operational requirement deduced from operational use of the radio network (see Col. 3, lines 16-17). Madebrink fails to teach that the business rule comprising deviating from at least one technically sufficient parameter setting requirement. In an

analogous art, Djoko teaches checking at least one modified parameter in which the business rule comprising rules regarding parameter assignments under different possible system conditions based on current operating data and current parameters of the communication systems (col. 3, 15-55 and col. 4, 48-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Djoko into the system of Madebrink in order to obtain optimal performance of a communication system and that compensates for changing system conditions.

Regarding claim 2, Madebrink discloses the at least one modified parameter is checked before implementation in the radio network (see Col. 4, lines 9-11) comprising the steps of

Copying to a database the at least one operational parameter from the radio network (see Col. 3, lines 30-34), changing the at least one operational parameter to the at least one modified parameter and/or value (see Col. 3, lines 35-38),

checking the at least one modified parameter by one selected business rule (see Col. 3, lines 24-25) comprising the least one operational requirement has been obeyed (see Col. 3, lines 39-41).

Regarding claim 3, Madebrink discloses a non-compliance signal is generated if the at least one modified parameter does not obey the at least one operational requirement (see Fig. 4A, (13) and (14), Col. 11, lines 15-20).

Regarding claim 4, Madebrink discloses at least one operational parameter is stored in a first part of the database (see Col. 5, lines 20-26, Fig. 3 ISPDBI) and the at least one modified parameter is stored in a second pad of the database (see Col. 5, lines 31-34, Fig. 3 FEDPJ).

Regarding to claim 5, Madebrink discloses the first and second part of the database are separate databases (see Fig.3 ISPDP) and FEDPI).

Regarding claim 7, Madebrink discloses the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter (see Col.16, Table 1; lines 44 (MTCEC) and 48 IMTNCC).

Regarding to Claim 8, Madebrink discloses at least one hierarchy table is used for checking whether the at least one modified parameter obeys the at least one selected business rule (see Col. 16,Table I line 48 & Col. 17, Table 11, line 12).

Regarding claim 17, Madebrink discloses at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network (see Col. 3, lines 54-57).

Regarding to claim 18, Madebrink discloses at least one operational practice requirement involves an administrative requirement (see Col. 3, lines 48-57).

Regarding claim 19, Madebrink discloses the operational practice requirement involves a technically preferable requirement programmed, ordered and/or influenced by the operator of the radio network (see Col. 3, lines 54-57).

Regarding to claim 20, Madebrink discloses the non-compliance signal is a file or message displayed to an operator (see Fig. 6 (3851, Col. 13, lines 60-68).

Specifically with respect to claim 21, Madebrink discloses the non-compliance signal is programmable (see Col.13, lines 16-21).

Regarding to claim 22, Madebrink discloses a system for checking at least one modified parameter (see Col. 3, lines 39-40) obtained from changing at least one operational parameter (see Col. 3, lines 16-20) of at least one component of a radio network (col. 3, lines 48-50), wherein said

system is adapted to perform checking on the basis of at least one business rule (see Col. 3, lines 24-25) comprising at least one operational requirement derived from operational use of the radio network (see Col. 3, lines 16-17). Madebrink fails to teach that the business rule comprising deviating from at least one technically sufficient parameter setting requirement. In an analogous art, Djoko teaches checking at least one modified parameter in which the business rule comprising rules regarding parameter assignments under different possible system conditions based on current operating data and current parameters of the communication systems (col. 3, 15-55 and col. 4, 48-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Djoko into the system of Madebrink in order to obtain optimal performance of a communication system and that compensates for changing system conditions.

Regarding claim 23, Madebrink discloses for checking the at least one modified parameter and/or value before implementation in the radio network (see Col. 4, lines 9-1 1) comprising:

a first part of a database to store the at least one operational parameter from the radio network (see Col. 5, lines 20-26, Fig. 3 ISPDBI);

a second part of a database to store the at least one modified parameter (see Col. 5, lines 31-34, Fig. 3 FEDPJ).

a business rule checker verifying whether the at least one modified parameter (see Col. 3, line: 24-25) obeys the at least one operational requirement (see Col. 3, lines 16-17).

Regarding to claim 24, Madebrink discloses a signal generator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement (see Fig. 4A (13) and (14), Col. 11, lines 15-20).

Regarding claim 26, Madebrink discloses radio network comprising at least one component (see Col. 3, lines 48-50) comprising at least one operational parameter that can be changed to at least one modified parameter (see Col. 3, lines 16-20) wherein the at least one modified parameter and/or value can be checked (see Col. 3, lines 39-40) on the basis of at least one business rule (see Col. 3, line 24-25) derived from operational use of the radio network (see Col. 3, lines 16-17).

Madebrink fails to teach that the business rule comprising deviating from at least one technically sufficient parameter setting requirement. In an analogous art, Djoko teaches checking at least one modified parameter in

which the business rule comprising rules regarding parameter assignments under different possible system conditions based on current operating data and current parameters of the communication systems (col. 3, 15-55 and col. 4, 48-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Djoko into the system of Madebrink in order to obtain optimal performance of a communication system and that compensates for changing system conditions.

Regarding to claim 28, Madebrink discloses computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network (see Col. 6, lines 24-33). Madebrink fails to teach that the business rule comprising deviating from at least one technically sufficient parameter setting requirement. In an analogous art, Djoko teaches checking at least one modified parameter in which the business rule comprising rules regarding parameter assignments under different possible system

conditions based on current operating data and current parameters of the communication systems (col. 3, 15-55 and col. 4, 48-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Djoko into the system of Madebrink in order to obtain optimal performance of a communication system and that compensates for changing system conditions.

Regarding to claim 31, Madebrink discloses data carrier stored with data loadable in a computer memory said data representing a computer program for running on a computer system at least including software code portions for checking at least one modified parameter obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network (see Col. 6, lines 24-29). Madebrink fails to teach that the business rule comprising deviating from at least one technically sufficient parameter setting requirement. In an analogous art, Djoko teaches checking at least one modified parameter in which the business rule comprising rules regarding parameter assignments under different possible system conditions based on current operating data and current

parameters of the communication systems (col. 3, 15-55 and col. 4, 48-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the teaching of Djoko into the system of Madebrink in order to obtain optimal performance of a communication system and that compensates for changing system conditions.

Specifically with respect to claim 32, Madebrink discloses software code portions are provided for checking the at least one modified parameter before implementation in the radio network (see Col. 6, lines 24-28) comprising the steps of copying to a database the at least one operational parameter and/or value from the radio network (see Col. 6, lines 38-40). changing the at least one operational parameter to the at least one modified parameter (see Col. 6, lines 28-33); checking the at least one modified parameter (see Col. 6, lines 30-33) by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed (see Col. 6, lines 34-37).

7. Claims 9-11,15,16, 25 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Djoko et al. (US 6,085,335) as applied to claims 1 and 22 above and further in view of Kauhanen (US 2003/0157935 A1).

Regarding to claim 9, Madebrink disclose method for checking at least one modified parameter (see Col.3, lines 39-40) obtained from changing at least one operational parameter (see Col. 3, lines 16-20) of and at least one component of a radio network (see Col. 3, lines 48-50) on the basis of at least one business rule (see Col. 3, lines 24-25) comprising at least one operational requirement deduced from operational use of the radio network (see Col. 3, lines' 16-17). However, Madebrink fails to teach at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy. Kauhanen discloses at least one modified parameter (see Col. 2, (00151) relates to at least one level of a GSM (see Fig. 1 (12)) or DCS network hierarchy. Therefore, It would have been obvious to one of ordinary skill in the art at the time of invention was made to provide the system of Madebrink with one level of GSM (Global System for Mobile communications). The level of GSM standard would generate detectable radio interference to be able to efficiently control the total traffic of the radio network and allows eight

simultaneous calls on the same radio frequency. Also, GSM was first introduced in 1991 (Telecommunication Dictionary).

Regarding claim 10, the combination of teachings of Madebrink and Kauhanen further discloses the levels of the GSM network hierarchy are MSC (see Kauhanen, Fig. 2 E12)), OMC, BSC (see Kauhanen, Fig. 2 (34)), BCF and/or BTS (see Kauhanen, Fig. 2 (30)).

Regarding to claim 11, the combination of teachings of Madebrink and Kauhanen further discloses the levels of the GSM network hierarchy are TRX , HO (see Kauhanen, Col. 3 (0038) Handover) and/or CH.

Regarding claim 15, the combination of teachings of Madebrink and Kauhanen further discloses at least one modified parameter by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy (see Kauhanen Page 2, (0019) and (0026)).

Regarding to claim 16, the combination of teachings of Madebrink and Kauhanen further discloses relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network (see Kauhanen, Page 2 (0018)).

Regarding to claim 25, Madebrink discloses for checking the at least one modified parameter and/or value before implementation in the radio network (see Col.4, lines 9-11), comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network (see Col. 5, lines 20-26, Fig. 3 ISPDBI);

a second part of a database to store the at least one modified parameter and/or value (see Col. 5, lines 31-34, Fig. 3 FEDPI);

a business rule checker verifying whether the at least one modified parameter (see Col. 3, lines 24-25) obeys the at least one operational requirement (see Col. 3, lines 16-17). Madebrink further teaches that the system further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker (Madebrink Col. 13, lines 60-68).

8. Claims 12-14,27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Kjoko et al. (US 6,085,335) as applied to claims 1 and 22 above and further in view of Arimijoo et al. (US 2001/0041575 A1).

Regarding to claim 12, Madebrink discloses method for checking at least one modified parameter (see Col. 3, lines 39-40) obtained from changing at least one operational parameter (see Col. 3, lines 16-20) of at least one component of a radio network (see Col. 3, lines 48-50) on the basis of at least one business rule (see Col. 3, lines 24-25) comprising at least one operational requirement deduced from operational use of the radio network (see Col. 3, lines 16-20)). However, Madebrink fails to teach at least one modified parameter relates to at least one level of a GPRS hierarchy. Arimijoo discloses at least one modified parameter (see Col. 3, (0033) modified power parameter from GPRS) relates to at least one level of a GPRS hierarchy (see Fig. 1). Therefore, it would have been have been obvious to one of ordinary skill in this art at the time of invention was made to have modified the system of Madebrink by including the level of GPRS to be able to efficiently speed up the system, supports a wide range of bandwidths and suits for sending and receiving small bursts of data (Telecommunication Dictionary).

Regarding claim 13, the combination of teachings of Madebrink and Arimijoo further discloses, the levels of the GPRS hierarchy are MSC (see Arimijoo Fig. 1 (221).

Regarding to claim 14, the combination of the teachings of Madebrink and Arimijoo further discloses the levels of the GPRS hierarchy are CH (see Arimijoo, page 1, (0008) with (PDCH) physical data channel).

Specifically with respect to claim 27, Madebrink discloses radio network comprising at least one component (see Col. 3, lines 48-50) comprising at least one operational parameter that can be changed to at least one modified parameter (see Col. 3, lines 16-29) wherein the at least one modified parameter and/or value can be checked (see Col. 3, lines 39-40) on the basis of at least one business rule (see Col. 3, lines 24-25) derived from operational use of the radio network (see Col 3, lines 16-17). However, Madebrink fails to teach at least one operational parameter and the at least one modified parameter relate to at least one level of a GSM, DCS or GPRS hierarchy of the radio network. Arimijoo discloses at least one operational parameter (see Col. 3, (0033)) and the at least one modified parameter (see Col. 3, (0033)) relate to at least one level of a GSM, DCS or GPRS (see Fig. 1) hierarchy of the radio network. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention was made to have modified the system of Madebrink by including the level of GPRS to able to efficiently speed up the system, supports a

wide range of bandwidths and suits for sending and receiving small bursts of data (Telecommunication Dictionary).

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Djoko et al. (US 6,085,335) as applied to claim 1 above and further in view of Burrows et al. (US 2002/0138509 A1).

Regarding to claim 6, Madebrink discloses the at least one modified parameter is checked before implementation in the radio network (see Col. 4,lines 9-10) comprising the steps of copying database the at least one operational parameter from the radio network (see Col. 3, lines 30-34), changing the least one operational parameter and/or value to the least one modified parameter (see Col. 3, lines 35-38), checking the at least one modified parameter by one selected business rule (see Col. 3, lines 24-25) comprising the least one operational requirement has been obeyed (see Col. 3, lines 39-41). However, Madebrink fails to teach at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique. Burrows discloses at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row

technique (see Figs 5,6 and Col. 1, (0012) and (0013)). Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention was made by Madebrink to include the compressed row technique of Burrows to compress the data in database to be able to reduce the memory to store a file, and take less time to transfer it.

10. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Burrows et al.

Regarding claim 30, Madebrink discloses computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network (Madebrink Col. 6, lines 24-33). However, Madebrink fails to teach at least one of the at least one operational parameter or the at least one modified parameter is

stored in a database using a compressed row technique. Burrows discloses at least one of the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique (see Figs 5, 6 and Col. 1, (0012), (0013)). Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention was made by Madebrink to include the compressed row technique of Burrows in compressing data in database to be able to take up less space to store a file in memory and less time to transfer it.

***Response to Arguments***

11. Applicant's arguments with respect to claims 1-32 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEE NGUYEN whose telephone number is (571)-272-7854. The examiner can normally be reached on 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NICK CORSARO can be reached on (571)-272-

7876. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

8/8/05

LEE NGUYEN
Primary Examiner
Art Unit 2682

## Index of Claims

| Application/Control No. | Applicant(s)/Patent under Reexamination |
|---|---|
| 10/188,538 | OLDENBURG ET AL. |
| **Examiner** | **Art Unit** |
| LEE NGUYEN | 2682 |

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## Search Notes

| Application/Control No. | Applicant(s)/Patent under Reexamination |
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| 10/188,538 | OLDENBURG ET AL. |
| **Examiner** | **Art Unit** |
| LEE NGUYEN | 2682 |

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| Class | Subclass | Date | Examiner |
| 455 | 422<br>423<br>424 | 8/8/2005 | LN |
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IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2683** Confirmation No.: **8186**

Examiner: **NGUYEN, QUYEN VAN**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S I R:

I believe that **no fee, of any kind,** is required for the accompanying amendment submitted in connection with the above-captioned application.

In the event a fee is due, kindly charge that fee to my deposit account number 13-3083. To facilitate that charge, a duplicate copy of this letter is enclosed herewith.

Respectfully submitted,

May 23, 2005

/Peter L. Michaelson/

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Customer No. 007265
(732) 530-6671

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P.O. Box 8489
Red Bank, New Jersey 07701

**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **May 14, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Peter L Michaelson — 30,090

Signature — Reg. No.

(PTT119NOFEELTR/ca:148)




IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2683** Confirmation No.: **8186**

Examiner: **NGUYEN, QUYEN VAN**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

S I R:

**AMENDMENT**

In response to the Office Action (Paper No. 07032002) dated February 24, 2005, please amend the above-identified application as follows:

Amendments to the specification begin on page 3 of this paper.

Amendments to the claims are reflected in the listing of claims which begins on page 14 of this paper.

Remarks/Arguments begin on page 22 of this paper.

Amendments to the Specification:

Please replace paragraph at page 1, lines 13-25 with the following amended paragraph:

Fig. 1 shows a schematic representation of a contemporary cellular network 1. The architecture of these cellular networks comprises a network ~~subsytem~~subsystem 2, a base station ~~subsytem~~subsystem 3 and a mobile station 4. Examples of these cellular networks are GSM and DCS and extensions of these networks such as GPRS, UMTS etc. The network subsystems main component involves the mobile switching centre 20 (MSC) providing the interface of the cellular network and wire bound networks 5 (PSTN, ISDN, ADSL etc.) as well as roaming and call-routing facilities (Home Location Register 21, Visitor Location Register 22, Equipment Identity Register 23 and Authentication Centre 24).

Please replace paragraph at page 2, lines 9-27 with the following amended paragraph:

As the complexity of cellular networks increases flexible operation of these networks becomes more difficult. Configuration and reconfiguration of a cellular network is complex since the ~~parametersettings~~parameter settings of the different components of the cellular radio network affect ~~eachother~~each other. United States Patent ~~5,343,798~~ 5,434,798 of Ericsson describes a reconfiguration method and apparatus in which the cell parameters of

particular mobile switching centres in a network are copied to a database, and the copied parameters are stored. A set of proposed changes to the stored parameters are prepared and the consistency of the prepared set of proposed changes is verified. Alterations to the set of proposed changes responsive to the verification are made and the verified set of proposed changes are copied to the concerned mobile switching centres. The verified set of proposed changes is then introduced into the network. An up-to-date image of the cell parameters in the mobile switching centres in the network is maintained in a system parameter database.

Please replace paragraph at page 2, line 30 through page 3, line 17 with the following amended paragraph:

Typically a cellular radio network comprises several MSCs~~'s~~ and a larger number of base stations. Operation of such cellular radio networks requires a high degree of flexibility in the sense that configuration and reconfiguration of the cellular network has to be possible within a limited period of time and with a high degree of accuracy. Such a reconfiguration of a radio network can be permanent or temporarily. Reasons for such a reconfiguration are numerous, e.g. a temporary cell split needed to deal with an expected increase in traffic due to an event or the permanent integration of new elements both affecting the settings of already existing elements in the radio network. Therefore sophisticated methods and systems are required that administrate the parameter settings of

the various components, e.g. the BTS or BSC, of the cellular radio network and change the parameter settings of said components. Examples of parameters that can be changed include cell type, cell designation, cell direction, signal strength, signal to noise ratio, etc. Moreover means have to be provided in order to check the consistency of the proposed parameter changes before the changes are implemented in the cellular network.

Please replace paragraph at page 5, lines 19-20 with the following amended paragraph:

Fig. 1 shows an elementary representation of a GSM ~~radionetwork~~radio network;

Please replace paragraph at page 7, lines 9-17 with the following amended paragraph:

It is one of the objects of the invention to provide a method and system to handle the parameter settings in these ~~kind~~kinds of hierarchies. More specifically a method and system are provided to supply operators of cellular radio networks with a control facility on each and every hierarchical level and on relationships between elements of the radio network before changes in the parameter settings are implemented into the network.

Please replace paragraphs at page 9, line 1 through page 11, line 2 with the following amended paragraphs:

Basically the compressed row technique involves a convenient database which is linked to a descriptive database. Therefore a database applying compressed row techniques contains at least two separate parts. The first part may store the real data as ~~strings,~~strings; the second part may contain the descriptive information needed to process the real data from the first part. The second part will be referred to as the repository.

A preferable mechanism to apply the compressed row technique comprises the following steps. For every hierarchical level of the radio network 1 a parameter table is formed in the database 62. In this parameter table all the parameters of all elements in the radio network of that hierarchical level are stored. For each element the parameters are divided into parameter groups, each parameter group containing a string (compressed row) storing multiple parameters that may be divided by ~~semi-coloms~~ semi-colons. Each group of parameters has a number assigned that indicates the nature of the group. Finally each group of parameters includes an identifier corresponding to the element. In the repository table for each parameter the group and the field within that group for that parameter is stored. To find the relevant element corresponding to an element identifier a hierarchy table is

used. Various level-tables link the element identifiers to the parameter strings.

A simple example will clarify the mechanism described. Suppose that the value of the parameter BS_TX_PWR_MAX of base station 8662 (the maximum transmission power of that particular base ~~station) is~~station) is being sought. The hierarchy table HIERARCHY_OMC_BTS contains a base station with identifier 8662. Next it is deduced from the repository that the parameter being sought is e.g. located in parameter group 2 in field 9. The repository indicates moreover that the value on this location is expressed in dBm. The level table BTS_OMC then indicates that for this particular BTS a ~~parameterstring~~parameter string for group 2 exists containing e.g. the string 1;8;1;4;1;8;1;1;0;15;1;0;0;2;0;0;0;0;;;;;;. The 9$^{th}$ value in this string is 0 which probably indicates that the BTS with identifier 8662 is not active.

The example above is a simplified case. There are values of parameters that ~~can not~~cannot be obtained in this direct way, but have to be obtained indirectly by means of a translate table. In that case the parameter has a translate identifier in the repository. By means of a field identifier, uniquely defining the parameter, the value of the parameter can be obtained from the translate table.

The business rule checker 70 performs a control function before parameters and/or values are implemented in the cellular radio network. In most cases there is ~~a~~ an inter-dependency of the various parameters and values of parameters and therefore checking of new and modulated parameters and values before implementation in the network is preferable. However not only the bare technical sufficient requirements set for the various parameters should be checked. Since contemporary cellular radio networks have reached ~~an~~ a considerable amount of complexity several other non-technical requirements, as e.g. administrative data should preferably be checked as well. As e.g. the operators administration indicates all cells for 900 MHz GSM with a cell_id starting with #1 and all cells for 1800 MHz DCS with cell_id starting with #6, these requirements should be part of the business rule check as well before configuration or reconfiguration of the network takes place.

Please replace paragraphs at page 11, line 23 through page 13, line 25 with the following amended paragraphs:

Figures 4A and 4B show a flow chart to illustrate schematically the application of business rules to parameter changes for the radio network 1 as proposed by the user 69. In the first step 81 a parameter group that is changed in mut 65 is read. Next the hierarchical level is determined from this parameter group at 82 and subsequently the parameter is found at 83. For this

parameter it may be that no business rule has been defined or programmed. In that case 84 the parameter is put directly into the ref part 64 of database 62 and is ready to be implemented in the radio network 1. If a business rule does exist for the particular parameter that business rule is read at 85. It is checked whether the parameter does obey the business rule. If the parameter does not obey the business rule an error list is generated and the parameter and corresponding value are put on that list at 86. If the parameter does obey to the business rule defined or programmed for that parameter the next step is to find out whether other parameters have been changed that belong to the parameter group under consideration. These parameters may run through the same series of steps as described above. If all the changed parameters have been put to the business rule test as described above, it is determined whether other parameter groups have been changed as well. The same series of steps as described above may be applied to the parameters belonging to that parameter group. Finally if all the parameter groups have been checked, the business rule checker 70 stops at step 87. As a result of the business rule checking process the parameters that obey the business rules defined or programmed for them are put in the ref part 64 of the database 62 at step 88 and are ready to be implemented in the radio network 1. If the parameters or values do not obey the business rules the parameters and corresponding values appear on the generated error list and after ~~finalisation~~finalization of the business rule checking of all the parameter groups this error list is put to the

user. The user then has to correct the parameters, as shown at step 89. The corrected parameters or values then can be put to the ref part 64 of database 62 as well. Now the complete set of parameters and corresponding values does obey the business rules and is ready to be implemented to the cellular radio network 1. Although in figures 4A ~~an~~ and B only individual parameters are checked whether or not they obey a business rule, ~~als~~ also relations of parameters can be checked on a business rule (see e.g. figure 6A as discussed below).

Figure 5 shows a table of business rules defined for a particular type of cellular radio network 1. It is ~~stressed that~~stressed that an almost infinite amount of these ~~kind~~kinds of business rules can be defined so the rules shown in figure 5 only give a few examples. The table shown in figure 5 shows columns defining a business rule identification number BR_ID, the state of the business rule, the file name or module, the iteration level and the message to be shown when a parameter does not obey the business rule. Additional columns can include e.g. the priority level, author of the business rule, date of modification, version number, remarks etc.

The state of a business rule establishes whether that business rule is taken into consideration when the business rule checking is performed. It is not necessary that all the business rules have to be checked in a particular configuration or reconfiguration project with regard to the radio network. It may be up to the user to

select the business rules he wants to apply. However it may be that some business rules have to be checked at all times and therefore ~~can not~~cannot be put aside by the user. Business rules can e.g. be applied by running a main script calling the separate business rule modules selected by the user or imposed by the system.

Please replace paragraph at page 14, line 23 through page 16, line 14 with the following amended paragraph:

Figures 6A-D show a few examples of business rule modules that are also mentioned in the table of figure 5. Figure 6A shows the script of the business rule module bcf002.br, which is a business rule of the administrative kind as mentioned previously. It checks whether the requirement that a BCF 29 of type DE21 has more than 3 BTSs~~'s~~ 31 connected according to e.g. the Nokia hierarchy 12 of figure 2. If it does, a blocking message appears on the error list indicating to the user 69 that that particular BCF does have more than 3 BTSs~~'s~~.

Figure 6B shows the script of the business rule module bts013.br. It states that one Access Grant Block (AGB) is required for each Basic Communication Channel. A blocking message appears if the business rule is not obeyed.

Figure 6C shows the script of the business rule module bts015.br, which is a business rule of the technical

kind, as mentioned above. This module checks the number of TRXs~~'s~~ for each LABD-link. A LABD link basically represents a direct or indirect physical link between two or more BSC~~'s~~s. For a ~~bitrate~~bit rate of 16 respectively 64 a maximum of 12 respectively~~resp~~. 10 ~~TRX's~~ TRXs ~~is~~ are allowed for each LABD-link. If this requirement is not obeyed, a blocking message appears on the error list.

Figure 6D shows the script of the business rule module ho006.br, which is a business rule of the technical kind as mentioned previously. This module checks whether a cell has ~~neighbour~~neighbor BTSs~~'s~~ with the same base station communication channel BCCH. A warning message is generated on the error list if this happens to be the case.

It is ~~explicitely~~explicitly stated that the examples and embodiments as described in this section do not limit the scope of the invention in any way. Modifications of the examples and embodiments fall within the scope of this application. E.g. it may be ~~a~~ an advantageous to distribute the cellular radio network amongst several geographic regions each of these regions having an operator. Basically the same system of network management, including the business rule checker, can be applied in this situation. Measures can be taken to avoid conflicts when more than one user 69 tries to change the parameter settings in his region, especially around the borderlines of the respective regions. This possible conflict can be solved by allowing only one proposal to change the parameters. The system signals succeeding users

trying to change the same parameters that an earlier proposal has already been made including the data of that particular user.

Another modification may be that proposals can be stored instead of being implemented immediately. This option is particularly relevant in the framework of more projects. Several projects can be identified, e.g. mass-updates involving future ~~optimalisation~~ optimization of large numbers of parameters or the pre-integration of new network elements. More projects may be planned simultaneously based on the same set of data. In order to avoid conflicts between projects it is possible to establish a 'frozen state' for a limited period.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): Method for checking at least one modified parameter ~~and/or value~~ obtained from changing at least one operational parameter ~~and/or value~~ of an at least one component of a radio network wherein said checking is performed on the basis of at least one business rule comprising at least one operational requirement deduced from operational use of the radio network and deviating from at least one technically sufficient parameter setting requirement.

Claim 2 (currently amended): Method according to claim 1 wherein the at least one modified parameter ~~and/or value~~ is checked before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter ~~and/or value~~ from the radio network;

changing the at least one operational parameter ~~and/or value~~ to the at least one modified parameter ~~and/or value~~;

checking the at least one modified parameter ~~and/or value~~ by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

Claim 3 (original): Method according to claim 2 wherein a non-compliance signal is generated if the at least one modified parameter does not obey the at least one operational requirement.

Claim 4 (previously presented): Method according to claim 2 in which the at least one operational parameter is stored in a first part of the database and the at least one modified parameter is stored in a second part of the database.

Claim 5 (original): Method according to claim 4 in which the first and second part of the database are separate databases.

Claim 6 (previously presented): Method according to claim 2 in which at least one of the at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique.

Claim 7 (previously presented): Method according to claim 2 in which the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter.

Claim 8 (original): Method according to claim 7 in which the at least one hierarchy table is used for checking whether the at least one modified parameter obeys the at least one selected business rule.

Claim 9 (previously presented): Method according to claim 1 in which the at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy.

Claim 10 (original): Method according to claim 9 in which the levels of the GSM network hierarchy are MSC, OMC, BSC, BCF and/or BTS.

Claim 11 (previously presented): Method according to claim 9 in which the levels of the GSM network hierarchy are TRX, HO and/or CH.

Claim 12 (previously presented): Method according to claim 1 in which the at least one modified parameter relates to at least one level of a GPRS hierarchy.

Claim 13 (original): Method according to claim 12 in which the levels of the GPRS hierarchy are MSC, OMC, BSC, SGSN, BCF and/or BTS.

Claim 14 (original): Method according to claim 13 in which the levels of the GPRS hierarchy are TRX, HO and/or CH.

Claim 15 (currently amended): Method according to claim 9 in which the checking of the at least one modified parameter ~~and/or value~~ by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy.

Claim 16 (previously presented): Method according to claim 9 wherein relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network.

Claim 17 (previously presented): Method according to claim 1 in which the at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network.

Claim 18 (previously presented): Method according to claim 1 in which the at least one operational practice requirement involves an administrative requirement.

Claim 19 (original): Method according to claim 17 in which the operational practice requirement involves a technically preferable requirement programmed, ordered and/or influenced by the operator of the radio network.

Claim 20 (original): Method according to claim 3 in which the non-compliance signal is a file or message displayed to an operator.

Claim 21 (previously presented): Method according to claim 3 in which the non-compliance signal is programmable.

Claim 22 (currently amended): A system for checking at least one modified parameter ~~and/or value~~ obtained from changing at least one operational parameter ~~and/or value~~ of at least one component of a radio network, wherein said system is adapted to perform said checking on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network and deviating from at least one technically sufficient parameter setting requirement.

Claim 23 (currently amended): System according to claim 22 for checking the at least one modified parameter ~~and/or value~~ before implementation in the radio network, comprising:

a first part of a database to store the at least one operational parameter ~~and/or value~~ from the radio network

a second part of a database to store the at least one modified parameter ~~and/or value~~;

a business rule checker verifying whether the at least one modified parameter ~~and/or value~~ obeys the at least one operational requirement.

Claim 24 (previously presented): System according to claim 23 wherein a signal generator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement.

Claim 25 (previously presented): System according to claim 23 further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker.

Claim 26 (currently amended): Radio network comprising at least one component comprising at least one operational parameter ~~and/or value~~ that can be changed to at least one modified parameter ~~and/or value~~ wherein the at least one modified parameter ~~and/or value~~ can be checked on the basis of at least one business rule derived from operational use of the radio network deviating from at least one technically sufficient parameter setting requirement.

Claim 27 (original): Radio network according to claim 26 wherein the at least one operational parameter and the at least one modified parameter relate to at least one level of a GSM, DCS or GPRS hierarchy of the radio network.

Claim 28 (currently amended): Computer program for running on a computer system comprising software code portions for checking at least one modified parameter ~~and/or value~~ obtained from changing at least one operational parameter ~~and/or value~~ of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network and deviating from at least one technically sufficient parameter setting requirement.

Claim 29 (currently amended): Computer program for running on a computer system comprising software code portions for checking the at least one modified parameter ~~and/or value~~ before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter ~~and/or value~~ from the radio network;

changing the at least one operational parameter ~~and/or value~~ to the at least one modified parameter ~~and/or value~~;

checking the at least one modified parameter ~~and/or value~~ by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

Claim 30 (previously presented): Computer program according to claim 28 wherein at least one of the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique.

Claim 31 (currently amended): Data carrier stored with data loadable in a computer memory said data representing a computer program for running on a computer system at least including software code portions for checking at least one modified parameter ~~and/or value~~ obtained from changing at least one operational parameter ~~and/or value~~ of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational

requirement derived from operational use of the radio network and deviating from at least one technically sufficient parameter setting requirement.

Claim 32 (currently amended): Data carrier according to claim 31 wherein software code portions are provided for checking the at least one modified parameter ~~and/or value~~ before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter ~~and/or value~~ from the radio network;

changing the at least one operational parameter ~~and/or value~~ to the at least one modified parameter ~~and/or value~~;

checking the at least one modified parameter ~~and/or value~~ by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

Claim 33 (canceled)

**REMARKS/ARGUMENTS**

In view of both the amendments presented above and the following discussion, the Applicants submit that none of the claims now pending in the application is obvious under the provisions of 35 USC §§ 102 and 103. Furthermore, the Applicants also submit that all of these claims now satisfy the requirements of 35 USC § 112. Thus, the Applicants believe that all of these claims are now in allowable form.

If the Examiner believes that there are any unresolved issues in any of the claims now pending in the application, the Examiner is urged to telephone Ms. Alberta A. Vitale, Esq. at (203) 469-8097 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Specification Objections

The Examiner states at page 2, paragraph 1 of the Office action:

> The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code in the specification at page 7 line 19, page 8 line 19 & 23 and page 10 line 14. See MPEP§ 608.01.

Applicants have reviewed the references to the specification which state: "parameters and/or values uploaded from the radio network 1" (page 7, line 19); "Therefore the various parameters and/or values can be" (page 8, line 19); aspect of the invention for storing the parameters and/or" (page 8, line 23); and "control function before parameters and/or values are" (page 10, line 14). The objection to "embedded hyperlink and/or other form of browser-executable code" is not understood by Applicants. Applicants respectfully request the Examiner to clarify the objection so that Applicants can understand what part, if any, of the Specification is "hyperlink" or "browser-executable code".

The Office action states: "The disclosure is objected to because of the following informalities: On page 2 the number 5343798 should apparently be corrected as 5434798. Appropriate correction is required." Applicants note that a typographical error was made and has been corrected herein so that the patent number reads "5,434,798". Applicants thank the Examiner for bringing the error to their attention.

Claim Amendments

Claims 1, 2, 15, 22, 23, 26, 28, 29, 31 and 32 have been amended.

Claim 33 has been cancelled.

In particular, claims 1, 22, 26, 28 and 31 have been amended by adding that the operational use requirement is "deviating from at least one technically sufficient parameter setting requirement". Support for the amendment can be found in the Specification, as filed, at page 4, lines 3-4. Clearly, the present invention solves the problem as discussed in the Specification, as filed, at page 4, line 32 to page 5, line 7; and page 10, line 13 to page 11, line 11.

Applicants respectfully note that the use of the word "sufficient" as introduced in the amended claims is not indefinite. The word "sufficient" is clear within the context of the present application. This is illustrated by referring to the paragraph ranging from page 10, line 31 to page 11, line 11, wherein a "preferred technical requirement" is contrasted with "technical sufficient requirements". The message of this paragraph is that a technical requirement that is theoretically sufficient does not guarantee a more reliable operation of the radio network, while a preferred technical requirement "guarantees a more reliable operation". The invention allows checking of business rules comprising such preferable technical requirements.

Rejections under 35 U.S.C. § 112

The Office action, at pages 2-3, paragraph 2, states that:

> Claims 1-32 contain the term "and/or". This term is unclear if the claim intends for the terms "parameter" and "value" to be different things (different types of data) or if it simply intends for them to be synonyms for one another. If the former, the specification does not support this. If the later (which in how they are currently being interpreted by the examiner), the claims should be amended to recite only one of the terms because it is not clear whether the claims require both elements or a single element.

Applicants deleted the phrase "and/or value" from claims 1, 2, 15, 22, 23, 26, 28, 29, 31 and 32. In the amended form, use of the term "parameter" implies both the parameter as such and the value of a parameter.

The Office action further states that with respect to claim 23, which references claims 3 and 31, is "unclear". Applicants cancelled claim 33 herein.

Rejections under 35 U.S.C. § 102

The Office action has rejected claims 1-5, 7, 8, 17-24, 26, 28, 29 and 31-33 under the provisions of 35 USC § 102 as being anticipated over the teachings in the Madebrink patent (United States patent 5,434,798 issued to Madebrink et al on July 18, 1995 (hereinafter Madebrink)). The amendments made herein overcome the rejection. This rejection is also traversed.

Applicants address the rejection in the context of independent claims 1, 22, 26, 28, 29 and 31. Madebrink fails to teach each and every element of Applicants'

claimed invention including Applicants' "deviating from at least one technically sufficient parameter setting requirement".

Madebrink discloses "a method and apparatus for reconfiguration of a cellular network." (Col. 1, lines 9-10). The Madebrink method involves copying of network parameters to a database, changing the copied parameters and verifying the consistency of the proposed changes in a consistency check. The consistency check involves checking whether technical requirements for the parameters as mentioned are fulfilled. In particular, Madebrink describes, at column 13, lines 16-59, verification of the power level relationship between the cells, hand-off and location thresholds and intra- and inter-exchange hand-off relationships. In contrast, the check according to Applicants' invention involves a check of at least one operational requirement deduced from operational use and deviating from technically sufficient parameter setting requirements. (See specification pages 10-11).

The Examiner opines, that Madebrink column 3, lines 16-17 discloses an "operational requirement deduced from operational use of the radio network." (Office action, page 3, paragraph 3, last two sentences). Applicants do not understand how the citation could possibly provide any teaching of the claim. Cell splitting and cell combining due to changes in traffic are indeed situations that regularly occur in a radio network. Note that in

Madebrink, col. 3, lines 15-25, the list relates only to activities:

> 1. cell splitting and cell combining due to changes in traffic; 2. cell reassignment to mobile switching centers due to changes in the number of mobile switching centers; 3. temporary or permanent cell reassignments due to malfunctioning units, for example, base stations or mobile switching centers; and 4. cell parameter changes due to engineering changes, for example, changes in the frequency plan.

Applicants describe activities, as well, at page 2, line 30 to page 3, line 8, which states:

> Typically a cellular radio network comprises several MSC's and a larger number of base stations. Operation of such cellular radio networks requires a high degree of flexibility in the sense that configuration and reconfiguration of the cellular network has to be possible within a limited period of time and with a high degree of accuracy. Such a reconfiguration of a radio network can be permanent or temporarily. Reasons for such a reconfiguration are numerous, e.g. a temporary cell split needed to deal with an expected increase in traffic due to an event or the permanent integration of new elements both affecting the settings of already existing elements in the radio network.

Note however, that these activities only highlight the necessity of modifying the parameters of the radio network and do not as such disclose or even suggest to verify the consistency of the modified parameter either by the method of Madebrink or the method of the present invention.

Accordingly, the portion of Madebrink cited by the Examiner is irrelevant with regard to the operational requirement. Only further in the specification of Madebrink, the consistency check is introduced. As explained above, the consistency check of Madebrink essentially differs from the check of the present invention in the nature of the requirements - technical v. operational - that may be used in the verification of the parameters.

The difference in requirements has an important effect. The technical effect is to obtain more certainty on the reliability of the radio network after the network parameters have been modified. As an example of the difference between technical and operational requirements, technical requirements are typically less strict than operational requirements. This can be understood from the explanation in Applicants' specification, at page 10, line 31 to page 11, line 11 which states:

> Moreover it is preferable that the bare technical sufficient requirements can be altered according to rules obtained from daily operational use of the radio network. It can e.g. be technically sufficient to have a channel distance of 20 Hz between different cells. All channel distances above this value then will pass the bcc/bcch consistency check. However, in practice it may be that a channel difference of 50 Hz between the cells guarantees a more reliable operation. In that case, according to the invention, it is possible to use the preferred channel distance of 50 Hz as obtained from the operational practice as a business rule instead of the technically sufficient channel distance. Such a technical

requirement will hereinafter referred to as a preferred technical requirement.

Further, operational requirements may involve other requirements that are not required from a technical point of view. The application gives the example of administrative data (page 10, lines 23-24: "e.g. administrative data should preferably be checked as well").

In conclusion, Madebrink does not anticipate independent claims 1, 22, 26, 28, 29 and 31. Further, based upon their dependency from one of these independent claims, dependent claims 2-5, 7, 8, 17-21, 23-24, 29, 32-33 are also not anticipated by Madebrink.

Rejections under 35 U.S.C. § 103

The Office action has rejected claims 9-11, 15, 16 and 25 under the provisions of 35 USC § 103 as being obvious over the teachings in the Madebrink patent taken in view of the Kauhanen application (United States patent application publication US 2003/0157935 A1 applied for by Timo Kauhanen and published on August 1, 2003 (hereinafter Kauhanen)).

The Office action has also rejected claims 12-14 and 27 under the provisions of 35 USC § 103 as being obvious over the teachings Madebrink taken in view of the Arimijoo application (United States patent application

publication US 2001/0041575 A1 applied for by Shahrokh Arimijoo et al and published on November 15, 2001 (hereinafter Arimijoo)).

Additionally, the Office action has rejected claims 6 and 30 under the provisions of 35 USC § 103 as being obvious over the teachings in Madebrink taken in view of the Burrows application (United States patent application publication US 2002/0138509 A1 applied for by Michael Burrows et al and published on September 26, 2002 (hereinafter Burrows)).

The obviousness rejections are respectfully traversed herein. All of the dependent claims that are the subject of the obviousness rejections depend, either directly or indirectly, from one of the following independent claims: 1, 22, 26 or 28. Each of the obviousness rejections cites Madebrink in combination with Kauhanen, Armijoo or Burrows. Since neither Madebrink alone, nor Madebrink in combination with Kauhanen, Armijoo or Burrows disclose checking "at least one operational requirement derived from operational use of the radio network and deviating from at least one technically sufficient parameter setting requirement" (claims 1, 22, 28) or "at least one business rule derived from operational use of the radio network deviating from at least one technically sufficient parameter setting requirement" (claim 26), Applicants' invention is not obvious.

Applicants traverse these rejections and address each of the secondary references below.

1. Madebrink in view of Kauhanen

Kauhanen relates to a method in situations where "handover is to be accomplished between the nodes of different communication systems." (Kauhanen, para. 0009). The disclosure of Kauhanen bears no relation to the present invention of modifying parameter settings as a result of network reconfiguration and checking thereof. Hence, there is no teaching, suggestion or motivation to combine Madebrink and Kauhanen. The disclosure in Kauhanen's Figs. 1 and 2 of a network hierarchy of levels, known as such, is irrelevant in this respect. Also the "parameters" of Kauhanen are not the same as Applicants claimed "parameter". The only similarity between Applicants' "parameter" and Kauhanen's "parameters" is that they are named similarly. Mere similarity is nomenclature is not enough to provide teaching of Applicants' claimed invention. Furthermore, the skilled person, consulting Kauhanen, is not taught, suggested or motivated to perform consistency checks relating to operational requirements for the levels specified in claims 9-11, 15, 16 and 25 of the present invention.

2. Madebrink in view of Amirijoo

Amirijoo discloses a method to locate the position of a specific type of GRPS mobile in a

GSM-network. (Amirijoo, para. 0005). A skilled person would not combine this Amirijoo with Madebrink, since it bears no relation to the present invention of modifying parameter settings as a result of network reconfiguration and checking thereof. The fact that Amirijoo refers to levels of a GPRS network hierarchy, known as such, is irrelevant in this respect. The skilled person, consulting Amirijoo, is not provided any teaching, suggestion or motivation to perform consistency checks relating to operational requirements for the levels specified in claims 12-14 and 27 of the present invention.

