LIST OF SYMBOLS, NOTATIONS AND ABBREVIATIONS

SYMBOLS AND NOTATIONS

$A_0(t)$: Packet Arrival distribution in simulation

$a$: Normalised propagation time

$b$: Normalised propagation delay with respect to data packet length ‘L’ (Optical medium)

$b_j$: Length of jam signal after collision has occurred

$C$: Channel capacity

$c$: Speed of the light

$D$: Average delay

$D_j$: Average delay to successfully transmit the control packet

$D_c$: Overall average delay in the system (Ratio of offered traffic to throughput)

$d_{max}$: Maximum propagation distance

$E$: Average number of retransmission attempts required per message transmitted

$E[B]$: Expected duration of the busy period

$E[I]$: Expected length of the idle period

$E[T_i]$: Average time the protocol spends in state $i$, $i=0, 1, 2$

$E[U]$: Average time during the cycle that the channel is used without collisions

$E[Y]$: Average value of random variable ‘Y’

$F_p$: Laplace transform of the probability density

$F(t)$: Probability that on inter arrival time in less that $t$

$f(t)$: Probability density function

$f(Y)$: Probability density function of ‘Y’

$G$: Offered traffic (Conventional Channels)
$G_c$ Offered traffic on control channel (Optical medium)
$G_d$ Offered traffic on data channel (Optical medium)
$G_t$ Total offered traffic (Optical medium)
$K$ Retransmission interval (uniformly distributed)
$L$ Length of data packets in time units (Optical medium)
$M,m$ Total number of users in the system
$N$ Number wavelength channels in the system
$n$ Number of bits in the packet
$n_a$ Number of arrivals in poisson distribution
$P(n_a)$ Probability of $n_a$ arrival (Poisson distribution)
$P_{sc}$ Success probability over control channel
$P_{sd}$ Success probability over data channel
$P_s$ Overall Success Probability
$P_{10}$ State transition probability from state 1 to state 0
$P_{11}$ State transition probability from state 1 to state 1
$P_{20}$ State transition probability from state 2 to state 0
$P_{21}$ State transition probability from state 2 to state 1
$R$ Average delay between two consecutive transmissions (i.e. a retransmission)
$R_b$ Bit-rate of the user
$r_1$ Pre-transmission delay
$S$ Throughput (Conventional Channels)
$S_c$ Control channel throughput (Optical medium)
$S_s$ System throughput or the fraction of data that gets through each data channel (Optical medium)
$S_t$ Total system throughput (Optical medium)
$S_j/S_2$ Random access scheme $S_j$ on control channel/Random access scheme $S_2$ on data channel
$T$ Packet transmission time in Aloha mode
$T_a$ Acknowledgment packet time
$T_{ar}$ Mean inter arrival time of the packet
$t_p$ Packet length in CSMA mode
$X$ Jamming period to cater for single laser operation
\( \bar{X} \) Average retransmission delay

\( Y \) Random variable (time of arrival of packets)

\( \alpha \) Normalised transmission time of acknowledgment packet

\( \gamma \) Time required to detect collisions and abort ongoing colliding transmissions

\( \delta \) Normalised average retransmission delay

\( \delta_1 \) Collision detection time

\( \lambda_u \) Mean arrival rate of the packets

\( \lambda_0 \) Wavelength used as a common control channel

\( \lambda_{i_1, i_2, i_3} \) Wavelengths used as data channel

\( \pi, [\pi_1, \pi_2, \pi_3] \) Stationary probability distribution of the embedded chain

\( \pi_i \) Probability of the system being in state \( i \), in three state markov chain

\( \pi_1 \) Probability of the system being in state 1 during a successful transmission in three state markov chain

\( \tau \) Propagation time

**ABBREVIATIONS**

CSMA Carrier Sense Multiple Access

CD Collision Detection

CSMA/CD Carrier Sense Multiple Access / Collision Detection

FDDI Fiber Distributed data Interface

WDMA Wavelength Division Multiple Access

UDR Uniformly Distributed Random number

EDR Exponentially Distributed Random number

AT Arrival Times

CAT Cumulative Arrival Times

UHSFON Ultra High Speed Fiber Optic Networks

TDMA Time Division Multiple Access

FDMA Frequency Division Multiple Access
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>RATO</td>
<td>Random Access Time Out</td>
</tr>
<tr>
<td>Kbps</td>
<td>Kilo bits per second</td>
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<tr>
<td>Mbps</td>
<td>Mega bits per second</td>
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<tr>
<td>Gbps</td>
<td>Giga bits per second</td>
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<tr>
<td>Tbps</td>
<td>Tera bits per second</td>
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<tr>
<td>OEIC</td>
<td>Opto Electronic Integrated Circuits</td>
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<tr>
<td>Tx</td>
<td>Transmitter</td>
</tr>
<tr>
<td>Rx</td>
<td>Receiver</td>
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