

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

---

Ex parte NEIL J. BERSHAD,  
ANURAG BIST, STAN HSIEH,  
and JAMES W. MAYER

---

Appeal No. 2006-1690  
Application No. 10/154,185

---

ON BRIEF

---

Before JERRY SMITH, BARRY, and SAADAT, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1, 2, and 4-27, which constitute all the claims pending in this application.

The disclosed invention pertains to a system and method for canceling echo in communications systems that adapts to double-talk and channel impulse response changes to improve the quality of communications signals.

Specifically, the system comprises a non-adaptive filter and an adaptive filter that

are configurable by first and second weights respectively. Control logic coupled to both filters compares error signals from both filters and replaces the non-adaptive filter's weights with the adaptive filter's weights if the non-adaptive filter's error signal has a higher signal power than that of the adaptive filter. If double-talk is detected, however, the control logic suspends replacement of the non-adaptive filter's weights before portions of the first signal are cancelled by the non-adaptive filter.

Representative claim 1 is reproduced as follows:

An apparatus comprising:

a non-adaptive filter configurable by a first set of weights to perform echo cancellation on a first signal;

an adaptive filter configurable by a second set of weights to perform echo cancellation on the first signal; and

a control logic coupled to the adaptive and non-adaptive filters, the control logic to receive a first error signal corresponding to the non-adaptive filter, and a second error signal corresponding to the adaptive filter, and replace the first set of weights in the non-adaptive filter with the second set of weights if the first error signal has a higher signal power than the second error signal,

wherein if double-talk is detected the control logic suspends replacement of the non-adaptive filter weights before portions of the first signal are cancelled by the non-adaptive filter.

The examiner relies on the following references:

Park et al. (Park)	6,181,794	Jan. 30, 2001
El Malki	5,920,548	Jul. 6, 1999

Sankaran et al. (Sankaran), "Convergence Analysis Results for the Class of Affine Projection Algorithms," Proc. of IEEE Int'l Symp. on Circuits & Systems, Orlando, FL, Vol. III, pp. 251-254, May 1999.

The following rejections are on appeal before us:

1. Claims 1, 2, 8, 10-12, 14, 18-23, and 27 stand rejected under 35 U.S.C. § 102(b) as being anticipated by the disclosure of Park.
2. Claims 4-7, 13, 15, 16, and 24-26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Park in view of El Malki.
3. Claims 9 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Park in view of Sankaran.

Rather than repeat the arguments of the appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

#### OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the disclosure of Park fully meets the invention as set forth in claims 1, 8, 10-12, 14, 18, 19, 21, 23, and 27. We reach the opposite conclusion, however, with respect to claims 2, 20, and 22. Finally, it is our view that the evidence relied upon and the level of skill in the particular art would have suggested to one of ordinary skill

in the art the obviousness of the invention as set forth in claims 4-7, 9, 13, 15-17, and 24-26. Accordingly, we affirm-in-part.

We consider first the examiner's anticipation rejection of claims 1, 2, 8, 10-12, 14, 18-23, and 27. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. dismissed, 468 U.S. 1228 (1984); W.L. Gore and Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

The examiner has indicated how the claimed invention is deemed to be fully met by the disclosure of Park [answer, pages 3-6 and 14-17]. Regarding claims 1, 8, and 10, appellants argue that Park does not disclose the limitation of independent claim 1 reciting that if double-talk is detected, the control logic suspends replacement of the non-adaptive filter weights before portions of the first signal are cancelled by the non-adaptive filter [brief, pages 3-5]. Appellants contend that Park does not disclose detecting double-talk. Specifically, appellants argue that comparing the Echo Return Loss Enhancement value (ERLE) of the adaptive filter (ERLE1) with a threshold  $T_E$  in block 855 in Fig. 8B does not disclose detecting double-talk [brief, pages 3 and 4; reply brief, page 2]. Rather, appellants contend that the power-based measures ERLE1 and ERLE2

(ERLE of non-adaptive filter) merely indicate how well filters 21 and 22 perform in canceling echo signals [brief, page 4].

Appellants further argue that Park actually teaches the opposite of detecting double-talk in col. 5, line 62 where Park states that "it is not necessary to detect double-talk" [id.] The examiner responds that Park's statement that "it is not necessary to detect double-talk" in col. 5, line 62, when read in context, "means the 'dual-h' echo canceller 20 does not diverge in the presence of double-talk..." [answer, page 15].

Appellants also argue that Park in col. 5, lines 59-67 only discloses that ERLE of the fixed filter 22 becomes higher during double-talk. According to appellants, Park teaches nothing about when weight replacement is suspended (i.e., avoiding step 891 in Fig. 8C in either steps 885 or 887) before portions of the first signal are canceled by the non-adaptive filter [brief, page 5]. The examiner responds that Park expressly indicates that when the ERLE of the fixed filter (ERLE2) becomes higher than the adaptive filter's ERLE (ERLE1) during double-talk, the fixed filter's coefficients are not updated with the adaptive filter's coefficients, thus confirming operation of step 887 in Fig. 8C [answer, page 16].