3. Madebrink in view of Burrows

Finally, Burrows discloses a "system and method for storing connectivity information in a web database." (Burrows, Title). More specifically, Burrows discloses how to "efficiently" store addresses of web pages using page link information. (See Burrows para. 0001). Burrows does not even relate to radio networks. Burrows is nonanalogous art, directed "generally to web crawlers and other systems that maintain a database of information about web pages, and particularly to a data structure for efficiently representing link information in a web database." (Burrows, para. 0001).

Generally, this issue of whether art is analogous turns on whether the inventor of the present invention "[w]ould reasonably be motivated to go to the field in which the Examiner found the reference in order to solve

the problem confronting the inventor." In Re Oetiker, 24 U.S.P.Q.2d 1443, at 1446 (Fed. Cir. 1992). To qualify as analogous art, a reference must satisfy a two part test and must be: (1) within the inventor's field of endeavor and (2) prudent to the inventor's particular problem. Burrows does not pass the two-part test; the reasons are set out as follows: First, Burrows is not related to the inventors' field of endeavor. Burrows is relates to the field of web crawlers for fetching web pages Burrows is not related to Applicant's field of endeavor, "checking various parameters of components of a cellular radio networks on the basis of business rules." Second, Burrows is not pertinent to the inventors' particular problem. Applicant's problem is related to reliability, flexibility and accuracy required for operating cellular radio networks. (Page 4, lines 20-22). Burrows addresses the problem of efficient storage of a large number of web pages in a web database. (Burrows, para. 0004).

For these reasons, Applicants would not have been reasonably motivated to go to the field of web crawlers, in which the Examiner found the Burrows reference in order to solve the problem of reliability of cellular networks confronting the inventors. Since Burrows fails the two-part test, it is nonanalogous art and Applicants respectfully request that rejection based upon Madebrink in view of Burrows be withdrawn.

For the above stated reasons with respect to the obviousness rejections, independent claims 1, 22, 26 and 28

are not obvious and dependent claims 6, 9-11, 12-14, 15, 16, 25, 27 and 30 are also not obvious.

Conclusion

Thus, the Applicants submit that none of the claims, presently in the application, is anticipated under the provisions of 35 USC § 102 or obvious under the provisions of 35 USC § 103. Furthermore, the Applicants also submit that all of these claims now fully satisfy the requirements of 35 USC § 112.

Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

Respectfully submitted,

May 23, 2005

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**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **May 24, 2005** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to:

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Peter L Kleinman 30,090

Signature Reg. No.

(PTT119AMEND/ca:148)

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# PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number: PTO/SB/AP/A (40570[illegible])

## CLAIMS AS FILED - PART I

| | (Column 1) | (Column 2) |
|---|---|---|
| TOTAL CLAIMS | 33 | |
| FOR | NUMBER FILED | NUMBER EXTRA |
| TOTAL CHARGEABLE CLAIMS | 33 minus 20= | * 13 |
| INDEPENDENT CLAIMS | 6 minus 3 = | * 3 |
| MULTIPLE DEPENDENT CLAIM PRESENT | ☐ | |

* If the difference in column 1 is less than zero, enter "0" in column 2

| SMALL ENTITY TYPE ☐ | | OR | OTHER THAN SMALL ENTITY | |
|---|---|---|---|---|
| RATE | FEE | | RATE | FEE |
| BASIC FEE | 370.00 | OR | BASIC FEE | 740.00 |
| X$ 9= | | OR | X$18= | 234.00 |
| X42= | | OR | X84= | 252.00 |
| +140= | | OR | +280= | |
| TOTAL | | OR | TOTAL | 1226.00 |

## CLAIMS AS AMENDED - PART II

AMENDMENT A

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * 32 | Minus | ** 33 | = |
| Independent | * 6 | Minus | *** 3 | = 3 |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | ☐ | | | |

| SMALL ENTITY | | OR | OTHER THAN SMALL ENTITY | |
|---|---|---|---|---|
| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

AMENDMENT B

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * | Minus | ** | = |
| Independent | * | Minus | *** | = |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | ☐ | | | |

| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
|---|---|---|---|---|
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

AMENDMENT C

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * | Minus | ** | = |
| Independent | * | Minus | *** | = |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | ☐ | | | |

| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
|---|---|---|---|---|
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP (402706US/1) | 8186 |

7265 7590 02/24/2005

MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
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RED BANK, NJ 07701

| EXAMINER | |
|---|---|
| NGUYEN, QUYEN VAN | |
| **ART UNIT** | **PAPER NUMBER** |
| 2682 | |

DATE MAILED: 02/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/188,538 | OLDENBURG ET AL. | |
| | Examiner | Art Unit | |
| | Quyen V. Nguyen | 2682 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *07/03/2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 July 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/09/2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code in the specification at page 7 line 19, page 8 line 19 & 23 and page 10 line 14. See MPEP§ 608.01.

The disclosure is objected to because of the following informalities: On page 2 the number 5343798 should apparently be corrected as 5434798. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-32 contain the term "and/or". This term is unclear if the claim intends for the terms "parameter" and "value" to be different things (different types of data) or if it simply intends for them to be synonyms for one another. If the former, the specification does not support this. If the later (which in how they are currently being interpreted by the examiner), the claims should be amended

to recite only one of the terms because it is not clear whether the claims require both elements or a single element.

Regarding to claim 33, It is unclear which claims (3 or 31 or both) that claim 33 depends upon. The current claim construction makes it unclear if is intended to be to be a multiple dependent claim (which it is not in the proper form for) or is to include the limitations of both claims. The claim is being interpreted in the later manner and it is suggested that the claim be amended to remove one of the dependencies.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5,7,8,17-24,26,28,29,31-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Madebrink et al. (US Patent Number 5,434,798).

Regarding to claim 1, Madebrink discloses a method for checking at least one modified parameter (see Col. 3, lines 39-40) and/or value obtained from changing at least one operational parameter (see Col. 3, lines 16-20) and/or value of and at least one component of a radio network (see Col. 3, lines 48-50) on the basis of at least one business rule (see Col. 3, line 24-25) comprising at least one operational requirement deduced from operational use of the radio network (see Col. 3, lines 16-17).

Specifically with respect to claim 2, Madebrink discloses the at least one modified parameter and/or value is checked before implementation in the radio network (see Col. 4, lines 9-11) comprising the steps of

Copying to a database the at least one operational parameter and/or value from the radio network (see Col. 3, lines 30-34);

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value (see Col. 3, lines 35-38);

checking the at least one modified parameter and/or value by one selected business rule (see Col. 3, lines 24-25) comprising the least one operational requirement has been obeyed (see Col. 3, lines 39-41).

Regarding to claim 3, Madebrink discloses a non-compliance signal is generated if the at least one modified parameter does not obey the at least one operational requirement (see Fig. 4A, [13] and [14]; Col. 11, lines 15-20).

Specifically with respect to claim 4, Madebrink discloses at least one operational parameter is stored in a first part of the database (see Col. 5, lines 20-26, Fig. 3 [SPDB]) and the at least one modified parameter is stored in a second part of the database (see Col. 5, lines 31-34, Fig. 3 [TEDP]).

Regarding to claim 5, Madebrink discloses the first and second part of the database are separate databases (see Fig.3 [SPDP] and [TEDP]).

Specifically with respect to claim 7, Madebrink discloses the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter (see Col.16, Table I; lines 44 [MTCEC] and 48 [MTNCC).

Regarding to Claim 8, Madebrink discloses at least one hierarchy table is used for checking whether the at least one modified parameter obeys the at least one selected business rule (see Col. 16,Table I line 48 & Col. 17, Table II, line 12).

Specifically with respect to claim 17, Madebrink discloses at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network (see Col. 3, lines 54-57).

Regarding to claim 18, Madebrink discloses at least one operational practice requirement involves an administrative requirement (see Col. 3, lines 48-57).

Specifically with respect to claim 19, Madebrink discloses the operational practice requirement involves a technically preferable requirement programmed, ordered and/or influenced by the operator of the radio network (see Col. 3, lines 54-57).

Regarding to claim 20, Madebrink discloses the non-compliance signal is a file or message displayed to an operator (see Fig. 6 [385], Col. 13, lines 60-68).

Specifically with respect to claim 21, Madebrink discloses the non-compliance signal is programmable (see Col.13, lines 16-21).

Regarding to claim 22, Madebrink discloses a system for checking at least one modified parameter (see Col. 3, lines 39-40) and/or value obtained from changing at least one operational parameter (see Col. 3, lines 16-20) and/or value of at least one component of a radio network (col. 3, lines 48-50) on the basis of at least one business rule (see Col. 3, lines 24-25) comprising at least

one operational requirement derived from operational use of the radio network (see Col. 3, lines 16-17).

Specifically with respect to claim 23, Madebrink discloses for checking the at least one modified parameter and/or value before implementation in the radio network (see Col. 4, lines 9-11) comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network (see Col. 5, lines 20-26, Fig. 3 [SPDB]).

a second part of a database to store the at least one modified parameter and/or value (see Col. 5, lines 31-34, Fig. 3 [TEDP]).

a business rule checker verifying whether the at least one modified parameter (see Col. 3, line 24-25) and/or value obeys the at least one operational requirement (see Col. 3, lines 16-17).

Regarding to claim 24, Madebrink discloses a signal generator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement (see Fig. 4A [13] and [14]; Col. 11, lines 15-20).

Specifically with respect to claim 26, Madebrink discloses radio network comprising at least one component (see Col. 3, lines 48-50) comprising at least one operational parameter and/or value that can be changed to at least one modified parameter (see Col. 3, lines 16-20) and/or value wherein the at least one modified parameter and/or value can be checked (see Col. 3, lines 39-40) on the basis of at least one business rule (see Col. 3, line 24-25) derived from operational use of the radio network (see Col. 3, lines 16-17).

Regarding to claim 28, Madebrink discloses computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network (see Col. 6, lines 24-33).

Specifically with respect to claim 29, Madebrink discloses computer program for running on a computer system comprising software code portions for checking the at least one modified parameter and/or value before implementation in the radio network (see Col. 6, line 24-28) comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network (see Col. 6, lines 38-40).

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value (see Col. 6, lines 28-33).

checking the at least one modified parameter (see Col. 6, lines 30-33) and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed (see Col. 6, lines 34-37).

Regarding to claim 31, Madebrink discloses data carrier stored with data loadable in a computer memory said data representing a computer program for running on a computer system at least including software code portions for checking at least one modified parameter and/or value obtained from changing at

least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network (see Col. 6, lines 24-29).

Specifically with respect to claim 32, Madebrink discloses software code portions are provided for checking the at least one modified parameter and/or value before implementation in the radio network (see Col. 6, lines 24-28) comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network (see Col. 6, lines 38-40).

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value (see Col. 6, lines 28-33).

checking the at least one modified parameter (see Col. 6, lines 30-33) and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed (see Col. 6, lines 34-37).

Regarding to claim 33, refer back to the rejections of claims 3 and 31 which are met by Madebrink. Madebrink also discloses software code portions are provided for executing the above method (see Col. 6, lines 24-28).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

> be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

a. Claims 9-11,15,16,25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Kauhanen (US 2003/0157935 A1).

Regarding to claim 9, Madebrink disclose method for checking at least one modified parameter (see Col.3, lines 39-40) and/or value obtained from changing at least one operational parameter (see Col. 3, lines 16-20) and/or value of and at least one component of a radio network (see Col. 3, lines 48-50) on the basis of at least one business rule (see Col. 3, lines 24-25) comprising at least one operational requirement deduced from operational use of the radio network (see Col. 3, lines 16-17). However, Madebrink fails to teach at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy. Kauhanen discloses at least one modified parameter (see Col. 2, [0015]) relates to at least one level of a GSM (see Fig. 1 (12)) or DCS network hierarchy. Therefore, It would have been obvious to one of ordinary skill in this art at the time of invention was made to provide the system of Madebrink with one level of GSM (Global System for Mobile communications). The level of GSM standard would generate detectable radio interference to be able to efficiently control the total traffic of the radio network and allows eight simultaneous calls on the same radio frequency. Also, GSM was first introduced in 1991 (Telecommunication Dictionary).

Specifically with respect to claim 10, the combination of teachings of Madebrink and Kauhanen further discloses the levels of the GSM network hierarchy are MSC (see Kauhanen, Fig. 2 [12]), OMC, BSC (see Kauhanen, Fig. 2 [34]), BCF and/or BTS (see Kauhanen, Fig. 2 [30]).

Regarding to claim 11, the combination of teachings of Madebrink and Kauhanen further discloses the levels of the GSM network hierarchy are TRX , HO (see Kauhanen, Col. 3 [0038] Handover) and/or CH.

Specifically with respect to claim 15, the combination of teachings of Madebrink and Kauhanen further discloses at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy (see Kauhanen Page 2, [0019] and [0026]).

Regarding to claim 16, the combination of teachings of Madebrink and Kauhanen further discloses relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network (see Kauhanen, Page 2 [0018]).

Regarding to claim 25, Madebrink discloses for checking the at least one modified parameter and/or value before implementation in the radio network (see Col.4, lines 9-11), comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network (see Col. 5, lines 20-26, Fig. 3 [SPDB]).

a second part of a database to store the at least one modified parameter and/or value (see Col. 5, lines 31-34, Fig. 3 [TEDP]).

a business rule checker verifying whether the at least one modified parameter (see Col. 3, lines 24-25) and/or value obeys the at least one operational requirement (see Col. 3, lines 16-17). Madebrink further teaches that the system further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker (Madebrink Col. 13, lines 60-68).

b. Claims 12-14,27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Arimijoo et al. (US 2001/0041575 A1).

Regarding to claim 12, Madebrinks discloses method for checking at least one modified parameter (see Col. 3, lines 39-40) and/or value obtained from changing at least one operational parameter (see Col. 3, lines 16-20) and/or value of and at least one component of a radio network (see Col. 3, lines 48-50) on the basis of at least one business rule (see Col. 3, lines 24-25) comprising at least one operational requirement deduced from operational use of the radio network (see Col. 3, lines 16-20)). However, Madebrink fails to teach at least one modified parameter relates to at least one level of a GPRS hierarchy. Amirijoo discloses at least one modified parameter (see Col. 3, [0033] modified power parameter from GPRS) relates to at least one level of a GPRS hierarchy (see Fig. 1). Therefore, It would have been have been obvious to one of ordinary skill in this art at the time of invention was made to have modified the system of

Madebrink by including the level of GPRS to be able to efficiently speed up the system, supports a wide range of bandwidths and suits for sending and receiving small bursts of data (Telecommunication Dictionary).

Specifically with respect to claim 13, the combination of teachings of Madebrink and Amirijoo further discloses, the levels of the GPRS hierarchy are MSC (see Amirijoo Fig. 1 [22]).

Regarding to claim 14, the combination of the teachings of Madebrink and Amirijoo further discloses the levels of the GPRS hierarchy are CH (see Amirijoo Page 1, [0008] with (PDCH) physical data channel).

Specifically with respect to claim 27, Madebrink discloses radio network comprising at least one component (see Col. 3, lines 48-50) comprising at least one operational parameter and/or value that can be changed to at least one modified parameter (see Col. 3, lines 16-29) and/or value wherein the at least one modified parameter and/or value can be checked (see Col. 3, lines 39-40) on the basis of at least one business rule (see Col. 3, lines 24-25) derived from operational use of the radio network (see Col 3, lines 16-17). However, Madebrink fails to teach at least one operational parameter and the at least one modified parameter relate to at least one level of a GSM, DCS or GPRS hierarchy of the radio network. Amirijoo discloses at least one operational parameter (see Col. 3, [0033]) and the at least one modified parameter (see Col. 3, [0033]) relate to at least one level of a GSM, DCS or GPRS (see Fig. 1) hierarchy of the radio network. Therefore, It would have been obvious to one of ordinary skill in this art at the time of invention was made to have modified the

system of Madebrink by including the level of GPRS to able to efficiently speed up the system, supports a wide range of bandwidths and suits for sending and receiving small bursts of data (Telecommunication Dictionary).

c. Claims 6,30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Madebrink et al. (US Patent Number 5,434,798) in view of Burrows et al. (US 2002/0138509 A1).

Regarding to claim 6, Madebrink discloses the at least one modified parameter and/or value is checked before implementation in the radio network (see Col. 4,lines 9-10) comprising the steps of

copying database the at least one operational parameter and/or value from the radio network (see Col. 3, lines 30-34);

changing the least one operational parameter and/or value to the least one modified parameter and/or value (see Col. 3, lines 35-38);

checking the at least one modified parameter and/or value by one selected business rule (see Col. 3, lines 24-25) comprising the least one operational requirement has been obeyed (see Col. 3, lines 39-41). However, Madebrink fails to teach at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique. Burrows discloses at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique (see Figs 5,6 and Col. 1, [0012] and [0013]). Therefore, It would have been obvious to one of ordinary skill in this art at the time of invention was made by Madebrink to include the compressed row technique of Burrows to compress the data in

database to be able to reduce the memory to store a file, and take less time to transfer it.

Specifically with respect to claim 30, Madebrink discloses computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network (Madebrink Col. 6, lines 24-33). However, Madebrink fails to teach at least one of the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique. Burrows discloses at least one of the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique (see Figs 5, 6 and Col. 1, [0012], [0013]). Therefore, It would have been obvious to one of ordinary skill in this art at the time of invention was made by Madebrink to include the compressed row technique of Burrows in compressing data in database to be able to take up less space to store a file in memory and less time to transfer it.

***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quyen V. Nguyen whose telephone number is (703) 305-0219. The examiner can normally be reached on 8:30-1700.

If attempts to reach the examiner by phone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 703-308-6739. The fax

number for the organization where this application or proceeding is assigned 703-305-9508.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Quyen V. Nguyen

Examiner

Art Unit 2682

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

2/18/2005

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PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(use as many sheets as necessary)*

Sheet 1 of 2

| *Complete if Known* | |
|---|---|
| Application Number | 10/188,538 |
| Filing Date | July 3, 2002 |
| First Named Inventor | Joannes W.M. OLDENBURG |
| Art Unit | 2681 |
| Examiner Name | |
| Attorney Docket Number | PTT-119/APP |

## U.S. PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Document Number: Number - Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear, Class/SubClass |
|---|---|---|---|---|---|
| QW | AA. | US- 6,185,437 | Feb. 6, 2001 | Bark | 455/560 |
| QW | AB. | US- ~~6,085,333~~ 6085335 | July 4, 2000 | ~~Dijoko~~ et al Djoko | 714/26 |
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## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| QW | AC. | DE 198 13 754 | Sept. 30, 1999 (with English abstract) | | | |
| QW | AD. | WO 92/21182 | Nov. 26, 1992 | | | |

(Communication and European Search Report also submitted)

| Examiner Signature | | Date Considered | 12/22/04 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(use as many sheets as necessary)*

Sheet 2 of 2

| Complete if Known | |
|---|---|
| Application Number | 10/188,538 |
| Filing Date | July 3, 2002 |
| First Named Inventor | Joannes W.M. |
| Group Art Unit | 2681 |
| Examiner Name | |
| Attorney Docket Number | PTT-119/APP |

## OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[2] |
|---|---|---|---|
| QN | AE. | Lucian Hirsch, "Einheitliches Verfahren zur Plausibilitätskontrolle der Konfigurationsänderungen von Radioparametern in einem Mobilfunknetz", Siemens Technik Report, Jahrgang 2, Nr. 2, January 1999, pps. 52-56. (with English-language translation) | |

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Technology Center 2600

| Examiner Signature | | Date Considered | 12/22/04 |
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(PTT119SB08A/ca:89)

| Notice of References Cited | Application/Control No. 10/188,538 | Applicant(s)/Patent Under Reexamination OLDENBURG ET AL. | |
|---|---|---|---|
| | Examiner Quyen V. Nguyen | Art Unit 2682 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| | A | US-5,434,798 | 07-1995 | Madebrink et al. | 709/221 |
| | B | US-2001/0041575 A1 | 11-2001 | AMIRIJOO et al. | 455/456 |
| | C | US-2003/0157935 A1 | 08-2003 | Kauhanen, Timo | 455/436 |
| | D | US-2002/0138509 A1 | 09-2002 | Burrows et al. | 707/501.1 |
| | E | US- | | | |
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**FOREIGN PATENT DOCUMENTS**

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**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
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*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
Washington, DC 20231
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Bib Data Sheet

**CONFIRMATION NO. 8186**

| SERIAL NUMBER | FILING DATE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002<br>RULE | 455 | 2681 | PTT-119/APP<br>(402706US/1) |

**APPLICANTS**

Joannes Willem Maria Oldenburg, Delft, NETHERLANDS;
Pierre Arnold, Rotterdam, NETHERLANDS;
Hermann Petrus Breurken, Harkstede, NETHERLANDS;
Gijsbert Van Veenendaal, Ede, NETHERLANDS;

** CONTINUING DATA ********** Yes RW

This appln claims benefit of 60/303,933 07/09/2001

** FOREIGN APPLICATIONS ********** Yes RW

EUROPEAN PATENT OFFICE (EPO) 01203820.4 10/09/2001

**IF REQUIRED, FOREIGN FILING LICENSE GRANTED**
** 08/08/2002

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|---|---|---|---|---|---|
| Foreign Priority claimed ☑ yes ☐ no<br>35 USC 119 (a-d) conditions met ☑ yes ☐ no ☐ Met after Allowance<br>Verified and Acknowledged Examiner's Signature Initials | STATE OR COUNTRY<br>NETHERLANDS | SHEETS DRAWING<br>7 | TOTAL CLAIMS<br>33 | INDEPENDENT CLAIMS<br>6 |

**ADDRESS**
007265

**TITLE**
System and method for checking parameter settings of radio networks

| FILING FEE RECEIVED | FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following: | ☐ All Fees<br>☐ 1.16 Fees ( Filing )<br>☐ 1.17 Fees ( Processing Ext. of time )<br>☐ 1.18 Fees ( Issue )<br>☐ Other _____<br>☐ Credit |
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## Index of Claims

| Application/Control No. | Applicant(s)/Patent under Reexamination |
|---|---|
| 10/188,538 | OLDENBURG ET AL. |
| **Examiner** | **Art Unit** |
| Quyen V. Nguyen | 2682 |

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| Final | Original | 12/21/04 |
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| Search Notes | Application/Control No. | Applicant(s)/Patent under Reexamination | |
|---|---|---|---|
| | 10/188,538 | OLDENBURG ET AL. | |
| | Examiner | Art Unit | |
| | Quyen V. Nguyen | 2682 | |

| SEARCHED | | | |
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| Class | Subclass | Date | Examiner |
| 455 | 418 | 1/13/2005 | QN |
| 455 | 419 | 1/13/2005 | QN |
| 455 | 560 | 1/13/2005 | QN |
| 455 | 420 | 1/19/2005 | QN |
| 455 | 432 | 1/13/2005 | QN |
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| SEARCH NOTES (INCLUDING SEARCH STRATEGY) | | |
|---|---|---|
| | DATE | EXMR |
| Mancuso, Joseph | 12/20/2004 | QN |
| Vo, Nguyen | 12/17/2004 | QN |
| Nguyen, Lee | 12/15/2004 | QN |
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| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| S1 | 1410 | 455/418 | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:17 |
| S2 | 1235 | 455/419 | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:07 |
| S4 | 1613 | 455/560 | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:08 |
| S6 | 639 | (check$4 or verif$3 or ensur$2 or confir$3) adj param$4 | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:15 |
| S9 | 4 | S6 and S1 | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:13 |
| S10 | 106984 | (modif$3 upd$3 chang$3) with parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:26 |
| S11 | 61839 | "455"/$.ccls. | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:19 |
| S12 | 3028 | S10 and S11 | US-PGPUB; USPAT | OR | ON | 2005/01/13 16:20 |
| S13 | 702 | 455/420 | US-PGPUB; USPAT | OR | ON | 2005/01/19 15:04 |
| S14 | 74 | reconfigur$4 adj parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:43 |
| S16 | 1410 | 455/418 | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:10 |
| S17 | 1410 | 455/418 | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:13 |
| S18 | 23 | "5434798" | US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT | OR | ON | 2005/01/13 17:15 |
| S19 | 1940 | 455/432 | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:46 |
| S20 | 2474 | 455/445 | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:47 |
| S21 | 4 | "455" with hierarchy | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:47 |
| S22 | 61839 | "455"/$.ccls. | US-PGPUB; USPAT | OR | ON | 2005/01/13 17:58 |
| S23 | 107062 | (modif$3 upd$3 chang$3) with parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/01/18 16:46 |
| S24 | 472 | S23 with (GSM DCS) | US-PGPUB; USPAT | OR | ON | 2005/01/18 16:47 |
| S25 | 7 | S23 with ho | US-PGPUB; USPAT | OR | ON | 2005/01/18 16:47 |

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| S26 | 3440 | 455/33.1 | US-PGPUB; USPAT | OR | ON | 2005/01/19 15:04 |
| S27 | 107062 | (modif$3 upd$3 chang$3) with parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/01/19 15:06 |
| S28 | 61879 | "455"/$.ccls. | US-PGPUB; USPAT | OR | ON | 2005/01/19 15:06 |
| S29 | 3031 | S27 and S28 | US-PGPUB; USPAT | OR | ON | 2005/01/19 15:07 |
| S30 | 189 | compres$4 adj row$2 | US-PGPUB; USPAT | OR | ON | 2005/01/19 15:09 |
| S31 | 2354 | 364/514 | US-PGPUB; USPAT | OR | ON | 2005/02/04 19:02 |
| S32 | 192 | S31 and reconfigur$6 | US-PGPUB; USPAT | OR | ON | 2005/02/04 19:03 |
| S33 | 108254 | (modif$3 upd$3 chang$3) with parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/02/08 07:34 |
| S34 | 46 | S33 with (GSM DCs) and "455"/$.ccls. | US-PGPUB; USPAT | OR | ON | 2005/02/08 07:34 |
| S35 | 1 | "10/204959" | US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT | OR | ON | 2005/02/11 11:18 |
| S36 | 108508 | (modif$3 upd$3 chang$3) with parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/02/11 13:53 |
| S37 | 27 | S36 with GPRS | US-PGPUB; USPAT | OR | ON | 2005/02/11 15:53 |
| S38 | 2200 | S36 with (compress$3 near$4 row$2) | US-PGPUB; USPAT | OR | ON | 2005/02/11 16:48 |
| S39 | 21 | S38 with databas$2 | US-PGPUB; USPAT | OR | ON | 2005/02/11 15:55 |
| S40 | 65658 | S36 and (compress$3 near$4 row$2) | US-PGPUB; USPAT | OR | ON | 2005/02/11 16:49 |
| S41 | 74 | reconfigur$4 adj parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/02/11 16:50 |
| S42 | 22 | S41 and (compres$3 near$3 row$3) | US-PGPUB; USPAT | OR | ON | 2005/02/11 16:51 |
| S43 | 108508 | (modif$3 upd$3 chang$3) with parameter$3 | US-PGPUB; USPAT | OR | ON | 2005/02/11 17:10 |
| S44 | 62469 | "455"/$.ccls. | US-PGPUB; USPAT | OR | ON | 2005/02/11 17:10 |
| S45 | 3078 | S43 and S44 | US-PGPUB; USPAT | OR | ON | 2005/02/11 17:11 |
| S46 | 1599 | S45 and (compress$3 near$4 row$2) | US-PGPUB; USPAT | OR | ON | 2005/02/11 17:13 |

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| S47 | 559 | S46 and database$2 | US-PGPUB; USPAT | OR | ON | 2005/02/11 17:13 |
| S48 | 1 | "6807227" | US-PGPUB; USPAT | OR | ON | 2005/02/14 09:22 |

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2681 #9 MJ 10/1/02

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PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2681** Confirmation No.: **8186**

Examiner:

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Commissioner for Patents
Washington, D. C. 20231

S I R:

## INFORMATION DISCLOSURE STATEMENT

The applicants respectfully request that the following references be considered in the examination of the above-identified application. A copy of each reference is enclosed. If any of these references were uncovered by an international or foreign search as part of a counterpart application filed by the applicants, then a copy of the search report is also enclosed.

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**United States Patents**

| Patent Number | Date Issued | Inventor | Class |
|---|---|---|---|
| AA. 6,185,437 | Feb. 6, 2001 | Bark | 455/560 |
| AB. 6,085,333 | July 4, 2000 | Dijoko et al | 714/26 |

**German Published Patent Application**

| Publication No. | Date Published |
|---|---|
| AC. 198 13 754 | Sept. 30, 1999 |

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**PCT International Publication**

| Publication No. | Date Published |
|---|---|
| AD. 92/21182 | Nov. 26, 1992 |

**Publication**

AE. Lucian Hirsch, "Einheitliches Verfahren zur Plausibilitätskontrolle der Konfigurationsänderungen von Radioparametern in einem Mobilfunknetz", Siemens Technik Report, Jahrgang 2, Nr. 2, January 1999, pps. 52-56.

**REMARKS**

Under rule 37 C.F.R. 1.98(a) (effective March 16, 1992), since above-cited references (References AA, AB and AD) are in the English language, the applicants submit that no specific comments are necessary for any of these.

An English abstract accompanies the German '754 reference (Ref. AC). An English-language translation accompanies the Hirsch publication (Ref. AE).

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For the Examiner's convenience, the applicants have attached a completed modified form PTO/SB/08A&B hereto.

Respectfully submitted,

October 2, 2002

Peter L. Michaelson, Attorney
Reg. No. 30,090
Customer No. 007265
(732) 530-6671

MICHAELSON & WALLACE
Counselors at Law
Parkway 109 Office Center
328 Newman Springs Road
P.O. Box 8489
Red Bank, New Jersey 07701

**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **October 3, 2002** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to the Commissioner for Patents, Washington, D.C. 20231.

Signature

30,090
Reg. No.

(PTT119DCST/89:ca:ks)

JAPE JC79
OCT 07 2002
PATENT & TRADEMARK OFFICE

PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449A/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(use as many sheets as necessary)*

Sheet 1 of 2

| Complete if Known | |
|---|---|
| Application Number | 10/188,538 |
| Filing Date | July 3, 2002 |
| First Named Inventor | Joannes W.M. OLDENBURG |
| Art Unit | 2681 |
| Examiner Name | |
| Attorney Docket Number | PTT-119/APP |

## U.S. PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Document Number: Number - Kind Code[2] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear, Class/SubClass |
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| | AB. | US- 6,085,333 | July 4, 2000 | Dijoko et al | 714/26 |
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## FOREIGN PATENT DOCUMENTS

| Examiner Initials* | Cite No.[1] | Foreign Patent Document: Country Code[3] -Number[4] - Kind Code[5] (if known) | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | AC. | DE 198 13 754 | Sept. 30, 1999 (with English abstract) | | | |
| | AD. | WO 92/21182 | Nov. 26, 1992 | | | |
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

(PTT119SB08A/ca:89)

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Substitute for form 1449B/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(use as many sheets as necessary)*

Sheet 2 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | 10/188,538 |
| **Filing Date** | July 3, 2002 |
| **First Named Inventor** | Joannes W.M. |
| Group Art Unit | 2681 |
| Examiner Name | |
| Attorney Docket Number | PTT-119/APP |

## OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[2] |
|---|---|---|---|
| | AE. | Lucian Hirsch, "Einheitliches Verfahren zur Plausibilitätskontrolle der Konfigurationsänderungen von Radioparametern in einem Mobilfunknetz", Siemens Technik Report, Jahrgang 2, Nr. 2, January 1999, pps. 52-56. (with English-language translation) | |

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| Examiner Signature | | Date Considered | |
|---|---|---|---|

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[1] Applicant's unique citation designation number (optional). [2] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

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#3

Atty. Doc. No.: _____

**DECLARATION AND**
**POWER OF ATTORNEY**
(Utility Patent Application)

As a below named inventor, I hereby declare:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below), of the subject matter which is claimed and for which a patent is sought on the invention entitled:

"System and method for checking parameter settings of radio networks."

the specification of which:

__ is attached hereto
X was filed on July 9, 2001 as Application Serial No. 60/303,933
with amendment(s) filed _____
__ was filed as PCT international application:
and was amended under PCT Article 19

hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations section 1.56.

I hereby claim foreign priority benefits under Section 119 of Title 35, United States Code for the above-identified US patent application based on the patent or inventor's certificate identified below and having a filing date before that of the US patent application for which priority is claimed:

| Application No | Country | Filing Date | Priority Claimed under 35 USC 119 |
|---|---|---|---|
| 60/303,933 | US | July 9, 2001 | YES |
| 01203820.4 | EP | October 9, 2001 | YES |

I hereby claim the benefit under Section 120 and/or Section 119(e) of Title 35 of the United States Code of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by Section 112 of Title 35 of the United States Code, I acknowledge the duty to disclose material information, as defined in Section 1.56 of Title 37 of the Code of Federal Regulations, which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

| Application Serial No. | Filing Date | Status: Patented | Pending | Abandoned |
|---|---|---|---|---|

Power of attorney:

As a named inventor, I hereby appoint:

Peter L. Michaelson (Reg. No. 30,090)
Robert M. Wallace (Reg. No. 29,119)
Jeremiah G. Murray (Reg. No. 20,533)
John T. Peoples (Reg. No. 28,250)
Ronald L. Drumheller (Reg. No. 25,674)
Edward M. Fink (Reg. No. 19,640)
Christopher Balzan (Reg. No. 40,901)
Eric Agaard (Reg. No. 40,478)
Janet M. Skafar (Reg. No. 41,315)
Arthur L. Liberman (Reg.No. 22,698)

as my attorneys to prosecute this application and to transact all business in the United States Patent and Trademark Office in connection therewith.

Direct all correspondence to Customer Number 007265 at the following address:

MICHAELSON & WALLACE
Parkway 109 Office Center
328 Newman Springs Road
P.O. Box 8489
Red Bank, New Jersey 07701.

Direct all telephone calls to: (732) 530-6671.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

First inventor:

Full name: OLDENBURG (last) Joannes (first) Willem Maria (middle)

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2623 RB DELFT (city, state, zip code) The Netherlands (country)

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post office & box number

2509 CH The Hague (city, state, zip code) The Netherlands (country)

Citizenship: The Netherlands
country

Signature: _____

Date: 01-07-, 2002

Second inventor:

Full name: ARNOLD (last) Pierre (first) (middle)

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Citizenship: The Netherlands
Country

Signature: 

Date: 01 - 07 - 2002

Third inventor:

Full name: BREURKEN (last) Hermann (first) Petrus (middle)

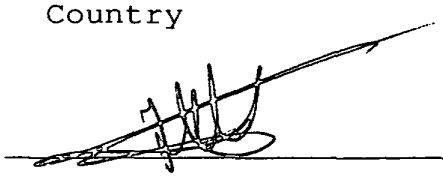
Residence address: Skiramere 5
Street

9617 EK HARKSTEDE (city, state, zip code) The Netherlands (country)

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post office & box number

2509 CH The Hague (city, state, zip code) The Netherlands (country)

Citizenship: The Netherlands
Country

Signature: 

Date: 01-07-2002

Fourth inventor:

Full name: VAN VEENENDAAL Gijsbert
last first middle

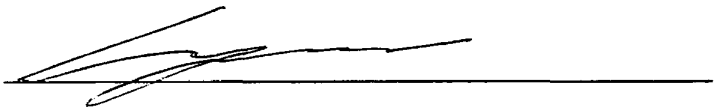
Residence address: Hobbemastraat 14
Street

6717 PP EDE The Netherlands
city, state, zip code country

Post Office address: P.O. Box 95321
post office & box number

2509 CH The Hague The Netherlands
city, state, zip code country

Citizenship: The Netherlands
Country

Signature: 

Date: 01.07.2002

OIPE JC41 SEP 05 2002 PATENT & TRADEMARK OFFICE

MICHAELSON & WALLACE
*A Partnership of Intellectual Property and Technology Lawyers*

Senior and Managing Partner:
Peter L. Michaelson
*NJ, NY, PA, AK Bars*

COPY OF PAPERS ORIGINALLY FILED

August 27, 2002

**PATENT APPLICATION**

Commissioner for Patents
Washington, D. C. 20231

Sir:

In response to a "Notice to File Missing Parts of Nonprovisional Application" (Formalities Letter) we received in connection with the following US patent application:

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2681** Confirmation No.: **8186**

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

We enclose the following material herewith:

XX Postcard receipt;
XX Our check in the amount of $ 1,396.00 to cover the basic filing fee of $ 740.00, additional claim fees in the amount of $ 486.00, the surcharge under 37 CFR 1.16(e) in the amount of $ 130.00 and assignment recordation fee of $ 40.00;
XX Executed Declaration and Power of Attorney (6 pps.);
XX Assignment with Recordation Form Cover Sheet to Koninklijke KPN N.V. (5 pps.); and
XX Copy of Formalities Letter (Notice to File Missing Parts of Nonprovisional Application) issued in connection with this application.

*email:*
*pmichaelson@mandw.com*

*web site:*
*www.mandw.com*

NJ Office (Reply to):

Parkway 109 Office Ctr.
328 Newman Springs Rd.
P.O. Box 8489
Red Bank, NJ 07701
Tel: 732-530-6671
Fax: 732-530-6584/5
Videoconference:
732-224-0132 (ISDN)

Offices also in:
Santa Clara, California

We have also enclosed the following items in connection with this application:

XX A claim to priority (**included in declaration**); and
XX Submission of Priority Documents and Certified copy of European Application No. 01203820.4, filed October 9, 2001 and United States Application No. 60/303,933, filed July 9, 2001.

In the event, we have indicated that a check is enclosed and this check is missing, is for an insufficient amount or is unacceptable in any way, please charge the applicable fees to our Deposit Account Number 13-3083. A copy of this letter is also enclosed herewith.

Respectfully submitted,

MICHAELSON & WALLACE

Peter L. Michaelson, Attorney
Customer No. 0072265
Reg. No. 30,090
(732) 530-6671

**CERTIFICATE OF MAILING UNDER 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **August 26, 2002** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to the Commissioner for Patents, Washington, D.C. 20231.

Signature

30,090
Reg. No.

(PTT119RESPONSE/ca:89)

#3

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UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

| APPLICATION NUMBER | FILING/RECEIPT DATE | FIRST NAMED APPLICANT | ATTORNEY DOCKET NUMBER |
|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP |

**CONFIRMATION NO. 8186**

007265
MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701

**FORMALITIES LETTER**

*OC000000008600953*

Date Mailed: 08/09/2002

# NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

09/06/2002 SMINASS1 00000122 10188538

01 FC:101 740.00 OP
02 FC:103 234.00 OP
03 FC:102 252.00 OP
04 FC:105 130.00 OP

**FILED UNDER 37 CFR 1.53(b)**

***Filing Date Granted***

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  *Applicant must submit $* **740** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing.
  *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(l) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

**Items Required To Avoid Processing Delays:**

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- Additional claim fees of **$486** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

**SUMMARY OF FEES DUE:**

Total additional fee(s) required for this application is **$1356** for a Large Entity

- **$740** Statutory basic filing fee.
- **$130** Late oath or declaration Surcharge.
- Total additional claim fee(s) for this application is **$486**
  - **$234** for **13** total claims over 20.
  - **$252** for **3** independent claims over 3.

---

***A copy of this notice MUST be returned with the reply.***

Haimanot Tegbaru

Customer Service Center
Initial Patent Examination Division (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE

# ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C. . .) The first artifact folder for an artifact type receives the letter A, the second B, etc. . . Example: 59 123 456 PA, 59 123 456 PB, 59 123 456 ZA, 59 123 456 ZB

10188538 ZA

Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/ box and artifact number for each Artifact Type.

☐ CD(s) containing:
Computer program listing
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Pages of specification and / or sequence listing and /or table
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Content unspecified or combined
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☐ Model(s)
Doc Code: Artifact Artifact Type Code: M

☐ Bound Document(s)
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☐ Confidential Information Disclosure Statement or Other Documents marked Proprietary, Trade Secrets, Subject to Protective Order, Material Submitted under MPEP 724.02, etc.
Doc Code: Artifact Artifact Type Code: X

☑ Other, description: US Priority
Doc Code: Artifact Artifact Type Code: Z

PA 811075

# THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

May 07, 2002

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: *60/303,933*
FILING DATE: *July 09, 2001*

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

P. SWAIN
Certifying Officer

#4

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OIPE JC41 SEP 05 2002 & TRADEMARK OFFICE

IN THE UNITED STATES
PATENT AND TRADEMARK OFFICE

**PATENT APPLICATION**

Applicants: **Joannes W.M. OLDENBURG, Pierre ARNOLD, Hermann P. BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: **10/188,538** Filed: **July 3, 2002**

Group Art Unit: **2681** Confirmation No.: **8186**

Examiner:

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Commissioner for Patents
Washington, D. C. 20231

S I R:

**SUBMISSION OF PRIORITY DOCUMENTS**

In connection with the above-captioned application, applicants enclose the following certified priority documents to support the claim to priority:

European Appl. No. 01203820.4, filed October 9, 2001; and
United States Appl. No. 60/303,933, filed July 9, 2001.

Respectfully submitted,

August 27, 2002

Peter L. Michaelson, Attorney
Reg. No. 30,090
Customer No. 007265
(732) 530-6671

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MICHAELSON & WALLACE
Counselors at Law
Parkway 109 Office Center
328 Newman Springs Road
P.O. Box 8489
Red Bank, New Jersey 07701

**CERTIFICATE OF MAILING under 37 C.F.R. 1.8(a)**

I hereby certify that this correspondence is being deposited on **August 28, 2002** with the United States Postal Service as first class mail, with sufficient postage, in an envelope addressed to the Commissioner for Patents, Washington, D.C. 20231.

/John C Kelly/ 30,090

Signature Reg. No.

