FDDI

(Fiber distributed Data Interface)

- Dual Ring Network, 100 Mb/s, up to 500 nodes, length 200 km. Distance between nodes < 2 km.

(Refer to transparency for Fig 5.24)

- The physical medium dependent (PMD) specifies fiber, optical transmitter, receiver, connectors optical bypass switches
- The physical layer (PHY) specifies encoding and modulation methods. The detection of faults is done with a station management protocol. The ring is reconfigurable to a single ring if a fault occurs. (Fig 5.25 transparency)
- The MAC protocol is a timed token mechanism

Similar to RAT

- The stations negotiate the parameter TTRT (total token rotation time)

  Each station i is allowed to transmit

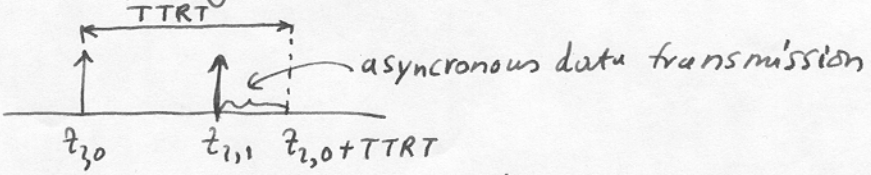
  - High priority traffic (synchronous traffic) for S_i time units.

$$\sum_i S_i + R \leq TTRT$$

where $R = ND + PROP$ (the latency of the ring)

We also denote $\sum_i S_i = S$.

  - Low priority traffic can be transmitted as follows: If $t_{i,0}, t_{i,1}, t_{i,2} \ldots$ are successive token visitation times then low priority traffic is sent during $y_i = TTRT - (t_{i,1} - t_{i,0})$



If $t_{i,1} \geq t_{i,0} + TTRT$ only synchronous data are transmitted.

- Efficiency of the FDDI:

$$\eta_{FDDI} = \frac{TTRT - N(D + TRANST) - PROP}{TTRT}$$

Ariz : 80 km , 100 Mb/s , 300 nodes , 16 bit delay per node , 100 bit token
dual PROP = $3.9 \cdot 10^{-4}$ sec

$$\eta = \frac{TTRT - 300(16+100)\cdot 10^{-8} - 3.9\cdot 10^{-4}}{TTRT} = 1 - \frac{7.38\cdot 10^{-4}}{TTRT}$$

