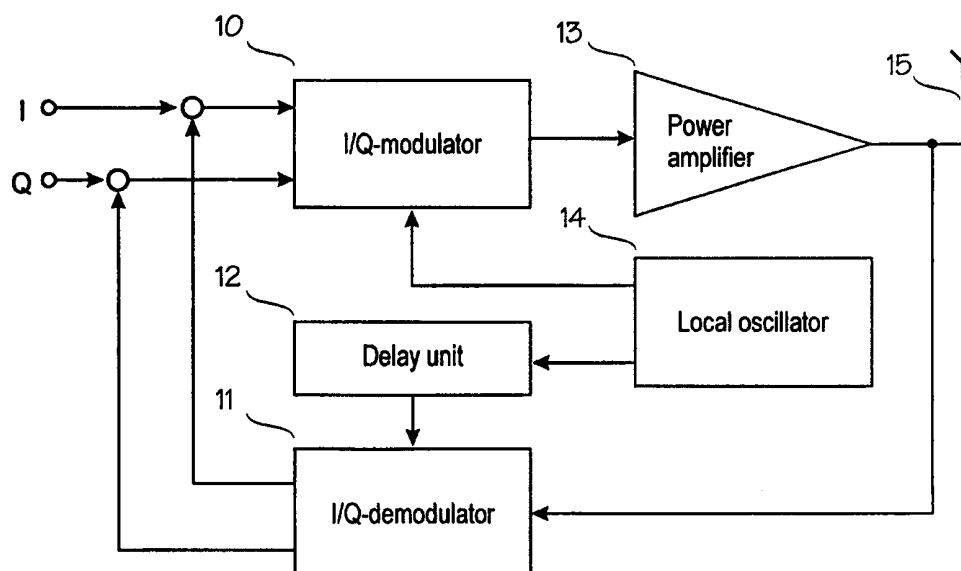




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>6</sup> : <b>H04B 1/40, 1/04, H03F 1/32</b></p>	<p><b>A3</b></p>	<p>(11) International Publication Number: <b>WO 99/19990</b> (43) International Publication Date: 22 April 1999 (22.04.99)</p>
<p>(21) International Application Number: PCT/FI98/00786 (22) International Filing Date: 7 October 1998 (07.10.98) (30) Priority Data: 973918 9 October 1997 (09.10.97) FI (71) Applicant (for all designated States except US): NOKIA TELECOMMUNICATIONS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): PELLONPERÄ, Marko [FI/FI]; Hämeenpuisto 42 B 52, FIN-33200 Tampere (FI). (74) Agent: KOLSTER OY AB; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).</p>		<p>(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, 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).</p> <p><b>Published</b> With international search report. In English translation (filed in Finnish).</p> <p>(88) Date of publication of the international search report: 24 June 1999 (24.06.99)</p>

(54) Title: COMPENSATION OF DELAY IN LINEARIZATION LOOP OF POWER AMPLIFIER



## (57) Abstract

A method of compensating delay in a linearization loop of a power amplifier and a linearization arrangement of a power amplifier, which arrangement comprises an I/Q modulator (10), one or more power amplifiers (13) to be linearized and generating delay, and a feedback loop comprising an I/Q demodulator (11) when the I/Q modulator (10) and the I/Q demodulator (11) derive an oscillator frequency from the same local oscillator (14). In accordance with the invention, the delay generated by the power amplifier in the feedback is compensated by delaying a local oscillator signal applied to the I/Q demodulator (11). The delay of the local oscillator signal applied to the I/Q demodulator (11) is generated by an amplifier optimized to have a great delay, preferably by a small-signal amplifier.

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI 98/00786

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC6: H04B 1/40, H04B 1/04, H03F 1/32**  
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)

**IPC6: H04B, H03F**

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.
A	US 5420536 A (MICHAEL FAULKNER ET AL), 30 May 1995 (30.05.95), figure 7, abstract  --	1-7
A	Patent Abstracts of Japan, abstract of JP 8-78967 A (NEC CORP), 22 March 1996 (22.03.96)  --	1-7
A	WO 9715980 A1 (PHILIPS ELECTRONICS N.V.), 1 May 1997 (01.05.97), figure 4, abstract  --	1-7
A	US 5396196 A (JAMES R. BLODGETT), 7 March 1995 (07.03.95), abstract  --	1-7

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

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Date of the actual completion of the international search <b>16 April 1999</b>	Date of mailing of the international search report <b>19 -04- 1999</b>
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International application No.

PCT/FI 98/00786

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 5469114 A (VINOD K. SAXENA), 21 November 1995 (21.11.95), abstract  -----  -----	1-7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/03/99

International application No.

PCT/FI 98/00786

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5420536 A	30/05/95	AU 5781794 A	22/09/94
WO 9715980 A1	01/05/97	EP 0803147 A GB 9521769 D JP 10512133 T US 5793817 A	29/10/97 00/00/00 17/11/98 11/08/98
US 5396196 A	07/03/95	CN 1116375 A DE 69413510 D EP 0661801 A,B JP 8070327 A	07/02/96 00/00/00 05/07/95 12/03/96
US 5469114 A	21/11/95	NONE	