(PTT119PRDOC/89:ca)

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Europäisches Patentamt | European Patent Office | Office européen des brevets

# Blatt 2 der Bescheinigung
# Sheet 2 of the certificate
# Page 2 de l'attestation

## CERTIFIED COPY OF PRIORITY DOCUMENT

Anmeldung Nr.:
Application no.: 01203820.4
Demande n°:

Anmeldetag:
Date of filing: 09/10/01
Date de dépôt:

Anmelder:
Applicant(s):
Demandeur(s):
Koninklijke KPN N.V.
9726 AE Groningen
NETHERLANDS

Bezeichnung der Erfindung:
Title of the invention:
Titre de l'invention:
System and method for checking parameter settings of radio networks

In Anspruch genommene Priorität(en) / Priority(ies) claimed / Priorité(s) revendiquée(s)

| Staat: State: Pays: | Tag: Date: Date: | Aktenzeichen: File no. Numéro de dépôt: |
|---|---|---|

Internationale Patentklassifikation:
International Patent classification:
Classification internationale des brevets:
H04Q7/34

Am Anmeldetag benannte Vertragstaaten:
Contracting states designated at date of filing: AT/BE/CH/CY/DE/DK/ES/FI/FR/GB/GR/IE/IT/LI/LU/MC/NL/PT/SE/TR
Etats contractants désignés lors du depôt:

Bemerkungen:
Remarks:
Remarques:

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EPO - DG 1
09. 10. 2001



# SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS

## Field of the invention

The invention relates to a method and system for checking parameter settings of a radio network. More specifically the invention relates to a method and system for checking various parameters of components of a cellular radio networks on the basis of business rules.

## Background

Fig. 1 shows a schematic representation of a contemporary cellular network 1. The architecture of these cellular networks comprises a network subsytem 2, a base station subsytem 3 and a mobile station 4. Examples of these cellular networks are GSM and DCS and extensions of these networks such as GPRS, UMTS etc. The network subsystems main component involves the mobile switching centre 20 (MSC) providing the interface of the cellular network and wire bound networks 5 (PSTN, ISDN, ADSL etc.) as well as roaming and call-routing facilities (Home Location Register 21, Visitor Location Register 22, Equipment Identity Register 23 and Authentication Centre 24).

The base station subsystem 3 consists of a number of base stations. The base station subsystem 3 constitutes the connection between a mobile station 4 and the MSC 20. The base station subsystem 3 may be distinguished into two parts, the Base Transceiver Station 31 (BTS) and the Base Station Controller 30 (BSC). The BTS 31 houses radio transceivers that define a cell and handles the radio-link protocols with the mobile station 4. In a large urban area, there will potentially be a large number

of BTSs deployed. The BSC 30 manages the radio resources for one or more BTSs 31. It handles radio-channel set-up, frequency hopping, and handovers.

The mobile station 4 is the mobile equipment that enables a user to communicate with others through the cellular network. A mobile station 4 usually comprises mobile equipment 41 and a Subscriber Identity Module 42 (SIM).

As the complexity of cellular networks increases flexible operation of these networks becomes more difficult. Configuration and reconfiguration of a cellular network is complex since the parametersettings of the different components of the cellular radio network affect eachother. United States Patent 5,343,798 of Ericsson describes a reconfiguration method and apparatus in which the cell parameters of particular mobile switching centres in a network are copied to a database, and the copied parameters are stored. A set of proposed changes to the stored parameters are prepared and the consistency of the prepared set of proposed changes is verified. Alterations to the set of proposed changes responsive to the verification are made and the verified set of proposed changes are copied to the concerned mobile switching centres. The verified set of proposed changes is then introduced into the network. An up-to-date image of the cell parameters in the mobile switching centres in the network is maintained in a system parameter database.

**Problem definition and aims of the invention**

Typically a cellular radio network comprises several MSC's and a larger number of base stations. Operation of such cellular radio networks requires a high degree of flexibility in the sense that configuration and reconfiguration of the cellular network has to be possible

within a limited period of time and with a high degree of accuracy. Such a reconfiguration of a radio network can be permanent or temporarily. Reasons for such a reconfiguration are numerous, e.g. a temporary cell split needed to deal with an expected increase in traffic due to an event or the permanent integration of new elements both affecting the settings of already existing elements in the radio network. Therefore sophisticated methods and systems are required that administrate the parameter settings of the various components, e.g. the BTS or BSC, of the cellular radio network and change the parameter settings of said components. Examples of parameters that can be changed include cell type, cell designation, cell direction, signal strength, signal to noise ratio, etc. Moreover means have to be provided in order to check the consistency of the proposed parameter changes before the changes are implemented in the cellular network.

The reconfiguration method and system as revealed by the '798 patent can be improved with regard to, inter alia, the performed routine to check the consistency of proposed parameter changes.

More particularly an improvement relates to the hierarchical levels that can be checked. The method of the '798 patent checks the consistency of the proposed parameters only with regard to cells and handovers. Thus only a very limited part of the network hierarchy is checked, resulting in a less reliable and efficient control of the radio network.

Another problem of the method described in the '798 patent relates to the type of rules used in performing the consistency check. The rules used in performing this check originate solely from technical requirements derived from cellular network technology. There is no possibility to apply rules derived from

operational practice as well. Moreover it is not possible to deviate from the technically sufficient parameter setting requirements if operational practice experience reveals a different more preferable technical parameter setting.

Still another problem of the method described in the '798 patent is that in performing the consistency check only pre-programmed rules are used. This limitation decreases the flexibility of the system for the operator that exploits a cellular radio network. It may be that such an operator is not satisfied with the requirements for the various parameters defined by the supplier of the network. The operator may want to define the requirements, including the technical requirements, himself.

The present invention aims to provide a method and system to check the consistency of the proposed changes of parameters.

**Summary**

The present invention provides a method and system that improve the reliability, flexibility and accuracy required for operating cellular radio networks.

It is an object of the invention to be able to verify the proposed changes in the parameter settings in all hierarchical levels of the radio network and of substantially every, i.e. any desired, relationship between parameters in the same or different hierarchical level of the radio network. By enabling verification on every hierarchical level the control and reliability of the network is significantly improved if changes in the parameter setting are to be implemented.

It is another object of the invention to enable the use of rules developed from operational practice in the verification of the parameter settings in one or

more of the levels of the network hierarchy and relationship between elements in the cellular radio network. Hereafter the rules used to verify the parameter settings will be referred to as business rules. These business rules comprise rules relate to technically preferable requirements as well as rules derived from operational practice.

It is still another object of the invention to enable the use of programmable rules in the verification of the proposed changes of the parameter settings in one or more hierarchical levels and relationship of elements in the radio system. These rules may preferably be programmed by the operator of the radio network or at least being ordered or influenced by the operator of the radio network. Moreover also the error messages if the rules are not obeyed may be operator-programmable.

**Short description of the drawings**

Fig.1 shows an elementary representation of a GSM radionetwork;

Fig.2 shows examples of representations of different hierarchies the invention is able to handle;

Fig.3 shows a detailed scheme of the parameter management;

Fig.4A,B shows a flow-chart illustrating an example of the business rule checking process;

Fig.5 shows a table of operational examples of business rules;

Fig.6A-D shows a few business rule modules.

**Description of preferred embodiments of the invention**

For the purpose of teaching the invention, preferred embodiments of the method and devices of the invention are described in the sequel. It will be apparent

to the person skilled in the art that other alternative and equivalent embodiments of the invention can be conceived and reduced to practice without departing from the true spirit of the invention, the scope of the invention being only limited by the claims as finally granted.

A radio network 1, as schematically shown in figure 1 may be represented alternatively by a network hierarchy 11,12 comprising different levels. These levels correspond to physical as well as non-physical parts of radio network 1. The hierarchies 11,12 may differ in their representation between several commercial suppliers of these kinds of radio networks 1. As an example figure 2 shows the network hierarchies of Ericsson 11 and Nokia 12 radio networks 1. It can be observed that the Ericsson and Nokia hierarchies 11 and 12 differ in some aspects, but are equivalent in other aspects.

The Ericsson hierarchy 11 comprises a MSC level 20. The MSC 20 is coupled to a transcoder 32 (TRC) and a BSC/TRC 33. The next level comprises the BSC 30. This BSC 30 may be linked to the TRC 32 or the BSC/TRC 33. In the case that a GPRS radio network should be represented an additional element Service GPRS Support Node 34 (SGSN) is introduced. The SGSN 34 may comprise different hierarchical levels itself. Next the Ericsson hierarchy 11 shows a Radio Base System 35 (RBS) level. The RBS may be linked to a BSC 30 or a BSC/TRC 33. Afterwards a handover 36 (HO) and the BTS 31 are shown. Finally the Ericsson hierarchy 11 exhibits a transceiver level 37 (TRX) and a channel level 38 (CH).

The Nokia hierarchy 12 differs from the Ericsson hierarchy in some aspects. Firstly the TRC 32 and BSC/TRC 33 level are replaced by an Operational Maintenance Centre 25 (OMC). Moreover whereas the Ericsson hierarchy 11 contains TRC and BSC/TRC levels, the Nokia hierarchy

implements the OMC-level 25. The Ericsson hierarchy 11 and the Nokia hierarchy 12 are equivalent below the RBS 35 and the BCF 39 respectively.

It is noticed that the network hierarchies of Ericsson 11 and Nokia 12 are only examples. Other network suppliers might handle different network hierarchies. The method and system according to the invention are suited for these network hierarchies as well.

It is one of the objects of the invention to provide a method and system to handle the parameter settings in these kind of hierarchies. More specifically a method and system are provided to supply operators of cellular radio networks with a control facility on each and every hierarchical level and on relationships between elements of the radio network before changes in the parameter settings are implemented into the network.

Figure 3 shows an example of a process flow according to a preferred embodiment of the invention. The parameters and/or values uploaded from the radio network 1 may originate from each of the hierarchical levels shown in figure 2. E.g. in the case of the Nokia hierarchy 11 the parameters may be uploaded from the Nokia omc 25, whereas in case the Ericsson hierarchy 12 is applied parameters obtained from the Ericsson MSC 20 may be uploaded. The database 62 can be distinguished into three parts indicated as omc 63, ref 64 and mut 65. The omc part contains the operational parameters and values as set for the radio network. The ref part 64 contains the preferred new or changed parameters and values to be implemented in the radio network. The mut part 65 contains the parameters and values that are subject to a change proposal from user 69. A database with frequency plans 67 and a database with location data 68 can be present. A list of differences 66 can be generated containing the differences between the

actual radio network and its representation in the omc part of the database. The user 69 handles the list of differences and can choose to change some parameter values. A system administrator may add or delete parameters. All these changes are made into the mut part 65 of the database 62. The mutated parameters are checked by the business rule checker 70 and put in the ref part 64 of the database 62 if the changed parameters obey the business rules applied to them or no business rule exists for the changed parameter or value. A delta list 76 is generated holding the values of the parameters that differ from the original values. These parameter values are implemented in the radio network 1 by means of a command file generator 75 and a downloader 77. Both the business rule modules and the command file are scripts as indicated by 72 and 73.

The method and system according to an aspect of the invention relate to the management and control of the various parameters in a cellular radio network. Therefore the various parameters and/or values can be stored in a database, indicated by 62 in figure 3. This database might be a commercially available database such as MS Access or Oracle. The method and system according to an aspect of the invention for storing the parameters and/or values uses a technique which will be referred to as the compressed row technique. One of the advantages of this technique is a simplification of manipulating data within a given database. Furthermore this technique limits the number of records to an acceptable level and new parameters may be added easily. Also differences between sets of parameters can be obtained quickly by comparison between the relevant strings instead of comparing individual parameters.

Basically the compressed row technique involves a convenient database which is linked to a

descriptive database. Therefore a database applying compressed row techniques contains at least two separate parts. The first part may store the real data as strings, the second part may contain the descriptive information needed to process the real data from the first part. The second part will be referred to as the repository.

A preferable mechanism to apply the compressed row technique comprises the following steps. For every hierarchical level of the radio network 1 a parameter table is formed in the database 62. In this parameter table all the parameters of all elements in the radio network of that hierarchical level are stored. For each element the parameters are divided into parameter groups, each parameter group containing a string (compressed row) storing multiple parameters that may be divided by semi-coloms. Each group of parameters has a number assigned that indicates the nature of the group. Finally each group of parameters includes an identifier corresponding to the element. In the repository table for each parameter the group and the field within that group for that parameter is stored. To find the relevant element corresponding to an element identifier a hierarchy table is used. Various level-tables link the element identifiers to the parameter strings.

A simple example will clarify the mechanism described. Suppose that the value of the parameter BS_TX_PWR_MAX of base station 8662 (the maximum transmission power of that particular base station) is being sought. The hierarchy table HIERARCHY_OMC_BTS contains a base station with identifier 8662. Next it is deduced from the repository that the parameter being sought is e.g. located in parameter group 2 in field 9. The repository indicates moreover that the value on this location is expressed in dBm. The level table BTS_OMC then indicates

that for this particular BTS a parameterstring for group 2 exists containing e.g. the string 1;8;1;4;1;8;1;1;0;15;1;0;0;2;0;0;0;0;;;;;;. The 9th value in this string is 0 which probably indicates that the BTS with identifier 8662 is not active.

The example above is a simplified case. There are values of parameters that can not be obtained in this direct way, but have to be obtained indirectly by means of a translate table. In that case the parameter has a translate identifier in the repository. By means of a field identifier, uniquely defining the parameter, the value of the parameter can be obtained from the translate table.

The business rule checker 70 performs a control function before parameters and/or values are implemented in the cellular radio network. In most cases there is a inter-dependency of the various parameters and values of parameters and therefore checking of new and modulated parameters and values before implementation in the network is preferable. However not only the bare technical sufficient requirements set for the various parameters should be checked. Since contemporary cellular radio networks have reached an considerable amount of complexity several other non-technical requirements as e.g. administrative data should preferably be checked as well. As e.g. the operators administration indicates all cells for 900 MHz GSM with a cell_id starting with #1 and all cells for 1800 MHz DCS with cell_id starting with #6, these requirements should be part of the business rule check as well before configuration or reconfiguration of the network takes place.

Moreover it is preferable that the bare technical sufficient requirements can be altered according to rules obtained from daily operational use of the radio network. It can e.g. be technically sufficient to have a

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# Bescheinigung | Certificate | Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

**Patentanmeldung Nr. | Patent application No. | Demande de brevet n°**

01203820.4

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

**R C van Dijk**

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channel distance of 20 Hz between different cells. All channel distances above this value then will pass the bcc/bcch consistency check. However, in practice it may be that a channel difference of 50 Hz between the cells guarantees a more reliable operation. In that case, according to the invention, it is possible to use the preferred channel distance of 50 Hz as obtained from the operational practice as a business rule instead of the technically sufficient channel distance. Such a technical requirement will hereinafter referred to as a preferred technical requirement.

The business rule checker 70 can use the hierarchy tables from the repository part of the database 62. The business rules may be formulated by the user and implemented as a script.

Figures 4A and 4B show a flow chart to illustrate schematically the application of business rules to parameter changes for the radio network 1 as proposed by the user 69. In the first step 81 a parameter group that is changed in mut 65 is read. Next the hierarchical level is determined from this parameter group at 82 and subsequently the parameter is found at 83. For this parameter it may be that no business rule has been defined or programmed. In that case 84 the parameter is put directly into the ref part 64 of database 62 and is ready to be implemented in the radio network 1. If a business rule does exist for the particular parameter that business rule is read at 85. It is checked whether the parameter does obey the business rule. If the parameter does not obey the business rule an error list is generated and the parameter and corresponding value are put on that list at 86. If the parameter does obey to the business rule defined or programmed for that parameter the next step is to find out whether other

parameters have been changed that belong to the parameter group under consideration. These parameters may run through the same series of steps as described above. If all the changed parameters have been put to the business rule test as described above, it is determined whether other parameter groups have been changed as well. The same series of steps as described above may be applied to the parameters belonging to that parameter group. Finally if all the parameter groups have been checked, the business rule checker 70 stops at step 87. As a result of the business rule checking process the parameters that obey the business rules defined or programmed for them are put in the ref part 64 of the database 62 at step 88 and are ready to be implemented in the radio network 1. If the parameters or values do not obey the business rules the parameters and corresponding values appear on the generated error list and after finalisation of the business rule checking of all the parameter groups this error list is put to the user. The user then has to correct the parameters, as shown at step 89. The corrected parameters or values then can be put to the ref part 64 of database 62 as well. Now the complete set of parameters and corresponding values does obey the business rules and is ready to be implemented to the cellular radio network 1. Although in figures 4A an B only individual parameters are checked whether or not they obey a business rule, als relations of parameters can be checked on a business rule (see e.g. figure 6A as discussed below).

Figure 5 shows a table of business rules defined for a particular type of cellular radio network 1. It is stressed that an almost infinite amount of these kind of business rules can be defined so the rules shown in figure 5 only give a few examples. The table shown in figure 5 shows columns defining a business rule

identification number BR_ID, the state of the business rule, the file name or module, the iteration level and the message to be shown when a parameter does not obey the business rule. Additional columns can include e.g. the priority level, author of the business rule, date of modification, version number, remarks etc.

The state of a business rule establishes whether that business rule is taken into consideration when the business rule checking is performed. It is not necessary that all the business rules have to be checked in a particular configuration or reconfiguration project with regard to the radio network. It may be up to the user to select the business rules he wants to apply. However it may be that some business rules have to be checked at all times and therefore can not be put aside by the user. Business rules can e.g. be applied by running a main script calling the separate business rule modules selected by the user or imposed by the system.

The iteration level relates to the hierarchical level of the elements of the cellular radio network to be checked. Generally, if the business rule is defined or programmed for another element at the same or a higher hierarchical level the iteration level will be higher than the highest of the hierarchical levels of all the elements involved for that specific business rule. An example of such a business rule is shown in figure 5 and 6B as module bts013.br. If the business rule is defined for the element internally the iteration level and the hierarchical level are the same. An example of such a business rule is shown in figure 5 and 6A as module bcf002.br.

The message relates to the messages shown to the user in the generated error list at 86 when a parameter or value does not obey the business rule applied to that

parameter or value. These error messages are operator-programmable as well. Different error levels can be distinguished, such as a blocking message (i.e. a serious error indicating that the proposed change may not be implemented in the radio network under any circumstances) or a warning message (i.e. an error indicating that the proposed change is not desirable, but does not do harm to the operation of the cellular radio network if implemented). Other error levels can be used as well, like e.g. engineering messages indicating that the change to be implemented does not achieve the optimal result.

The description column of the table in figure 5 defines the business rule in human language. In figure 6 the contents of some of the files used for the business rule check are displayed.

Figures 6A-D show a few examples of business rule modules that are also mentioned in the table of figure 5. Figure 6A shows the script of the business rule module bcf002.br, which is a business rule of the administrative kind as mentioned previously. It checks whether the requirement that a BCF 29 of type DE21 has more than 3 BTS's 31 connected according to e.g. the Nokia hierarchy 12 of figure 2. If it does, a blocking message appears on the error list indicating to the user 69 that that particular BCF does have more than 3 BTS's.

Figure 6B shows the script of the business rule module bts013.br. It states that one Access Grant Block (AGB) is required for each Basic Communication Channel. A blocking message appears if the business rule is not obeyed.

Figure 6C shows the script of the business rule module bts015.br, which is a business rule of the technical kind as mentioned above. This module checks the number of TRX's for each LABD-link. A LABD link basically

represents a direct or indirect physical link between two or more BSC's. For a bitrate of 16 respectively 64 a maximum of 12 resp. 10 TRX's is allowed for each LABD-link. If this requirement is not obeyed, a blocking message appears on the error list.

Figure 6D shows the script of the business rule module ho006.br, which is a business rule of the technical kind as mentioned previously. This module checks whether a cell has neighbour BTS's with the same base station communication channel BCCH. A warning message is generated on the error list if this happens to be the case.

It is explicitely stated that the examples and embodiments as described in this section do not limit the scope of the invention in any way. Modifications of the examples and embodiments fall within the scope of this application. E.g. it may be a advantageous to distribute the cellular radio network amongst several geographic regions each of these regions having an operator. Basically the same system of network management, including the business rule checker, can be applied in this situation. Measures can be taken to avoid conflicts when more than one user 69 tries to change the parameter settings in his region, especially around the borderlines of the respective regions. This possible conflict can be solved by allowing only one proposal to change the parameters. The system signals succeeding users trying to change the same parameters that an earlier proposal has already been made including the data of that particular user.

Another modification may be that proposals can be stored instead of being implemented immediately. This option is particularly relevant in the framework of more projects. Several projects can be identified, e.g. mass- updates involving future optimalisation of large

numbers of parameters or the pre-integration of new network elements. More projects may be planned simultaneously based on the same set of data. In order to avoid conflicts between projects it is possible to establish a 'frozen state' for a limited period.

EPO - DG 1
09. 10. 2001
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## CLAIMS

1. Method for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement deduced from operational use of the radio network.

2. Method according to claim 1 wherein the at least one modified parameter and/or value is checked before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

3. Method according to claim 2 wherein a non-compliance signal is generated if the at least one modified parameter does not obey the at least one operational requirement.

4. Method according to claims 2 or 3 in which the at least one operational parameter is stored in a first part of the database and the at least one modified parameter is stored in a second part of the database.

5. Method according to claim 4 in which the first and second part of the database are separate databases.

6. Method according to any of the claims 2-5 in which at least one of the the at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique.

7. Method according to any of the claims 2-5 in which the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter.

8. Method according to claim 7 in which the at least one hierarchy table is used for checking whether the at least one modified parameter obeys the at least one selected business rule.

9. Method according to any of the preceding claims in which the at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy.

10. Method according to claim 9 in which the levels of the GSM network hierarchy are MSC, OMC, BSC, BCF and/or BTS.

11. Method according to claim 9 or 10 in which the levels of the GSM network hierarchy are TRX, HO and/or CH.

12. Method according to any of the preceding claims in which the at least one modified parameter relates to at least one level of a GPRS hierarchy.

13. Method according to claim 12 in which the levels of the GPRS hierarchy are MSC, OMC, BSC, SGSN, BCF and/or BTS.

14. Method according to claim 13 in which the levels of the GPRS hierarchy are TRX, HO and/or CH.

15. Method according any of the claims 9-14 in which the checking of the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy.

16. Method according to any of claims 9-15 wherein relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network.

17. Method according to any of the preceding claims in which the at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network.

18. Method according to any of the preceding claims in which the at least one operational practice requirement involves an administrative requirement.

19. Method according to claim 17 in which the operational practice requirement involves a technically preferable requirement programmed, ordered and/or influenced by the operator of the radio network.

20. Method according to claim 3 in which the non-compliance signal is a file or message displayed to an operator.

21. Method according to claim 3 or 20 in which the non-compliance signal is programmable.

22. A system for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

23. System according to claim 22 for checking the at least one modified parameter and/or value before implementation in the radio network, comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network

a second part of a database to store the at least one modified parameter and/or value;

a business rule checker verifying whether the at least one modified parameter and/or value obeys the at least one operational requirement;

24. System according to claim 23 wherein a signal genarator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement.

25. System according to claims 23 or 24 further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker.

26. Radio network comprising at least one component comprising at least one operational parameter and/or value that can be changed to at least one modified parameter and/or value wherein the at least one modified parameter and/or value can be checked on the basis of at least one business rule derived from operational use of the radio network.

27. Radio network according to claim 26 wherein the at least one operational parameter and the at least one modified parameter relate to at least one level of a GSM, DCS or GPRS hierarchy of the radio network.

28. Computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

29. Computer program for running on a computer system comprising software code portions for checking the at least one modified parameter and/or value before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

30. Computer program according to claim 28 or 29 wherein at least one of the the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique.

31. Data carrier stored with data loadable in a computer memory said data representing a computer program for running on a computer system at least including software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

32. Data carrier according to claim 31 wherein software code portions are provided for checking the at least one modified parameter and/or value before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

33. Data carrier according to claims 31 or 32 wherein software code portions are provided for executing the method as claimed in any of the claims 3 - 21.

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09. 10. 2001



Abstract

A method and system are disclosed for checking modified parameters of components of a radio network. Operational parameters that have been modified are checked first on obeying business rules comprising requirements that have been deduced from operational use of the radio network, preferably before they are implemented in the network. The method and system all application of compressed row techniques in databases comprising the parameters.

+ figure 4A and 4B

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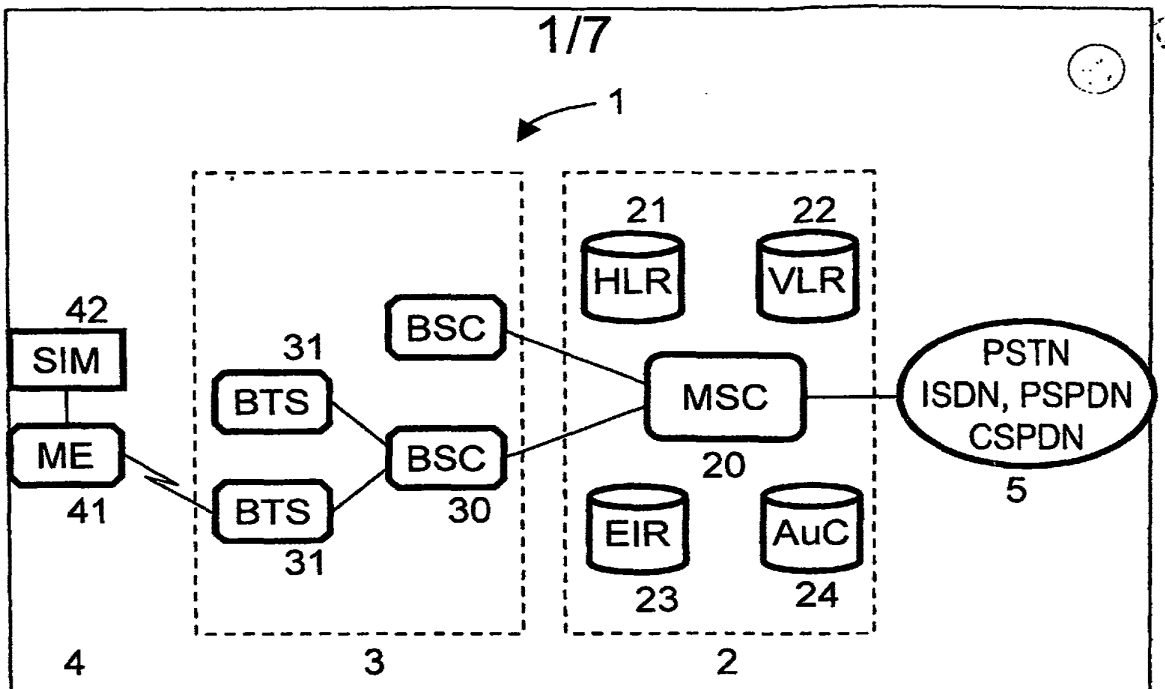



FIG. 1

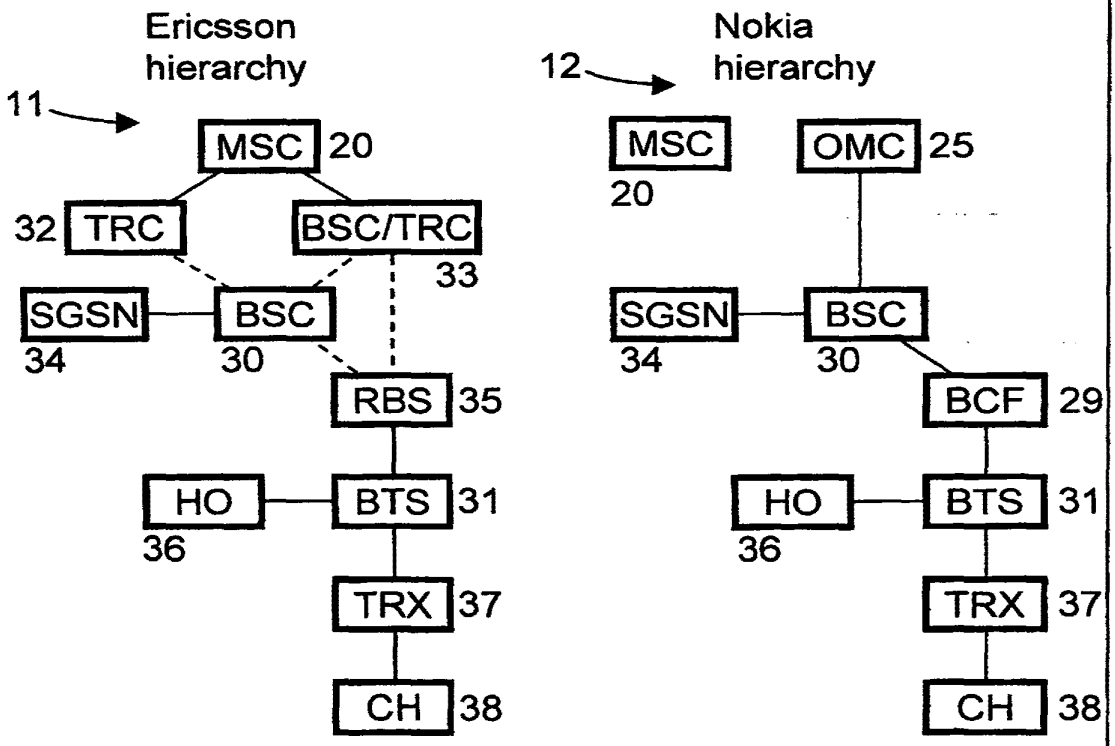



FIG. 2

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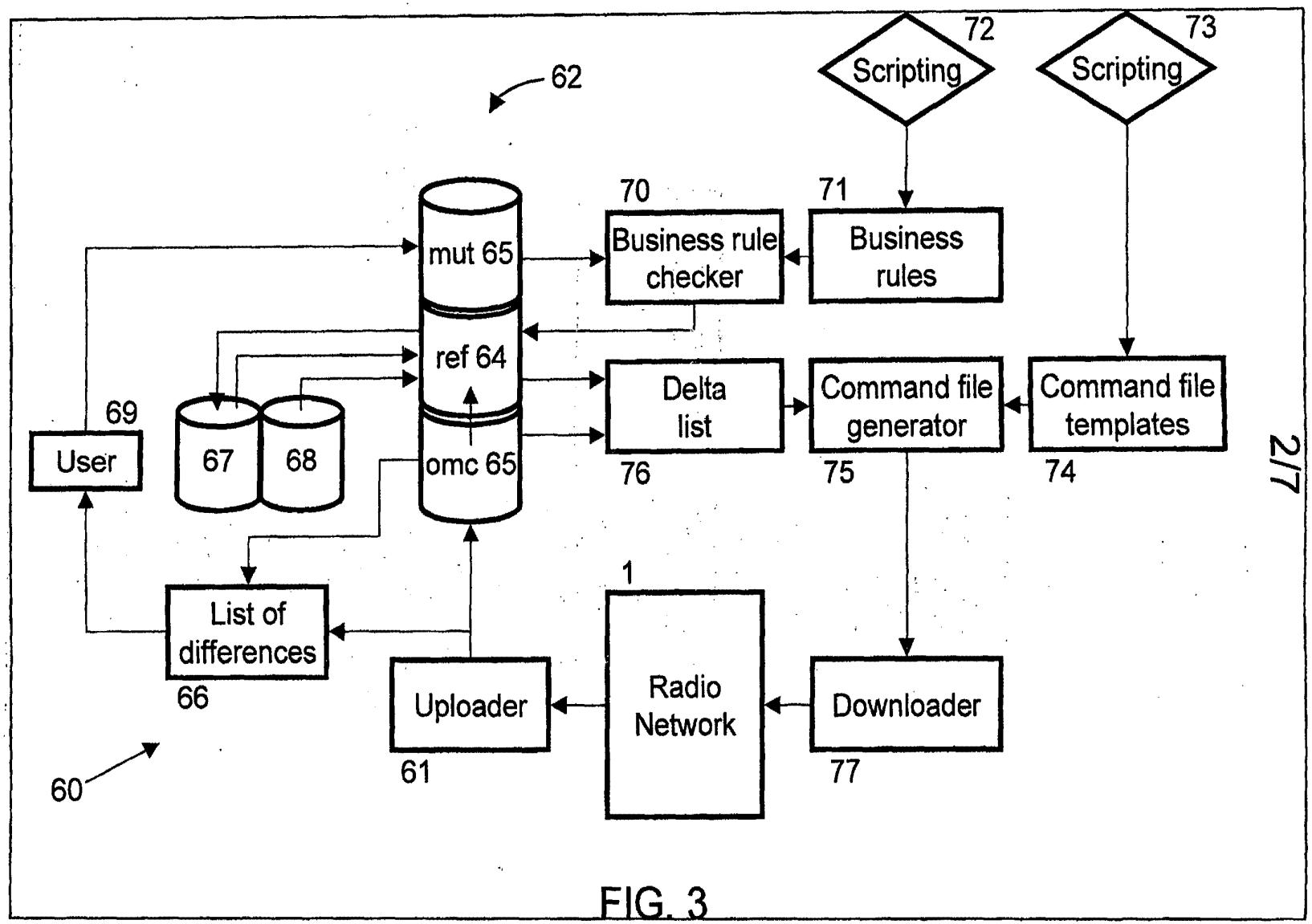



FIG. 3

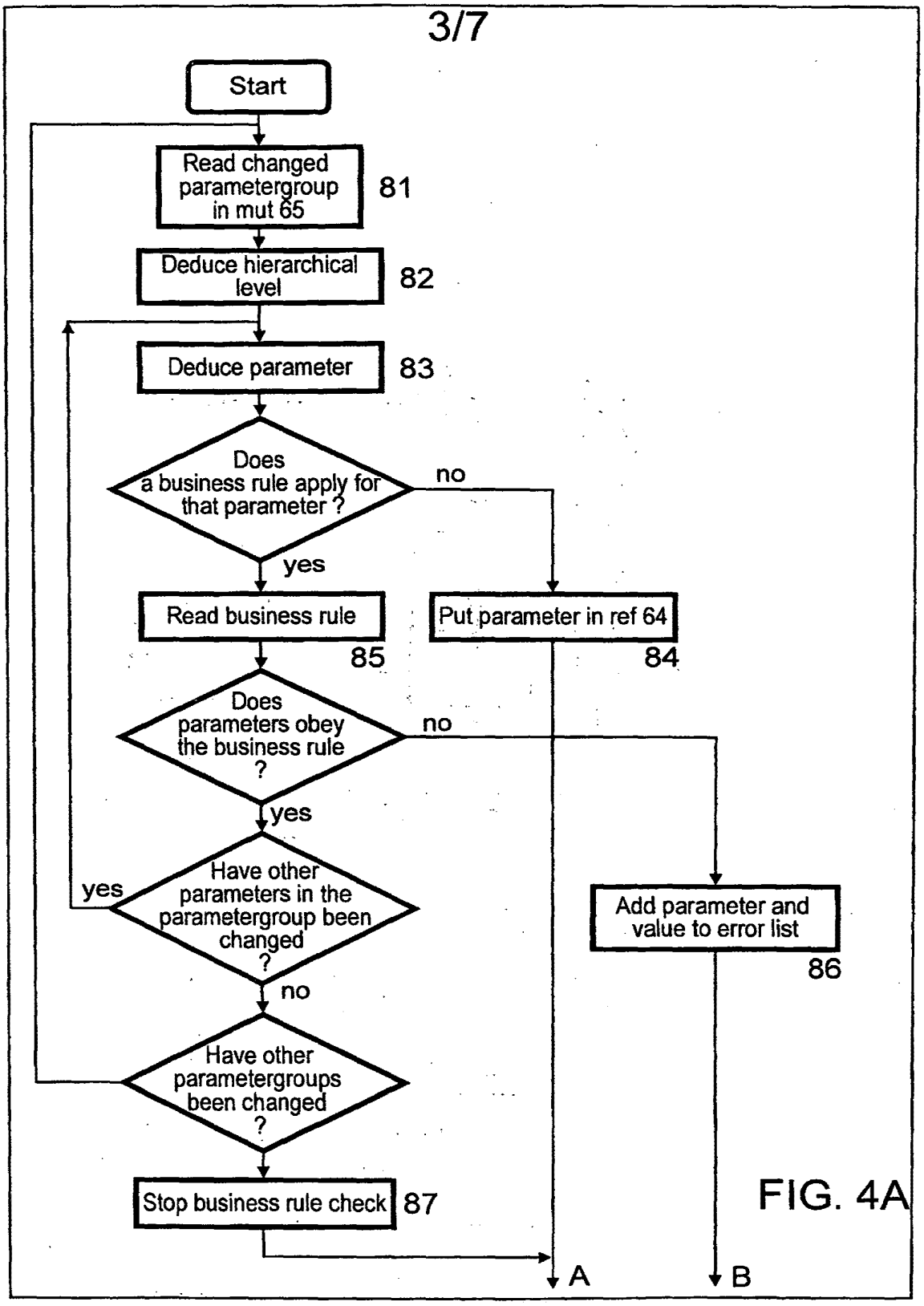

3/7
Start
Read changed parametergroup in mut 65
81
Deduce hierarchical level
82
Deduce parameter
83
Does a business rule apply for that parameter ?
no
yes
Read business rule
85
Put parameter in ref 64
84
Does parameters obey the business rule ?
no
yes
Have other parameters in the parametergroup been changed ?
yes
Add parameter and value to error list
86
no
Have other parametergroups been changed ?
Stop business rule check
87
A
B

FIG. 4A

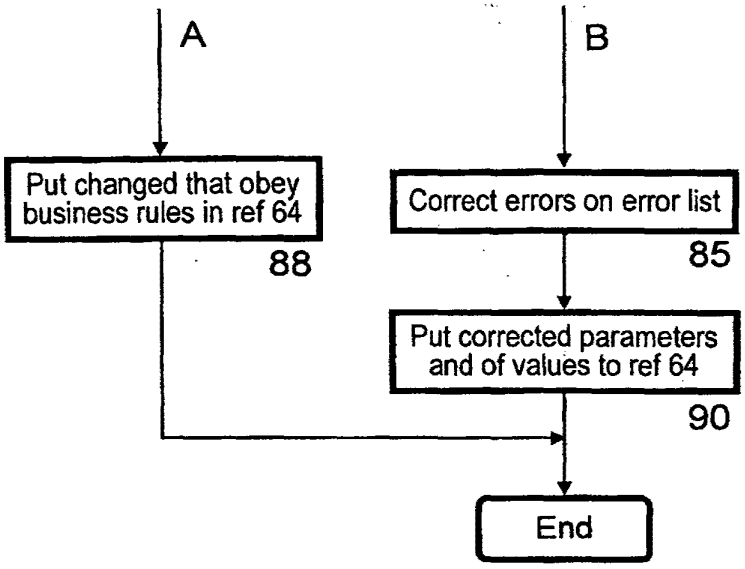

A
B
Put changed that obey business rules in ref 64
88
Correct errors on error list
85
Put corrected parameters and of values to ref 64
90
End

FIG. 4B

| BR_ID | STATE | MODULE | DESCRIPTION | ITERATION LEVEL | MESSAGE |
|---|---|---|---|---|---|
| | | | | | |
| 2 | 1 | bcf002.br | A BCF of type DE21 has a maximum of 3 BTS's | BCF - BTS | BLOCKING |
| 4 | 1 | bcf004.br | A BCF of type DE45 has a maximum of 1 BTS | BCF - BTS | BLOCKING |
| 5 | 1 | bcf005.br | A BCF has a maximum of 12 TRX's | BCF - TRX | BLOCKING |
| 27 | 3 | bts012.br | A BTS having > 3 TRX's has a additional SDCCH-channel | BTS - TRX | WARNING |
| 28 | 1 | bts013.br | At a combined BCCH 0...2 "no blocks for access grant" have to be used | BTS - CH | BLOCKING |
| 29 | 1 | bts014.br | At a non-combined BCCH 0...7 "no blocks for access grant" have to be used | BTS - CH | BLOCKING |
| 30 | 3 | bts015.br | Check on number of TRX's per LABD-link | BCF - TRX | WARNING |
| 62 | 1 | ho006.br | Preferrably a cell has no neighbours using the same BCCH | BTS -TRX | WARNING |
| 63 | 0 | ho009.br | Neighbours are basically bi-directional | BTS - HO | WARNING |
| 64 | 3 | ho010.br | The sum of handover margin pbgt Should be larger than 0 | BTS - HO | WARNING |
| 79 | 1 | trx001.br | Frequency difference of at least 2 channels of TRX's on same site for different BTS's | BTS - TRX | BLOCKING |
| 83 | 1 | trx004.br | A TRX has a LABD-link | TRX | BLOCKING |
| 85 | 0 | trx009.br | A new TRX is assigned a dummy frequency | TRX | BLOCKING |
| 104 | 1 | ch004.br | The BCCH has to be defined on TRX1 | BTS-TRX-CH | WARNING |

**Figure 5**

```
Iterate1Start(BCF)
  ResetCounter1
  If [BCF.bcf_type] == "$DE21" Then
    Iterate2Start(BTS)
      IncrementCounter1
    Iterate2End
  EndIf
  If Counter1 > "3" Then
    logBlocking(BCF,BCF of type DE21 exceeds maximum of 3 BTS's)
  EndIf
Iterate1End
```

***Fig. 6A (module bcf002.br)***

```
Iterate1Start(BTS)
  If [BTS.no_of_blocks_for_access_grant1] > "2" Then
    Iterate2Start(CH)
      If [CH.channel_type] == table(chMode,"MBCCB") Then
        logWarning(BTS,To much AccessGrantBlocks have been defined)
      EndIf
    Iterate2End
  EndIf
Iterate1End
```

***Fig. 6B (module bts013.br)***

(19) BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENT- UND MARKENAMT

(12) **Offenlegungsschrift**

(10) **DE 198 13 754 A 1**

(51) Int. Cl.[6]:
**H 04 Q 7/20**
H 04 B 7/26

(21) Aktenzeichen: 198 13 754.0
(22) Anmeldetag: 27. 3. 98
(43) Offenlegungstag: 30. 9. 99

DE 198 13 754 A 1

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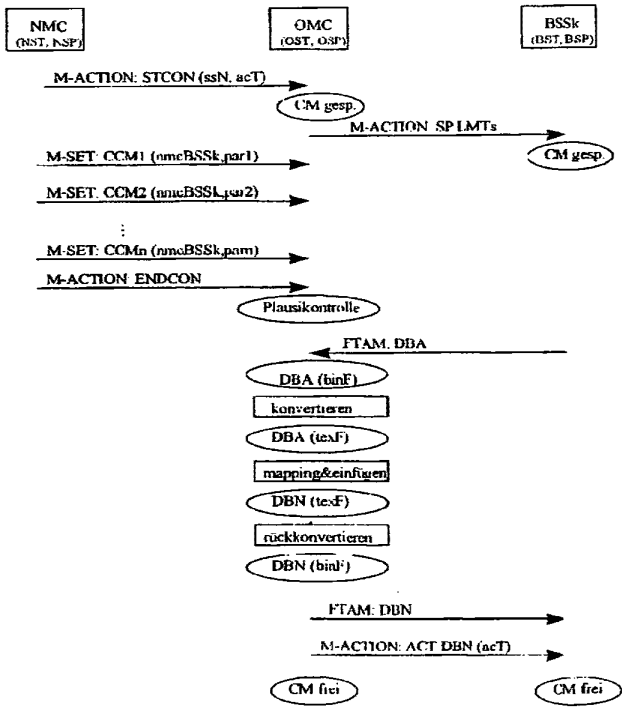
(56) Entgegenhaltungen:
DE 197 40 713 A1
DE 69 128 42 1T2

**Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen**

Prüfungsantrag gem. § 44 PatG ist gestellt

(54) Verfahren und Managementnetz zur Konfiguration eines Funk-Kommunikationsnetzes

(57) Die Erfindung geht davon aus, daß zumindest ein Netzmanagementzentrum (NMC), ein Betriebs- und Wartungszentrum (OMC) und ein Basisstationssystem (BSSk) die Managementebenen des Managementnetzes bilden. Gemäß dem Gegenstand der Erfindung werden vom Netzmanagementzentrum (NMC) ein Konfigurationsvorgang mit mindestens einer Konfigurationsänderung (CCM1) für ein Basisstationssystem (BSSk) eingeleitet und dabei Parameter (par1) mit netzweiter Bedeutung zu dem Betriebs- und Wartungszentrum (OMC) gesendet. Bei einer erfolgreichen Plausibilitätskontrolle für die empfangenen Parameter (par1), die vom Betriebs- und Wartungszentrum (OMC) durchgeführt wird, empfängt und speichert das Betriebs- und Wartungszentrum (OMC) jeweils eine Datenbank (DBA), die den bisherigen Konfigurationsstand des von der Konfigurationsänderung betroffenen Basisstationssystems (BSSk) kennzeichnet. Anschließend erzeugt das Betriebs- und Wartungszentrum (OMC) aus der jeweiligen Datenbank (DBA) durch Einfügen der zur Konfigurationsänderung gehörigen Parameter (par1) eine neue Datenbank (DBN) und sendet sie jeweils zu dem von der Konfigurationsänderung betroffenen Basisstationssystem (BSSk), um einen neuen Konfigurationsstand zu aktivieren.