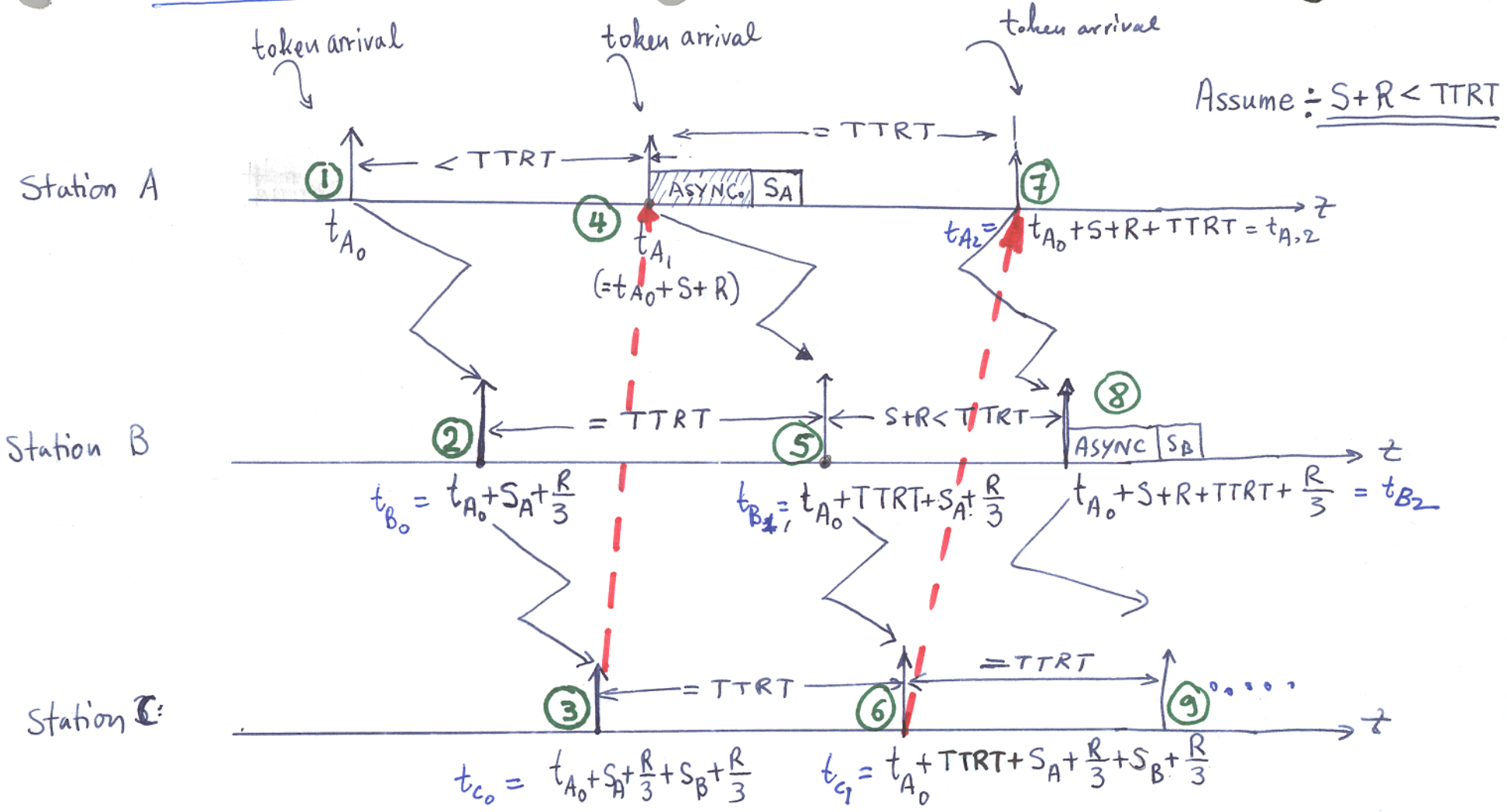
With TTRT = 10 ms $\Rightarrow$ $\eta = 92.6\%$.

DQDB

(Distributed Queue Dual Bus)

- 53 bit fixed frame structure. Each frame includes a busy bit (B) and a request bit (R).
- MAC protocol of DQDB attempts to have nodes transmit packets in the order at which they arrive at the MAC layer.
- Each node is attached to a unidirectional bus. The operation of each bus is symmetric.
- Each node has two counters : CD (count down) , CR (count requests)
  Whenever a node wants to transmit to the left it issues a request to the right.

FDDI OPERATION



For the synchronous traffic MMAT $\approx$ TTRT.

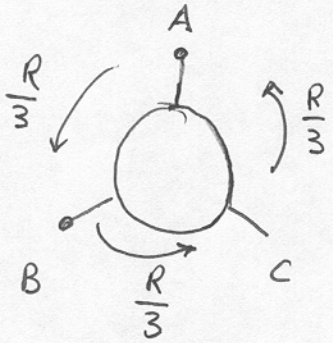
For the asynchronous traffic MMAT $\approx n$ TTRT.

Assumption: All stations transmit synchronous traffic till time t_{A_1}

FDDI EXAMPLE

Here are some explanations related to previous graph of the operation of FDDI:

(1) token arrives at station A at t_{A_0}. Assume 3 stations equally spaced



Token

R: Propogation time

S_i: Synchronous allocation time for station i, $i = A, B, C$

$\sum_{i=A,B,C} S_i \triangleq S$.

(2) Station A transmits synchronous traffic for S_A time units.

Token arrives at B at $t_{A_0} + S_A + \frac{R}{3}$ $(= t_{B_0})$

(3) Token arrives at C at $t_{A_0} + S_A + \frac{R}{3} + S_B + \frac{R}{3}$

(B transmits synchronous traffic for S_B).

(4) Token arrives at A at $t_{A_1} = t_{A_0} + St + R$. Assume A has just accepted a data packet. Also assume similar packets arrived in B, C.

Since $t_{A_1} - t_{A_0} < TTRT$ A will transmit its packet.

(5) Since $t_{B_1} - t_{B_0} = TTRT$ B does NOT transmit data

⋮

(6) Observe B transmits data at t_{B_2}! e.t.c.

⋮

Observe that A transmits data at t_{A_1}, B at t_{B_2}, C at t_{C_3} etc. Please complete the graph for t_{A_3}, t_{A_4} etc