A Classification of Technology and Techniques Used to Contend with Holes in Wireless Sensor Networks

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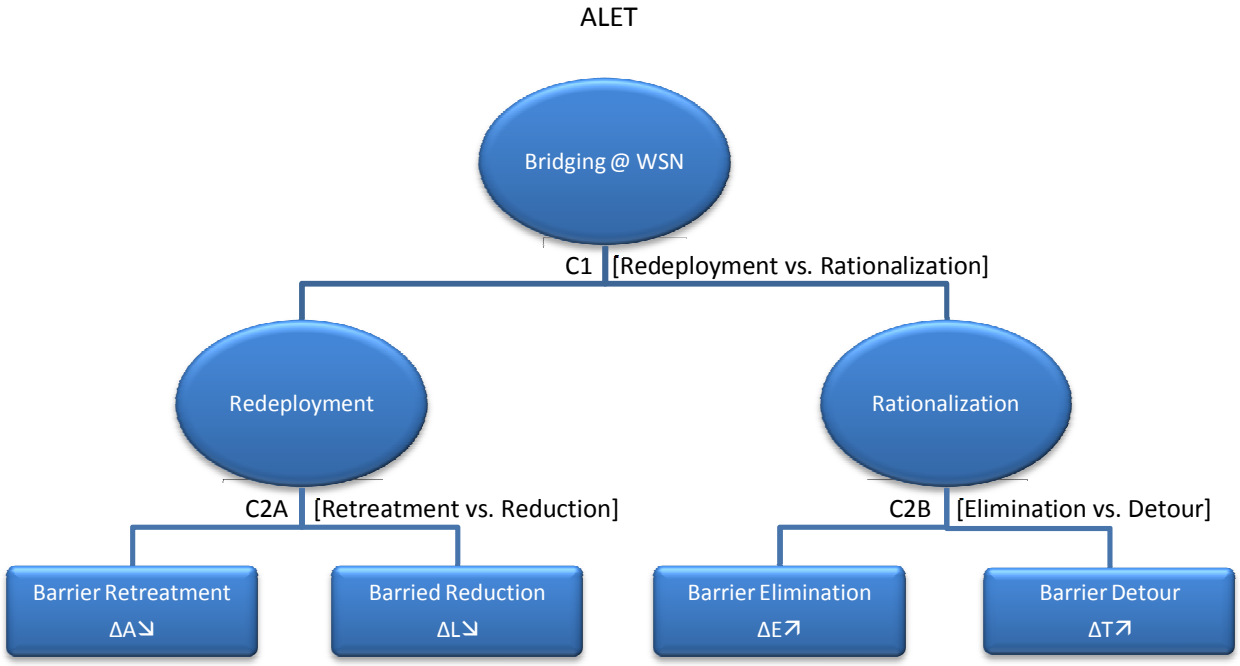
Abstract - This work presents a novel classification, ALET, of technology and techniques used for handling holes in Wireless Sensor Networks. We distinguish redeployment, via aircraft or robot, and rationalization, via energy replenishment or geographic routing. A qualitative comparison of these approaches is also provided.



(a)

Class	Barrier Retreatment (via aircraft)	Barrier Reduction (via robot)	Barrier Elimination (via energy replenishment)	Barrier Detour (via multihop)
Symbol	ΔA↘ (Eagle)	ΔL↘ (Pigeon)	ΔE↗(Phoenix)	ΔT↗(Sparrow)
Cost	H	M	L	N
Energy consumption	N	M	L	H
Performance	H	M	M	L
CostEnergyPerformance	M	M	M	L
Application constraints	H	M	M	L
Technology constraints	H	M	M	L
Scalability	H	M	M	H
Robustness	H	L	M	M
Adaptability	H	L	L	M
Energy sustainability	M	M	H	L
Reliability	H	M	L	M
Mobility	H	H	M	N
Timeliness	M	L	M	M
Availability	L	M	M	H

(b)

Figure1: A summary of ALET (A refers to minimization of ΔA - area of not covered; L refers to minimization of ΔL - length to traverse; E refers to maximization of ΔE - energy to fulfill goals; T refers to maximization of ΔT - time to traverse): (a) A classification of ALET systems (bridging in WSN); (b) A tabular presentation of major ALET issues (H stands for High, M for Medium, L for Low, and N for Negligible).

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