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## Beschreibung

Die Erfindung betrifft ein Verfahren zur Konfiguration eines Funk-Kommunikationsnetzes durch ein mehrere Managementebenen aufweisendes Managementnetz sowie ein entsprechendes Managementnetz.

Die Prinzipien eines Managementnetzes, die auch als TMN-Prinzipien (Telecommunications Management Network) bezeichnet werden, definieren mehrere Managementebenen für das Management eines Kommunikationsnetzes – beispielsweise eines Funk-Kommunikationsnetzes –, wobei jede Ebene eine doppelte Funktion hat. Im managenden System hat jede Ebene außer der untersten eine Manager-Funktion für die darunterliegende Ebene. Im gemanagten System hat jede Ebene außer der obersten eine Agenten-Funktion für die nächsthöhere Ebene. Die Managementebenen umfassen zumindest eine Netzeinrichtungsebene ("Network Element Level") mit üblicherweise mehreren Basisstationssystemen, eine Netzeinrichtungsmanagementebene ("Network Element Management Level") mit mindestens einem Betriebs- und Wartungszentrum sowie eine Netzmanagementebene ("Network Management Level") mit mindestens einem Netzmanagementzentrum. Ein wesentlicher Managementfunktionsbereich ist das Konfigurationsmanagement (Configuration Management), das eine Reihe von Diensten definiert, die eine Änderung der Struktur und damit des Verhaltens des Kommunikationsnetzes durch den Netzbetreiber (Operator) ermöglichen. Diese Dienste beziehen sich immer auf Instanzen von gemanagten Objekten, die insgesamt die netzspezifische Managementinformationsbasis bilden. Ein gemanagtes Objekt ist eine logische Abstraktion einer Ressource im Kommunikationsnetz. Hierbei wird unterschieden zwischen hardwarebezogenen gemanagten Objekten, die eine herstellerspezifische Realisierung einer Funktion beschreiben, und funktionsbezogenen gemanagten Objekten, bei denen es sich jeweils um die Abstraktion einer herstellerunabhängigen Funktionalität handelt. Zur objektorientierten Modellierung werden Objektklassen (Managed Object Class) verwendet.

Grundsätzlich kann das Konfigurationsmanagement eines Funkkommunikationsnetzes von zwei Managerseiten erfolgen, nämlich entweder zentral an dem Betriebs- und Wartungszentrum mit einem 'Operation and Maintenance Terminal' (OMT) oder vor Ort mit einer an Netzeinrichtungen des Basisstationssystems angeschlossenen Wartungseinrichtung ('Local Maintenance Terminal', LMT). Konfigurationsänderungen von OMT- oder LMT-Einrichtungen haben den Nachteil, daß sie nur einen begrenzten Teil des Gesamtnetzes betreffen. Dies bedeutet, daß sie für konfigurierbare Parameter, die eine Bedeutung über den verwalteten Bereich hinaus haben, nicht geeignet sind. Der Netzbetreiber hat in der Netzmanagementebene keine Möglichkeit, "on-line" in die aktuelle Konfiguration einzugreifen.

Es ist Aufgabe der Erfindung, ein Verfahren und ein Managementnetz anzugeben, durch das ein "on-line" Konfigurationsmanagement für die Gesamtkonfiguration eines Funk-Kommunikationsnetzes möglich ist.

Diese Aufgabe wird gemäß der Erfindung hinsichtlich des Verfahrens durch die Merkmale des Patentanspruchs 1 und hinsichtlich des Managementnetzes durch die Merkmale des Patentanspruchs 12 gelöst. Weiterbildungen der Erfindung sind den Unteransprüchen zu entnehmen.

Die Erfindung geht davon aus, daß zumindest ein Netzmanagementzentrum, ein Betriebs- und Wartungszentrum und ein Basisstationssystem die Managementebenen des Managementnetzes bilden. Gemäß dem Gegenstand der Erfindung werden vom Netzmanagementzentrum ein Konfigurationsvorgang mit mindestens einer Konfigurationsänderung für ein Basisstationssystem eingeleitet und dabei Parameter mit netzweiter Bedeutung zu dem Betriebs- und Wartungszentrum gesendet. Bei einer erfolgreichen Plausibilitätskontrolle für die empfangenen Parameter, die vom Betriebs- und Wartungszentrum durchgeführt wird, empfängt und speichert das Betriebs- und Wartungszentrum jeweils eine Datenbank, die den bisherigen Konfigurationsstand des von der Konfigurationsänderung betroffenen Basisstationssystems kennzeichnet. Anschließend erzeugt das Betriebs- und Wartungszentrum aus der jeweiligen Datenbank durch Einfügen der zur Konfigurationsänderung gehörigen Parameter eine neue Datenbank und sendet sie jeweils zu dem von der Konfigurationsänderung betroffenen Basisstationssystem, um einen neuen Konfigurationsstand zu aktivieren.



Das erfindungsgemäße Konfigurationsverfahren bietet dem Netzbetreiber die Funktionalität von "on-line" Konfigurationsänderungen von einem übergeordneten Netzmanagementzentrum der Netzmanagementebene an. Damit läßt sich die momentane Gesamtkonfiguration des Funk-Kommunikationsnetzes überprüfen – beispielsweise unmittelbar nach Auftreten von Alarmen, ausgelöst bei Ausfall von Hardware-Komponenten, bei mangelnder Dienstegüte usw.. Ein weiterer Vorteil der Erfindung liegt darin, daß bei dem Konfigurationsvorgang mit einer oder mehreren Konfigurationsänderungen die mitgesendeten Parameter eine netzweite Bedeutung haben, sodaß die Eingriffsmöglichkeit nicht mehr allein auf lokale OMT- oder LMT-Einrichtungen beschränkt ist. Ein besonderer Vorteil ergibt sich durch die Erfindung, indem die Konfigurationsänderungen von demselben Netzmanagementzentrum der Netzmanagementebene initiiert werden können, das auch eine netzweite Alarmüberwachung verwaltet und steuert. Eine sofortige Reaktion hinsichtlich der Gesamtkonfiguration ist beim Auftreten von Fehlern möglich. Darüber hinaus wirkt sich die Erfindung auch auf das Überprüfen von Konfigurationsänderungen durch den Operator vorteilhaft aus, die wegen möglichst schneller Verbesserung der Netzleistung als Reaktion auf unerwartete Probleme kurz- oder mittelfristig durchgeführt wurden.

Gemäß einer Weiterbildung der Erfindung werden von dem Betriebs- und Wartungszentrum die den bisherigen Konfigurationsstand kennzeichnende Datenbank in einem binären Format vom Basisstationssystem empfangen und in ein Textformat konvertiert sowie die neue Datenbank im Textformat generiert und vor dem Rücksenden zum Basisstationssystem in das binäre Format rückkonvertiert. Damit können die Konfigurationsänderungen, die vom Netzmanagementzentrum gemäß einem Objektmodell auf der Schnittstelle zum Betriebs- und Wartungszentrum gesendet werden, in ein anderes Objektmodell, das auf der Schnittstelle zwischen Betriebs- und Wartungszentrum und dem Basisstationssystem existiert, umgesetzt und eingebunden werden (mapping). Damit können in vorteilhafter Weise die Konfigurationsänderungen vom Netzbetreiber über das Netzmanagementzentrum in Textformat – vorzugsweise als ASCII Format – eingegeben und über einen Editor bei Bedarf wieder ausgelesen werden. Nach dem Mapping ersetzt der neue Parameter in der neuen Datenbank den alten Parameter der bisherigen Datenbank.

Weitere vorteilhafte Ausgestaltungen der Erfindung sehen vor, daß zum einen der neue Konfigurationsstand für das von der Konfigurationsänderung betroffene Basisstationssystem zu einem vom Netzmanagementzentrum übermittelten Zeitpunkt durch das Betriebs- und Wartungszentrum aktiviert wird, und daß zum anderen vom Netzmanagementzentrum eine Vorgangsnummer jedem Konfigurationsvorgang zugeordnet wird. Damit steuert das Netzmanagementzentrum der Netzmanagementebene den zeitlichen Ablauf der

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netzweiten Konfigurationsänderungen, und kann bei mehreren Konfigurationsvorgängen durch die Vorgangsnummer die initiierten Konfigurationsänderungen eindeutig dem jeweiligen Konfigurationsvorgang zuordnen.

Es hat sich auch als günstig erwiesen, wenn vom Betriebs- und Wartungszentrum bei Empfang einer Startnachricht für den vom Netzmanagementzentrum initiierten Konfigurationsvorgang weitere Konfigurationsvorgänge gesperrt werden, bis der initiierte Konfigurationsvorgang mit dem Aktivieren des neuen Konfigurationsstands endet oder ein Abbruch erfolgt. Damit können Konflikte mit parallel laufenden Konfigurationsänderungen, die lokal oder zentral von einer OMT- bzw. LMT-Einrichtung initiiert wurden, sicher vermieden werden. Aufwendige Abstimmungen brauchen somit nicht durchgeführt zu werden.

Eine Weiterbildung der Erfindung sieht vor, daß das Betriebs- und Wartungszentrum bereits nach Empfang einer ersten Konfigurationsänderung mit Parametern im Rahmen des vom Netzmanagementzentrum initiierten Konfigurationsvorgangs die Datenbank, die den bisherigen Konfigurationsstand des von der Konfigurationsänderung betroffenen Basisstationssystems (BSS) kennzeichnet, empfängt und speichert. Daraufhin wird vom Betriebs- und Wartungszentrum diese Konfigurationsänderung anhand der empfangenen Datenbank in eine Konfigurationsänderung für das Basisstationssystem umgesetzt (mapping) und mit den entsprechenden Parametern, die unmittelbar zum Basisstationssystem gesendet werden, ausgeführt. Diese Vorgehensweise hat den Vorteil, daß die Konfiguration anhand von Parametern mit netzweiter Bedeutung zu kurzfristigen Zwecken, beispielsweise zu Testzwecken oder zur Beobachtung des dynamischen Netzverhaltens, schnell und ohne Plausibilitätskontrolle vom Netzmanagementzentrum aus geändert werden können. Besonders vorteilhaft ist eine Kombination des Konfigurationsmanagements für kurzfristige, schnelle und vorzugsweise kleinere Konfigurationsänderungen mit dem Konfigurationsmanagement für die Überprüfung der geänderten Gesamtkonfiguration gemäß dem Gegenstand der Erfindung, die zielorientiert die Netzleistung verbessert.

Dabei hat es sich als günstig herausgestellt, auf die erste Konfigurationsänderung folgende weitere Konfigurationsänderungen anhand der empfangenen Datenbank jeweils vom Betriebs- und Wartungszentrum in eine Konfigurationsänderung für das Basisstationssystem umzusetzen und mit den entsprechenden Parametern, die unmittelbar zum Basisstationssystem gesendet werden, auszuführen. Damit werden die einzelnen, vom Netzmanagementzentrum initiierten Konfigurationsänderungen unmittelbar nach dem Umsetzen (mapping) in dem Betriebs- und Wartungszentrum direkt – ohne Sammeln – zum Basisstationssystem weitergeleitet und ausgeführt.

Nachstehend wird die Erfindung anhand eines Ausführungsbeispiels unter Bezugnahme auf die Figuren näher erläutert. Es zeigen

**Fig.** 1 das Blockschaltbild eines Managementnetzes mit mehreren Managementebenen, die von Netzmanagementzentren, Betriebs- und Wartungszentren und Basisstationssystemen gebildet werden,

**Fig.** 2 den Nachrichtenfluß zwischen den Managementebenen zur Konfiguration eines Funk-Kommunikationsnetzes gemäß dem Gegenstand der Erfindung, und

**Fig.** 3 den Nachrichtenfluß zwischen den Managementebenen für schnelle Konfigurationsänderungen, die zusätzlich im Funk-Kommunikationsnetz durchführbar sind.

Das Ausführungsbeispiel beschreibt die Erfindung anhand eines TMN-Konzepts für das Management eines Funk-Kommunikationsnetzes, das beispielsweise Netzeinrichtungen eines nach dem GSM-Standard betriebenen Kommunikationsnetzes aufweist. Die Erfindung ist aber nicht auf GSM-Kommunikationsnetze beschränkt, sondern läßt sich auf andere Netze, die ein TMN-Managementnetz nutzen, anwenden.

Ein Funk-Kommunikationsnetz ist ein hierarchisch gegliedertes System verschiedener Netzeinrichtungen, bei dem die unterste Hierarchiestufe von den beweglichen Endgeräten, den Mobilstationen, gebildet wird. Diese Mobilstationen kommunizieren über eine Funkschnittstelle mit die nächste Hierarchieebene bildenden Funkstationen, die als Basisstationen bezeichnet werden. Die beispielsweise mehrere Mobilstationen in einem Funkbereich einer Funkzelle versorgenden Basisstationen sind vorzugsweise zur Abdekkung eines größeren Funkgebiets zusammengefaßt und mit Basisstationssteuerungen verbunden. Die Basisstationen und Basisstationssteuerungen gehören zu einem Basisstationssystem (Base Station Subsystem) des Funk-Kommunikationsnetzes. Die Basisstationssteuerungen kommunizieren über definierte Schnittstellen mit einer oder mehreren Vermittlungseinrichtungen, den Mobilvermittlungsstellen, über die u. a. auch der Übergang zu anderen Kommunikationsnetzen erfolgt. Die Mobilvermittlungsstellen bilden gemeinsam mit einer Mehrzahl von Datenbanken das Vermittlungssystem (Switching Subsystem) des Funk-Kommunikationsnetzes.

Neben den obigen Netzeinrichtungen existieren ein oder mehrere Betriebs- und Wartungszentren (Operation and Maintenance Centers), die u. a. zur lokalen Konfiguration und Überwachung angeschlossener Netzeinrichtungen dienen. Ein Betriebs- und Wartungszentrum kommuniziert dabei jeweils mit einem Basisstationssystem oder Vermittlungssystem über eine definierte Schnittstelle.

Für das Managementnetz zur Konfiguration des Funk-Kommunikationsnetzes sind mehrere Ebenen ("Levels") definiert, von denen im vorliegenden Beispiel drei Ebenen unter Bezugnahme auf die **Fig.** 1 nachfolgend erläutert sind. Dies sind die Ebenen A, B und C des Managementnetzes, von denen die Managementebene C die Netzeinrichtungsebene ("Network Element Level") mit mehreren Basisstationssystemen BSS11 . . . BSS1N sowie BSS1, BSS2 . . .BSSM bildet. Das zusätzlich dargestellte Basisstationssystem BSSk steht stellvertretend für alle Basisstationssysteme BSS11 . . ., deren Aufbau und Funktion identisch mit dem des Basisstationssystems BSSk ist. Die nachfolgenden Erläuterungen beziehen sich nur auf das Basisstationssystem BSSk, gelten aber ebenso für die anderen Basisstationssysteme. Die Managementebene B kennzeichnet die Netzeinrichtungsmanagementebene ("Network Element Management Level"), in der beispielhaft zwei Betriebs- und Wartungszentren OMC und OMC1 jeweils die herstellerspezifische Managementfunktionalität für die zugeordneten Basisstationssysteme BSSk, BSS11 . . . BSS1N und BSS1, BSS2...BSSM bereitstellen. Die Managementebene A kennzeichnet die Netzmanagementebene ("Network Management Level"), in der beispielhaft zwei Netzmanagementzentren NMC und NMC1 jeweils eine integrierte, vom Hersteller unabhängige Management-Funktionalität für den Netzbetreiber realisieren. Dabei können mehrere Netzmanagementzentren einen Zugriff zu derselben Netzeinrichtung der nächstniedrigeren Managementebene B haben, im vorliegenden Beispiel die Netzmanagementzentren NMC und NMC1 der nächsthöheren Managementebene C zum Betriebs- und Wartungszentrum OMC der nächstniedrigeren Managementebene B. Zwischen den Einrichtungen unterschiedlicher Managementebenen sind definierte Schnittstellen zur Nachrichtenübertragung vorgesehen.

Jedes Netzmanagementzentrum, siehe NMC, und jedes Betriebs- und Wartungszentrum, siehe OMC, und jedes Ba-

sisstationssystem, siehe BSSk, weist eine Steuereinrichtung, siehe NST und OST und BST, sowie eine mit der jeweiligen Steuereinrichtung in Verbindung stehende Speichereinrichtung, siehe NSP und OSP und BSP, auf. Ebenso verfügen sie über - nicht näher dargestellte - Sende/Empfangseinrichtungen für das Senden und Empfangen von Nachrichten und Informationen über die Schnittstellen zwischen den unterschiedlichen Managementebenen. Dabei verläuft die Nachrichten und Informationsübertragung auf der NMC-OMC-Schnittstelle gemäß einem definierten Objektmodell und auf der OMC-BSSk-Schnittstelle gemäß einem anderen definierten Objektmodell. Jeder Konfigurationsvorgang mit zumindest einer Konfigurationsänderung für ein Basisstationssystem wird erfindungsgemäß von der Netzmanagementebene aus durch das Netzmanagementzentrum, z. B. NMC, eingeleitet. Die Konfigurationsänderung enthält Parameter mit netzweiter Bedeutung, sodaß durch das Netzmanagementzentrum NMC – und damit durch den Netzbetreiber – aktiv und "on-line" in die Gesamtkonfiguration des Kommunikationsnetzes steuernd eingegriffen werden kann.

**Fig.** 2 zeigt den Nachrichtenfluß zur Konfiguration des Funk-Kommunikationsnetzes gemäß dem Gegenstand der Erfindung, in den beispielsweise das Netzmanagementzentrum NMC mit Steuereinrichtung NST und Speichereinrichtung NSP, das Betriebs- und Wartungszentrum OMC mit Steuereinrichtung OST und Speichereinrichtung OSP sowie das Basisstationssystem BSSk mit Steuereinrichtung BST und Speichereinrichtung BSP involviert sind. Die Steuereinrichtungen und Speichereinrichtungen übernehmen in der jeweiligen Managementkomponente die beim Konfigurationsablauf anfallenden Steuer- und Speicherfunktionen. Die Nachrichten folgen generischen CMISE-standardisierten (Common Management Information Service Element) Prozeduren, die gemäß ITU-T X.710 definiert sind. Zum Konfigurationsablauf werden die bekannten Dienste M-ACTION und M-SET benutzt. Darüber hinaus findet ein standardisiertes Protokoll FTAM (File Transfer Administration and Management) auf der OMC-BSSk-Schnittstelle zur Übertragung von jeweils in einer Datenbank gespeicherten Informationen über den momentanen Konfigurationsstand des Basisstationssystems BSSk Anwendung.

Gestartet wird jeder Konfigurationsvorgang vom Netzmanagementzentrum NMC durch Senden einer Startnachricht STCON gemäß der M-ACTION Prozedur an das Betriebs- und Wartungszentrum OMC. Vorzugsweise werden für den Konfigurationsvorgang eine Vorgangsnummer ssN sowie ein Zeitpunkt acT, wann der neue Konfigurationsstand für das von einer Konfigurationsänderung betroffene Basisstationssystem BSSk zu aktivieren ist, festgelegt und in der Startnachricht STCON übermittelt. Das Betriebs- und Wartungszentrum OMC veranlaßt das Sperren weiterer Konfigurationsvorgänge, die im Rahmen eines Konfigurationsmanagements CM von einem OMT initiiert werden können. Darüber hinaus sendet das Betriebs- und Wartungszentrum OMC eine Nachricht SP LMTs gemäß der M-ACTION Prozedur zum Basisstationssystem BSSk, um einen Konflikt mit einem lokal vor Ort durchführbaren Konfigurationsmanagement cm eines oder mehrerer LMTs auszuschließen.

In einer Folge von M-SET Prozeduren werden zum initiierten Konfigurationsvorgang gehörige Konfigurationsänderungen CCM1, CCM2...CCMn nacheinander an das Betriebs- und Wartungszentrum OMC übermittelt. Dabei betreffen alle Konfigurationsänderungen CCM1, CCM2 . . . CCMn (Configuration commando) im vorliegenden Beispiel das Basisstationssystem BSSk, das an einer in der Nachricht enthaltenen Kennung nmcBSSk identifizierbar ist. Grundsätzlich können sich die Konfigurationsänderungen auch auf mehrere, gegebenenfalls verschiedene Basisstationssysteme beziehen. Jede Konfigurationsänderung CCM1 . . . wirkt auf eine Instanz einer gemanagten Objektklasse, auf Objektattribute und auf Objektattributwerte, die im entsprechenden Objektmodell auf der Schnittstelle NMC-OMC definiert sind. In jeder Konfigurationsänderung CCM1, CCM2 . . . CCMn werden Parameter par1, par2 . . . parn mit netzweiter Bedeutung zu dem Betriebs- und Wartungszentrum OMC gesendet. Diese Parameter haben einen Einfluß auf das Gesamtnetz, d. h. über den vom Betriebs- und Wartungszentrum OMC verwalteten Bereich hinaus. Beispiele für konfigurierbare Parameter par1 . . . sind das Handover (Verbindungsweiterschaltung) innerhalb einer Funkzelle sowie zwischen Funkzellen, die Beziehungen zwischen benachbarten Funkzellen, die Frequenzaufteilung in Zellkonfigurationen, das Generieren und Einrichten neuer Funkzellen usw.

Das Ende des Konfigurationsvorgangs wird durch Übermittlung einer vom Netzmanagementzentrum NMC generierten Endenachricht ENDCON gemäß der M-ACTION Prozedur an das Betriebs- und Wartungszentrum OMC signalisiert. Alle Konfigurationsänderungen CCM1, CCM2 . . . CCMn des Konfigurationsvorgangs werden zunächst im Betriebs- und Wartungszentrum OMC gesammelt bzw. gespeichert, damit anschließend nur eine Plausibilitätskontrolle für die empfangenen und gespeicherten Parameter par1 . . . des gesamten Konfigurationsvorgangs zu erfolgen braucht. Die Plausibilitätskontrolle basiert auf einer Überprüfung, ob die alle empfangenen Parameter par1 . . . mit netzweiter Bedeutung zueinander kompatibel sind. Jeder weitere Konfigurationsvorgang ist erst nach Ausführung des gesamten Konfigurationsmanagements für den Fall, daß die Plausibilitätskontrolle erfolgreich ist, oder nach Abbruch wegen fehlerhafter Plausibilitätskontrolle wieder möglich. Im letztgenannten Fall wird der Konfigurationsvorgang durch Senden einer standardisierten Fehlermeldung an das Netzmanagementzentrum NMC beendet.

Im erstgenannten Fall wird im Anschluß an die Plausibilitätskontrolle eine Kopie (snapshot copy) der Datenbank DBA vom Basisstationssystem BSSk empfangen, in der dessen bisheriger Konfigurationsstand enthalten ist. Dabei fordert das Betriebs- und Wartungszentrum OMC die Datenbank DBA gemäß dem bekannten Protokoll FTAM an und speichert den übersandten alten Konfigurationsstand ab. Für den Fall, daß mehrere Basisstationssysteme von einer oder mehreren Konfigurationsänderungen CCM1 . . . betroffen sind, empfängt und speichert das Betriebs- und Wartungszentrum OMC von jedem Basisstationssystem die zugehörige Datenbank DBA. Der Dateiname, unter dem die Kopie der jeweiligen Datenbank DBA in der Speichereinrichtung OSP angelegt ist, enthält auch die vom Netzmanagementzentrum NMC vergebene Vorgangsnummer ssN.

Da auf den beiden Schnittstellen NMC-OMC und OMC-BSSk wegen der hierarchischen Managementebenen unterschiedliche Objektmodelle zur Anwendung kommen, empfängt das Betriebs- und Wartungszentrum OMC die Datenbank DBA in einem binären Format binF. Es konvertiert folglich die Datenbank DBA in ein Textformat texF – am einfachsten in ein ASCII Format – entsprechend der BSSk-Konfiguration zum Startzeitpunkt des Konfigurationsvorgangs. Die jeweilige Konfigurationsänderung, die als NMC-Kommando (configuration commando) mit Textformat vorliegt, wird von dem Betriebs- und Wartungszentrum OMC gemäß dem vorhandenen Objektmodell an der Schnittstelle OMC-BSSk umgesetzt (mapping) und in die alte Datenbank DBA zur Erzeugung einer neuen Datenbank DBN eingefügt. Dabei ersetzt die Konfigurationsänderung – z. B. CCM1 – in der konvertierten Datenbank DBA den bisherigen Eintrag für den entsprechenden Parameter – z. B. par1.

Nachdem alle Konfigurationsänderungen CCM1 . . . CCMn als NMC-Kommandos vom Betriebs- und Wartungszentrum OMC in die jeweilige(n) Datenbank(en) DBA auf Textformatniveau eingearbeitet sind, wird jede BSSk-bezogene neue Datenbank DBN in Textformat texF in die entsprechende neue Datenbank DBN mit binärem Format binF rückkonvertiert. Eine Kopie jeder neuen Datebank DBN wird in das jeweilige Basisstationssystem BSSk über das FTAM-Protokoll geladen (downloading) und der darin enthaltene neue Konfigurationsstand mittels einer Nachricht ACT DBN an das Basisstationssystem BSSk zum eingestellten Zeitpunkt acT gemäß einer M-ACTION Prozedur aktiviert. Danach können die eingestellten Sperrfunktionen für ein OMT- oder ein LMT-Konfigurationsmanagement CM im Betriebs- und Wartungszentrum OMC sowie im Basisstationssystem BSSk wieder aufgehoben werden.

**Fig.** 3 zeigt den Nachrichtenfluß zwischen den Managementebenen für schnelle Konfigurationsänderungen, die zusätzlich im Funk-Kommunikationsnetz durchführbar sind. In diesem Konfigurationsmodus lassen sich Parameter im gesamten Netz zu kurzfristigen Zwecken, wie z. B. zum Testen und zur Beobachtung des Netzverhaltens, ohne Plausibilitätskontrolle ändern. Der Start des Konfigurationsvorgangs über die Nachricht STCON einschließlich der Vergabe der Vorgangsnummer ssN, die Ausführung der Sperrfunktionen für weitere Konfigurationsmanagements CM sowie das Übersenden einer ersten Konfigurationsänderung CCM1 mit der Kennung nmcBSSk und den Parametern par1 erfolgt in Analogie zum Ablauf gemäß **Fig.** 2. Nach dem Empfang der ersten Konfigurationsänderung CCM1 wird aber bereits die Datenbank DBA mit dem bisherigen Konfigurationsstand des von der Konfigurationsänderung betroffenen Basisstationssystems BSSk über das Protokoll FTAM übersandt und vom Betriebs- und Wartungszentrum OMC gespeichert. Damit liegt ein Abbild des jeweils zu Beginn des Konfigurationsvorgangs bestehenden Konfigurationsstand aller Objektinstanzen des Basisstationssystems BSSk im Betriebs- und Wartungszentrum OMC vor. Der Dateiname, unter dem die Kopie der Datenbank DBA von der Speichereinrichtung OSP registriert ist, enthält die zugeteilte Vorgangsnummer ssN. Die erste Konfigurationsänderung CCM1, die als NMC-Kommando vorliegt, wird unter Einbeziehung der Datenbank DBA in eine Konfigurationsänderung CCM1' gemäß dem Objektmodell an der Schnittstelle OMC-BSSk umgesetzt (mäpping) und die Konfigurationsänderung CCM1' mit den eingearbeiteten Parametern par1' an das Basisstationssystem BSSk weitergeleitet. Die auf die erste Konfigurationsänderung CCM1 folgenden weiteren Konfigurationsänderungen CCM2 . . . CCMn, die jeweils die Kennung nmcBSSk und die Parameter par2 . . . parn aufweisen, werden ebenfalls anhand der jeweils betroffenen und im Betriebs- und Wartungszentrum OMC gespeicherten Datenbank DBA in entsprechende Konfigurationsänderungen CCM2' . . . CCMn' für die Schnittstelle OMC-BSSk umgewandelt und jeweils mit den entsprechenden Parametern par2' . . . parn' unmittelbar zum betroffenen Basisstationssystem BSSk gesendet. Die Endenachricht ENDCON beendet den Konfigurationsvorgang für das schnelle Verändern von netzweiten Parametern, der vom Netzbetreiber über das Netzmanagementzentrum NMC initiiert wurde.

Alternativ zum ordnungsgemäßen Beenden des Konfigurationsvorgangs kann auch eine Abbruchnachricht ABOCON gemäß der M-ACTION Prozedur vom Netzmanagementzentrum NMC erzeugt und dem Betriebs- und Wartungszentrum OMC signalisiert werden. Auf Grund des Abbruchs des Konfigurationsvorgangs sendet das Betriebs- und Wartungszentrum OMC an jedes Basisstationssystem BSSk, für das eine Kopie der Datenbank DBA gespeichert ist, die entsprechende Datenbank DBA über das Protokoll FTAM zurück. Die alte Version des Konfigurationsstands wird vom Betriebs- und Wartungszentrum OMC durch Übermittlung der Nachricht ACT DBA gemäß der M-ACTION Prozedur an das Basisstationssystem BSSk aktiviert. Damit ist der zum Zeitpunkt des Starts des Konfigurationsvorgangs gültige ursprüngliche Konfigurationsstand wieder hergestellt. In Analogie zum Anlauf gemäß **Fig.** 2 können die Sperrfunktionen für die OMT- oder LMT-Konfigurationsmanagements entweder nach der Endenachricht ENDCON oder der Abbbruchnachricht ABOCON im Betriebs- und Wartungszentrum OMC sowie im Basisstationssystem BSSk aufgehoben werden. Besonders vorteilhaft ist die Kombination des Konfigurationsmanagements nach dem Ablauf von **Fig.** 3 für kurzfristige, schnelle und vorzugsweise kleinere Konfigurationsänderungen mit dem Konfigurationsmanagement für die Überprüfung der geänderten Gesamtkonfiguration nach dem Ablauf in **Fig.** 2. So können vom Netzbetreiber jeweils über das Netzmanagementzentrum der Netzmanagementebene zunächst kurzfristige Änderungen der Konfiguration in einem ersten Schritt netzweit ohne Plausibilitätskontrolle eingestellt und in einem zweiten Schritt für eine zielorientierte Verbesserung der Netzleistung mit Plausibilitätskontrolle überprüft werden.

## Patentansprüche

1. Verfahren zur Konfiguration eines Funk-Kommunikationsnetzes durch ein mehrere Managementebenen (A, B, C) aufweisendes Managementnetz mit zumindest einem Netzmanagementzentrum (NMC), einem Betriebs- und Wartungszentrum (OMC) und einem Basisstationssystem (BSSk), bei dem
   - vom Netzmanagementzentrum (NMC) ein Konfigurationsvorgang mit mindestens einer Konfigurationsänderung (CCM1) für ein Basisstationssystem (BSSk) eingeleitet und dabei Parameter (par1) mit netzweiter Bedeutung zu dem Betriebs- und Wartungszentrum (OMC) gesendet werden,
   - vom dem Betriebs- und Wartungszentrum (OMC) eine Plausibilitätskontrolle für die empfangenen Parameter (par1) durchgeführt wird,
   - bei erfolgreicher Plausibilitätskontrolle von dem Betriebs- und Wartungszentrum (OMC) jeweils eine Datenbank (DBA), die den bisherigen Konfigurationsstand des von der Konfigurationsänderung (CCM1) betroffenen Basisstationssystems (BSSk) kennzeichnet, empfangen und gespeichert wird,
   - von dem Betriebs- und Wartungszentrum (OMC) aus der jeweiligen Datenbank (DBA) durch Einfügen der zur Konfigurationsänderung (CCM1) gehörigen Parameter (par1) eine neue Datenbank (DBN) erzeugt wird, und
   - von dem Betriebs- und Wartungszentrum (OMC) die neue Datenbank (DBN) jeweils zu dem von der Konfigurationsänderung (CCM1) betroffenen Basisstationssystem (BSSk) gesendet und ein neuer Konfigurationsstand aktiviert wird.

2. Verfahren nach Anspruch 1, bei dem von dem Betriebs- und Wartungszentrum (OMC) die den bisherigen Konfigurationsstand kennzeichnende Datenbank (DBA) in einem binären Format (binF) vom Basisstationssystem (BSSk) empfangen und in ein Textformat (texF) konvertiert sowie die neue Datenbank (DBN) im Textformat (texF) generiert und vor dem Rücksenden

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zum Basisstationssystem (BSSk) in das binäre Format (binF) konvertiert werden.

3. Verfahren nach Anspruch 1 oder 2, bei dem der neue Konfigurationsstand für das von der Konfigurationsänderung (CCM1) betroffene Basisstationssystem (BSSk) zu einem vom Netzmanagementzentrum (NMC) übermittelten Zeitpunkt (acT) durch das Betriebs- und Wartungszentrum (OMC) aktiviert wird.

4. Verfahren nach einem der vorhergehenden Ansprüche, bei dem vom Netzmanagementzentrum (NMC) eine Vorgangsnummer (ssN) jedem Konfigurationsvorgang zugeordnet und dem Betriebs- und Wartungszentrum (OMC) übermittelt wird.

5. Verfahren nach einem der vorhergehenden Ansprüche, bei dem vom Betriebs- und Wartungszentrum (OMC) bei Empfang einer Startnachricht (STCON) für den vom Netzmanagementzentrum (NMC) initiierten Konfigurationsvorgang weitere Konfigurationsvorgänge gesperrt werden, bis der initiierte Konfigurationsvorgang mit dem Aktivieren des neuen Konfigurationsstands endet oder ein Abbruch erfolgt.

6. Verfahren nach einem der vorhergehenden Ansprüche, bei dem vom Betriebs- und Wartungszentrum (OMC) mehrere Konfigurationsänderungen (CCM1, CCM2 . . .) mit Parametern (par1, par2 . . .) für ein oder mehrere Basisstationssysteme (BSS) in einem Konfigurationsvorgang vor der Durchführung der Plausibilitätskontrolle gesammelt und eine oder mehrere neue Datenbanken (DBA) durch Einfügen der jeweiligen Parameter (par1, par2 . . .) erzeugt werden, bevor das Aktivieren des neuen Konfigurationsstands individuell für jedes Basisstationssystem (BSSk) veranlaßt wird.

7. Verfahren nach einem der vorhergehenden Ansprüche, bei dem

- vom Betriebs- und Wartungszentrum (OMC) bereits nach Empfang einer ersten Konfigurationsänderung (CCM1) mit Parametern (par1) im Rahmen des vom Netzmanagementzentrum (NMC) initiierten Konfigurationsvorgangs die Datenbank (DBA), die den bisherigen Konfigurationsstand des von der Konfigurationsänderung betroffenen Basisstationssystems (BSSk) kennzeichnet, empfangen und gespeichert wird,
- vom Betriebs- und Wartungszentrum (OMC) die Konfigurationsänderung (CCM1) anhand der empfangenen Datenbank (DBA) in eine Konfigurationsänderung (CCM1') für das Basisstationssystem (BSSk) umgesetzt und mit den entsprechenden Parametern (par1'), die unmittelbar zum Basisstationssystem (BSSk) gesendet werden, ausgeführt wird.

8. Verfahren nach Anspruch 7, bei dem auf die erste Konfigurationsänderung (CCM1) folgende weitere Konfigurationsänderungen (CCM2 . . .) anhand der empfangenen Datenbank (DBA) jeweils vom Betriebs- und Wartungszentrum (OMC) in eine Konfigurationsänderung (CCM2' . . .) für das Basisstationssystem (BSSk) umgesetzt und mit den entsprechenden Parametern (par2' . . .), die unmittelbar zum Basisstationssystem (BSSk) gesendet werden, ausgeführt werden.

9. Verfahren nach Anspruch 7 oder 8, bei dem vom Netzmanagementzentrum (NMC) eine Nachricht (ENDCON) zum Beenden des Konfigurationsvorgangs mit den zugehörigen Konfigurationsänderungen (CCM1 . . .CCMn) zum Betriebs- und Wartungszentrum (OMC) gesendet wird.

10. Verfahren nach Anspruch 7 oder 8, bei dem vom Netzmanagementzentrum (NMC) eine Nachricht (ABOCON) zum Abbruch des Konfigurationsvorgangs mit den zugehörigen Konfigurationsänderungen (CCM1 . . . CCMn) zum Betriebs- und Wartungszentrum (OMC) gesendet wird.

11. Verfahren nach einem der vorhergehenden Ansprüche, bei dem von den Konfigurationsänderungen (CCM1 . . . CCMn) jeweils eine Instanz einer Objektklasse, Objektattribute und Objektattributwerte betroffen sind.

12. Managementnetz zur Konfiguration eines Funk-Kommunikationsnetzes, mit mehreren Managementebenen (A, B, C), die zumindest ein Netzmanagementzentrum (NMC), ein Betriebs- und Wartungszentrum (OMC) und ein Basisstationssystem (BSSk) aufweisen, mit

- Mittel (NST) im Netzmanagementzentrum (NMC) zum Einleiten eines Konfigurationsvorgangs mit mindestens einer Konfigurationsänderung (CCM1) für ein Basisstationssystem (BSSk) und zum Senden von Parametern (par1) mit netzweiter Bedeutung zu dem Betriebs- und Wartungszentrum (OMC),
- Mittel (OST) im Betriebs- und Wartungszentrum (OMC) zur Durchführung einer Plausibilitätskontrolle für die empfangenen Parameter (par1),
- Mittel (OST) im Betriebs- und Wartungszentrum (OMC) zum Empfangen und Speichern jeweils einer Datenbank (DBA), die den bisherigen Konfigurationsstand des von der Konfigurationsänderung (CCM1) betroffenen Basisstationssystems (BSS) kennzeichnet, bei erfolgreicher Plausibilitätskontrolle,
- Mittel (OST) im Betriebs- und Wartungszentrum (OMC) zum Erzeugen einer neuen Datenbank (DBN) aus der jeweils empfangenen Datenbank durch Einfügen der zur Konfigurationsänderung (CCM1) gehörigen Parameter (par1), und
- Mittel (OST) im Betriebs- und Wartungszentrum (OMC) zum Senden der neuen Datenbank (DBN) jeweils zu dem von der Konfigurationsänderung (CCM1) betroffenen Basisstationssystem (BSSk) und zum Aktivieren des neuen Konfigurationsstands.

13. Managementnetz (TMN) nach Anspruch 12, bei dem die Mittel (OST) im Betriebs- und Wartungszentrum (OMC) die den bisherigen Konfigurationsstand kennzeichnende Datenbank (DBA) in einem binären Format (binF) vom Basisstationssystem (BSSk) empfangen und in ein Textformat (texF) konvertieren sowie die neue Datenbank (DBN) im Textformat (texF) generieren und vor dem Rücksenden zum Basisstationssystem (BSSk) in das binäre Format (binF) konvertieren.