The examiner notes that Park in Fig. 5 depicts the effects of double-talk on ERLE1 and ERLE2 [answer, page 12]. Specifically, the examiner notes that Fig. 5 shows that the ERLE of the adaptive filter converges alongside the fixed filter's ERLE during frames 0-20, but at frame 56, the adaptive filter's ERLE swings below that of the fixed filter that remains relatively constant. The examiner concludes that the only explanation for this divergence is that the adaptive filter

provides updated coefficients to the fixed filter when double-talk is not detected, but that the fixed filter is not updated when the presence of double-talk is detected [id.].

The examiner further notes that comparing the power-based measure ERLE1 with a threshold  $T_E$  in block 855 in Fig. 8B corresponds to double-talk detection because such a comparison blocks copying coefficients from the adaptive filter to the fixed filter in steps 857 and 885 [answer, page 15].

Appellants respond that block 855 does not disclose detecting double-talk and note that in Fig. 6 in Park, no double-talk is present, yet ERLE1 also drops below threshold  $T_E$  [reply brief, page 2].

We will sustain the examiner's anticipation rejection of claims 1, 8, 10-12, 14, 18, 19, 21, 23, and 27. We find that the echo canceler of Park detects double-talk and suspends replacement of the non-adaptive filter weights before portions of the first signal are cancelled by the non-adaptive filter as claimed.

When double-talk occurs in Park, ERLE1 is below ERLE2. See Park, Fig. 5 (noting the presence of double-talk from the fifty-sixth frame to the sixty-eighth frame). Therefore, at step 887 in Fig. 8C, the coefficient from the fixed filter is copied to the adaptive filter since step 895 is executed. Such a result necessarily suspends replacement of the non-adaptive filter weights because step 891 (copying the adaptive filter's coefficient to the fixed filter) is not executed in this condition (i.e., when double-talk occurs). See also Park, col. 6, line 66 - col. 7, line 19 (noting that during double-talk, the fixed filter is used and maintains its coefficient previously copied from the adaptive filter). Therefore, Park detects

double-talk and suspends replacement of the non-adaptive filter weights before portions of the first signal are cancelled by the non-adaptive filter as claimed.

Although Park does state in col. 5, line 62 that "it is not necessary to detect double-talk" in connection with the echo canceler's improved performance during double-talk, Park's disclosure nevertheless contains other statements that call for detecting double-talk. For example, in col. 3, lines 39-42, Park states that "[a] mode controller 25 receives the first and second voice signals U and S, and the first and second echo-canceled signals e1 and e2, to detect double-talk" [emphasis added]. Also, in col. 4, lines 38-45, Park emphasizes the importance of detecting double-talk accurately to effectively cancel echoes during double-talk. Specifically, Park notes:

[T]he echo canceler 20 performs echo canceling even in the case of double-talk. It is very important that the echo canceler 20 detects double talk accurately, since the adaptive filter 21 quickly generates its output during double-talk. In general, double-talk is detected by using an energy level based on the assumption that a loss caused through an echo path is at least 6 dB [emphasis added].

Moreover, in col. 6, lines 5-10, Park notes:

In practice, it is preferable that the adaptive filter 21 operates inadaptively during double-talk...For this purpose, double-talk using its energy level is detected [emphasis added].

Park's repeated references to detecting double-talk reasonably suggest to the skilled artisan that double-talk is detected notwithstanding the statement in col. 5, line 62.

Regarding claims 11, 12, 14, 18, 19, 21, 23, and 27, appellants argue that Park does not disclose all elements of the device, method, and medium of independent claims 11, 14, and 21. Appellants essentially reiterate that Park's power-based measures ERLE1 and ERLE2 merely indicate how well the filters 21 and 22 perform in canceling echo signals and do not necessarily indicate the presence or absence of double-talk [brief, page 6]. Appellants also dispute the examiner's assertion that when ERLE1 is greater than ERLE2 in step 887 in Fig. 8C of Park, such a condition will occur only if no double-talk is present [brief, page 6]. Appellants also reiterate that Park does not disclose suspending weights before portions of the first signal are filtered/canceled [id.]. The examiner responds that during double-talk, the adaptive filter's ERLE drops well below that of the fixed filter [answer, page 17].

We will sustain the examiner's anticipation rejection of claims 11, 12, 14, 18, 19, 21, 23, and 27. For the reasons stated previously, Park detects double-talk and suspends replacement of the non-adaptive filter weights before portions of the first signal are cancelled by the non-adaptive filter.

