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LIST OF ABBREVIATIONS

ACK	Acknowledgement indicating data packet received correctly
AMC	Adaptive modulation and coding
ARQ	Automatic request protocol
AS	Aggregation service
BER	Bit error rate
BPSK	Binary phase shift keying
CBR	Constant bit rate
CGI	Common gateway interface
CSMA-CA	Carrier sense multiple access-collision avoidance
DI	Source signal directivity index
DPLC	Dynamic packet length control
EKF	Extended Kalman filter
EPUB	Energy per useful bit
FDMA	Frequency division multiple access
FEC	Forward error correction
FS	Fragmentation service
HARQ	Hybrid ARQ
ICTG	Inter-column time guard
IFTG	Inter-frame time guard
LR-WPAN	Low-rate wireless personal area network
MAC	Media access control
MMAC	Miracle media access control
MPHY	Miracle physical
MSDU	Medium access control service data unit
NACK	Negative ACK (indicate data packet received has error)
ODPS	Optimal data packet size
PER	Packet error rate
PHY	Physical layer

PPR	Packet reception rate
RTS	Request to send
S&W	Stop-and-Wait protocol
SIR	Signal-to-Interference ratio
SL	Source signal level
SNR	Signal-to-Noise ratio
SRP	Selective repeat protocol
TcL	Tool command language
TDMA	Time division multiple access
TG	Time guard
TL	Transmission loss
TWC	Terrestrial wireless communications
UG	Underground
UW	Underwater
UWA	Underwater acoustic
UWAC	Underwater acoustic communications
UWAN	Underwater acoustic network
UWC	Underwater wireless communications
WSN	Wireless sensor network

LIST OF SYMBOLS

α	packet header length in bits
τ	packet trailer length in bits
λ	packets per second
η	energy efficiency
η_{opt}	optimal energy efficiency
σ	fading component
ε	transmission efficiency
B_n	total payload bits sent by a node
c	nominal speed of sound in water (1500 m/s)
d	distance between source and sink node in meter
D_w	water depth in meter
E_b	energy required to transmit and receive one bit of information
Ec	communication energy consumption
E_{dec}	energy consumed for decoding a packet
E_{flow}	end-to-end energy consumption
E_s	start-up energy consumption
E_{th}	energy throughput
g	group of packets sent by source node
h	header length
H	MAC layer header overhead
l_H	fixed protocol overhead
lR	range-rate product (unit = meter-bps)
L_{min}	minimum frame size
L_{max}	maximum frame size
M	packets transmitted in a group
N	packet size in bits i.e. $N = N_{oh} + N_l$
N_E	number of error bits
N_l	packet payload length in bits (note: N_l is interchangeable with l)

N_{oh} packet overhead bits i.e. $N_{oh} = \alpha + \tau$(note: N_{oh} is interchangeable with h)

N_{be} total number of packets in error

N_b total number of packets sent

N_{opt} optimal data packet size (note: interchangeable with k_{opt} and l_{opt})

p bit error rate (note: may be stated as b or ρ in certain circumstances)

P_b bit error probability

p_e packet error rate (note: may be interchangeable with p in certain cases)

PER_{e2e} end-to-end packet error rate

P_o output transmit power

$P_{te/re}$ power consumed in transmitter/receiver electronics

R data rate in bps

R_{phy} PHY layer bit rate

r reliability i.e. successful packet reception rate (equivalent to 1 – PER)

t error correcting capability in a forward error correction scheme

t_b time interval of one back-off period

T transmission efficiency

T_{flow} end-to-end latency

$T_{tst/rst}$ transmitter/receiver start-up time

T_w total waiting time in stop-and-wait protocol

w sliding window size