Hierzu 3 Seite(n) Zeichnungen

- Leerseite -

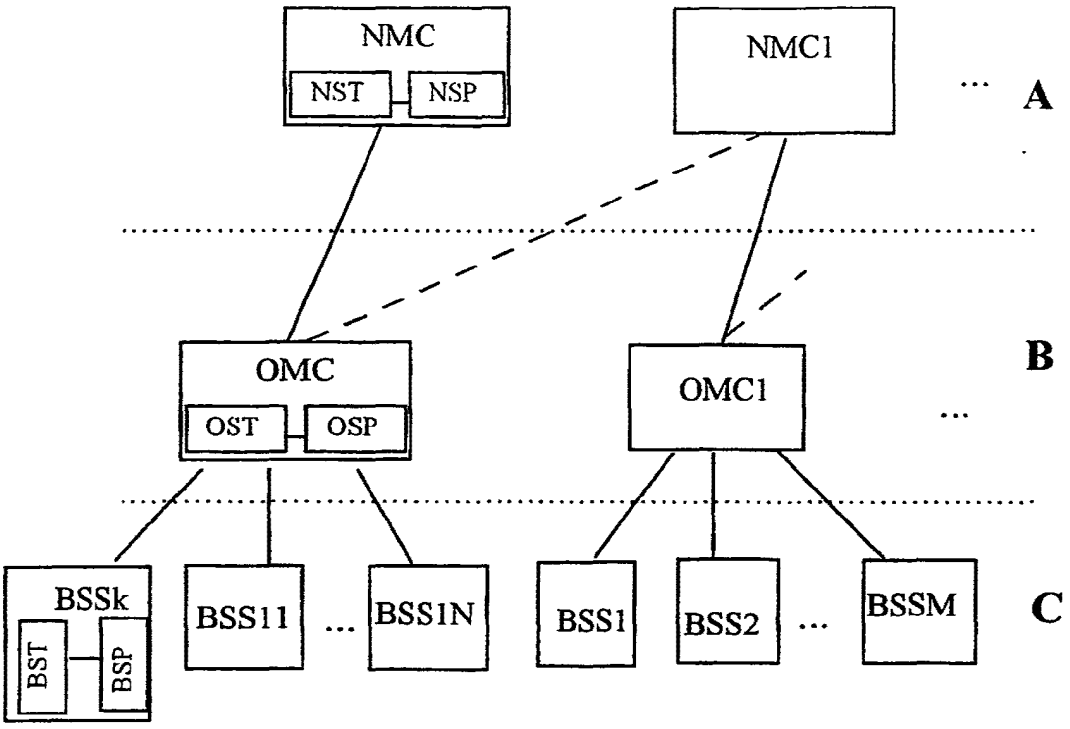



FIG 1



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Int. Cl.[6]: H 04 Q 7/20
Offenlegungstag: 30. September 1999

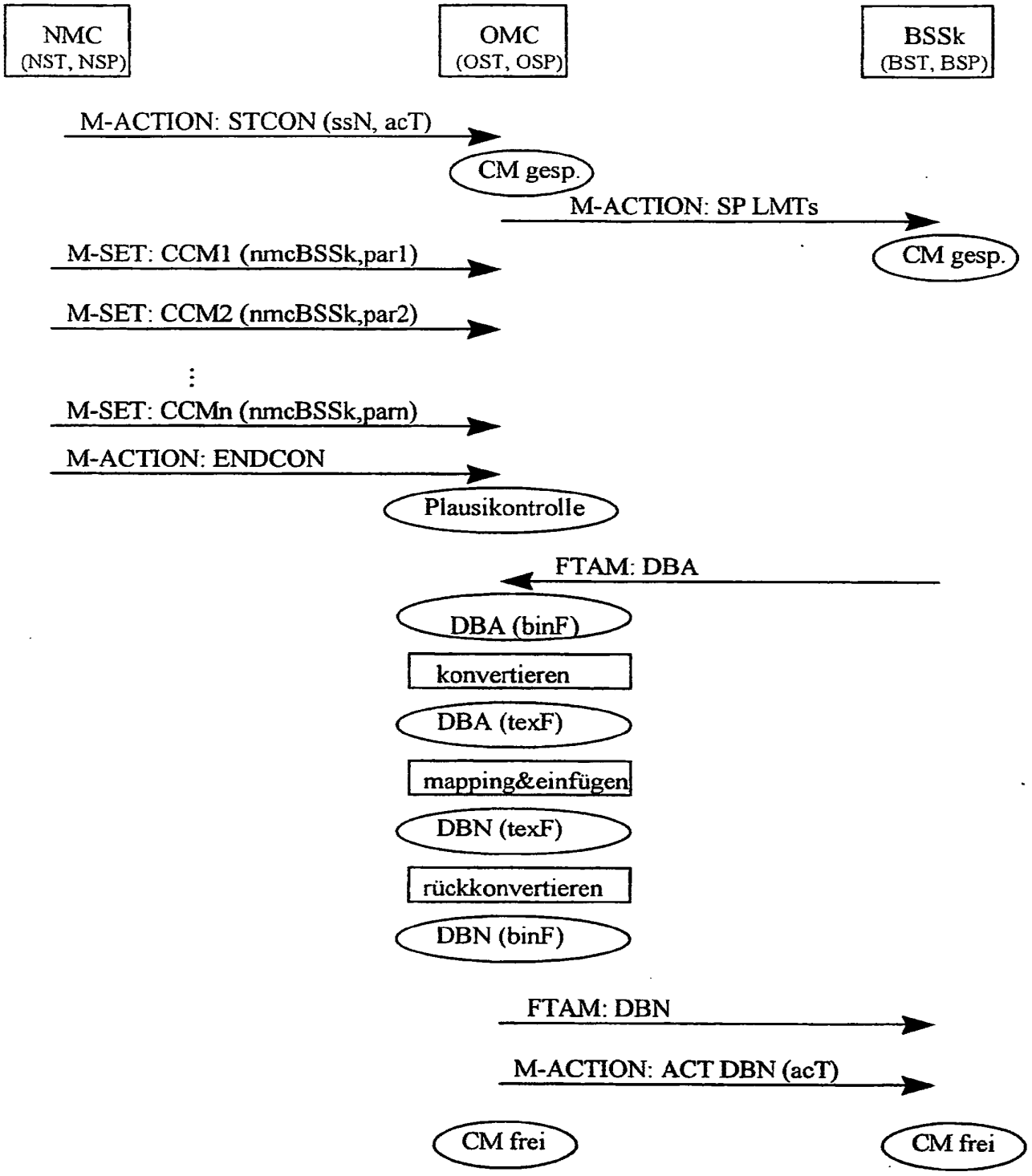



FIG 2

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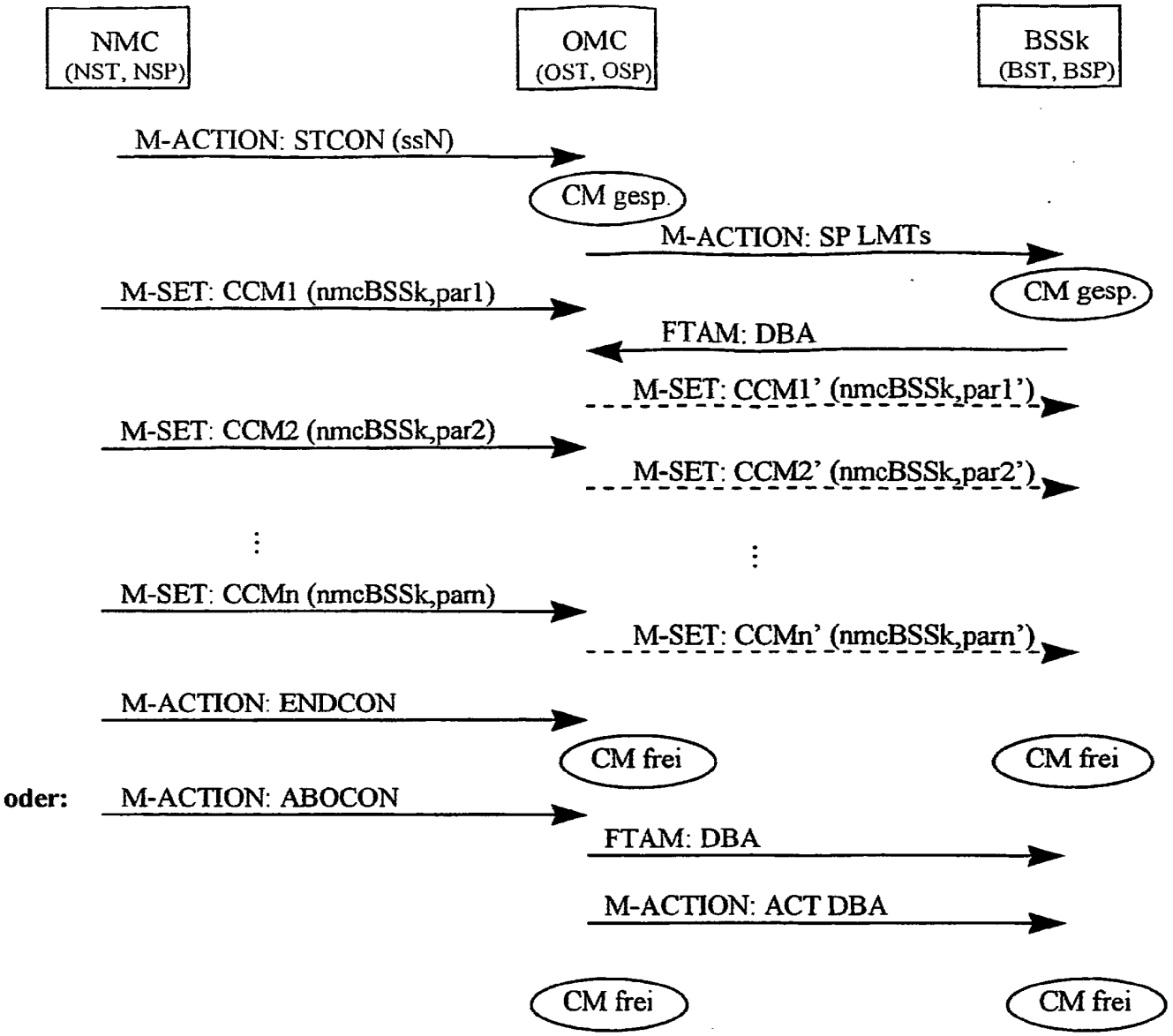



FIG 3



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(51) International Patent Classification 5 : H04B 7/26, H04Q 7/00

A1

(11) International Publication Number: WO 92/21182

(43) International Publication Date: 26 November 1992 (26.11.92)

(21) International Application Number: PCT/SE92/00339

(22) International Filing Date: 20 May 1992 (20.05.92)

(30) Priority data:
704,397 23 May 1991 (23.05.91) US

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(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), MC (European patent), NL (European patent), SE (European patent).

**Published**
*With international search report.*
*With amended claims.*

(54) Title: RECONFIGURATION OF A CELLULAR COMMUNICATIONS NETWORK

(57) Abstract

A method and apparatus for performing reconfiguration of a cellular network is provided. Cell parameters of affected radio network controlling units in the network are copied to a database, and the copied parameters are stored (11). A set of proposed changes to the stored parameters are prepared and the consistency of the prepared set of proposed changes is verified (12, 13). Any necessary alterations to the set of proposed changes responsive to the verification are made and the verified set of proposed changes are copied to the affected radio network controlling units (14, 15). The verified set of proposed changes are then introduced into the network (20-26). Additionally, at all times, an up-to-date image of all the cell parameters in all the radio network controlling units in the network is maintained in a system parameter database.

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BNSDOCID: <WO___9221182A1_I_>

# RECONFIGURATION OF A CELLULAR COMMUNICATIONS NETWORK

## FIELD OF THE INVENTION

The present invention relates to the management of cellular mobile radio systems. More particularly, the present invention is directed to a method and apparatus for reconfiguration of a cellular network when such reconfiguration becomes necessary due to permanent or temporary growth, decrease of traffic, equipment malfunctions or engineering changes.

## BACKGROUND OF THE INVENTION

A typical cellular mobile radio telephone system is controlled by at least one mobile switching center (also known as a mobile telephone switching office), at least one base station, and at least one mobile station. The mobile switching center constitutes an interface between the radio system and the public switching telephone network. The base station transmits information between the mobile stations and the mobile switching center. Calls to and from mobile subscribers are switched by the mobile switching center. The mobile switching center also provides the signalling functions needed to establish the calls.

In order to obtain radio coverage of a geographical area, a number of base stations are normally required. This number may range from, in the exceptional case, one base station, and up to one hundred or more base stations in normal systems. The area is divided into cells, where each cell may either be serviced by a base station or may share a base station with a number of the other cells.

The fast development of cellular telephony has caused the administration of cellular networks and their reconfiguration to become more difficult. Problems with the administration of the networks arise when, for example, the growth of the number of mobile subscribers requires existing cells to be split into

several smaller cells or a base station or a mobile switching center becomes temporarily inoperative requiring traffic through that base station or mobile switching center to be temporarily reassigned.

Wire bound telephone networks have had administrative systems for some time. But mobile cellular networks have many parameters and many requirements which are not encountered in the wire bound networks and which are not satisfied by existing administrative systems. For example, the location of the mobile subscribers must be known to the land system in order to direct calls properly. Additionally, each cell has certain associated parameters or characteristics which must be properly maintained to ensure proper operation of the cellular network.

Conventionally, manual or semi-manual ad hoc methods have been used to introduce parameter changes in the cellular networks for reconfiguration purposes and to check the accuracy of the proposed parameter changes. One such manual method used in conventional systems is performed in the following manner. The method will be described with reference to Figs. 1 and 2 and Table I and using, as an example, a proposed cell split caused by an increase in the number of mobile subscribers. A cell split is described in IICMS 88 Cellular Mobile Telephone System", Ericsson publication EN/LZT 101 908 R2B, Chapter 6 (1987).

Fig. 1 illustrates a simple cell split, which, in this example, consists only of the introduction of one new cell. As shown in Fig. 1, there are five existing cells 1,...,5 (shown in solid lines) and one new cell 6 (shown in dashed lines). Each cell includes a base station BS1,...,BS6. There are two mobile switching centers MSC1, MSC2, and cells 1, 5 and 4 are allocated to MSC1, whereas cells 2, 3 and 6 are allocated to MSC2. The cells are connected to their respective mobile switching centers via a PCM link. There is also an administrative center ADM connected to the mobile switching centers MSC1, MSC2 via an X25 link.

Fig. 2 illustrates an example of a manual check which is done in conventional systems when a cell split is being planned and implemented. When the operator at, for example, MSC2 wants to introduce cell 6 in the network, he collects the network parameters involved from MSC2 and MSC1, and prepares the new data required in MSC1 and MSC2, for example, the new neighbor cell definition of Fig. 2. Then he performs a manual check of the proposed changes to determine if any errors have been made. One such check involves determining whether the matrix of Fig. 2 has an equal number of cells in each row and in the corresponding column to ensure that all neighboring cells have been identified properly. This is important since the changes required to introduce a new cell into the network may not only affect the concerned switch, including associated radio base stations and cells, but also the surrounding switches, radio base stations and cells.

If the number of cells in one row is different than the number of cells in the corresponding column, this indicates that there is at least one cell defined as a neighbor for another cell but not visa versa. Other manual and computer assisted checks are also performed before the new data is approved. These manual and semi-manual checks become unduly burdensome and unmanageable as the network grows in size.

Table I illustrates an example of some of the information, i.e., the orders, to be entered into MSC2 to introduce cell 6 in MSC2. A corresponding set of orders is prepared for MSC1. The details of the illustrated commands may be found in the man machine language MML standards (CCITT Yellow Book, Vol. VI, VII Plenary Assembly, Geneva 1981).

In conventional systems, the commands shown in Table I are entered manually by the operator responsible for the mobile switching center concerned. If more than one mobile switching center is involved, the operators agree by telephone what data to enter and when. When installing and starting a complete new network the orders may be provided on a magnetic tape per mobile switching

center and entered into the network via tape readers. The manual procedures done conventionally are prone to human error and are very slow. This is of particular concern when reconfiguration is required quickly, with no advance planning possible, due to malfunctions in the network, for example, a failed base station or mobile switching center.

In a cellular network, a large number of parameters and relationships are stored in the mobile switching centers. For operators of these networks, it is difficult to maintain an overview of these parameters and to keep them consistent and correct. It is particularly difficult to maintain consistency when manually implementing a reconfiguration. This difficulty is compounded when several mobile switching centers are operating in the network.

In conventional systems, to survey the cellular network, a copy of all system parameters are maintained in a database, which can be termed the system parameter database. It is important that the system parameter database always contain the current picture of the cellular network. In a rapidly growing network, the system parameter database must therefore be updated frequently and efficiently. This is difficult to accomplish in conventional systems.

The above-discussed disadvantages and difficulties may also occur in the European cellular GSM system and in radio local loop (RLL) applications. Fig. 9 discloses a typical example of a GSM system including the cells (shown in Fig. 1) together with the associated base stations BS1-BS6. In the GSM system, the base stations are controlled by base station controllers BSC1-BSC3 via the standardized interface referred to as A' in the GSM specification. The BSCs in turn are controlled by mobile service centers MSC1 and MSC2 via the interface called A in the GSM specification.

Fig. 10 shows an example radio local loop application where radio base stations BS are connected to a switch in the public switch telephone network PSTN. No mobile switching center MSC is

required because the telephones connected via radio are not mobile and do not need the advanced functions available in an MSC.

SUMMARY OF THE INVENTION

The CCITT man machine language MML or an equivalent language has conventionally been used to perform several activities interactively in the network. These activities include:

1. cell splitting and cell combining due to changes in traffic;
2. cell reassignment to mobile switching centers or other radio network controlling units due to changes in the number of mobile switching centers or other radio network controlling units;
3. temporary or permanent cell reassignments due to malfunctioning radio network controlling units, for example, base stations or mobile switching centers; and
4. cell parameter changes due to engineering changes, for example, changes in the frequency plan.

The present invention is based on the observation that the network activities described above contain a common procedure which may be called "reconfiguration". It consists mainly of the following steps:

1. the cell parameters of the affected part of the network, as they appear before a reconfiguration is implemented, are copied via data link from the associated mobile switching centers or other radio network controlling units to a database in an administrative center in the network;
2. the changes to the cell parameters of the cell or cells affected by the proposed reconfiguration are prepared by the network planners and/or by an automatic program and entered into the database;
3. a program verifies the consistency of the suggested parameter changes and any necessary corrections are made manually or automatically;
4. the new cell parameters are copied via data link from the database to the mobile switching centers or other radio network controlling units concerned; and

5. the reconfiguration and associated parameter changes are introduced in the network, for example, by deblocking the affected cells.

One advantage of the present invention is that the changes may be simultaneously downloaded into several mobile switching centers or other radio network controlling units from one common point in the network, that is the administrative center, thereby creating a complete procedure which may be activated with or without human intervention. In other words, the procedure may be activated by the operator or automatically when, for example, a base station malfunction alarm triggers an automatic reconfiguration based on prestored change specifications.

The present invention introduces a centralized processor controlled procedure with a number of advantages, including, but not limited to:

1. reconfiguration is carried out more reliably using a unified procedure which is not dependent upon the reason for the reconfiguration; and

2. reconfiguration is carried out faster, or in some case automatically.

In order to overcome the disadvantages noted with conventional systems, the present invention according to a preferred embodiment is directed to a method of performing reconfiguration of a cellular network including copying cell parameters of affected radio network controlling units in the network to a database, and storing the copied parameters, preparing a set of proposed changes to the stored parameters, verifying the consistency of the prepared set of proposed changes and making any necessary alterations of the set of proposed changes responsive to the verification, copying the verified set of proposed changes to the affected radio network controlling units, and introducing the verified set of proposed changes into the network. The reconfiguration may be temporary and the network may be restored to an original state using the stored cell parameters. The updating function of the image of the network may be initiated periodically

by the operator and the set of proposed changes may be manually entered. Alternatively, the reconfiguration may be automatically initiated upon an occurrence of an event and the set of proposed changes may be stored in a memory.

According to a preferred embodiment, a method is provided of modifying at least a part of a cellular network, including copying, via a datalink from associated ones of the radio network controlling units to the administrative database, cell parameters of at least one cell as the parameters are stored before a proposed modification is implemented, determining at least one change to the cell parameters of the at least one cell affected by the proposed modification, and entering the at least one change into the administrative database. The consistency of the entered change is then verified and any necessary corrections are made to the at least one change responsive to the verification. The verified/corrected cell parameters are then copied, via the data link from the administrative center to the associated ones of the radio network controlling units, and the verified/corrected cell parameters in the associated ones of the radio network controlling units are activated to introduce the modification into the network. The method may further include, prior to the activation, eliminating ongoing calls of the at least one mobile station assigned to the associated cells by handing off ongoing calls to neighboring cells, and inhibiting new calls in the affected cells, and after the step of activating, the step of restarting calls in the affected cells. A set of parameter changes may be stored for each base station and each radio network controlling unit in the network, and when a particular radio network controlling unit malfunctions, the modification of the at least part of the cellular network may be automatically initiated by using the stored set of parameter changes associated with the particular radio network controlling unit in the step of determining. Before the activation, routing table changes may be ordered in any radio network controlling units affected by the modification. Live traffic in the network may be measured after the activation, and the cell parameters may be optimized using successive changes responsive to the live traffic measurements.

According to a preferred embodiment, a method of maintaining a system parameter database in a cellular network is provided including obtaining current parameter data from at least one radio network controlling unit in the network, storing the obtained current parameter data in a data buffer, generating a difference list by comparing the stored current parameters with existing data in the system parameter database by storing in the difference list data which is in the stored current parameter data but not in the existing data, data which is in the existing data but not in the stored current parameter data, and data which has different values in the stored current parameter data as compared with the existing data, and updating the system parameter database from the difference list. The step of updating includes deleting data from the system parameter database which is in the existing data but not the stored current parameter data, adding data into the system parameter database which is in the stored current parameter data but not in the existing data, and updating data in the system parameter database for which different values were found.

According to a preferred embodiment, an apparatus is provided for providing service in a cellular radio system in response to a communication need, including a base station located near an area in need of communication services, and means connected to the system for implementing a plurality of system changes required to connect the base station to the system. The means for implementing comprises means for verifying the consistency of the plurality of changes.

According to a preferred embodiment, an apparatus is provided for performing reconfiguration of a cellular network, including at least one radio network controlling unit database for storing a plurality of cell parameters, a system parameter database connected to the at least one radio network controlling unit database for storing an up-to-date image of cell parameters in the network, buffer memory means connected to the at least one radio network controlling unit database and the system parameter database for storing at least one cell parameter change to be used to update the system parameter database, and a temporary database

connected to the system parameter database and the buffer memory means for temporarily storing proposed cell parameter changes to be introduced into the network. The apparatus further includes means for updating the system parameter database from the at least one cell parameter stored in the buffer memory means, said means being connected to the system parameter database and buffer memory means, and being responsive to an update command. The means for updating includes means for creating a difference list by comparing the at least one cell parameter in the buffer means with the cell parameters stored in the system parameter database, and storing in the difference list any cell parameter which is in the system parameter database and not in the buffer means, any cell parameter which is in the buffer memory means and not in the system parameter database, and any cell parameter for which the value in the buffer memory means is different than the value in the system parameter database.

According to a preferred embodiment, a method is provided of maintaining a cellular network, including copying data from at least one switch affected by the maintenance into a buffer memory, and updating data in a system parameter database from the data in the buffer memory, whereby an up-todate image of the network is maintained in the system parameter database. The step of updating includes generating a difference list by comparing the data in the system parameter database with the data in the buffer memory and storing in the difference list data, which is in the system parameter database and not in the buffer memory, data which is in buffer memory and not in the system parameter database, and data which has different values in the system parameter database as compared with the buffer memory, and updating the system parameter database from the different list. The step of updating from the difference list includes deleting data from the system parameter database which is in the system parameter database and not in the buffer memory, adding data to the system parameter database which is in the buffer memory and not in the system parameter database, and updating data in the system parameter database for which different values are found. The method further includes copying the data in the system parameter database into a temporary

database, making changes to the data stored in the temporary database, performing at least one consistency verification procedure on the changed data stored in the temporary database, and transferring the verified data to the at least one switch affected by the maintenance. The step of performing includes for any data that fails the at least one consistency verification procedure, making any necessary correction to the data, and the step of transferring includes when the data passes the at least one consistency verification procedure, translating the data to appropriate commands and sending the commands to the affected at least one switch. The method further includes measuring live traffic in the network after the step of transferring and optimizing cell parameters in the at least one switch responsive to the live traffic measurements.

According to a preferred embodiment, a computer program product is provided having a computer readable medium having computer program logic recorded thereon for implementing reconfiguration of a cellular network. The computer program product includes means for receiving and storing existing cell parameters, means for storing a set of proposed changes to the stored parameters, means for verifying the consistency of the stored set of proposed changes, and means for outputting the verified set of proposed changes.

According to a preferred embodiment, a computer program product is provided having a computer readable medium having computer logic recorded thereon for implementing maintenance of a cellular network. The computer program product includes means for copying cell data from at least one cell in the network into a buffer memory, and means for updating cell data in a system parameter database from the cell data in the buffer memory, whereby an up-to-date image of the network is maintained in the system parameter database.

The means for updating includes means for generating a difference list by comparing the current data in the system parameter database with the data in the buffer memory and storing in the difference list data which is in the system parameter database and

not in the buffer memory, data which is in buffer memory and not in the system parameter database, and data which has different values in the system parameter database as compared with the buffer memory, and means for updating the system parameter database from the difference list.

Still other objects, features and attendant advantages of the present invention will become apparent to those skilled in the art from a reading of the following detailed description of the embodiments constructed in accordance therewith, taken in conjunction with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be described in more detail with reference to the preferred embodiments of the device, given only by way of example, and with reference to the accompanying drawings, in which:

Fig. 1 is a schematic diagram illustrating a simple reconfiguration to be implemented in a cellular network;
Fig. 2 illustrates an example of a manual check which is performed in conventional methods of implementing a reconfiguration;
Fig. 3 is a schematic block diagram illustrating an apparatus for implementing reconfiguration of a cellular network according to the present invention;
Fig. 4A and 4B are flowcharts illustrating a method of reconfiguring a cellular network according to the present invention;
Fig. 5 is a flowchart illustrating an update routine according to the present invention;
Fig. 6 is a flowchart illustrating a consistency check routine according to the present invention;
Figs. 7A and 7B are block diagrams illustrating a base station in a cellular mobile radio system;
Fig. 8 is a block diagram illustrating a mobile switching center in a cellular mobile radio system;
Fig. 9 is a schematic diagram illustrating a GSM cellular system; and

Fig. 10 is a schematic diagram illustrating a radio local loop application.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 3 illustrates, in schematic block diagram form, a portion of a cellular network according to the present invention. Three main databases are used to store the network parameter data according to a preferred embodiment of the present invention: the system parameter database SPDB, the buffer MSCDA, and the temporary database TEDB. According to a preferred embodiment of the present invention, these databases interact as follows.

An updated image of the network is maintained in the SPDB. When changes occur in the network, SPDB is incorrect until it has been updated.

It is also necessary to identify the actual changes in the network when they occur. For this purpose, a snapshot buffer memory MSCDA is used enabling the registration of changes, before they are used to update the network image in SPDB. The changes are either induced changes, when the administrative center orders them, or they are spontaneous, as for example, in the case of malfunctions and alarms.

The SPDB is a large file, whereas MSCDA often registers a very limited number of changed parameters, for example, considering the planned change of Fig. 1. It is useful to know not only the new version of SPDB, but also where in the large SPDB the changes have been made. This is seen in MSCDA. However, in other cases, such as periodic checks of the network parameters, all parameters have to be collected in the MSCDA. In this case, the size of MSCDA is equal to the size of SPDB.

The TEDB is a working area in which suggested parameter changes can be introduced while leaving the up-to-date image of the network undisturbed in SPDB, since it may be necessary to refer back to the unchanged image. Once the consistency of the proposed

changes has been verified, the changes are introduced into the network from the TEDB through the translation program.

According to a preferred embodiment as shown in Fig. 3, the cellular network 100 includes two mobile switching centers MSC1 and MSC2, of course, depending upon network requirements, any number of mobile switching centers may be connected together. For the sake of simplicity, the associated base stations are not shown in Fig. 3. In the mobile switching center MSC1, there is a database MSCDAL which stores the parameters describing the cells associated with the mobile switching center MSC1. D1 is the data of one cell group, where the database MSCDAL stores data from a number of cell groups and a cell group contains at least one cell.

A cell group is defined as follows. When introducing a change in a given cell, the cells affected by the change consist of the cell to be changed and all neighboring cells, where the neighboring cells are those cells to which handoff may be made from the given cell. A cell group is the subset of the cells affected by the change which are connected to the same mobile switching center, if there are more than one mobile switching centers associated with the cells involved in the change.

According to a preferred embodiment, the mobile switching center MSC1 is implemented as an Ericsson AXE switch. Of course, the present invention can be implemented using other types of switches. The mobile switching center MSC2 may be described similarly to the mobile switching center msc1.

An administrative center 200 is connected to the mobile switching centers in the network 100 to administrate the network and, in particular, according to a preferred embodiment of the present invention to perform reconfigurations. According to a preferred embodiment, the administrative center is implemented as a SUNO computer model sPARC, although any computer may be used. The methods and apparatus of the present invention, according to a preferred embodiment, are implemented as a computer program which runs on this computer. The administrative center can be col-

located with one of the mobile switching centers in the network or it can be separately located with respect to all mobile switching centers.

A first subsystem of the SUNO system contains the means to create and maintain an up-to-date image of the cellular network. This subsystem is outlined by a dashed line labeled 2001 in Fig. 3.

The subsystem 2001 consists of the following parts. The system parameter database SPDB contains a complete image of the network parameters, including the data from all mobile switching centers in the network. Examples of some of the parameters stored in the SPDB are shown in Table II.

In a preferred embodiment, in the SPDB of Fig. 3, D1 is the cell group data from the mobile switching center MSC1 and D2 is the cell group data from the mobile switching center MSC2. For example, considering the example shown in Fig. 1, when a change is introduced into the network, only the data in the network associated with the planned change needs to be collected. For the example of Fig. 1, the data of cells 1-5 must be collected, since they are neighbor cells to the planned new cell 6. Cells 1, 4 and 5 are referred to as one cell group and cells 2 and 3 as a different cell group, because their data has to be collected from different mobile switching centers. Each time the SPDB is to be updated, the buffer MSCDA receives the current parameter data collected from the mobile switching centers MSC1 and MSC2 before it is used to update the system parameter database SPDB.

The difference lists DIFFLIST1, DIFFLIST2, DIFFLIST3 are preferably software routines which extract and store in a memory the differences between the buffer MSCDA and the system parameter database SPDB. In a preferred embodiment, DIFFLIST1 stores objects found in both the buffer MSCDA and the system parameter database SPDB but with differing parameter values, DIFFLIST2 stores objects which are in the buffer MSCDA but not in the system parameter database SPDB, and DIFFLIST3 stores objects not in the buffer MSCDA but in the system parameter database SPDB. For

purpose of this discussion, objects are, for example, base stations and cells. Each object has associated therewith at least one parameter. An object is represented in the database as an identity with parameters. The function unit UPDATE SPDB performs the updating in three steps according to the subdivision described with reference to the difference lists. This will be described more fully in the following discussion.

The updating function may be initiated periodically or may be event-controlled by the SUNO computer which sends an appropriate audit order to the mobile switching centers it supervises. A system which allows both event-controlled and periodic updating is preferable, since it is a function of the system parameter database to have an updated image of the cellular network at all times as well as to allow operator initiated updating when desired.

A second subsystem of the SUNO system contains features for reconfiguring the cellular network, that is, introducing or eliminating cells or whole mobile switching centers in the cellular network, or merely changing parameters of existing cells or mobile switching centers. This subsystem is outlined by a dashed line labeled 20011 in Fig. 3.

According to a preferred embodiment of the invention, a temporary rise in the number of subscribers in a given location, for example, a large concert or sporting event, may cause severe cellular traffic problems. To handle the additional traffic created by such an event, a permanent base station may be installed in a location where such additional traffic may be generated. This base station may then be temporarily added to the network as necessary. Alternatively, a temporary mobile base station, mounted in a vehicle or movable container may be moved into the area. During, or just prior to the event which is anticipated to cause additional cellular traffic, a cell split may be performed to add the temporary base station to the network using the techniques of reconfiguration described herein. When the event is over, a cell recombination may be performed, removing the temporary base

station from the network, using the techniques of reconfiguration described herein. The reconfiguration may be done using cell split data that is stored and can be reused when there is an event in that location. Alternatively, the cell split data may be entered by an operator as described below.

The subsystem 200" consists of the following parts. The temporary database TEDB is a copy of the system parameter database SPDB in which changes to the cellular network may be introduced and checked before they are implemented in the real cellular network. After the procedures for verifying the accuracy and appropriateness of the proposed changes stored in TEDB are completed, the network has been updated from TEDB and SPDB has been updated from the network, the temporary database TEDB may be compared to the system parameter database SPDB to be sure the intended change or changes have been implemented.
The area DR, which takes part in the evaluation of a suggested change, may be defined such as to include all cells and mobile switching centers which might be affected by the proposed changes. The part of DR labeled DRS indicates where in the network actual parameter changes have been suggested so that checking of any uninvolved parts of the network can be avoided. According to a preferred embodiment, the consistency check program must operate on all parameters occurring in the checks, not only on parameters that have been changed. For example, the parameters of a neighboring cell may not have been changed, but these parameters are required to complete the operation of the consistency check. The area DRS stores the parameters which have been changed, while DR stores the changed parameters (in DRS) plus any other parameters which may be involved in the consistency check. The data stored in IOTC, IOGC and the parameters in the disk file become DRS when read into the temporary database TEDB.

The changes to be introduced into the network may be entered into the temporary database TEDB in one of three possible ways: either via I/O tables in windows on a monitor (box IOT), by writing directly new parameters where desired or via graphic I/O means such as a mouse pointing on a monitor to, for example, a geographi-

cal location where a new cell is desired, (box IOG), or from a disk file DF where sets of prestored parameters are kept for the case of malfunction of, for example, a single base station. The portions of IOT and IOG labelled, respectively, IOTC and IOGC, store the desired changes. That is, the I/O program stores, and shows in a window on the monitor, the changes to be made, until change editing is to be started. Then a command is given to enter the changes into the temporary database TEDB. The changes are filed in the temporary database TEDB, but they are also stored by themselves in the blocks IOT and IOG as a log of what has been done. The operator may choose to enter the parameter changes himself, or they may be introduced from a disk file in the administrative center computer depending on the nature of the modification.

The function block CONSISTENCY CHECK is a program which performs the verification tests on the entered suggested changes. A manual example of one such test has been described with respect to Fig. 2. This block will be described more fully below.

The function block TRANSLATOR is used when the suggested changes have been checked and found satisfactory. In a preferred embodiment, this program translates the parameters in the TEDB into man machine language (MML) commands. Alternatively, the TRANSLATOR program may translate the parameters into a corresponding AXE file format in a known manner. The translated information is then sent to MSC1 and MSC2.

A preferred embodiment of the flow of control for the reconfiguring method according to the present invention is shown in Fig. 4. The coding of the process steps of the flow chart in Fig. 4 into the instructions of a suitable commercially available computer is a mere mechanical step for a routineer skilled in the art.

The updating of SPDB (step 10) may be started as a periodic function or may be event driven. If it is event driven, any occurrence in any mobile switching center which is known to alter

the configuration of the network causes a message from the mobile switching center to the administrative center. This message informs the administrative center that an update should be initiated. Then, the administrative center sends an audit command to the mobile switching center involved, and will receive the modified data into the MSCDA. The differences between SPDB and MSCDA will be spotted by the function blocks DIFFLIST1, DIFFLIST2, DIFFLIST3 and the updating of SPDB will be performed by the function block UPDATE SPDB.

The SPDB is copied into the TEDB (step 11) and the changes are specified (step 12). The changes may be entered manually, by entering or changing figures in tables, or by pointing at the monitor using, for example, a mouse and specifying attributes, such as cell size and channel frequencies, as described above. Alternatively, the changes may be entered automatically, by letting an alarm signal, indicating that a particular base station or mobile switching center is out of service, cause a predefined set of changes to be entered from the disk file DF. A message indicating that the particular base station or mobile switching center has been repaired and is ready to be put into service again may be treated in the same way.

Block 13 causes a consistency check to be performed on the entered changes. If no inconsistencies are found (step 14), the flow continues to implement the changes in the network. If there are inconsistencies, an operator will decide whether to approve the changes anyway or to specify modifications to the changes (not explicitly shown).

In block 15, the approved changes are translated into orders for the mobile switching centers concerned, either in the form of man machine language MML commands or in the form of the AXE file format, and they are sent to the MSCS. This function is shown in more detail in Fig. 4B.

When the changes have been introduced into the network, the administrative center may perform an update of the SPDB and then

compare the TEDB against the SPDB (block 16). These two databases should be the same at this point. If they are not, the cause can be analyzed and new changes can be specified to correct the error. The SPDB and TEDB may be compared in any manner known for comparing two databases. In order to save computer time, the comparison may be limited to the database areas which have been affected, for example, the DR in the TEDB and the corresponding area in the SPDB, and the data in the SPDB and the TEDB corresponding to data collected in the MSCDA.

In step 20, the changes in the TEBD are copied to the affected MSC'S. However, before the verified and/or corrected cell parameters are activated in the network, the ongoing and new calls must be properly handled in a manner consistent with the network changes. Accordingly, before the new changes are activated in some cases, ongoing calls between affected cells may have to be handed off, in a known manner, to neighboring cells (step 21). For example, this would be the case when a temporary cell has been created because of a football game or other temporary, high traffic event and afterwards, the temporary cell has to be eliminated from the network. Before eliminating the cell, any new calls within this cell are inhibited (step 22) and directed retry can be used to redirect these calls to neighboring cells.

In the event that a complete MSC is to be added or deleted according to the present invention, it is necessary to inform the network, enabling it to route calls to the new MSC or to discontinue routing calls to a blocked (or deleted) MSC. This implies defining or deleting a destination in routing table in the switches of the wire-bound and mobile networks (step 23).

After the modifications have been made, the updated parameters are activated within the network (step 24). The calls in the affected cells are restarted (step 25) and the operator may then choose to optimize the newly changed parameters (step 26). Once the network is operating again, live traffic measurements may be taken which may be used to optimize the cell parameters and if necessary, further changes may be implemented responsive to the optimization.

An example of the optimization of parameters is as follows. A supervision program may detect that the congestion rate of a certain cell is much higher than in neighboring cells. A manual or automatic adjustment of the size of this cell and its neighbors may then take place by ordering a change of the minimum signal strength SSMIN required to allow handoff into a cell (refer to parameters listed in Table II). An increase in the threshold SSMIN of a cell may result in a smaller cell and vice versa.

The details of a preferred embodiment of the function block UPDATE SPDB will now be described with reference to Fig. 5. The coding of the process steps of the flowchart in Fig. 5 into the instructions of a suitable commercially available computer is a mere mechanical step for a routineer skilled in the art. As noted above, a copy of the parameter setup for the cellular network system is maintained in the system parameter database SPDB. All objects, that is, cells, base stations, etc., for which data is kept in the mobile switching centers, have a unique identity in the SPDB database. Loading of the database from the mobile switching centers is done as discussed above with reference to Fig. 3. The data in the SPDB is called, for purposes of this discussion, SPDB data.

According to a preferred embodiment of the invention, the update of the SPDB is done for each mobile switching center in the following manner. A complete update of the SPDB is shown and described. It is understood that partial updates of the SPDB may be performed in a similar manner within the scope of the present invention.

In step 310, all cellular network parameters are fetched from the mobile switching center and the different objects to be handled are identified. This data is called 'IMSC data" for purposes of this discussion. The MSC data is then stored in MSCDA (step 315). According to a preferred embodiment, the MSC data in MSCDA is organized in the same manner as the SPDB data. By organizing the two sets of data in a similar manner, the steps required to compare the data are significantly simplified.

The MSCDA data and the SPDB data are compared (steps 320-330) and one difference list is produced. As shown, the comparison process is divided into three steps. The parameters for all objects common to both the MSCDA data and the SPDB data are checked (step 320). This corresponds to DIFFLIST1 of Fig. 3. If one or several parameter values differ for an object, the object identity and its parameters are saved in the difference list. Parameters from both the MSCDA data and the SPDB data are saved so that a result list showing all changes of data in the SPDB can be produced after the update has been completed (for example, the printed output of UPDATE SPDB, Fig. 3). The common objects for which changes are required are marked with "changell in the difference list".

In step 325, which corresponds to DIFFLIST2 of Fig. 3, all objects are found which exist only in the MSCDA data. These objects are saved, with their parameters, in the difference list, with a "new" mark. Finally, all objects are found which exist only in the SPDB data (step 330). This corresponds to DIFFLIST3. These objects found only in the SPDB data are saved with their parameters in the difference list and are marked with "delete".

All changes now stored in the difference list are introduced into the SPDB database. In three steps, shown in step 335 of Fig. 5. All objects in the difference list marked "new" are inserted in the SPDB database. All objects in the difference list marked "changell are updated in the SPDB database with the new parameters from the MSCDA data. Finally, all objects in the difference list marked I'deletell are deleted from the SPDB database.

At step 340, it is determined whether or not the end of both the MSCDA and the SPDB has been reached. If not, the routine returns to step 320. If so, the routine ends.

The CONSISTENCY CHECK routine will now be described with respect to Fig. 6. The coding of the process steps of the flowchart in Fig. 6 into the instructions of a suitable commercially available computer is a mere mechanical step for a routineer skilled in the art. The CONSISTENCY CHECK program uses the data kept in the TEDB

to perform the checks. This routine is performed after the TEDB has been updated from the SPDB and suggested changes have been entered into DRS, as is clear from Fig. 4.

The CONSISTENCY CHECK routine performs the following groups of checks in the network. Additional checks are possible, according to the requirements of the specific network. Step 350 selects the cells to be examined and the tests or rules to be performed. Step 355 checks the frequency allocations for the control and voice channels. Step 360 is a hardware configuration check that determines that the cells have backup channel devices for the control channel and the signal strength receiver. The power level relationship is tested in step 365 to determine that the cells' power level parameters follow a number of known rules. For example, one such rule is that the base station power level must correspond to the size of the cell according to a known table. Step 370 checks the hand-off and locating thresholds to determine that they follow a number of known rules. One such rule is that the thresholds of neighboring cells must be such so as to avoid handoff oscillation back and forth between two cells. The intraexchange hand-off relationships are checked in step 375 by checking that the relationship between the neighboring cell and adjacent cell lists are correct. For example, it must be possible to handoff back to the considered cell after an unsatisfactory directed retry. That is, an "adjacent" cell (defined for directed retry) must have the considered cell as a lineighbor" cell (defined for handoff). Step 380 checks the inter-exchange hand-off relationships by checking that the relationship between the neighboring cell and bordering cell lists are correct. For example, an "adjacent" cell (defined for directed retry) must have the considered cell as a "border" cell (defined for handoff), where a "border" cell is a neighbor cell connected to another MSC.

