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COMMENTS AND CORRECTIONS

Corrections to "GCORP: Geographic and Cooperative Opportunistic Routing Protocol for Underwater Sensor Networks"

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In the above article [1], we highlight and address the errors that were the previously unintended. Initially, we pointed out a typo error in (20) of the weighting scheme. If readers use the uncorrected equation, it will ultimately generate false results. Thus, it will affect the efficiency and performance of the proposed routing scheme. Henceforth, the correct form of the weighting scheme is given in this article with a more concrete and rigorous explanation. Next, we acknowledge the collaboration of the institutes to carry out the titled work, which was unfortunately not incorporated in the acknowledgment section by the IEEE in the previous version of the above-titled article.

We proposed a novel weighting scheme (W_{R_k}) by which a source node selects the best relay node ($\mathcal{B}_{R_k}$) from the relay forwarding set in the GCORP (Geographic and Cooperative Opportunistic Routing) protocol [1] and also in the preliminary work [2]. The weighting scheme is applied on three different key parameters, such as normalized energy (α_0), normalized Packet Delivery Probability (PDP) (β_0), and normalized distance (γ_0) and is given as below:

$$W_{R_k}(\alpha_0, \beta_0, \gamma_0) = \frac{\alpha_0 \cdot \beta_0}{\gamma_0} \tag{20a}$$

The correct form of a weighting scheme is given below, which was unfortunately published in an incorrect form in the previous version of the article [1].

$$W_{R_k}(\alpha_0, \beta_0, \gamma_0) = \frac{(E_{res}(R_k)/E_{init}(R_k)) \cdot P_{iR_k}}{(D_{S_iR_k} / \max\limits_{R_k \to k} D_{S_iR_k})} \tag{20}$$

Equation (20) is an extended version of (20a). Therefore, the neighboring relay node (R_k) of the relay forwarding set must hold the highest weighting value to become the best relay node ($\mathcal{B}_{R_k}$). In the weighting scheme, we multiplied the normalized energy (α_0) with the normalized PDP (β_0), and then divide it with the normalized (Norm.) distance (γ_0) in order to get the highest weighting value for the neighboring relay node (R_k). Because the best relay node must have maximum residual energy and PDP to route the data packets in the direction of surface sinks. Besides, the best node needs to be closer to the destination to advance the packets reliably and has to tackle all unwanted and multipath transmissions issues [3]. The numerical analysis on the weighting scheme for different values of α_0, β_0, γ_0 is given in Table 1. By referring to Table 1, we can assume the best relay node ($\mathcal{B}_{R_k}$) based on the weighting value. The list of symbols used in (20a) and (20) is tabulated in Table 2.

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TABLE 1. Numerical analysis on a weighting scheme.

Sr. #	Norm. Energy (α_0)	Norm. PDP (β_0)	Norm. Distance (γ_0)	Weight value (W_{R_k})
1	0.9	0.9	0.9	0.90
2	0.9	0.9	0.8	1.01
3	0.9	0.9	0.7	1.15
4	0.9	0.8	0.9	0.80
5	0.9	0.8	0.8	0.90
6	0.9	0.8	0.7	1.03
7	0.9	0.7	0.9	0.70
8	0.9	0.7	0.8	0.79
9	0.9	0.7	0.7	0.90
10	0.8	0.9	0.9	0.80
11	0.8	0.9	0.8	0.90
12	0.8	0.9	0.7	1.03
13	0.8	0.8	0.9	0.71
14	0.8	0.8	0.8	0.80
15	0.8	0.8	0.7	0.91
16	0.8	0.7	0.9	0.62
17	0.8	0.7	0.8	0.70
18	0.8	0.7	0.7	0.80
19	0.7	0.9	0.9	0.70
20	0.7	0.9	0.8	0.79
21	0.7	0.9	0.7	0.90
22	0.7	0.8	0.9	0.62
23	0.7	0.8	0.8	0.70
24	0.7	0.8	0.7	0.80
25	0.7	0.7	0.9	0.54
26	0.7	0.7	0.8	0.61
27	0.7	0.7	0.7	0.70

TABLE 2. List of symbols and their meanings.

Sr #	Symbols	Meanings
1	W_{R_k}	Weighting value
2	R_k	Relay node
3	α_0	Normalized energy
4	β_0	Normalized packet delivery probability
5	γ_0	Normalized distance
6	$E_{res}(R_k)$	Residual energy of a relay node
7	$E_{init}(R_k)$	Initial energy of a relay node
8	P_{iR_k}	Packet Delivery Probability
9	$D_{S_iR_k}$	Distance from the known surface sink to the relay nodes
10	$\mathcal{B}_{R_k}$	Best relay node