Regarding claims 20 and 22, appellants argue that Park does not disclose distinguishing between double-talk and channel impulse response changes [brief, page 7]. The examiner responds that Figs. 5 and 6 of Park show that the echo canceller behaves differently in the presence of double-talk compared to echo path change. Specifically, the examiner contrasts Fig. 5 with Fig. 6 and emphasizes that only the adaptive filter's ERLE diverges from the true echo path in Fig. 5, but both filters' ERLE decreases in Fig. 6 thus "signaling a divergence

from the true echo path" [answer, page 18]. According to the examiner, the operational behavior of Park distinguishes between double-talk and channel impulse response change [id.].

We will not sustain the examiner's rejection of claims 20 and 22. We agree with appellants that Park does not disclose either expressly or inherently a channel impulse response, let alone distinguishing between double-talk and channel impulse response changes as claimed.<sup>1</sup> We disagree with the examiner that the change in echo path disclosed by Park reasonably corresponds to the claimed channel impulse response changes. On this record, the examiner's characterization that Park distinguishes between double-talk and channel impulse response is, at best, speculative with no supporting evidence.

Regarding claim 2, appellants argue that Park fails to disclose that the control logic replaces the adaptive filter weights with the non-adaptive filter weights if a change in channel impulse response is detected. Appellants note that Park does not mention "channel impulse response" or detecting a change in channel impulse response as claimed [brief, pages 7 and 8]. The examiner responds that steps 887 and 895 anticipate claim 2. Specifically, the examiner contends that "when step 887 detects that the adaptive filter diverges slightly and

---

<sup>1</sup> We further note that the drawings in the instant application do not appear to show detecting a change in channel impulse response or distinguishing between double-talk and channel impulse response changes as claimed. "The drawing[s] in a nonprovisional application must show every feature of the invention specified in the claims." 37 C.F.R. § 1.83(a). In an ex parte appeal, however, "the Board is basically a board of review – we review...rejections made by patent examiners." Ex parte Gambogi, 62 USPQ2d 1209, 1211 (Bd.Pat.App. & Int. 2001). Consequently, we leave the issue of whether the appellants have satisfied the requirements of 37 C.F.R. § 1.83(a) to the examiner and the appellants.

ERLE1 lowers while ERLE2 remains constantly above ERLE2 [sic], a channel impulse response change is detected" [answer, page 19].

We will not sustain the examiner's rejection of claim 2. We disagree with the examiner that Park discloses either expressly or inherently a channel impulse response, let alone detecting a change in channel impulse response as claimed. There is simply nothing in the record before us that supports the examiner's assertion that Park discloses detecting a channel impulse response.

We now consider the examiner's rejection of claims 4-7, 13, 15, 16, and 24-26 under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Park in view of El Malki. In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732

F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the brief have not been considered and are deemed to be waived [see 37 CFR § 41.37(c)(1)(vii)(2004)].

We will sustain the examiner's rejection of claims 4-7, 13, 15, 16, and 24-26. We find that the examiner has established at least a prima facie case of obviousness of those claims that appellants have not persuasively rebutted. Here, the examiner has (1) pointed out the teachings of Park, (2) pointed out the perceived differences between Park and the claimed invention, and (3) reasonably indicated how and why Park would have been modified to arrive at the claimed invention [answer, pages 6-9]. Once the examiner has satisfied the burden of presenting a prima facie case of obviousness, the burden then shifts to appellants to present evidence or arguments that persuasively rebut the

examiner's prima facie case. Appellants did not persuasively rebut the examiner's prima facie case of obviousness, but merely noted that the addition of El Malki fails to cure the deficiencies of Park in connection with claims 1, 11, 14, and 21. The rejection is therefore sustained.

Likewise, we will sustain the examiner's rejection of claims 9 and 17 under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Park in view of Sankaran. We find that (1) the examiner has established at least a prima facie case of obviousness for these claims on page 9 of the answer, and (2) appellants have not persuasively rebutted the examiner's prima facie case. The rejection is therefore sustained.

In summary, we have sustained the examiner's rejections of claims 1, 4-8, 10-16, 18, 19, 21, and 23-27, but we have not sustained the examiner's rejection of claims 2, 20, and 22. Therefore, the decision of the examiner rejecting claims 1, 2, and 4-27 is affirmed-in-part.

Appeal No. 2006-1690  
Application No. 10/154,185

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

JERRY SMITH	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
	)	
LANCE LEONARD BARRY	)	BOARD OF PATENT
Administrative Patent Judge	)	APPEALS AND
	)	INTERFERENCES
	)	
	)	
MASHID D. SAADAT	)	
Administrative Patent Judge	)	

JS/jaj/rwk

Appeal No. 2006-1690  
Application No. 10/154,185

BLAKELY SOKOLOFF TAYLOR & ZAFMAN  
12400 WILSHIRE BOULEVARD  
SEVENTH FLOOR  
LOS ANGELES, CA 90025-1030