In step 385, two lists are output from the CONSISTENCY CHECK routine. The first list is of system parameters that are incorrect in some way and will degrade the system. The second list contains parameters that are missing in the SPDB (that is, there is no entry in the SPDB for each of the parameters), and therefore

no checks were performed for those parameters. In addition to the lists, the inconsistencies in the parameters may be displayed graphically.

One execution of the CONSISTENCY CHECK routine includes the following actions. First the operator of the administrative center chooses which cells and which checkrules to execute and the CHECK routine is started. The CONSISTENCY CHECK routine goes through the chosen rules in sequential order. The routine then loops through the chosen cells and performs the sub-checks for each cell individually. If an inconsistency is detected in the data, this inconsistency is saved in the check result lists. When the execution is completed, the operator will be informed about the status, that is Execution Completed or Failed. The operator can specify limit values for the checked parameters. Additionally, thresholds can be set for each check rule which must be surpassed before an inconsistency will be found for that rule.

Figs. 7A and 7B illustrate an embodiment of a base station that can be utilized in a cellular telephone system that operates in accordance with the present invention. The base station is designed for transmission and reception on a plurality of radio channels in this example analog communication channels and control channels. The equipment configuration shown in Fig. 7B, i.e., one control channel, a number of voice channels, one signal strength receiver, and one channel tester is a typical configuration of a radio channel group required to serve one cell. A typical base station shown in Fig. 7A comprises three major functional units: a radio channel group 32, exchange radio interface 30, and the power supply (not shown). The exchange radio interface 30 functions as a medium to signal between the mobile switching center and the base station. Thus, the equipment receives data from the channel units and sends this data to the mobile switching center on a dedicated mobile switching center to base station data link. In the reverse direction, the equipment receives data from the mobile switching center on the mobile switching center to base station data link and sends this data to the channel unit of destination. A voltage of 26.4 volts is normally provided as the

distributed supply voltage to the base station from mains via analog AC/DC converters. A battery back-up power supply is normally provided for continued service in the case of mains break down.

The radio channel group 32 holds all of the equipment normally needed to handle the radio communication with the mobile stations. A typical radio channel group 32, shown in Fig. 7B, comprises the following equipment: channel units 42, 44, a transmitter/combiner 46, receiver multi-couplers 48, a signal strength receiver 50, a control channel redundancy switch 52, a channel tester 54, a power monitoring unit 56 and an antenna system 58.

The channel units for the control channels 42 and for the voice channels 44 are identical. Each channel unit consists of a transmitter 440, a receiver 442 and a control unit 444 and a power amplifier (not shown) connected to the transmitter output. The output power determines the size of the coverage area of the channel in question. The particular power amplifier used is controlled in order to obtain the required coverage for each cell. In addition, accurate adjustment of the output power may be manually performed.

A radio channel group can consist of a number of channel units, for example, 96 channel units. A radio base station can consist of one or more radio channel groups.

In typical configurations, the receiver multicouplers 48 allow a number of channel receivers and signal strength receivers to be connected to the same receiver antenna. For example, up to 48 channel receivers and two signal strength receivers may be connected to the same receiver antenna.

The signal strength receiver 50 is implemented in a channel unit frame. It consists of a receiver 442 and a control unit 444. The signal strength receiver 50 measures the strength of the received signals (from the mobile stations) on any channel allocated for mobiles in the neighboring cells. The relevant channel numbers as

specified by the mobile switching center and the channels are continuously scanned one-by-one and samples of the 20 measurements are stored in the control unit 444.

The transmitter combiner 46 allows a number of transmitters to be connected to a common antenna, for example, up to 16 transmitters can be connected to one antenna. The channel tester 54 performs mobile switching center operator 25 controlled tests of the equipment. The power monitoring unit 56 is connected at the combiner output. It supervises the forward and reflected power and activates an alarm when, for example, the reflected power is too high. The antenna system comprises several alternative antenna configurations depending on the cell shapes required.

The control unit 444 used in the various channel units is based on a microprocessor. The microprocessor can be any suitable commercially available microprocessor and may include program stores implemented with the read/write memories.

Fig. 8 is a block diagram of an example of a mobile switching center which can be used to implement the method according to the present invention. The mobile switching center shown in Fig. 8 is a simplified block diagram of some of the functional units in a mobile switching center. Fig. 8 shows but one example of a mobile switching center. Other systems may also be used.

The mobile switching center 70 is a highly modular system which includes a central processor 72 and a mobile telephone subsystem 74 for the cellular system which is integrated with the other subsystems. A group switching subsystem 76, a common channel signalling subsystem 78, and a trunk and signalling subsystem 80 are connected to the central processor 72. The mobile telephone subsystem 74 includes a regional processor 82, a mobile telephone base station line terminal 84 and a signalling terminal 86. The remaining subsystems also each include a regional processor 82.

The mobile telephone subsystem 74 handles specific mobile subscriber functions, cellular network functions, as well as the

signalling with the mobile stations. Subsystem 74 also provides the common channel signalling subsystem 78 with the necessary data from the mobile switching center signalling. The operation and maintenance functions specific for the cellular system are also implemented in the mobile telephone subsystem 74. The mobile telephone subsystem 74 includes the mobile telephone base station line terminals 84 which connect the mobile telephone subsystem 74 to the various base stations within the system and to the public switching telephone network. The signalling terminal 86 provided in the mobile telephone subsystem 74 handles data communication between the mobile switching center and the base stations. The regional processor 82 provided in each of the subsystems stores and executes the regional software for the switching system, handling simple, routine and high capacity tasks.

The group switching subsystem 76 is controlled by a traffic control subsystem (not shown). The group switching subsystem 76 sets up, supervises and clears connections through the group switch (not shown). The common channel signalling subsystem 78 contains functions for signalling, routing, supervision and correction of messages sent in accordance with a predetermined standard. The trunk and signalling subsystem 80 supervises the state of the trunk lines to the public switching telephone network and to the other mobile switching centers.

The central processor 72 stores and executes the central processor software for the switching system, handling the more complex functions. These functions include, but are not limited to, job administration, store handling, loading and changing of programs, etc. Further, to the extent that the methods according to the preferred embodiments of the present invention are implemented by software routines operating in the mobile switching center, they are implemented in the central processor 72.

It is understood that the methods of the present invention can be used in a cellular mobile radio system which transmits analog signals, digital signals, or a combination of both.

As discussed in the Background section of this application, Fig. 9 illustrates a GSM system including an AOM (administration and maintenance center), plurality of MSCs, plurality of BSCs (base station controllers) and a plurality of cells (BS1-BS6). The functions described above with respect to the present invention are performed in the administration and maintenance center AOM, i.e., copying information from the radio network controlling units (including for example, MSCs, BSCs and BSs), preparing changes, verifying them, writing them back to the radio network controlling units (RNCUs) and introducing them in the network. The dedicated connections between the AOM and the BSCs are required according to a preferred embodiment of the present invention, because the standardized A-interface does not provide for the transfer of all information associated with the invention from the AOM via the MSCs to the BSCs and vice versa. Dedicated connections between the AOM and the BSs are not strictly required, because the A'-interface provides for the possibility of certain communications such as loading configuration parameters into the BS via the BSC. However, according to a preferred embodiment of the invention, direct connections between the AOM and the BSs would be provided (not shown in Fig. 9).

As also discussed above in the Background section, Fig. 10 illustrates an example of a radio local loop application (RLL) consisting of an AOM, a plurality of base stations BS and a public switch telephone network PSTN switch, as well as a plurality of radios which transmit to the base stations. In this case, the AOM has to have dedicated connections to the base stations in order to implement a preferred embodiment of the present invention. Reconfiguration in this RLL application may, for example, involve increasing the size of cells by changing the sending level of the BSs, in order to take over subscribers from a malfunctioning cell. Another example of reconfiguration would be reintroducing a cell into the network after a malfunction has occurred as described earlier.

The foregoing description of the specific embodiments will so fully reveal the general nature of the invention that others can,

by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology of terminology employed herein is for the purpose of description and not of limitation.

TABLE I

| ORDER | EXPLANATION |
|---|---|
| MTCEI ... | Cell definition, cell 6 |
| MTCEC ... | Cell parameters, cell 6, except handoff parameters |
| MTNCC ... | Neighbor cell definitions |
| MTDCC ... | Directed retry cell definitions |
| MTNCC ... | New cell 6 as neighbor to old cells |
| MTDCC ... | New cell 6 as directed retry cell to old cells |
| BLODE ... | Deblock channels & signal strength receiver on new cell 6 |

EXAMPLE:

BLODE = MCC-XXX&XMLOC-XXX&MVC-XXX&&-YYY

| control signal channel | strength receiver | voice channel X to Y |
|---|---|---|

TABLE II

SITE DATA

id site identification

If the geographical position is given:

long Geographical position, longitude

lat Geographical position, latitude

If the site id is not a common part of the site's cell id:s:

cell1 Id of cell 1

. .

. .

. .

celln Id of cell n (Max: 64, typically 3)

CELL DATA

Commands: MTCEI, MTCEE, MTCEC, MTCEP
MTCEP printout: Mobile Telephone Cell Data

Parameters:

| | |
|---|---|
| type | Cell type: omni or sectorized |
| deg | If sectorized cell: number of degrees |
| dir | Cell direction: 1 to 360' (90' east, 180' = south, 270' = west, 360' = north) |
| size | Nominal cell size |
| cplan | Cell plan, 7/21 or 4/12 |

MTS parameters (examples only):

| | |
|---|---|
| r | Voice channel route |
| cell | Cell designation |
| sid | System identification number |
| plc | Mobile station power level for accessing the system on control channels |
| plvm | Maximum mobile station power level on voice channels |
| plv | Initial mobile station power level on voice channels |
| ssh | Signal strength threshold requiring handoff |
| ssb | Signal strength threshold requiring blocking of idle voice channel |
| ssmin | Minimum signal strength required to allow handoff into the cell; the actual signal strength is measured in the cell |
| snh | Signal to noise ratio requiring handoff |
| snr | Signal to noise ratio requiring release of the mobile station on a voice channel |
| suh | Time interval in seconds during which suppression of renewed handoff requests should take place |
| ssacc | Minimum signal strength required on control channel for acceptance of originating accesses and page responses |
| ssreg | Minimum signal strength required on control channel for acceptance of registration accesses |

NEIGHBORING CELL DATA

Commands: MTNCI, MTNCE, MTNCP, MTNCC
MTNCP printouts: Mobile Telephone Neighboring Cell Data

MTS parameters:

| | |
|---|---|
| cell | Cell designation |
| ncell | Neighboring cell designation |
| sshyp | Signal strength hysteresis value, required for handoff, positive value |
| sshyn | Signal strength hysteresis value, required for handoff, negative value |

CHANNEL DEVICE DATA

Commands: MTCCI, MTCCE, MTCDC, MTCDP
MTCDP printout: Mobile Telephone Channel Device Data

MTS parameters:

| | |
|---|---|
| type | Channel device type: voice channel, control channel or signal strength receiver |
| devl | Channel device |
| cell | Cell designation |
| chnr | Channel number (f) |
| col | Color code (SAT or DCC) |
| dev2 | Voice line |
| adml | Administrative state 1<br>C = Connected device<br>NC = Not connected device |
| adm2 | Administrative state 2<br>NHW = The device is not equipped with own hardware<br>BHW = The device is specified as back-up hardware for a control channel or a signal strength receiver |

WHAT IS CLAIMED IS:

1. A method of performing reconfiguration of a cellular network comprising:

copying cell parameters of affected radio network controlling units in the network to a database, and storing the copied parameters;

preparing a set of proposed changes to the stored parameters;

verifying the consistency of the prepared set of proposed changes and making any necessary alterations of the set of proposed changes responsive to the verification;

copying the verified set of proposed changes to the affected radio network controlling units; and

introducing the verified set of proposed changes into the network.

2. The method of claim 1, wherein the reconfiguration is temporary and further comprising the step of restoring the network to an original state using the stored cell parameters.

3. The method of claim 1, wherein the copying of cell parameters is initiated periodically by the operator and the set of proposed changes is manually entered.

4. The method of claim 1, wherein the reconfiguration is automatically initiated upon an occurrence of an event and the set of proposed changes is stored in a memory.

5. A method of modifying at least a part of a cellular network, the network comprising an administrative database, at least one radio network controlling unit, and a plurality of cells the method comprising:

copying, via a datalink from associated ones of the radio network controlling units to the administrative database, cell parameters of at least one cell as the parameters are stored before a proposed modification is implemented,

determining at least one change to the cell parameters of the at least one cell affected by the proposed modification,

entering the at least one change into the administrative database,

verifying the consistency of the entered change; making any necessary corrections to the at least one change responsive to the verification,

copying, via the data link from the administrative center to the associated ones of the radio network controlling units, the verified/corrected cell parameters; and

activating the verified/corrected cell parameters in the associated ones of the radio network controlling units to introduce the modification into the network.

6. The method of claim 5, wherein the network further includes at least one mobile station and the method further comprises prior to the step of activating, the steps of:

eliminating ongoing calls of the at least one mobile station assigned to the associated cells by handing off ongoing calls to neighboring cells;

inhibiting new calls in the affected cells; and

further comprising, after the step of activating, the step of restarting calls in the affected cells.

7. The method of claim 5, further comprising:

storing a set of parameter changes for at least one base station in the network; and

when a particular base station malfunctions, automatically initiating the modification of the at least part of the cellular network by using the stored set of parameter changes associated with the particular base station in the step of determining.

8. The method of claim 5, further comprising:

storing a set of parameter changes for at least one radio network controlling unit in the network; and

when a particular radio network controlling unit malfunctions, automatically initiating the modification of the at

least part of the cellular network by using the stored set of parameter changes associated with the particular controlling unit in the step of determining.

9. The method of claim 5, further comprising:

before the step of activating, ordering routing table changes in any radio network controlling unit affected by the modification.

10. The method of claim 5, further comprising:

measuring live traffic in the network after the step of activating; and

optimizing the cell parameters using successive changes responsive to the live traffic measurements.

11. A method of maintaining a system parameter database in a cellular network, comprising:

obtaining current parameter data from at least one radio network controlling unit in the network;

storing the obtained current parameter data in a data buffer;

generating a difference list by comparing the stored current parameters with existing data in the system parameter database by storing in the difference list data which is in the stored current parameter data but not in the existing data, data which is in the existing data but not in the stored current parameter data, and data which has different values in the stored current parameter data as compared with the existing data; and

updating the system parameter database from the difference list.

12. The method of claim 11, wherein the step of updating comprises:

deleting data from the system parameter database which is in the existing data but not the stored current parameter data;

adding data into the system parameter database which is in the stored current parameter data but not in the existing data; and

updating data in the system parameter database for which different values were found.

13. An apparatus for providing service in a cellular radio system in response to a communication need, comprising:

a base station located near an area in need of communication services; and

means connected to the system for implementing a plurality of system changes required to connect the base station to the system.

14. The apparatus of claim 13, wherein said means for implementing comprises means for verifying the consistency of the plurality of changes.

15. An apparatus for performing reconfiguration of a cellular network, said network including at least one cell connected to at least one radio network controlling unit, said apparatus comprising:

at least one radio network controlling unit database for storing a plurality of cell parameters;

a system parameter database connected to the at least one radio network controlling unit database for storing an up--to-date image of cell parameters in the network;

buffer memory means connected to the at least one radio network controlling unit database and the system parameter database for storing at least one cell parameter change to be used to update the system parameter database; and

a temporary database connected to the system parameter database for temporarily storing proposed cell parameter changes to be introduced into the network.

16. The apparatus of claim 15, further comprising means for updating the system parameter database from the at least one cell parameter stored in the buffer memory means, said means being connected to the system parameter database and buffer memory means, and being responsive to an update command.

17. The apparatus of claim 16, wherein the means for updating comprises:

means for creating a difference list by comparing the at least one cell parameter in the buffer means with the cell parameters stored in the system parameter database, and storing in the difference list any cell parameter which is in the system parameter database and not in the buffer means, any cell parameter which is in the buffer memory means and not in the system parameter database, and any cell parameter for which the value in the buffer memory means is different than the value in the system parameter database.

18. A method of maintaining a cellular network, the network comprising at least one switch, and a plurality of cells, the method comprising:

copying data from at least one switch affected by the maintenance into a buffer memory;

updating data in a system parameter database from the data in the buffer memory,

whereby an up-to-date image of the network is maintained in the system parameter database.

19. The method of claim 18, wherein the step of updating comprises:

generating a difference list by comparing the data in the system parameter database with the data in the buffer memory and storing in the difference list data, which is in the system parameter database and not in the buffer memory, data which is in buffer memory and not in the system parameter database, and data which has different values in the system parameter database as compared with the buffer memory; and

updating the system parameter database from the different list.

20. The method of claim 19, wherein the step of updating from the difference list comprises:

deleting data from the system parameter database which is in the system parameter database and not in the buffer memory;

adding data to the system parameter database which is in the buffer memory and not in the system parameter database; and

updating data in the system parameter database for which different values are found.

21. The method of claim 18, further comprising:

copying the data in the system parameter database into a temporary database;

making changes to the data stored in the temporary database;

performing at least one consistency verification procedure on the changed data stored in the temporary database; and

transferring the verified data to the at least one switch affected by the maintenance.

22. The method of claim 21, wherein the step of performing comprises, for any data that fails the at least one consistency verification procedure, making any necessary correction to the data, and the step of transferring comprises when the data passes the at least one consistency verification procedure, translating the data to appropriate commands and sending the commands to the affected at least one switch.

23. The method of claim 21, further comprising measuring live traffic in the network after the step of transferring and optimizing cell parameters in the at least one switch responsive to the live traffic measurements.

24. A computer program product having a computer readable medium having computer program logic recorded thereon for implementing reconfiguration of a cellular network, the computer program product comprising:

means for receiving and storing existing cell parameters;

means for storing a set of proposed changes to the stored parameters;

means for verifying the consistency of the stored set of proposed changes;

means for outputting the verified set of proposed changes.

25. A computer program product having a computer readable medium having computer logic recorded thereon for implementing maintenance of a cellular network, the computer program product comprising:

means for copying cell data from at least one cell in the network into a buffer memory;

means for updating cell data in a system parameter database from the cell data in the buffer memory,

whereby an up-to-date image of the network is maintained in the system parameter database.

26. The computer program product of claim 25, wherein the means for updating comprises:

means for generating a difference list by comparing the current data in the system parameter database with the data in the buffer memory and storing in the difference list data which is in the system parameter database and not in the buffer memory, data which is in buffer memory and not in the system parameter database, and data which has different values in the system parameter database as compared with the buffer memory; and

means for updating the system parameter database from the difference list.

**AMENDED CLAIMS**

[received by the International Bureau on 7 October 1992 (07.10.92); original claims 1-26 replaced by amended claims 1-26 (7 pages)]

1. A method of performing reconfiguration of a cellular network comprising:

copying cell parameters of affected radio network controlling units in the network to a database, and storing the copied parameters;

preparing a set of proposed changes to the stored parameters;

verifying the consistency of the prepared set of proposed changes and making any necessary alterations of the set of proposed changes responsive to the verification;

copying the verified set of proposed changes to the affected radio network controlling units; and

introducing the verified set of proposed changes into the network.

2. The method of claim 1, wherein the reconfiguration is temporary and further comprising the step of restoring the network to an original state using the stored cell parameters.

3. The method of claim 1, wherein the copying of cell parameters is initiated periodically by the operator and the set of proposed changes is manually entered.

4. The method of claim 1, wherein the reconfiguration is automatically initiated upon an occurrence of an event and the set of proposed changes is stored in a memory.

5. A method of modifying at least a part of a cellular network, the network comprising an administrative database, at least one radio network controlling unit, and a plurality of cells the method comprising:

copying, via a datalink from associated ones of the radio network controlling units to the administrative database, cell parameters of at least one cell as the parameters are stored before a proposed modification is implemented,

determining at least one change to the cell parameters of the at least one cell affected by the proposed modification,

entering the at least one change into the administrative database,

verifying the consistency of the entered change; making any necessary corrections to the at least one change responsive to the verification,

copying, via the data link from the administrative center to the associated ones of the radio network controlling units, the verified/corrected cell parameters; and

activating the verified/corrected cell parameters in the associated ones of the radio network controlling units to introduce the modification into the network.

6. The method of claim 5, wherein the network further includes at least one mobile station and the method further comprises prior to the step of activating, the steps of:

eliminating ongoing calls of the at least one mobile station assigned to the associated cells by handing off ongoing calls to neighboring cells;

inhibiting new calls in the affected cells; and

further comprising, after the step of activating, the step of restarting calls in the affected cells.

7. The method of claim 5, further comprising:

storing a set of parameter changes for at least one base station in the network; and

when a particular base station malfunctions, automatically initiating the modification of the at least part of the cellular network by using the stored set of parameter changes associated with the particular base station in the step of determining.

8. The method of claim 5, further comprising:

storing a set of parameter changes for at least one radio network controlling unit in the network; and

when a particular radio network controlling unit malfunctions, automatically initiating the modification of the at

least part of the cellular network by using the stored set of parameter changes associated with the particular controlling unit in the step of determining.

9. The method of claim 5, further comprising:

before the step of activating, ordering routing table changes in any radio network controlling unit affected by the modification.

10. The method of claim 5, further comprising:

measuring live traffic in the network after the step of activating; and

optimizing the cell parameters using successive changes responsive to the live traffic measurements.

11. A method of maintaining a system parameter database in a cellular network, comprising:

obtaining current parameter data from at least one radio network controlling unit in the network;

storing the obtained current parameter data in a data buffer;

generating a difference list by comparing the stored current parameters with existing data in the system parameter database by storing in the difference list data which is in the stored current parameter data but not in the existing data, data which is in the existing data but not in the stored current parameter data, and data which has different values in the stored current parameter data as compared with the existing data; and

updating the system parameter database from the difference list.

12. The method of claim 11, wherein the step of updating comprises:

deleting data from the system parameter database which is in the existing data but not the stored current parameter data;

adding data into the system parameter database which is in the stored current parameter data but not in the existing data; and

updating data in the system parameter database for which different values were found.

13. An apparatus for providing service in a cellular radio system in response to a communication need, comprising:

a base station located near an area in need of communication services; and

means connected to the system for copying a plurality of system changes required to connect the base station to the system and affecting at least one radio network controlling unit in the system, from a memory to the affecting radio network controlling unit, and for introducing the plurality of system changes into the system.

14. The apparatus of claim 13, wherein said means for implementing comprises means for verifying the consistency of the plurality of changes.

15. An apparatus for performing reconfiguration of a cellular network, said network including at least one cell connected to at least one radio network controlling unit, said apparatus comprising:

at least one radio network controlling unit database for storing a plurality of cell parameters;

a system parameter database connected to the at least one radio network controlling unit database for storing an up--to-date image of cell parameters in the network;

buffer memory means connected to the at least one radio network controlling unit database and the system parameter database for storing at least one cell parameter change to be used to update the system parameter database; and

a temporary database connected to the system parameter database for temporarily storing proposed cell parameter changes to be introduced into the network.

16. The apparatus of claim 15, further comprising means for updating the system parameter database from the at least one cell parameter stored in the buffer memory means, said means being

connected to the system parameter database and buffer memory means, and being responsive to an update command.

17. The apparatus of claim 16, wherein the means for updating comprises:

means for creating a difference list by comparing the at least one cell parameter in the buffer means with the cell parameters stored in the system parameter database, and storing in the difference list any cell parameter which is in the system parameter database and not in the buffer means, any cell parameter which is in the buffer memory means and not in the system parameter database, and any cell parameter for which the value in the buffer memory means is different than the value in the system parameter database.

18. A method of maintaining a cellular network, the network comprising at least one switch, and a plurality of cells, the method comprising:

copying data from at least one switch affected by the maintenance into a buffer memory;

updating data in a system parameter database from the data in the buffer memory,

whereby an up-to-date image of the network is maintained in the system parameter database.

19. The method of claim 18, wherein the step of updating comprises:

generating a difference list by comparing the data in the system parameter database with the data in the buffer memory and storing in the difference list data, which is in the system parameter database and not in the buffer memory, data which is in buffer memory and not in the system parameter database, and data which has different values in the system parameter database as compared with the buffer memory; and

updating the system parameter database from the different list.

20. The method of claim 19, wherein the step of updating from the difference list comprises:

deleting data from the system parameter database which is in the system parameter database and not in the buffer memory;

adding data to the system parameter database which is in the buffer memory and not in the system parameter database; and

updating data in the system parameter database for which different values are found.

21. The method of claim 18, further comprising:

copying the data in the system parameter database into a temporary database;

making changes to the data stored in the temporary database;

performing at least one consistency verification procedure on the changed data stored in the temporary database; and

transferring the verified data to the at least one switch affected by the maintenance.

22. The method of claim 21, wherein the step of performing comprises, for any data that fails the at least one consistency verification procedure, making any necessary correction to the data, and the step of transferring comprises when the data passes the at least one consistency verification procedure, translating the data to appropriate commands and sending the commands to the affected at least one switch.

23. The method of claim 21, further comprising measuring live traffic in the network after the step of transferring and optimizing cell parameters in the at least one switch responsive to the live traffic measurements.

24. A computer program product having a computer readable medium having computer program logic recorded thereon for implementing reconfiguration of a cellular network, the computer program product comprising:

means for receiving and storing existing cell parameters;

means for storing a set of proposed changes to the stored parameters;

means for verifying the consistency of the stored set of proposed changes;

means for outputting the verified set of proposed changes.

25. A computer program product having a computer readable medium having computer logic recorded thereon for implementing maintenance of a cellular network, the computer program product comprising:

means for copying cell data from at least one cell in the network into a buffer memory;

means for updating cell data in a system parameter database from the cell data in the buffer memory,

whereby an up-to-date image of the network is maintained in the system parameter database.

26. The computer program product of claim 25, wherein the means for updating comprises:

means for generating a difference list by comparing the current data in the system parameter database with the data in the buffer memory and storing in the difference list data which is in the system parameter database and not in the buffer memory, data which is in buffer memory and not in the system parameter database, and data which has different values in the system parameter database as compared with the buffer memory; and

means for updating the system parameter database from the difference list.

Fig. 1
(PRIOR ART)

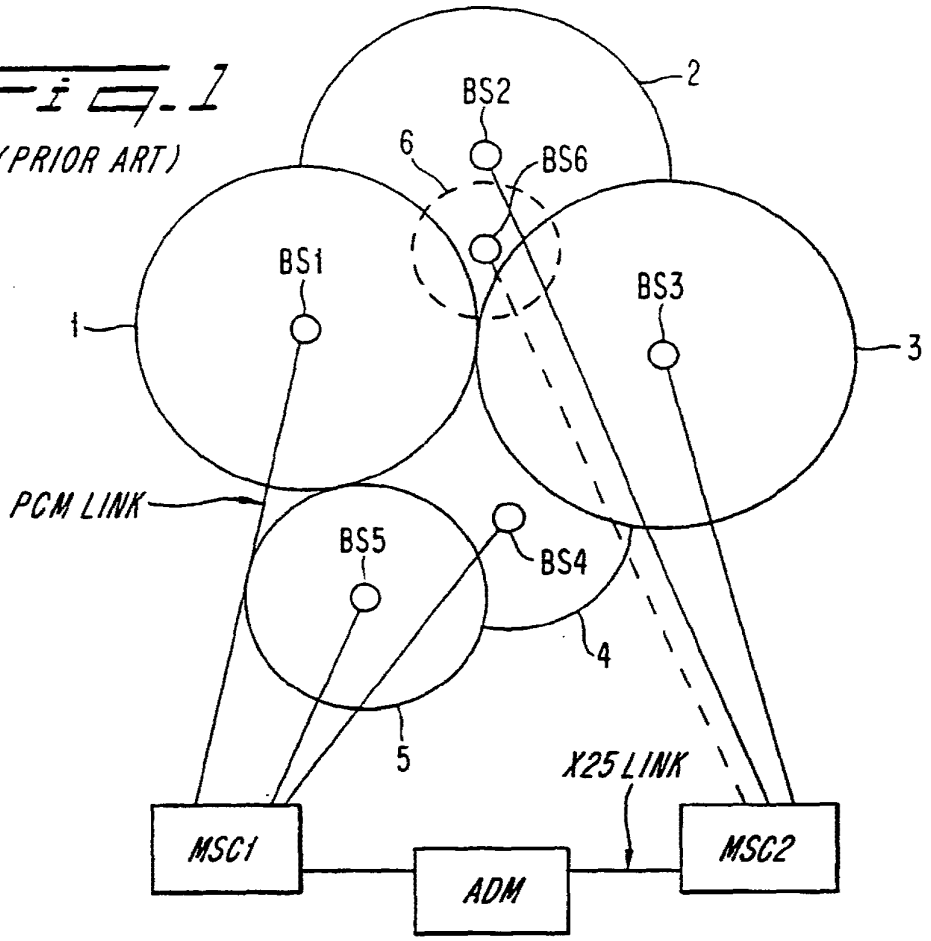
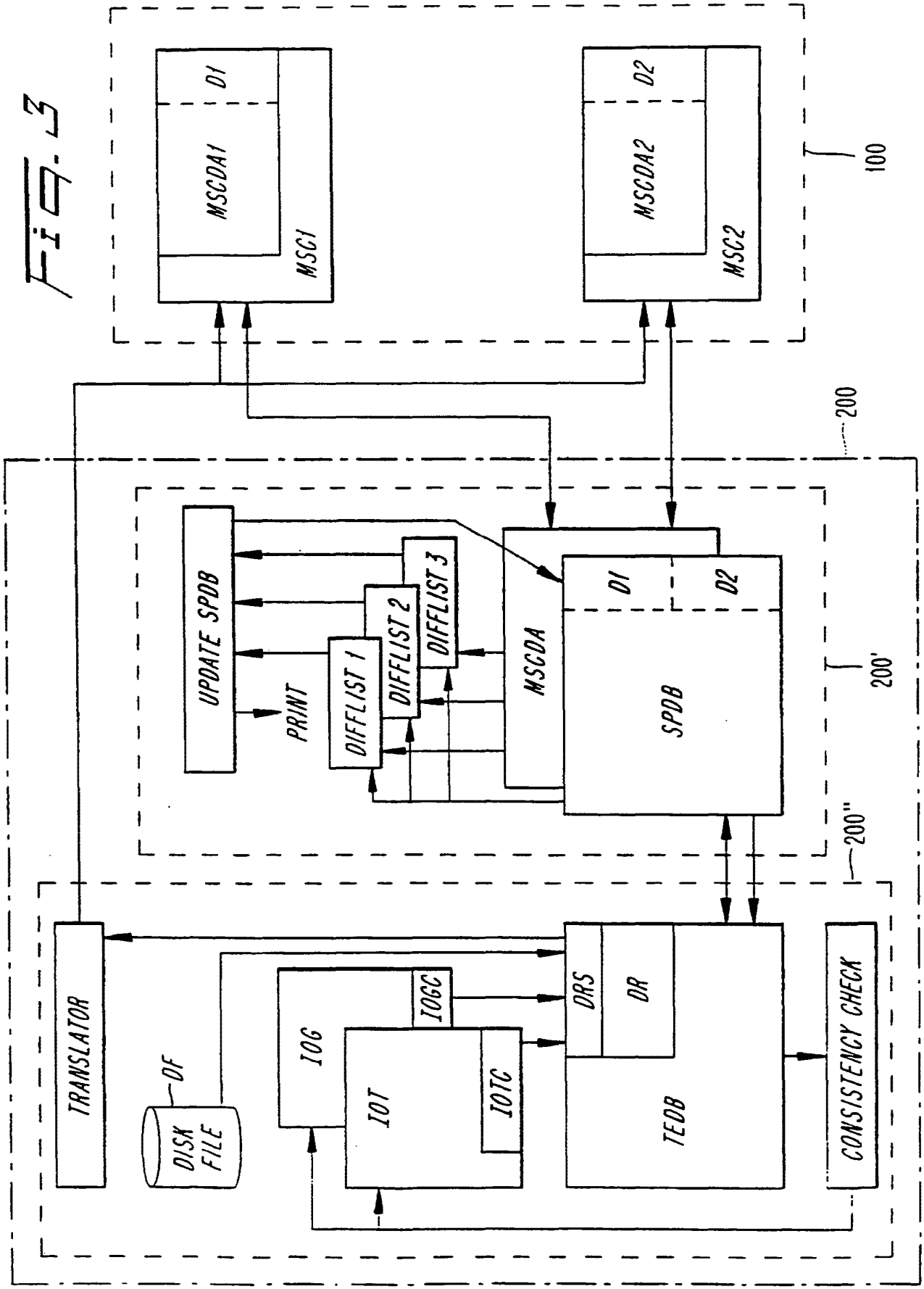



Fig. 2
(PRIOR ART)

| CELL | NEIGHBOR CELLS |
|---|---|
| 1 | 2 3 4 5 6 |
| 2 | 1 3 6 |
| 3 | 1 2 4 6 |
| 4 | 1 3 5 |
| 5 | 1 4 |
| 6 | 1 2 3 |

Fig. 2


D1
MSCDA1
MSC1
D2
MSCDA2
MSC2
100
200
UPDATE SPDB
DIFFLIST 3
DIFFLIST 2
DIFFLIST 1
PRINT
MSCDA
D1
D2
SPDB
200'
200"
TRANSLATOR
DF
DISK FILE
IOG
IOGC
IOT
IOTC
DRS
DR
TEDB
CONSISTENCY CHECK

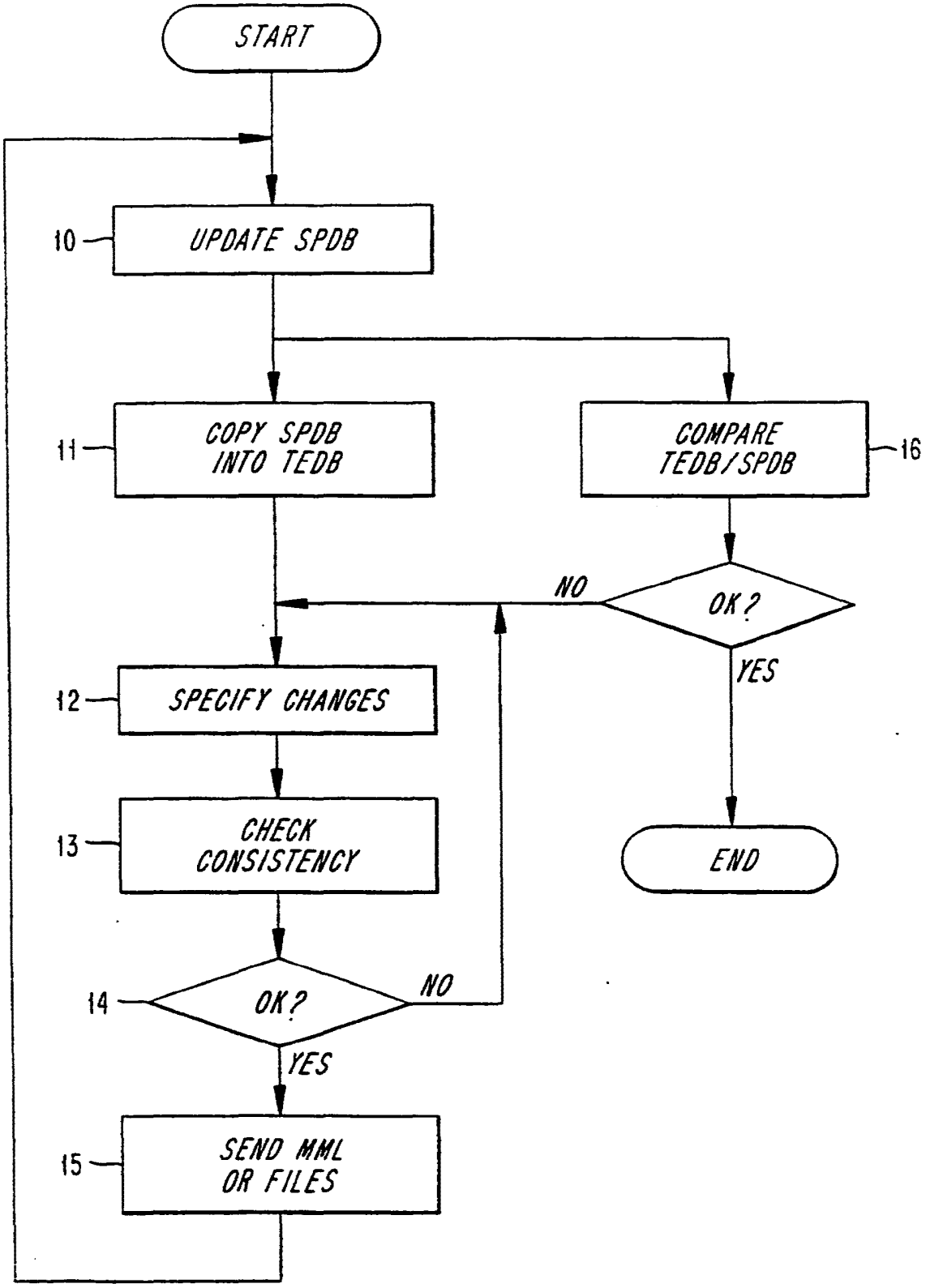
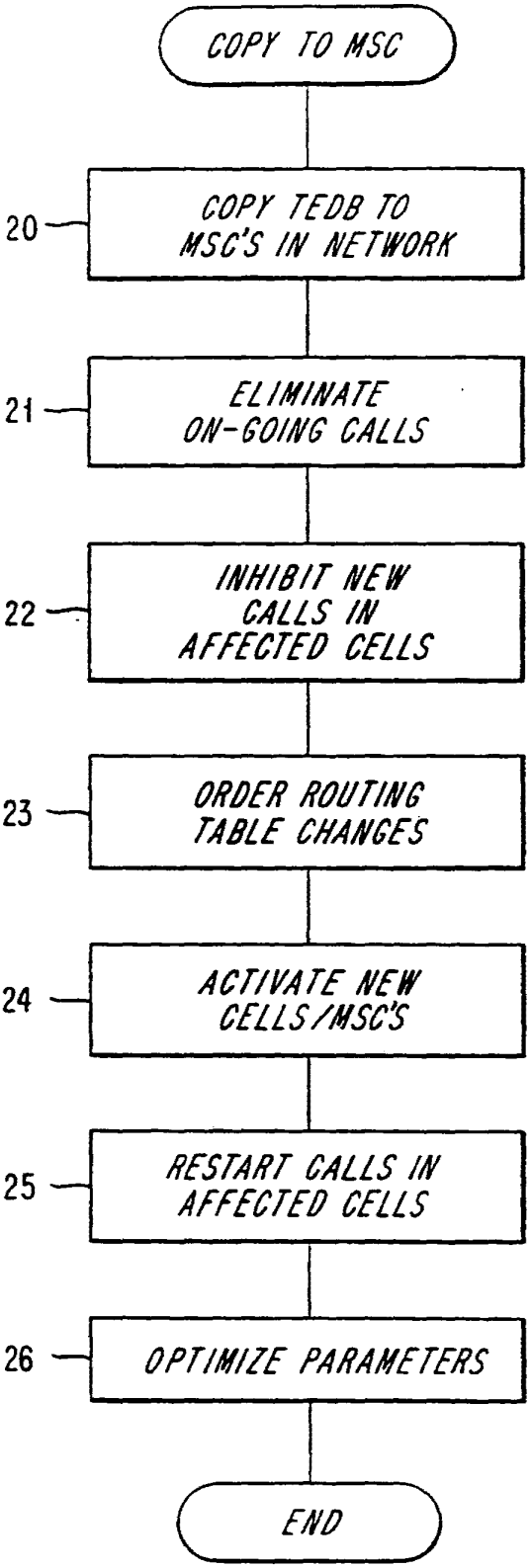

START
10
UPDATE SPDB
11
COPY SPDB INTO TEDB
16
COMPARE TEDB/SPDB
NO
OK?
YES
12
SPECIFY CHANGES
13
CHECK CONSISTENCY
END
14
OK?
NO
YES
15
SEND MML OR FILES

Fig. 4A

Fig. 4B


COPY TO MSC
20
COPY TEDB TO MSC'S IN NETWORK
21
ELIMINATE ON-GOING CALLS
22
INHIBIT NEW CALLS IN AFFECTED CELLS
23
ORDER ROUTING TABLE CHANGES
24
ACTIVATE NEW CELLS/MSC'S
25
RESTART CALLS IN AFFECTED CELLS
26
OPTIMIZE PARAMETERS
END

