

# Symbols and Notations

$\alpha^c$	Cumulative Q-demand
$\alpha_i$	Q-demand of a node $i$
$\bar{X}$	Mean service time of a packet
$\beta^c$	Cumulative A-demand
$\beta_i$	A-demand of a node $i$
$\beta_{n_{i_k}^l}$	demand of the $i^{th}$ child belonging to $k^{th}$ cluster of level $l$
$\delta_i$	Start time of a flow $f_i$
$\delta d$	Threshold in delay change
$\delta b$	Threshold in bandwidth change
$\delta_r$	Time slot number where $r^{th}$ packet to be scheduled
$\Delta d$	Maximum delay-bound for delay sensitive traffic class
$\Delta b$	Minimum throughput-bound for bandwidth traffic class
$\Delta t_r$	Time interval during which a given number of probe packets are received
$\Delta t_s$	Time interval during which probe packets are sent
$\gamma_{n_{i_k}^l}$	Bandwidth share received by the $i^{th}$ child in the $k^{th}$ cluster of level $l$
$\gamma_{n_{p_k}^l}$	Bandwidth available with the parent node $p$ of the $k^{th}$ cluster of level $l$
$\gamma_{n_k}^Q$	Time slots allocated to a cluster head of cluster $k$ for Q-demand
$\gamma_{n_k}^A$	Time slots allocated to a cluster head of cluster $k$ for A-demand traffic
$\lambda_n$	Arrival rate at $n^{th}$ queue (Poisson)

$\overline{X}_n$	Mean service time of packets at $n^{th}$ queue
$\pi_i$	A path $i$
$\rho$	Utilization factor of a queuing system
$\rho_e$	Effective utilization factor of a queuing system
$\rho^n$	Utilization factor of $n^{th}$ queue
$\theta$	Angular difference between any two adjacent directional point-to-point links
$Adj[n]$	Number of adjacent links of node $n$
$AP_{size}$	Average packet size
$B_{avail}(i)$	Available bandwidth of link $i$
$B_{avail}(\pi_i)$	Available bandwidth of path $\pi_i$
$B_{resv}(i)$	Reserved bandwidth of link $i$
$B_{resv}(\pi_i)$	Reserved bandwidth of path $\pi_i$
$c$	Speed of Light ( $3 \times 10^8$ meter/sec)
$C_i$	Colour $i$
$C^r$	Resolution of receiver's clock
$Child[n]$	Number of children nodes of node $n$
$D(\pi_i)$	Delay of a path $\pi_i$
$D_i$	Average single-hop delay incurred by a packet in link $i$
$D_i^Q$	Queuing delay of link $i$
$D_i^T$	Transmission delay of link $i$
$D_{mh}$	Multi-hop delay
$E$	Set of point-to-point WiLD links
$E[\rho_i]$	Expected Link Bandwidth of link $i$
$E[L_i^d]$	Expected delay of link $i$
$f_i$	$i^{th}$ flow
$f_i.\alpha$	I-value of flow $f_i$
$f_i.bw$	Bandwidth demand of a flow $f_i$
$f_i.tr$	Number of scheduling retries for a flow $f_i$

$F_r$	Frame rate (/sec)
$F\_Table$	Flow table
$FR_k$	$k^{th}$ Flow request
$FReg$	A flow register
$G(V, E)$	A graph G with $ V $ number of nodes and $ E $ number of edges
$G_t$	Guard time
$h$	Height of a tree
$K_n$	Packet limit of $n^{th}$ queue
$K$	Packet limit of a queue
$L$	Number of levels in a tree topology
$LC_{max}$	Maximum capacity of a WiLD link
$N_E$	Total number of links in a network
$n$	An arbitrary node in a tree
$n_{i,l}$	The $i^{th}$ node in the $l^{th}$ level
$n_{i,l.colour}$	Colour of node $i$ belonging to level $l$ of a topology tree
$(n_{i,l}, n_{k,l+1})$	A link from $i^{th}$ node in level $l$ to $k^{th}$ node in level $l + 1$
$n_{pk}^l$	The parent node in the $k^{th}$ cluster of level $l$
$n_{ik}^l$	The $i^{th}$ child in the $k^{th}$ cluster of level $l$
$N_{sync}^h$	Minimum number of control and contention slots required to fully synchronize a network with height $h$
$N\_List$	Neighbour list
$N\_Table$	Neighbour table
$NP_s$	Number of Packets per slot
$NS_{time}$	Minimum time required to fully synchronize a network
$P\_Table$	Path table
$P_d$	Propagation delay
$P(u, v)$	Set of all possible paths between the nodes $u$ and $v$
$Packet_{size}$	Packet Size
$PP_{size}$	Size of probe packet
$Q_i$	Number of packets available in the buffer when a new packet enters the queue of link $i$

$R$	The root or gateway node
$r_k^l$	Number of nodes available in $k^{th}$ cluster at level $l$
$R\_Table$	Routing table
$S$	A set of data slots in a TDMA frame
$S^{even}$	The set of transmission slots assigned to even level nodes
$S^{odd}$	The set of transmission slots assigned to odd level nodes
$S_f$	Number of data slots per frame per node
$Size_{ts}$	Size of a TDMA time slot
$SS_{opt}$	Optimal slot size
$S_p$	Average Packet Size
$S\_List$	Source list
$ST$	Stack
$T(\pi_i)$	Throughput of a path $\pi_i$
$t_a$	Asked transmission time
$t_r$	Remaining usable time of a TDMA slot
$T$	A set of slots where $T \subseteq S$
$T_{cycle}$	A time cycle consisting of two consecutive unit slots of a TDMA frame
$T_{i,n}$	$n^{th}$ service time sample measured over link $i$
$t_s$	A time slot
$T(V, E)$	A tree with $ V $ no. of nodes and $ E $ no. of edges
$TC_j$	$j^{th}$ traffic class
$TC_j.\alpha$	I-value assigned to $j^{th}$ traffic class
$TC_j.g$	Packet generation rate of traffic class $T_j$
$TD_{i,n}$	Average transmission delay of $n^{th}$ packet over link $i$
$TF_r$	A TDMA frame
$Tr_d$	Transmission delay
$TS_{eff}$	Effective transmission time per slot
$V$	Set of nodes
$W_{qn}$	Average waiting time of $n^{th}$ queue
$X$	Number of successful transmission of a node $n_{i_k}^l$ during a given number of $T_{cycles}$