

REVISED VERSION

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
15 March 2001 (15.03.2001)

PCT

(10) International Publication Number
WO 01/18790 A1

(51) International Patent Classification⁷: G10L 13/00

(21) International Application Number: PCT/SE00/01687

(22) International Filing Date:
1 September 2000 (01.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
9903223-7 9 September 1999 (09.09.1999) SE

(71) Applicant: TELEFONAKTIEBOLAGET L M ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).

(72) Inventors: SUNDQVIST, Jim; Regnvägen 80, S-976 32 Luleå (SE). FRANKKILA, Tomas; Kabelgatan 5A, S-972 53 Luleå (SE). NOHLGREN, Anders; Rektorsgatan 4, S-972 42 Luleå (SE).

(74) Agent: ERICSSON RADIO SYSTEMS AB; Patent Unit Research, S-164 80 Stockholm (SE).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

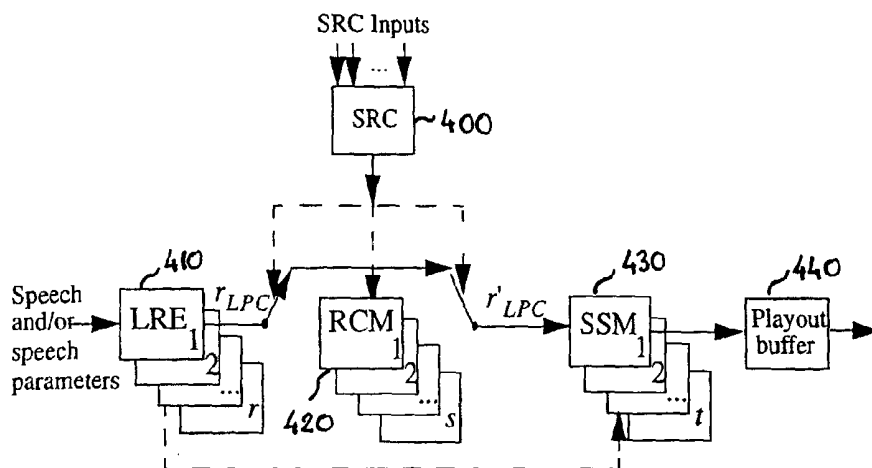
Published:
— with international search report

(88) Date of publication of the revised international search report: 28 February 2002

(15) Information about Correction:
see PCT Gazette No. 09/2002 of 28 February 2002, Section II

[Continued on next page]

(54) Title: METHOD AND APPARATUS IN A TELECOMMUNICATIONS SYSTEM



(57) Abstract: The present invention relates to methods for improving speech quality in e.g. an IP-telephony system. The invention reduces audio artefacts being due to overrun or underrun in a playout buffer caused by the sampling rates at a sending and receiving side not being at the same rate. The inventive solution modifies an LPC-residual on a sample-by-sample basis. The LPC-residual block comprising N samples is converted to a block comprising N+1 or N-1 samples. A sample rate controller 400 decides whether samples should be added to or removed from the LPC-residual. The exact position where to add respective remove samples is either chosen arbitrarily or found by searching for low energy segments in the LPC-residual. A speech synthesiser module 430 then reproduces the speech. By using the proposed sample rate conversion method the playout buffer 440 can be continuously controlled. Furthermore, since the method works on a sample-by-sample basis the buffer can be kept to a minimum and hence no extra delay is introduced.

WO 01/18790 A1



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01687

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G10L 13/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G10L, H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0743773 A2 (ROCKWELL INTERNATIONAL CORPORATION), 20 November 1996 (20.11.96), column 7, line 38 - line 42; column 8, line 15 - line 18; column 9, line 17 - line 20, abstract --	1-44
A	US 5825771 A (A. COHEN ET AL.), 20 October 1998 (20.10.98), column 2, line 40 - line 43; column 2, line 46; column 6, line 55 - line 61, column 7, line 59 - line 61 --	1-44
A	US 5517521 A (D.F. STRAWN), 14 May 1996 (14.05.96), abstract --	1-44

Further documents are listed in the continuation of Box C. See patent family annex.

- * Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent 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 when the document is taken alone
- "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

Date of the actual completion of the international search
02-01-2001

Date of mailing of the international search report
07-01-2001

Name and mailing address of the ISA/
Swedish Patent Office
Box 5055, S-102 42 STOCKHOLM
Facsimile No. +46 8 666 02 86

Authorized officer
Peder Gjervaldsæter/AE
Telephone No. +46 8 742 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/01687

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5119093 A (L. VOGT ET AL.), 2 June 1992 (02.06.92), column 4, line 8 - line 29, abstract --	1-44
A	US 5953695 A (B. BARAZESH ET AL.), 14 Sept 1999 (14.09.99), column 3, line 45 - line 56, abstract --	1-44
A	EP 0680033 A2 (AT & T CORP.), 2 November 1995 (02.11.95), abstract -- -----	1-44

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

04/12/00

PCT/SE 00/01687

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0743773 A2	20/11/96	JP 9044193 A US 5699481 A	14/02/97 16/12/97
US 5825771 A	20/10/98	AU 4018995 A EP 0791253 A FI 971997 A IL 115902 A JP 10508997 T WO 9615598 A	06/06/96 27/08/97 09/07/97 11/04/99 02/09/98 23/05/96
US 5517521 A	14/05/96	NONE	
US 5119093 A	02/06/92	AT 142060 T DE 3918866 A DE 59010464 D EP 0401562 A,B JP 3026102 A	15/09/96 13/12/90 00/00/00 12/12/90 04/02/91
US 5953695 A	14/09/99	NONE	
EP 0680033 A2	02/11/95	CA 2145016 A JP 7319496 A US 5717823 A	15/10/95 08/12/95 10/02/98