Correction to the Proof of Theorem 2 in "Parallel Signature Analysis Design with Bounds on Aliasing"

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IN [1], Saxena and McCluskey have reported parallel signature design techniques and simple bounds on the aliasing probability. In the proof of Theorem 2 on p.436, it was stated that:

$$\sum \frac{1}{v_k+1}\binom{L}{v_o, v_1, \ldots, v_{2^m-1}} p_0^{v_0} \ldots p_{2^m-1}^{v_{2^m-1}} = \frac{1}{p_k(L+1)} - \frac{(1-p_k)^L}{p_k(L+1)}. \quad (1)$$

The exponent of the numerator in the second term on the right hand side of (1) should be $L + 1$ instead of L. The correct result is obtained as follows. By integrating the multinomial expansion treating p_k as auxiliary variable, we have:

$$\int_0^{p_k} \left(p_o + p_1 + \cdots + p_{2^m-1}\right)^L dp_k = p_k \sum \frac{1}{v_k+1}\binom{L}{v_o, v_1, \ldots, v_{2^m-1}} p_0^{v_0} \ldots p_{2^m-1}^{v_{2^m-1}}. \quad (2)$$

By applying the substitution rule:

$$\sum_{i=0}^{2^m-1} p_i = u. \quad (3)$$

This yields:

$$\int_{1-p_k}^{1} u^L du = \frac{1}{L+1} - \frac{(1-p_k)^{L+1}}{L+1}. \quad (4)$$

From (2) and (4) we obtain:

$$\sum \frac{1}{v_k+1}\binom{L}{v_o, v_1, \ldots, v_{2^m-1}} p_0^{v_0} \ldots p_{2^m-1}^{v_{2^m-1}} = \frac{1}{p_k(L+1)} - \frac{(1-p_k)^{L+1}}{p_k(L+1)}. \quad (5)$$

Now, note that the exponent of the numerator in the second term on the right hand side of equation (5) is $L + 1$. It should be noted that this term is ignored in the original paper [1] and does not have any impact on the final result.

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REFERENCE

[1] N. Saxena and E.J. McCluskey, "Parallel Signature Analysis Design with Bounds on Aliasing," *IEEE Trans. Computers*, vol. 46, no. 4, pp. 425-438, Apr. 1997.

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