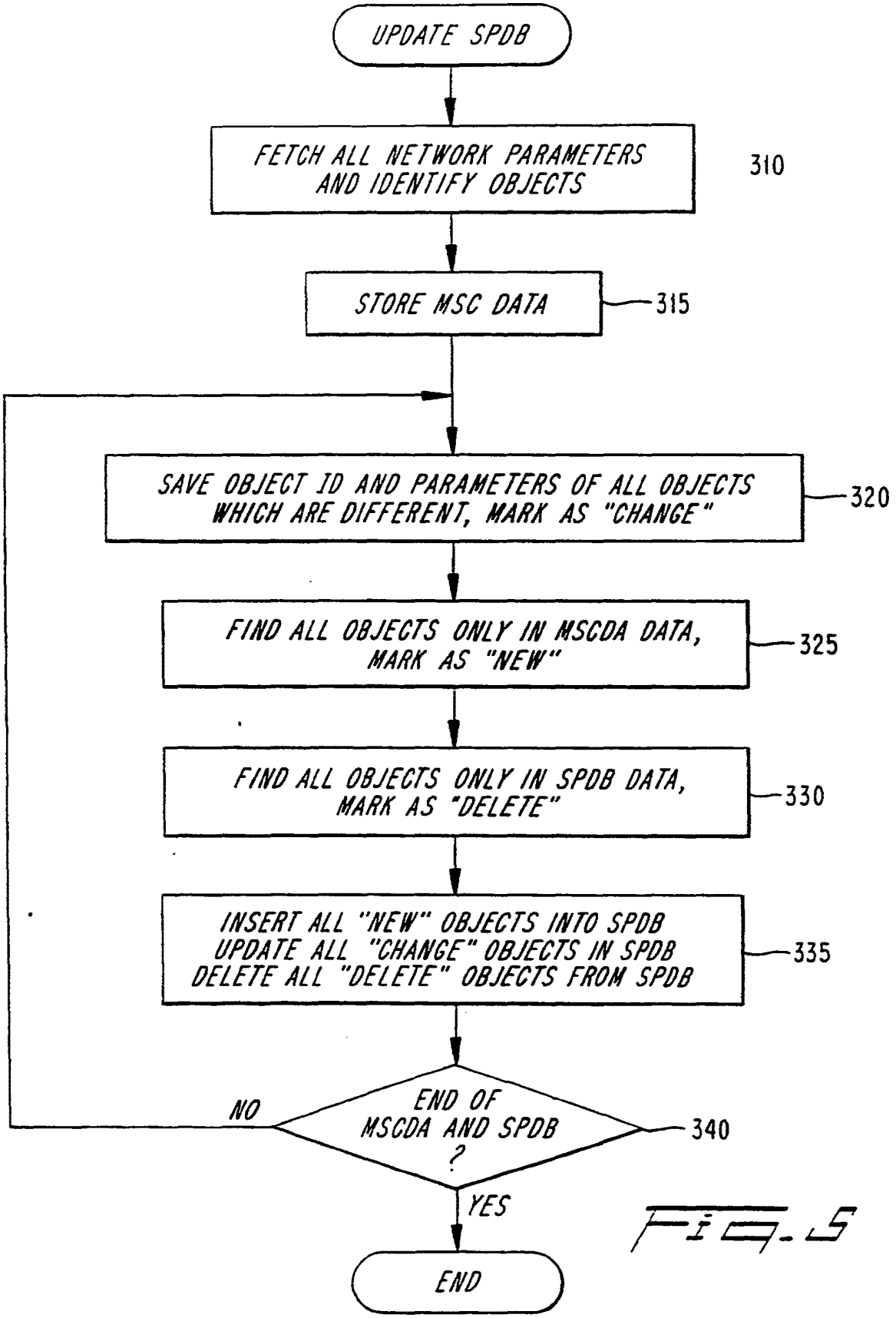
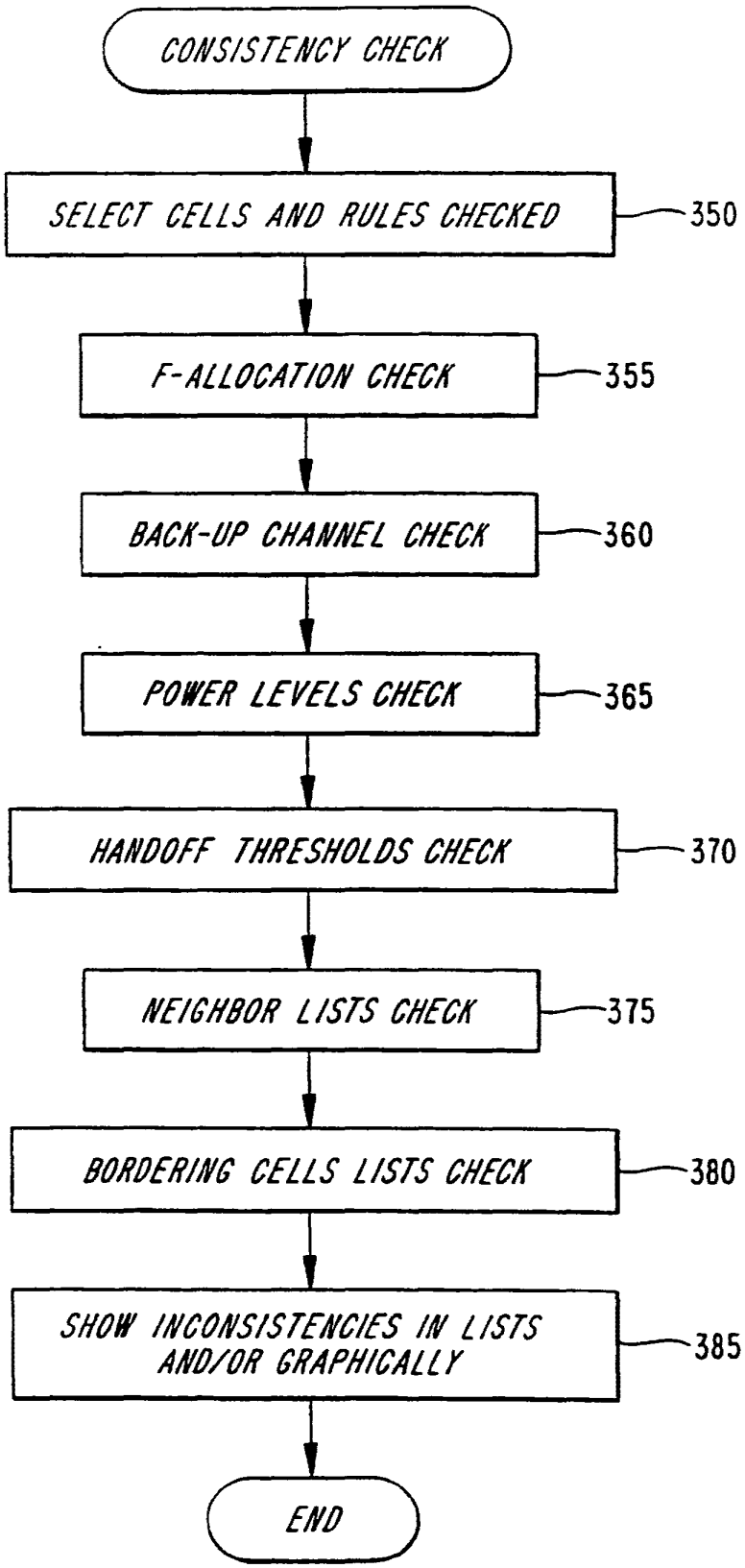

UPDATE SPDB
FETCH ALL NETWORK PARAMETERS AND IDENTIFY OBJECTS
310
STORE MSC DATA
315
SAVE OBJECT ID AND PARAMETERS OF ALL OBJECTS WHICH ARE DIFFERENT, MARK AS "CHANGE"
320
FIND ALL OBJECTS ONLY IN MSCDA DATA, MARK AS "NEW"
325
FIND ALL OBJECTS ONLY IN SPDB DATA, MARK AS "DELETE"
330
INSERT ALL "NEW" OBJECTS INTO SPDB
UPDATE ALL "CHANGE" OBJECTS IN SPDB
DELETE ALL "DELETE" OBJECTS FROM SPDB
335
END OF MSCDA AND SPDB ?
340
NO
YES
END

Fig. 5

Fig. 6


CONSISTENCY CHECK
SELECT CELLS AND RULES CHECKED
350
F-ALLOCATION CHECK
355
BACK-UP CHANNEL CHECK
360
POWER LEVELS CHECK
365
HANDOFF THRESHOLDS CHECK
370
NEIGHBOR LISTS CHECK
375
BORDERING CELLS LISTS CHECK
380
SHOW INCONSISTENCIES IN LISTS AND/OR GRAPHICALLY
385
END

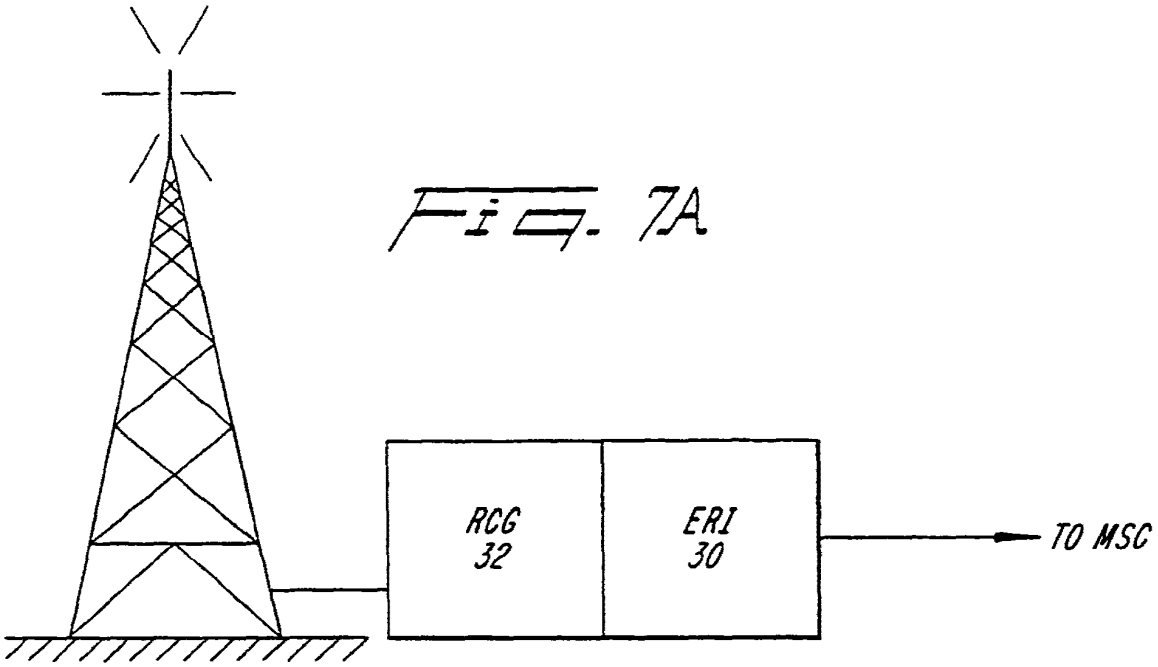
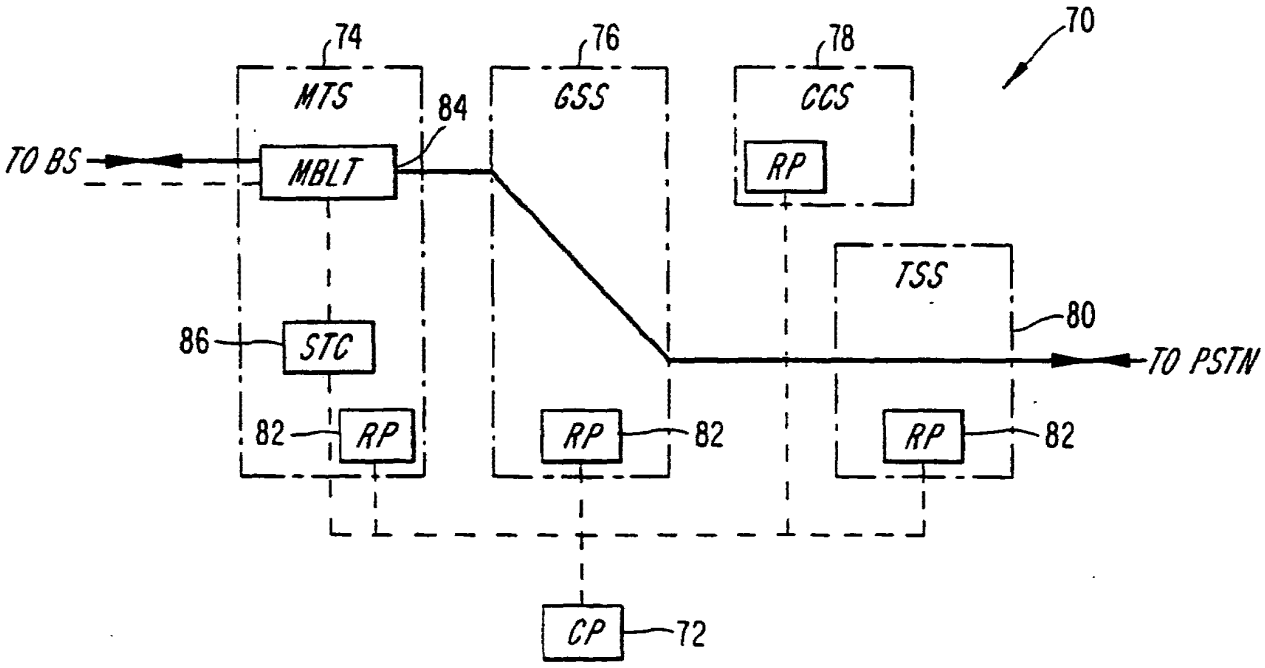

RCG
32
ERI
30
TO MSC

Fig. 7A

Fig. 8


70
74
MTS
76
GSS
78
CCS
84
TO BS
MBLT
RP
TSS
80
86
STC
TO PSTN
82
RP
RP
82
RP
82
CP
72

BNSDOCID: <WO 9221182A1 I >



Fig. 7B

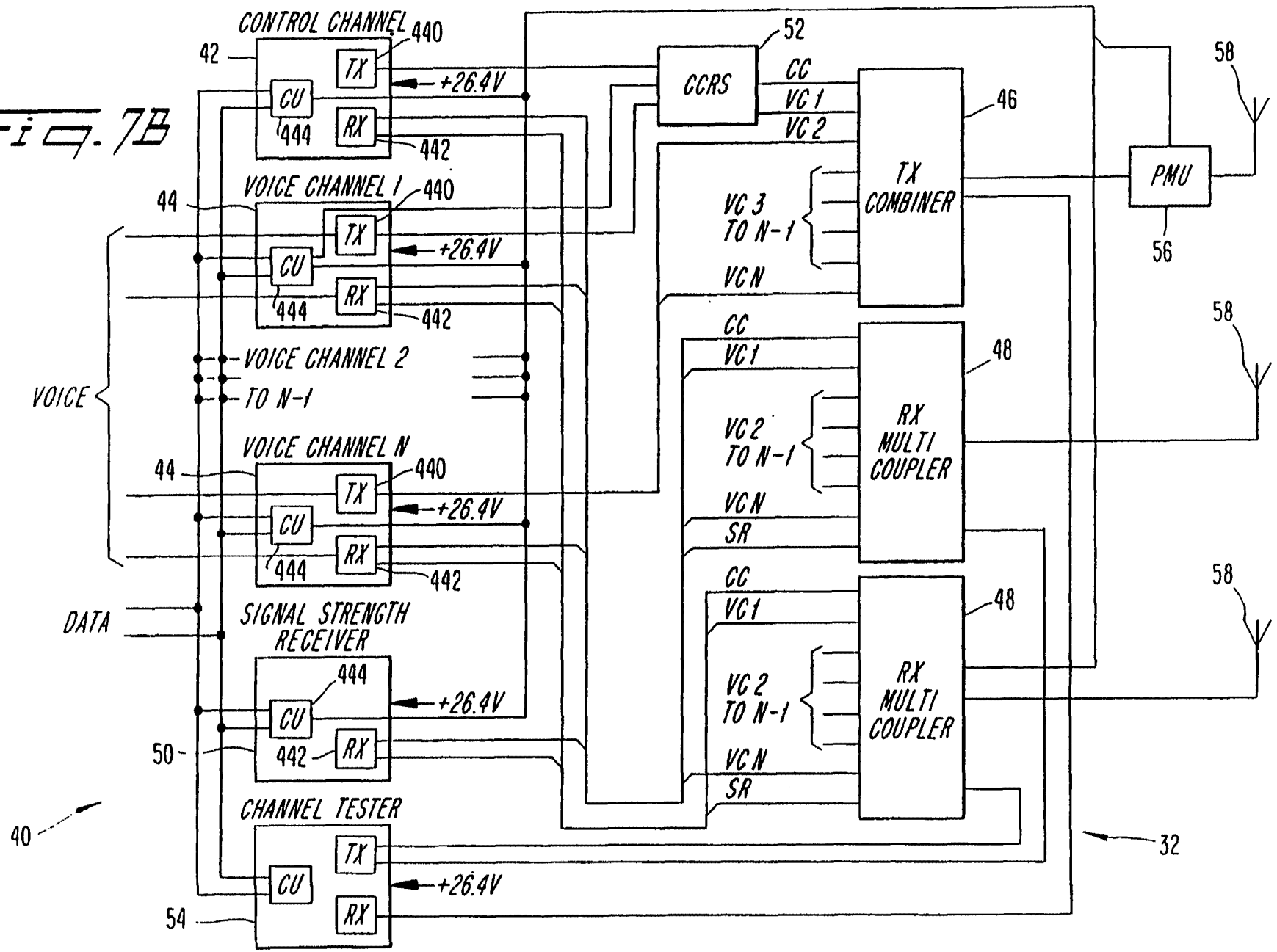
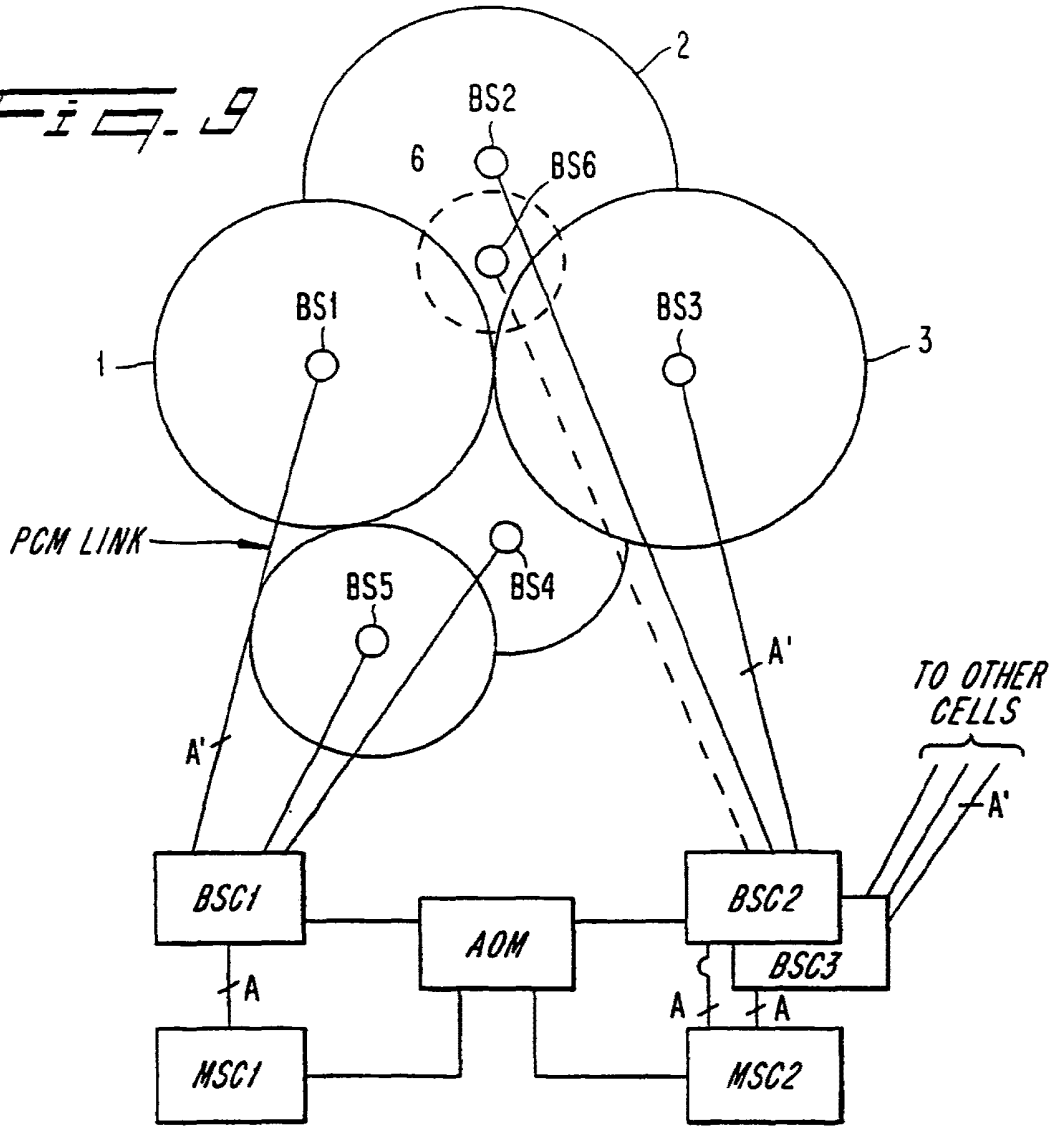


Fig. 9


2
BS2
6
BS6
BS1
BS3
1
3
PCM LINK
BS5
BS4
A'
A'
TO OTHER CELLS
A'
BSC1
AOM
BSC2
BSC3
A
A
A
MSC1
MSC2

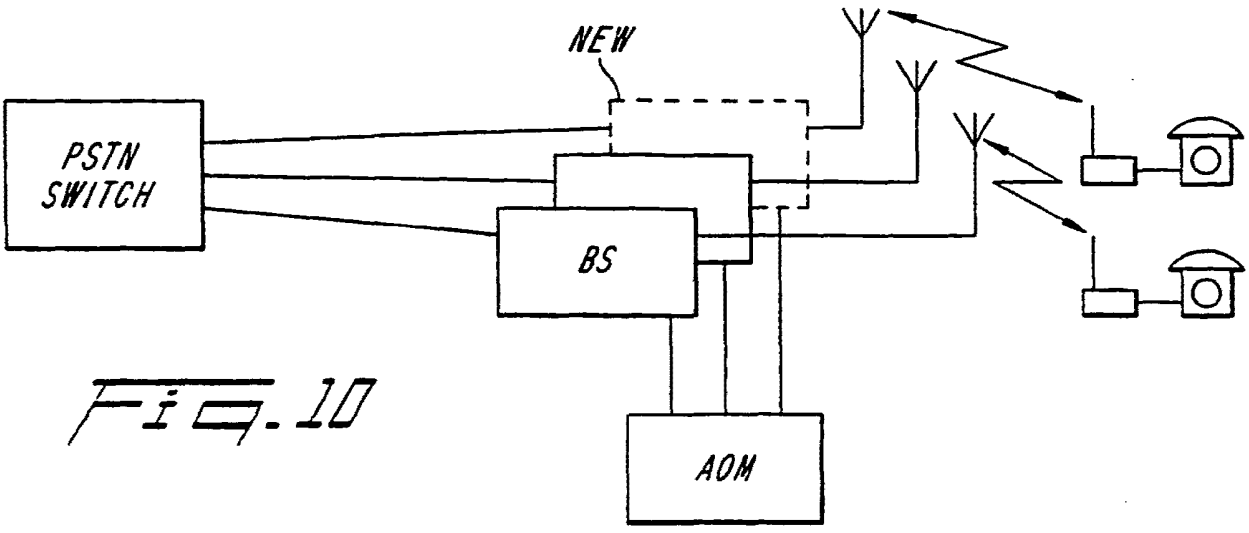

NEW
PSTN SWITCH
BS
AOM

Fig. 10

# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00339

**I. CLASSIFICATION OF SUBJECT MATTER** (if several classification symbols apply, indicate all)[5]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: H 04 B 7/26, H 04 Q 7/00

**II. FIELDS SEARCHED**

**Minimum Documentation Searched**[7]

| Classification System | Classification Symbols |
|---|---|
| IPC5 | H 04 B; H 04 Q |

**Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in Fields Searched**[8]

SE,DK,FI,NO classes as above

**III. DOCUMENTS CONSIDERED TO BE RELEVANT**[9]

| Category * | Citation of Document,[11] with indication, where appropriate, of the relevant passages[12] | Relevant to Claim No.[13] |
|---|---|---|
| A | WO, A1, 9114278 (MOTOROLA, INC) 19 September 1991, see page 5, line 8 - line 21 -- --- | 1-26 |

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

**IV. CERTIFICATION**

| Date of the Actual Completion of the International Search | Date of Mailing of this International Search Report |
|---|---|
| 5th August 1992 | 1992 -08- 07 |
| **International Searching Authority** | **Signature of Authorized Officer** |
| SWEDISH PATENT OFFICE | Lars Henriksson |

Form PCT/ISA/210 (second sheet) (January 1985)

BNSDOCID: <WO___9221182A1_I_>

# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 92/00339

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 01/07/92
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| WO-A1- 9114278 | 91-09-19 | NONE | |

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WASHINGTON, D.C. 20231
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| APPLICATION NUMBER | FILING/RECEIPT DATE | FIRST NAMED APPLICANT | ATTORNEY DOCKET NUMBER |
|---|---|---|---|
| 10/188,538 | 07/03/2002 | Joannes Willem Maria Oldenburg | PTT-119/APP |

**CONFIRMATION NO. 8186**

007265
MICHAELSON AND WALLACE
PARKWAY 109 OFFICE CENTER
328 NEWMAN SPRINGS RD
P O BOX 8489
RED BANK, NJ 07701

**FORMALITIES LETTER**

*OC000000008600953*

Date Mailed: 08/09/2002

# NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

**FILED UNDER 37 CFR 1.53(b)**

***Filing Date Granted***

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  *Applicant must submit $* **740** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing.
  *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(l) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

**Items Required To Avoid Processing Delays:**

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- Additional claim fees of **$486** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

**SUMMARY OF FEES DUE:**

Total additional fee(s) required for this application is **$1356** for a Large Entity

- **$740** Statutory basic filing fee.
- **$130** Late oath or declaration Surcharge.
- Total additional claim fee(s) for this application is **$486**
  - **$234** for **13** total claims over 20.
  - **$252** for **3** independent claims over 3.

---

***A copy of this notice MUST be returned with the reply.***

Haimanot Tegbaru

Customer Service Center
Initial Patent Examination Division (703) 308-1202

PART 3 - OFFICE COPY

07-05-02 10188538-070302 A

jc914 U.S. PTO 07/03/02

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j1036 U.S. PTO 10/188538 07/03/02

# UTILITY PATENT APPLICATION TRANSMITTAL

*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

| | |
|---|---|
| *Attorney Docket No.* | PTT-119/APP(402706US/1) |
| *First Inventor* | J.W.M. OLDENBURG |
| *Title* | SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS |
| *Express Mail Label No.* | EV031805989US |

## APPLICATION ELEMENTS

*See MPEP chapter 600 concerning utility patent application contents.*

1. [x] Fee Transmittal Form (WITHOUT FEES) *(Submit an original and a duplicate for fee processing)*
2. [ ] Applicant claims small entity status. See 37 CFR 1.27.
3. [x] Specification [*Total Pages* 24 ]
   *(preferred arrangement set forth below)*
   - Descriptive title of the invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [x] Drawing(s) *(35 U.S.C. 113)* [ *Total Sheets* 7 ]
5. Oath or Declaration [ *Total Pages* ]
   a. [ ] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR 1.63 (d)) *(for continuation/divisional with Box 18 completed)*
      i. [ ] DELETION OF INVENTOR(S)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1 63(d)(2) and 1 33(b)
6. [x] Application Data Sheet. See 37 CFR 1.76

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Box Patent Application
Washington, DC 20231

7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] paper
   c. [ ] Statements verifying identity of above copies

## ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [x] Preliminary Amendment
14. [x] Return Receipt Postcard (MPEP 503) (1) *(Should be specifically itemized)*
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [ ] Nonpublication Request under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. [x] Other: marked-up specification page; substitute specification page and substitute/clean claims

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:* [x] Non Prov. of Provisional
[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No 60/303,933

*Prior application information.* *Examiner* _____ *Group Art Unit* _____

**For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.**

## 19. CORRESPONDENCE ADDRESS

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| *Country* | | *Telephone* | | *Fax* | |

| | | | |
|---|---|---|---|
| *Name (Print/Type)* | Peter L. MICHAELSON | *Registration No. (Attorney/Agent)* | 30,090 |
| *Signature* | /Peter L. Michaelson/ | *Date* | July 3, 2002 |

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(PTT119TRANS/ca:88)

10189538.070102

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Fax: 732-530-6584/5
Videoconference:
732-224-0132 (ISDN)

Offices also in:
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**Doc. No. PTT-119/APP(402706US/1)**

July 2, 2002

**TRANSMITTAL FORM (WITHOUT FEES)**

Commissioner for Patents
**Box Patent Application**
Washington, D. C. 20231

Sir:

Enclosed herewith for filing is the following **utility patent application:**

Applicants: **Joannes Willem Maria OLDENBURG, Pierre ARNOLD, Hermann Petrus BREURKEN, Gijsbert VAN VEENENDAAL**

Title of application: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Pages of application: **24** (inclusive of **7** pages of claims [1-33], **1** page of abstract)

Sheets of drawings: **7** (FIGs. 1-6D)

Docket No.: **PTT-119/APP(402706US/1)**

PATENT APPLICATION FILING FEE CALCULATION

| | No. Filed | Less | Rate/Claim | Fee |
|---|---|---|---|---|
| Total Claims | **33** | -20 | 13 x $18.00 | $ 234.00 |
| Independent Claims | **6** | -3 | 3 x $84.00 | $ 252.00 |
| | Minimum Filing Fee | | | $ 740.00 |
| | Multiple Dependency Fee (if applicable - $280.00) | | | $ 00.00 |
| | 50% Reduction for Small Entity (Independent Inventor, Non-profit Corporation, or Small Business Concern) | | | $- 00.00 |
| | TOTAL | | | $ 1,226.00 |
| | ASSIGNMENT RECORDATION | | | $ 40.00 |
| | TOTAL FILING FEES | | | $ 1,266.00 |
| | **TOTAL FEES ENCLOSED** | | | **$ 00.00** |



*****EXPRESS MAIL CERTIFICATE APPEARS ON LAST PAGE*****

Also enclosed herewith for filing in connection with the enclosed application are:

XX Postcard Receipt;
XX Utility Patent Application Transmittal;
XX Application Data Sheet; and
XX Other: Preliminary Amendment with marked-up specification page, substitute specification page and substitute claims.

Respectfully submitted,

MICHAELSON & WALLACE

Peter L. Michaelson, Attorney
Reg. No. 30,090
Customer No. 007265

*****EXPRESS MAIL CERTIFICATION*****

"Express Mail" mailing label number: **EV031805989US**
Date of deposit: **July 3, 2002**

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Signature of person making certification

Peter L. MICHAELSON
Name of person making certification

(PTT119PTOLTR/ca:88)



*****EXPRESS MAIL CERTIFICATE APPEARS ON LAST PAGE*****

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| | |
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| | |
| City of Residence:: | Ede |
| Country of Residence:: | NL |
| Citizenship Country:: | NL |

**Correspondence Information**

Correspondence Customer Number:: 007265

**Application Information**

| | |
|---|---|
| Title Line One:: | System and Method For Checking Parameter |
| Title Line Two:: | Settings of Radio Networks |
| Total Drawing Sheets:: | 7 |
| Formal Drawings?:: | yes |
| Application Type:: | Utility |
| Docket Number:: | PTT-119/APP |

**Representative Information**

Representative Customer Number:: 007265

**Continuity Information**

This application is a:: Non Prov. of Provisional

| | |
|---|---|
| >>Application One:: | 60/303,933 |
| Filing Date:: | July 9, 2001 |
| Patent Number:: | NA |

**Prior Foreign Applications**

| | |
|---|---|
| Foreign Application One:: | 01203820.4 |
| Filing Date:: | October 9, 2001 |
| Country:: | EP |
| Priority Claimed:: | yes |

IN THE UNITED STATES
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**PATENT APPLICATION**

Applicants: **Joannes Willem Maria OLDENBURG, Pierre ARNOLD, Hermann Petrus BREURKEN, Gijsbert VAN VEENENDAAL**

Atty. Doc.: **PTT-119/APP(402706US/1)**

Serial No.: Filed:

Group Art Unit:

Examiner:

Title: **SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS**

Commissioner for Patents
**Box Patent Application**
Washington, D. C. 20231

S I R:

**PRELIMINARY AMENDMENT**

Please amend the above-identified patent application which is simultaneously filed herewith, as follows:

IN THE SPECIFICATION-

To facilitate entry of the following changes, the Applicants have submitted herewith marked-up pages of their specification which depict all the following changes along with substitute pages that incorporate these changes.

Page 1, line 4 Insert the following heading and paragraph:

--CLAIM TO PRIORITY

This application claims the benefit of our co-pending United States provisional patent application entitled "System and Method For Checking Parameter Settings of Radio Networks" filed July 9, 2001 and assigned serial number 60/303,933, which is incorporated by reference herein. --.

IN THE CLAIMS-

To facilitate entry of the following changes, the Applicants have also submitted herewith substitute pages providing all the pending claims, as they now stand, incorporating the changes indicated below.

Amend the following claims:

--4. (amended) Method according to [claims 2 or 3] claim 2 in which the at least one operational parameter is stored in a first part of the database and the at least one modified parameter is stored in a second part of the database.

6. (amended) Method according to [any of the claims 2-5] claim 2 in which at least one of the [the] at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique.

7. (amended) Method according to [any of the claims 2-5] claim 2 in which the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter.

9. (amended) Method according to [any of the preceding claims] claim 1 in which the at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy.

11. (amended) Method according to claim 9 [or 10] in which the levels of the GSM network hierarchy are TRX, HO and/or CH.

12. (amended) Method according to [any of the preceding claims] claim 1 in which the at least one modified parameter relates to at least one level of a GPRS hierarchy.

15. (amended) Method according [any of the claims 9-14] to claim 9 in which the checking of the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy.

16. (amended) Method according to [any of claims 9-15] claim 9 wherein relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network.

17. (amended) Method according to [any of the preceding claims] claim 1 in which the at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network.

18. (amended) Method according to [any of the preceding claims] claim 1 in which the at least one operational practice requirement involves an administrative requirement.

21. (amended) Method according to claim 3 [or 20] in which the non-compliance signal is programmable.

23. (amended) System according to claim 22 for checking the at least one modified parameter and/or value before implementation in the radio network, comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network

a second part of a database to store the at least one modified parameter and/or value;

a business rule checker verifying whether the at least one modified parameter and/or value obeys the at least one operational requirement[;].

24. (amended) System according to claim 23 wherein a signal [genarator] generator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement.

25. (amended) System according to [claims 23 or 24] claim 23 further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker.

30. (amended) Computer program according to claim 28 [or 29] wherein at least one of the [the] at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique.

33. (amended) Data carrier according to [claims 31 or 32] claim 31 wherein software code portions are provided for executing the method as claimed in [any of the claims 3 - 21] claim 3. --.

**REMARKS**

The foregoing amendment is made to insert a claim to priority paragraph and to eliminate multiple dependent claims and correct minor typographical errors.

Respectfully submitted,

July 3, 2002

Peter L. Michaelson, Attorney
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(732) 530-6671

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Red Bank, New Jersey 07701

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Date of deposit: **July 3, 2002**

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Signature of person making certification

Peter L. Michaelson
Name of person making certification

(PTT119PREAMEND/ca:88)

1. Method for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement deduced from operational use of the radio network.

2. Method according to claim 1 wherein the at least one modified parameter and/or value is checked before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

3. Method according to claim 2 wherein a non-compliance signal is generated if the at least one modified parameter does not obey the at least one operational requirement.

4. Method according to claim 2 in which the at least one operational parameter is stored in a first part of the database and the at least one modified parameter is stored in a second part of the database.

5. Method according to claim 4 in which the first and second part of the database are separate databases.

6. Method according to claim 2 in which at least one of the at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique.

7. Method according to claim 2 in which the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter.

8. Method according to claim 7 in which the at least one hierarchy table is used for checking whether the at least one modified parameter obeys the at least one selected business rule.

9. Method according to claim 1 in which the at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy.

10. Method according to claim 9 in which the levels of the GSM network hierarchy are MSC, OMC, BSC, BCF and/or BTS.

11. Method according to claim 9 in which the levels of the GSM network hierarchy are TRX, HO and/or CH.

12. Method according to claim 1 in which the at least one modified parameter relates to at least one level of a GPRS hierarchy.

13. Method according to claim 12 in which the levels of the GPRS hierarchy are MSC, OMC, BSC, SGSN, BCF and/or BTS.

14. Method according to claim 13 in which the levels of the GPRS hierarchy are TRX, HO and/or CH.

15. Method according to claim 9 in which the checking of the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy.

16. Method according to claim 9 wherein relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network.

17. Method according to claim 1 in which the at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network.

18. Method according to claim 1 in which the at least one operational practice requirement involves an administrative requirement.

19. Method according to claim 17 in which the operational practice requirement involves a technically preferable requirement programmed, ordered and/or influenced by the operator of the radio network.

20. Method according to claim 3 in which the non-compliance signal is a file or message displayed to an operator.

21. Method according to claim 3 in which the non-compliance signal is programmable.

22. A system for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

23. System according to claim 22 for checking the at least one modified parameter and/or value before implementation in the radio network, comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network

a second part of a database to store the at least one modified parameter and/or value;

a business rule checker verifying whether the at least one modified parameter and/or value obeys the at least one operational requirement.

24. System according to claim 23 wherein a signal generator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement.

25. System according to claim 23 further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker.

26. Radio network comprising at least one component comprising at least one operational parameter and/or value that can be changed to at least one modified parameter and/or value wherein the at least one modified parameter and/or value can be checked on the basis of at least one business rule derived from operational use of the radio network.

27. Radio network according to claim 26 wherein the at least one operational parameter and the at least one modified parameter relate to at least one level of a GSM, DCS or GPRS hierarchy of the radio network.

28. Computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

29. Computer program for running on a computer system comprising software code portions for checking the at least one modified parameter and/or value before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

30. Computer program according to claim 28 wherein at least one of the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique.

31. Data carrier stored with data loadable in a computer memory said data representing a computer program for running on a computer system at least including software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

32. Data carrier according to claim 31 wherein software code portions are provided for checking the at least one modified parameter and/or value before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

33. Data carrier according to claim 31 wherein software code portions are provided for executing the method as claimed in claim 3.

# SYSTEM AND METHOD FOR CHECKING PARAMETER SETTINGS OF RADIO NETWORKS

## CLAIM TO PRIORITY

This application claims the benefit of our co-pending United States provisional patent application entitled "System and Method For Checking Parameter Settings of Radio Networks" filed July 9, 2001 and assigned serial number 60/303,933, which is incorporated by reference herein.

## Field of the invention

The invention relates to a method and system for checking parameter settings of a radio network. More specifically the invention relates to a method and system for checking various parameters of components of a cellular radio networks on the basis of business rules.

## Background

Fig. 1 shows a schematic representation of a contemporary cellular network 1. The architecture of these cellular networks comprises a network subsytem 2, a base station subsytem 3 and a mobile station 4. Examples of these cellular networks are GSM and DCS and extensions of these networks such as GPRS, UMTS etc. The network subsystems main component involves the mobile switching centre 20 (MSC) providing the interface of the cellular network and wire bound networks 5 (PSTN, ISDN, ADSL etc.) as well as roaming and call-routing facilities (Home Location Register 21, Visitor Location Register 22,

Equipment Identity Register 23 and Authentication Centre 24).

The base station subsystem 3 consists of a number of base stations. The base station subsystem 3 constitutes the connection between a mobile station 4 and the MSC 20. The base station subsystem 3 may be distinguished into two parts, the Base Transceiver Station 31 (BTS) and the Base Station Controller 30 (BSC). The BTS 31 houses radio transceivers that define a cell and handles the radio-link protocols with the mobile station 4. In a large urban area, there will potentially be a large number

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of BTSs deployed. The BSC 30 manages the radio resources for one or more BTSs 31. It handles radio-channel set-up, frequency hopping, and handovers.

The mobile station 4 is the mobile equipment that enables a user to communicate with others through the cellular network. A mobile station 4 usually comprises mobile equipment 41 and a Subscriber Identity Module 42 (SIM).

As the complexity of cellular networks increases flexible operation of these networks becomes more difficult. Configuration and reconfiguration of a cellular network is complex since the parametersettings of the different components of the cellular radio network affect eachother. United States Patent 5,343,798 of Ericsson describes a reconfiguration method and apparatus in which the cell parameters of particular mobile switching centres in a network are copied to a database, and the copied parameters are stored. A set of proposed changes to the stored parameters are prepared and the consistency of the prepared set of proposed changes is verified. Alterations to the set of proposed changes responsive to the verification are made and the verified set of proposed changes are copied to the concerned mobile switching centres. The verified set of proposed changes is then introduced into the network. An up-to-date image of the cell parameters in the mobile switching centres in the network is maintained in a system parameter database.

**Problem definition and aims of the invention**

Typically a cellular radio network comprises several MSC's and a larger number of base stations. Operation of such cellular radio networks requires a high degree of flexibility in the sense that configuration and reconfiguration of the cellular network has to be possible

within a limited period of time and with a high degree of accuracy. Such a reconfiguration of a radio network can be permanent or temporarily. Reasons for such a reconfiguration are numerous, e.g. a temporary cell split needed to deal with an expected increase in traffic due to an event or the permanent integration of new elements both affecting the settings of already existing elements in the radio network. Therefore sophisticated methods and systems are required that administrate the parameter settings of the various components, e.g. the BTS or BSC, of the cellular radio network and change the parameter settings of said components. Examples of parameters that can be changed include cell type, cell designation, cell direction, signal strength, signal to noise ratio, etc. Moreover means have to be provided in order to check the consistency of the proposed parameter changes before the changes are implemented in the cellular network.

The reconfiguration method and system as revealed by the '798 patent can be improved with regard to, inter alia, the performed routine to check the consistency of proposed parameter changes.

More particularly an improvement relates to the hierarchical levels that can be checked. The method of the '798 patent checks the consistency of the proposed parameters only with regard to cells and handovers. Thus only a very limited part of the network hierarchy is checked, resulting in a less reliable and efficient control of the radio network.

Another problem of the method described in the '798 patent relates to the type of rules used in performing the consistency check. The rules used in performing this check originate solely from technical requirements derived from cellular network technology. There is no possibility to apply rules derived from

operational practice as well. Moreover it is not possible to deviate from the technically sufficient parameter setting requirements if operational practice experience reveals a different more preferable technical parameter setting.

Still another problem of the method described in the '798 patent is that in performing the consistency check only pre-programmed rules are used. This limitation decreases the flexibility of the system for the operator that exploits a cellular radio network. It may be that such an operator is not satisfied with the requirements for the various parameters defined by the supplier of the network. The operator may want to define the requirements, including the technical requirements, himself.

The present invention aims to provide a method and system to check the consistency of the proposed changes of parameters.

**Summary**

The present invention provides a method and system that improve the reliability, flexibility and accuracy required for operating cellular radio networks.

It is an object of the invention to be able to verify the proposed changes in the parameter settings in all hierarchical levels of the radio network and of substantially every, i.e. any desired, relationship between parameters in the same or different hierarchical level of the radio network. By enabling verification on every hierarchical level the control and reliability of the network is significantly improved if changes in the parameter setting are to be implemented.

It is another object of the invention to enable the use of rules developed from operational practice in the verification of the parameter settings in one or

more of the levels of the network hierarchy and relationship between elements in the cellular radio network. Hereafter the rules used to verify the parameter settings will be referred to as business rules. These business rules comprise rules relate to technically preferable requirements as well as rules derived from operational practice.

It is still another object of the invention to enable the use of programmable rules in the verification of the proposed changes of the parameter settings in one or more hierarchical levels and relationship of elements in the radio system. These rules may preferably be programmed by the operator of the radio network or at least being ordered or influenced by the operator of the radio network. Moreover also the error messages if the rules are not obeyed may be operator-programmable.

## Short description of the drawings

Fig.1 shows an elementary representation of a GSM radionetwork;

Fig.2 shows examples of representations of different hierarchies the invention is able to handle;

Fig.3 shows a detailed scheme of the parameter management;

Fig.4A,B shows a flow-chart illustrating an example of the business rule checking process;

Fig.5 shows a table of operational examples of business rules;

Fig.6A-D shows a few business rule modules.

## Description of preferred embodiments of the invention

For the purpose of teaching the invention, preferred embodiments of the method and devices of the invention are described in the sequel. It will be apparent

to the person skilled in the art that other alternative and equivalent embodiments of the invention can be conceived and reduced to practice without departing from the true spirit of the invention, the scope of the invention being only limited by the claims as finally granted.

A radio network 1, as schematically shown in figure 1 may be represented alternatively by a network hierarchy 11,12 comprising different levels. These levels correspond to physical as well as non-physical parts of radio network 1. The hierarchies 11,12 may differ in their representation between several commercial suppliers of these kinds of radio networks 1. As an example figure 2 shows the network hierarchies of Ericsson 11 and Nokia 12 radio networks 1. It can be observed that the Ericsson and Nokia hierarchies 11 and 12 differ in some aspects, but are equivalent in other aspects.

The Ericsson hierarchy 11 comprises a MSC level 20. The MSC 20 is coupled to a transcoder 32 (TRC) and a BSC/TRC 33. The next level comprises the BSC 30. This BSC 30 may be linked to the TRC 32 or the BSC/TRC 33. In the case that a GPRS radio network should be represented an additional element Service GPRS Support Node 34 (SGSN) is introduced. The SGSN 34 may comprise different hierarchical levels itself. Next the Ericsson hierarchy 11 shows a Radio Base System 35 (RBS) level. The RBS may be linked to a BSC 30 or a BSC/TRC 33. Afterwards a handover 36 (HO) and the BTS 31 are shown. Finally the Ericsson hierarchy 11 exhibits a transceiver level 37 (TRX) and a channel level 38 (CH).

The Nokia hierarchy 12 differs from the Ericsson hierarchy in some aspects. Firstly the TRC 32 and BSC/TRC 33 level are replaced by an Operational Maintenance Centre 25 (OMC). Moreover whereas the Ericsson hierarchy 11 contains TRC and BSC/TRC levels, the Nokia hierarchy

implements the OMC-level 25. The Ericsson hierarchy 11 and the Nokia hierarchy 12 are equivalent below the RBS 35 and the BCF 39 respectively.

It is noticed that the network hierarchies of Ericsson 11 and Nokia 12 are only examples. Other network suppliers might handle different network hierarchies. The method and system according to the invention are suited for these network hierarchies as well.

It is one of the objects of the invention to provide a method and system to handle the parameter settings in these kind of hierarchies. More specifically a method and system are provided to supply operators of cellular radio networks with a control facility on each and every hierarchical level and on relationships between elements of the radio network before changes in the parameter settings are implemented into the network.

Figure 3 shows an example of a process flow according to a preferred embodiment of the invention. The parameters and/or values uploaded from the radio network 1 may originate from each of the hierarchical levels shown in figure 2. E.g. in the case of the Nokia hierarchy 11 the parameters may be uploaded from the Nokia omc 25, whereas in case the Ericsson hierarchy 12 is applied parameters obtained from the Ericsson MSC 20 may be uploaded. The database 62 can be distinguished into three parts indicated as omc 63, ref 64 and mut 65. The omc part contains the operational parameters and values as set for the radio network. The ref part 64 contains the preferred new or changed parameters and values to be implemented in the radio network. The mut part 65 contains the parameters and values that are subject to a change proposal from user 69. A database with frequency plans 67 and a database with location data 68 can be present. A list of differences 66 can be generated containing the differences between the

actual radio network and its representation in the omc part of the database. The user 69 handles the list of differences and can choose to change some parameter values. A system administrator may add or delete parameters. All these changes are made into the mut part 65 of the database 62. The mutated parameters are checked by the business rule checker 70 and put in the ref part 64 of the database 62 if the changed parameters obey the business rules applied to them or no business rule exists for the changed parameter or value. A delta list 76 is generated holding the values of the parameters that differ from the original values. These parameter values are implemented in the radio network 1 by means of a command file generator 75 and a downloader 77. Both the business rule modules and the command file are scripts as indicated by 72 and 73.

The method and system according to an aspect of the invention relate to the management and control of the various parameters in a cellular radio network. Therefore the various parameters and/or values can be stored in a database, indicated by 62 in figure 3. This database might be a commercially available database such as MS Access or Oracle. The method and system according to an aspect of the invention for storing the parameters and/or values uses a technique which will be referred to as the compressed row technique. One of the advantages of this technique is a simplification of manipulating data within a given database. Furthermore this technique limits the number of records to an acceptable level and new parameters may be added easily. Also differences between sets of parameters can be obtained quickly by comparison between the relevant strings instead of comparing individual parameters.

Basically the compressed row technique involves a convenient database which is linked to a

descriptive database. Therefore a database applying compressed row techniques contains at least two separate parts. The first part may store the real data as strings, the second part may contain the descriptive information needed to process the real data from the first part. The second part will be referred to as the repository.

A preferable mechanism to apply the compressed row technique comprises the following steps. For every hierarchical level of the radio network 1 a parameter table is formed in the database 62. In this parameter table all the parameters of all elements in the radio network of that hierarchical level are stored. For each element the parameters are divided into parameter groups, each parameter group containing a string (compressed row) storing multiple parameters that may be divided by semi-coloms. Each group of parameters has a number assigned that indicates the nature of the group. Finally each group of parameters includes an identifier corresponding to the element. In the repository table for each parameter the group and the field within that group for that parameter is stored. To find the relevant element corresponding to an element identifier a hierarchy table is used. Various level-tables link the element identifiers to the parameter strings.

A simple example will clarify the mechanism described. Suppose that the value of the parameter BS_TX_PWR_MAX of base station 8662 (the maximum transmission power of that particular base station)is being sought. The hierarchy table HIERARCHY_OMC_BTS contains a base station with identifier 8662. Next it is deduced from the repository that the parameter being sought is e.g. located in parameter group 2 in field 9. The repository indicates moreover that the value on this location is expressed in dBm. The level table BTS_OMC then indicates

that for this particular BTS a parameterstring for group 2 exists containing e.g. the string 1;8;1;4;1;8;1;1;0;15;1;0;0;2;0;0;0;;;;;;. The 9th value in this string is 0 which probably indicates that the BTS with identifier 8662 is not active.

The example above is a simplified case. There are values of parameters that can not be obtained in this direct way, but have to be obtained indirectly by means of a translate table. In that case the parameter has a translate identifier in the repository. By means of a field identifier, uniquely defining the parameter, the value of the parameter can be obtained from the translate table.

The business rule checker 70 performs a control function before parameters and/or values are implemented in the cellular radio network. In most cases there is a inter-dependency of the various parameters and values of parameters and therefore checking of new and modulated parameters and values before implementation in the network is preferable. However not only the bare technical sufficient requirements set for the various parameters should be checked. Since contemporary cellular radio networks have reached an considerable amount of complexity several other non-technical requirements as e.g. administrative data should preferably be checked as well. As e.g. the operators administration indicates all cells for 900 MHz GSM with a cell_id starting with #1 and all cells for 1800 MHz DCS with cell_id starting with #6, these requirements should be part of the business rule check as well before configuration or reconfiguration of the network takes place.

Moreover it is preferable that the bare technical sufficient requirements can be altered according to rules obtained from daily operational use of the radio network. It can e.g. be technically sufficient to have a

channel distance of 20 Hz between different cells. All channel distances above this value then will pass the bcc/bcch consistency check. However, in practice it may be that a channel difference of 50 Hz between the cells guarantees a more reliable operation. In that case, according to the invention, it is possible to use the preferred channel distance of 50 Hz as obtained from the operational practice as a business rule instead of the technically sufficient channel distance. Such a technical requirement will hereinafter referred to as a preferred technical requirement.

The business rule checker 70 can use the hierarchy tables from the repository part of the database 62. The business rules may be formulated by the user and implemented as a script.

Figures 4A and 4B show a flow chart to illustrate schematically the application of business rules to parameter changes for the radio network 1 as proposed by the user 69. In the first step 81 a parameter group that is changed in mut 65 is read. Next the hierarchical level is determined from this parameter group at 82 and subsequently the parameter is found at 83. For this parameter it may be that no business rule has been defined or programmed. In that case 84 the parameter is put directly into the ref part 64 of database 62 and is ready to be implemented in the radio network 1. If a business rule does exist for the particular parameter that business rule is read at 85. It is checked whether the parameter does obey the business rule. If the parameter does not obey the business rule an error list is generated and the parameter and corresponding value are put on that list at 86. If the parameter does obey to the business rule defined or programmed for that parameter the next step is to find out whether other

parameters have been changed that belong to the parameter group under consideration. These parameters may run through the same series of steps as described above. If all the changed parameters have been put to the business rule test as described above, it is determined whether other parameter groups have been changed as well. The same series of steps as described above may be applied to the parameters belonging to that parameter group. Finally if all the parameter groups have been checked, the business rule checker 70 stops at step 87. As a result of the business rule checking process the parameters that obey the business rules defined or programmed for them are put in the ref part 64 of the database 62 at step 88 and are ready to be implemented in the radio network 1. If the parameters or values do not obey the business rules the parameters and corresponding values appear on the generated error list and after finalisation of the business rule checking of all the parameter groups this error list is put to the user. The user then has to correct the parameters, as shown at step 89. The corrected parameters or values then can be put to the ref part 64 of database 62 as well. Now the complete set of parameters and corresponding values does obey the business rules and is ready to be implemented to the cellular radio network 1. Although in figures 4A an B only individual parameters are checked whether or not they obey a business rule, als relations of parameters can be checked on a business rule (see e.g. figure 6A as discussed below).

Figure 5 shows a table of business rules defined for a particular type of cellular radio network 1. It is stressed that an almost infinite amount of these kind of business rules can be defined so the rules shown in figure 5 only give a few examples. The table shown in figure 5 shows columns defining a business rule

identification number BR_ID, the state of the business rule, the file name or module, the iteration level and the message to be shown when a parameter does not obey the business rule. Additional columns can include e.g. the priority level, author of the business rule, date of modification, version number, remarks etc.

The state of a business rule establishes whether that business rule is taken into consideration when the business rule checking is performed. It is not necessary that all the business rules have to be checked in a particular configuration or reconfiguration project with regard to the radio network. It may be up to the user to select the business rules he wants to apply. However it may be that some business rules have to be checked at all times and therefore can not be put aside by the user. Business rules can e.g. be applied by running a main script calling the separate business rule modules selected by the user or imposed by the system.

The iteration level relates to the hierarchical level of the elements of the cellular radio network to be checked. Generally, if the business rule is defined or programmed for another element at the same or a higher hierarchical level the iteration level will be higher than the highest of the hierarchical levels of all the elements involved for that specific business rule. An example of such a business rule is shown in figure 5 and 6B as module bts013.br. If the business rule is defined for the element internally the iteration level and the hierarchical level are the same. An example of such a business rule is shown in figure 5 and 6A as module bcf002.br.

The message relates to the messages shown to the user in the generated error list at 86 when a parameter or value does not obey the business rule applied to that

parameter or value. These error messages are operator-programmable as well. Different error levels can be distinguished, such as a blocking message (i.e. a serious error indicating that the proposed change may not be implemented in the radio network under any circumstances) or a warning message (i.e. an error indicating that the proposed change is not desirable, but does not do harm to the operation of the cellular radio network if implemented). Other error levels can be used as well, like e.g. engineering messages indicating that the change to be implemented does not achieve the optimal result.

The description column of the table in figure 5 defines the business rule in human language. In figure 6 the contents of some of the files used for the business rule check are displayed.

Figures 6A-D show a few examples of business rule modules that are also mentioned in the table of figure 5. Figure 6A shows the script of the business rule module bcf002.br, which is a business rule of the administrative kind as mentioned previously. It checks whether the requirement that a BCF 29 of type DE21 has more than 3 BTS's 31 connected according to e.g. the Nokia hierarchy 12 of figure 2. If it does, a blocking message appears on the error list indicating to the user 69 that that particular BCF does have more than 3 BTS's.

Figure 6B shows the script of the business rule module bts013.br. It states that one Access Grant Block (AGB) is required for each Basic Communication Channel. A blocking message appears if the business rule is not obeyed.

Figure 6C shows the script of the business rule module bts015.br, which is a business rule of the technical kind as mentioned above. This module checks the number of TRX's for each LABD-link. A LABD link basically

represents a direct or indirect physical link between two or more BSC's. For a bitrate of 16 respectively 64 a maximum of 12 resp. 10 TRX's is allowed for each LABD-link. If this requirement is not obeyed, a blocking message appears on the error list.

Figure 6D shows the script of the business rule module ho006.br, which is a business rule of the technical kind as mentioned previously. This module checks whether a cell has neighbour BTS's with the same base station communication channel BCCH. A warning message is generated on the error list if this happens to be the case.

It is explicitely stated that the examples and embodiments as described in this section do not limit the scope of the invention in any way. Modifications of the examples and embodiments fall within the scope of this application. E.g. it may be a advantageous to distribute the cellular radio network amongst several geographic regions each of these regions having an operator. Basically the same system of network management, including the business rule checker, can be applied in this situation. Measures can be taken to avoid conflicts when more than one user 69 tries to change the parameter settings in his region, especially around the borderlines of the respective regions. This possible conflict can be solved by allowing only one proposal to change the parameters. The system signals succeeding users trying to change the same parameters that an earlier proposal has already been made including the data of that particular user.

Another modification may be that proposals can be stored instead of being implemented immediately. This option is particularly relevant in the framework of more projects. Several projects can be identified, e.g. mass- updates involving future optimalisation of large

numbers of parameters or the pre-integration of new network elements. More projects may be planned simultaneously based on the same set of data. In order to avoid conflicts between projects it is possible to establish a 'frozen state' for a limited period.

**CLAIMS**

1. Method for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement deduced from operational use of the radio network.

2. Method according to claim 1 wherein the at least one modified parameter and/or value is checked before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

3. Method according to claim 2 wherein a non-compliance signal is generated if the at least one modified parameter does not obey the at least one operational requirement.

4. Method according to claims 2 or 3 in which the at least one operational parameter is stored in a first part of the database and the at least one modified parameter is stored in a second part of the database.

5. Method according to claim 4 in which the first and second part of the database are separate databases.

6. Method according to any of the claims 2-5 in which at least one of the the at least one operational parameter or the at least one modified parameter is stored in the database using a compressed row technique.

7. Method according to any of the claims 2-5 in which the database comprises at least one hierarchy table to store and have access to the at least one operational parameter and the at least one modified parameter.

8. Method according to claim 7 in which the at least one hierarchy table is used for checking whether the at least one modified parameter obeys the at least one selected business rule.

9. Method according to any of the preceding claims in which the at least one modified parameter relates to at least one level of a GSM or DCS network hierarchy.

10. Method according to claim 9 in which the levels of the GSM network hierarchy are MSC, OMC, BSC, BCF and/or BTS.

11. Method according to claim 9 or 10 in which the levels of the GSM network hierarchy are TRX, HO and/or CH.

12. Method according to any of the preceding claims in which the at least one modified parameter relates to at least one level of a GPRS hierarchy.

13. Method according to claim 12 in which the levels of the GPRS hierarchy are MSC, OMC, BSC, SGSN, BCF and/or BTS.

14. Method according to claim 13 in which the levels of the GPRS hierarchy are TRX, HO and/or CH.

15. Method according any of the claims 9-14 in which the checking of the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising at least one operational requirement has been obeyed is applied to at least one of the levels of the GSM, DCS or GPRS hierarchy.

16. Method according to any of claims 9-15 wherein relationships are checked between different operational and/or modified parameters in the same or different hierarchical levels of the radio network.

17. Method according to any of the preceding claims in which the at least one selected business rule is programmed by an operator or at least ordered or influenced by the operator of the radio network.

18. Method according to any of the preceding claims in which the at least one operational practice requirement involves an administrative requirement.

19. Method according to claim 17 in which the operational practice requirement involves a technically preferable requirement programmed, ordered and/or influenced by the operator of the radio network.

20. Method according to claim 3 in which the non-compliance signal is a file or message displayed to an operator.

21. Method according to claim 3 or 20 in which the non-compliance signal is programmable.

22. A system for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

23. System according to claim 22 for checking the at least one modified parameter and/or value before implementation in the radio network, comprising:

a first part of a database to store the at least one operational parameter and/or value from the radio network

a second part of a database to store the at least one modified parameter and/or value;

a business rule checker verifying whether the at least one modified parameter and/or value obeys the at least one operational requirement;

24. System according to claim 23 wherein a signal genarator can generate a non-compliance signal if the at least one modified parameter does not obey the at least one operational requirement.

25. System according to claims 23 or 24 further comprising scripting means in order to define business rules and/or error messages to be used by the business rule checker.

26. Radio network comprising at least one component comprising at least one operational parameter and/or value that can be changed to at least one modified parameter and/or value wherein the at least one modified parameter and/or value can be checked on the basis of at least one business rule derived from operational use of the radio network.

27. Radio network according to claim 26 wherein the at least one operational parameter and the at least one modified parameter relate to at least one level of a GSM, DCS or GPRS hierarchy of the radio network.

28. Computer program for running on a computer system comprising software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

29. Computer program for running on a computer system comprising software code portions for checking the at least one modified parameter and/or value before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

30. Computer program according to claim 28 or 29 wherein at least one of the the at least one operational parameter or the at least one modified parameter is stored in a database using a compressed row technique.

31. Data carrier stored with data loadable in a computer memory said data representing a computer program for running on a computer system at least including software code portions for checking at least one modified parameter and/or value obtained from changing at least one operational parameter and/or value of an at least one component of a radio network on the basis of at least one business rule comprising at least one operational requirement derived from operational use of the radio network.

32. Data carrier according to claim 31 wherein software code portions are provided for checking the at least one modified parameter and/or value before implementation in the radio network comprising the steps of

copying to a database the at least one operational parameter and/or value from the radio network;

changing the at least one operational parameter and/or value to the at least one modified parameter and/or value;

checking the at least one modified parameter and/or value by verifying whether the at least one selected business rule comprising the at least one operational requirement has been obeyed.

33. Data carrier according to claims 31 or 32 wherein software code portions are provided for executing the method as claimed in any of the claims 3 - 21.

Abstract

A method and system are disclosed for checking modified parameters of components of a radio network. Operational parameters that have been modified are checked on obeying business rules comprising requirements that have been deduced from operational use of the radio network, preferably before they are implemented in the network. The method and system allow application of compressed row techniques in databases comprising the parameters.

+ figure 4A and 4B

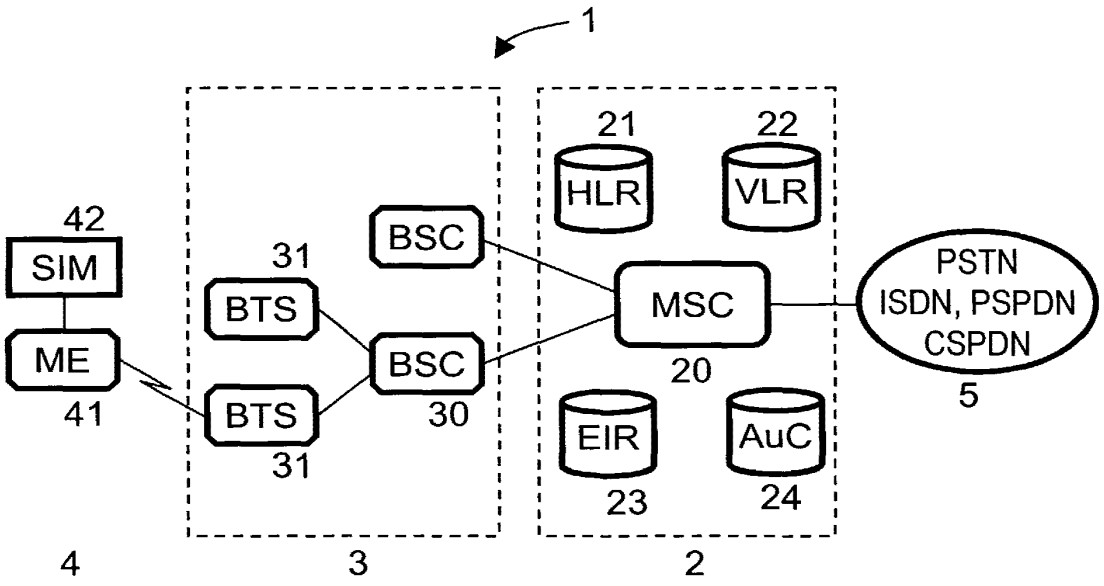

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21
22
HLR
VLR
42
SIM
31
BTS
BSC
MSC
PSTN
ISDN, PSPDN
CSPDN
ME
41
BTS
31
BSC
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20
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EIR
23
AuC
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2

FIG. 1

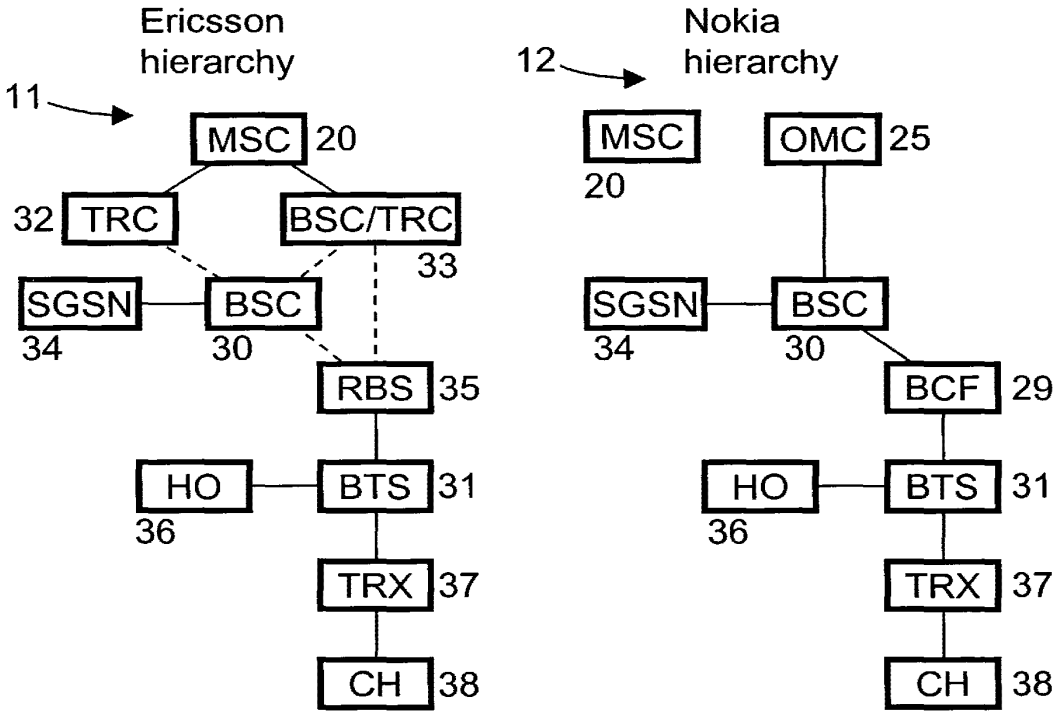

Ericsson
hierarchy
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MSC
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TRC
BSC/TRC
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SGSN
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BSC
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RBS
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HO
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BTS
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TRX
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CH
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Nokia
hierarchy
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MSC
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BTS
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FIG. 2

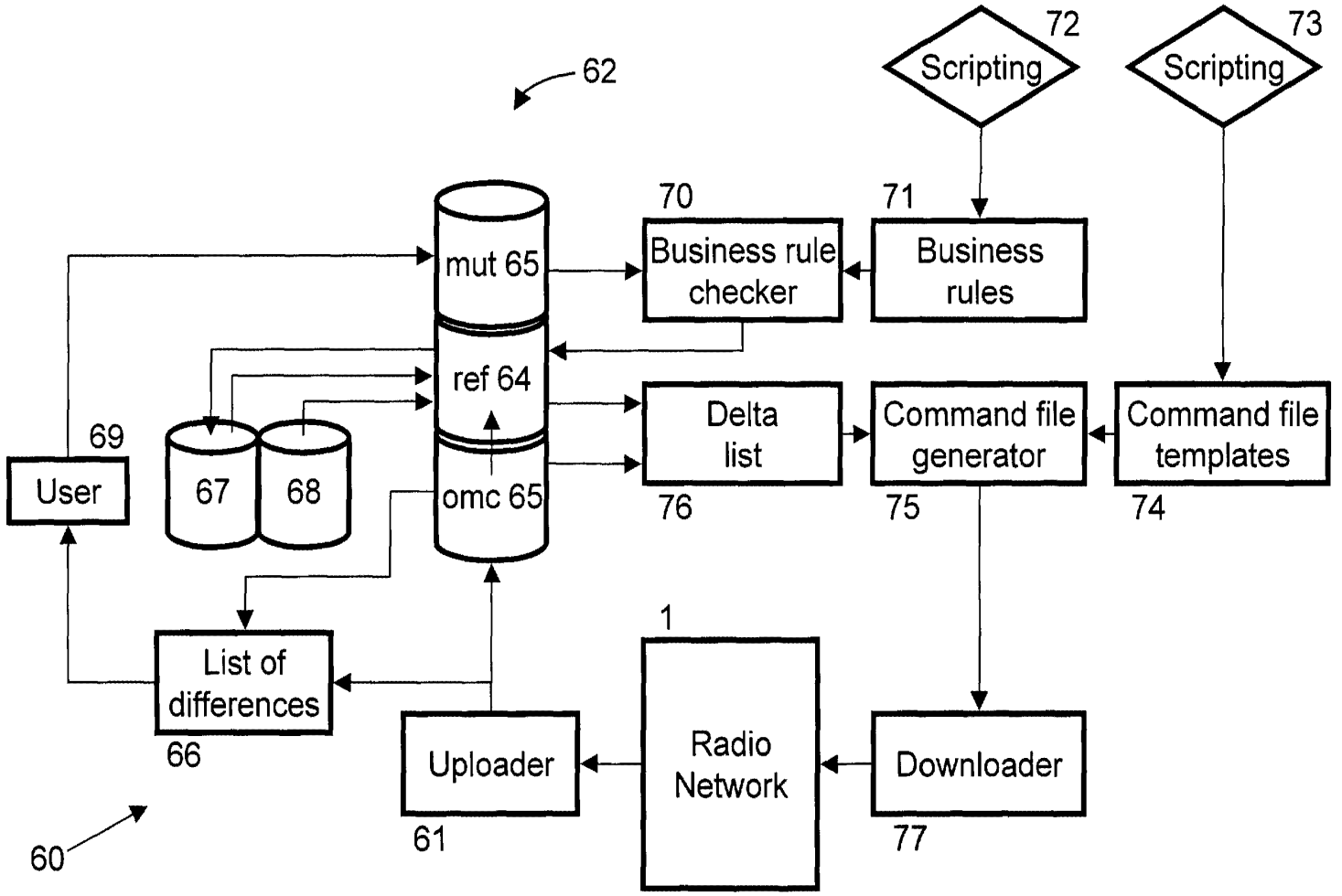

62
Scripting
72
Scripting
73
70
71
mut 65
Business rule checker
Business rules
ref 64
Delta list
Command file generator
Command file templates
69
User
67
68
omc 65
76
75
74
List of differences
66
1
Uploader
Radio Network
Downloader
61
77
60

FIG. 3

2/7

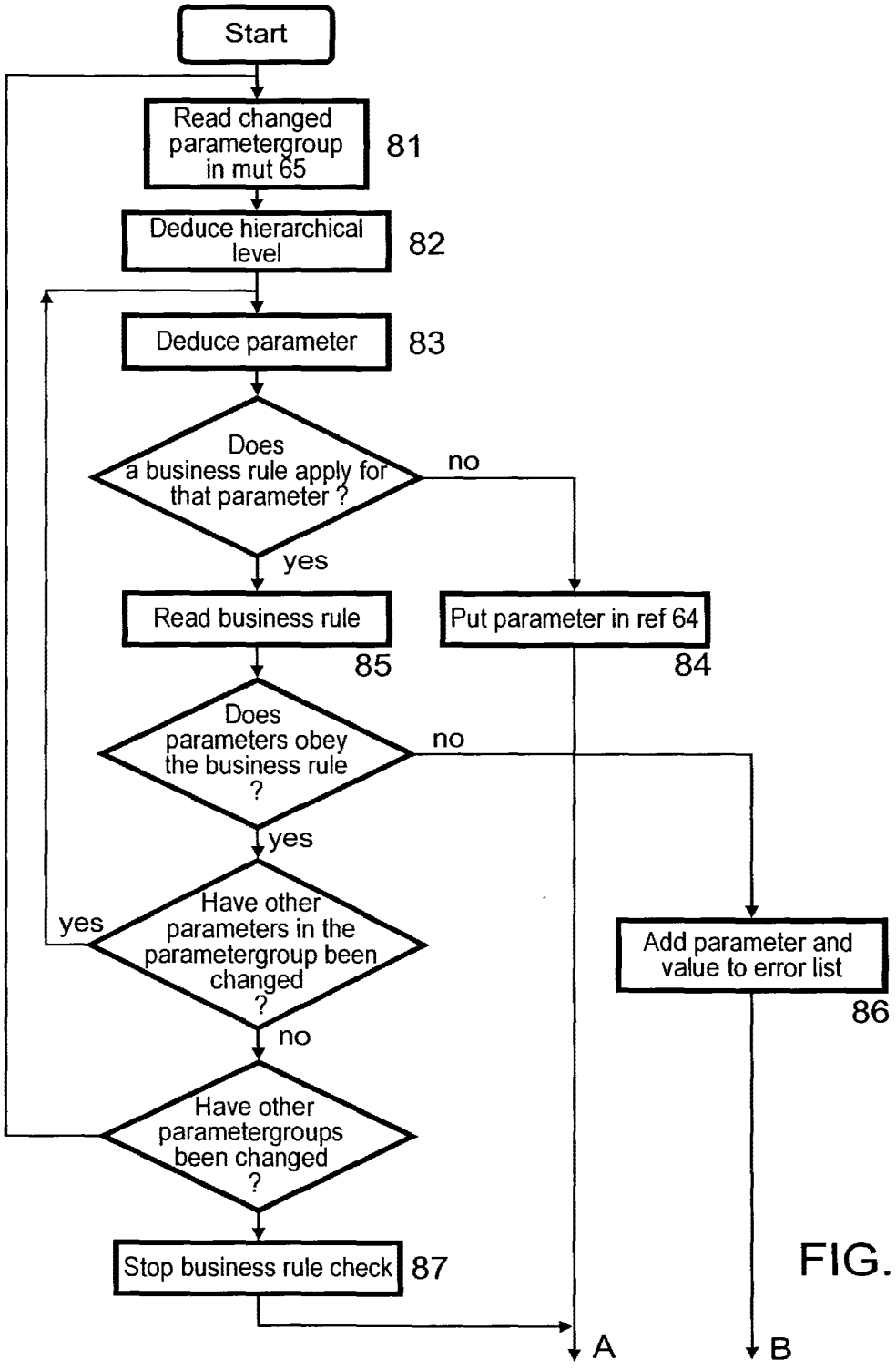

Start
Read changed parametergroup in mut 65
81
Deduce hierarchical level
82
Deduce parameter
83
Does a business rule apply for that parameter ?
no
yes
Read business rule
85
Put parameter in ref 64
84
Does parameters obey the business rule ?
no
yes
Have other parameters in the parametergroup been changed ?
yes
no
Add parameter and value to error list
86
Have other parametergroups been changed ?
Stop business rule check
87
A
B

FIG. 4A

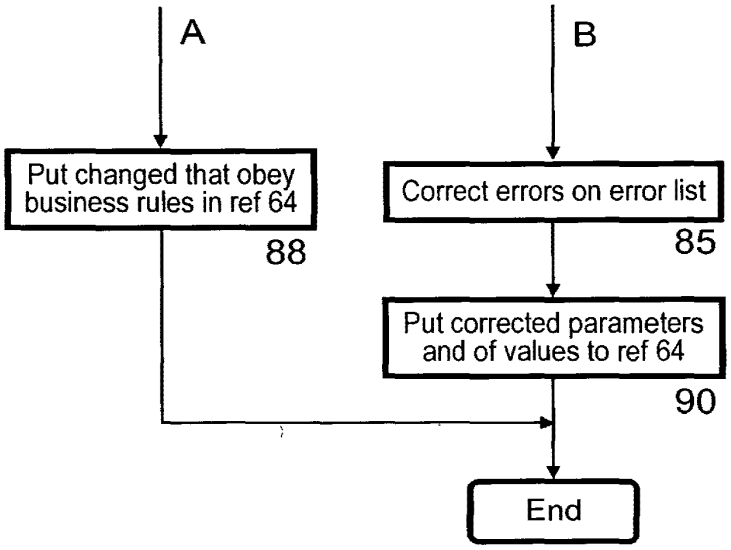

A
B
Put changed that obey business rules in ref 64
88
Correct errors on error list
85
Put corrected parameters and of values to ref 64
90
End

FIG. 4B

| BR_ID | STATE | MODULE | DESCRIPTION | ITERATION LEVEL | MESSAGE |
|---|---|---|---|---|---|
| | | | | | |
| 2 | 1 | bcf002.br | A BCF of type DE21 has a maximum of 3 BTS's | BCF - BTS | BLOCKING |
| 4 | 1 | bcf004.br | A BCF of type DE45 has a maximum of 1 BTS | BCF - BTS | BLOCKING |
| 5 | 1 | bcf005.br | A BCF has a maximum of 12 TRX's | BCF - TRX | BLOCKING |
| 27 | 3 | bts012.br | A BTS having > 3 TRX's has a additional SDCCH-channel | BTS - TRX | WARNING |
| 28 | 1 | bts013.br | At a combined BCCH 0...2 "no blocks for access grant" have to be used | BTS - CH | BLOCKING |
| 29 | 1 | bts014.br | At a non-combined BCCH 0...7 "no blocks for access grant" have to be used | BTS - CH | BLOCKING |
| 30 | 3 | bts015.br | Check on number of TRX's per LABD-link | BCF - TRX | WARNING |
| 62 | 1 | ho006.br | Preferrably a cell has no neighbours using the same BCCH | BTS -TRX | WARNING |
| 63 | 0 | ho009.br | Neighbours are basically bi-directional | BTS - HO | WARNING |
| 64 | 3 | ho010.br | The sum of handover margin pbgt Should be larger than 0 | BTS - HO | WARNING |
| 79 | 1 | trx001.br | Frequency difference of at least 2 channels of TRX's on same site for different BTS's | BTS - TRX | BLOCKING |
| 83 | 1 | trx004.br | A TRX has a LABD-link | TRX | BLOCKING |
| 85 | 0 | trx009.br | A new TRX is assigned a dummy frequency | TRX | BLOCKING |
| 104 | 1 | ch004.br | The BCCH has to be defined on TRX1 | BTS-TRX-CH | WARNING |

**Figure 5**

5/7

```
Iterate1Start(BCF)
  ResetCounter1
  If [BCF.bcf_type] == "$DE21" Then
    Iterate2Start(BTS)
      IncrementCounter1
    Iterate2End
  EndIf
  If Counter1 > "3" Then
    logBlocking(BCF,BCF of type DE21 exceeds maximum of 3 BTS's)
  EndIf
Iterate1End
```

***Fig. 6A (module bcf002.br)***

```
Iterate1Start(BTS)
  If [BTS.no_of_blocks_for_access_grant1] > "2" Then
    Iterate2Start(CH)
      If [CH.channel_type] == table(chMode,"MBCCB") Then
        logWarning(BTS,To much AccessGrantBlocks have been defined)
      EndIf
    Iterate2End
  EndIf
Iterate1End
```

***Fig. 6B (module bts013.br)***

```
Iterate1Start(BCF)
  Resetcounter1
  Iterate2Start(TRX)
    IncrementCounter1
  Iterate2end
  If [LAPD.BIT_RATE] == "16" Then
    If counter1 > "12" Then
      logBlocking(BCF,BCF exceeds 12 TRX's)
    EndIf
  Else
    If [LAPD.BIT_RATE] == "64" Then
      If counter1 > "10" Then
        logBlocking(BCF,BCF exceeds 10 TRX's)
      EndIf
    EndIf
  EndIf
Iterate1End
```

***Fig. 6C (module bts015.br)***

```
Iterate1Start(BTS)
  Iterate2Start(TRX)
    If [trx.$trx]=="1" and not
is_inTable(BCCHchannels,[TRX.initial_frequency]) Then
      Iterate4Start(HO)
        If [*4:TRX.initial_frequency] == [HO.adj_cell_bcch_frequency] Then
          logwarning(BTS,BTS has neighbour with same BCCH)
        EndIf
      Iterate4End
    EndIf
  Iterate2End
Iterate1End
```

***Fig. 6D (module ho006.br)***

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
Washington, DC 20231
www.uspto.gov

Bib Data Sheet

**CONFIRMATION NO. 8186**

| SERIAL NUMBER | FILING DATE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 10/188,538 | 07/03/2002<br>RULE | 455 | 2681 | PTT-119/APP<br>(402706US/1) |

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Hermann Petrus Breurken, Harkstede, NETHERLANDS;
Gijsbert Van Veenendaal, Ede, NETHERLANDS;

**** CONTINUING DATA ***************************

This appln claims benefit of 60/303,933 07/09/2001

**** FOREIGN APPLICATIONS *********************

EUROPEAN PATENT OFFICE (EPO) 01203820.4 10/09/2001

**IF REQUIRED, FOREIGN FILING LICENSE GRANTED**
** 08/08/2002

| Foreign Priority claimed | STATE OR COUNTRY | SHEETS DRAWING | TOTAL CLAIMS | INDEPENDENT CLAIMS |
|---|---|---|---|---|
| ☐ yes ☐ no | NETHERLANDS | 7 | 33 | 6 |

35 USC 119 (a-d) conditions met: ☐ yes ☐ no ☐ Met after Allowance

Verified and Acknowledged: _____ Examiner's Signature Initials

**ADDRESS**

007265

**TITLE**

System and method for checking parameter settings of radio networks

| FILING FEE RECEIVED | FEES: Authority has been given in Paper |
|---|---|
| 1356 | No. _____ to charge/credit DEPOSIT ACCOUNT<br>No. _____ for following: |

☐ All Fees
☐ 1.16 Fees ( Filing )
☐ 1.17 Fees ( Processing Ext. of time )
☐ 1.18 Fees ( Issue )
☐ Other _____
☐ Credit

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## PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2001

Application or Docket Number: PTT-119/APP(40270645/1)

### CLAIMS AS FILED - PART I

| | (Column 1) | (Column 2) |
|---|---|---|
| TOTAL CLAIMS | 33 | |
| FOR | NUMBER FILED | NUMBER EXTRA |
| TOTAL CHARGEABLE CLAIMS | 33 minus 20= | * 13 |
| INDEPENDENT CLAIMS | 6 minus 3 = | * 3 |
| MULTIPLE DEPENDENT CLAIM PRESENT | | ☐ |

* If the difference in column 1 is less than zero, enter "0" in column 2

| SMALL ENTITY TYPE ☐ | | OR | OTHER THAN SMALL ENTITY | |
|---|---|---|---|---|
| RATE | FEE | | RATE | FEE |
| BASIC FEE | 370.00 | OR | BASIC FEE | 740.00 |
| X$ 9= | | OR | X$18= | 234.00 |
| X42= | | OR | X84= | 252.00 |
| +140= | | OR | +280= | |
| TOTAL | | OR | TOTAL | 1226.00 |

### CLAIMS AS AMENDED - PART II

AMENDMENT A

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * | Minus | ** | = |
| Independent | * | Minus | *** | = |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | | | | ☐ |

| SMALL ENTITY | | OR | OTHER THAN SMALL ENTITY | |
|---|---|---|---|---|
| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

AMENDMENT B

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * | Minus | ** | = |
| Independent | * | Minus | *** | = |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | | | | ☐ |

| | | | | |
|---|---|---|---|---|
| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

AMENDMENT C

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA |
|---|---|---|---|---|
| Total | * | Minus | ** | = |
| Independent | * | Minus | *** | = |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM | | | | ☐ |

| | | | | |
|---|---|---|---|---|
| RATE | ADDITIONAL FEE | | RATE | ADDITIONAL FEE |
| X$ 9= | | OR | X$18= | |
| X42= | | OR | X84= | |
| +140= | | OR | +280= | |
| TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

# CLAIMS ONLY

| SERIAL NO. | FILING DATE |
|---|---|
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| APPLICANT(S) | |
| | |

CLAIMS

| | AS FILED | | AFTER 1st AMENDMENT | | AFTER 2nd AMENDMENT | |
|---|---|---|---|---|---|---|
| | IND. | DEP. | IND. | DEP. | IND. | DEP. |
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| 31 | 1 | | | | | |
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| TOTAL IND. | 6 | | | | | |
| TOTAL DEP. | 27 | | | | | |
| TOTAL CLAIMS | 33 | | | | | |

| | * | | * | | * | |
|---|---|---|---|---|---|---|
| | IND. | DEP. | IND. | DEP. | IND. | DEP. |
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| TOTAL IND. | | | | | | |
| TOTAL DEP. | | | | | | |
| TOTAL CLAIMS | | | | | | |

*MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS*

FORM PTO-2022 (1-96)

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