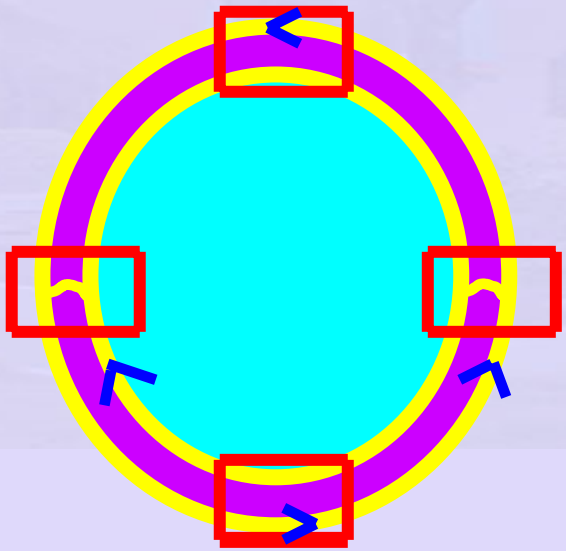
Fibre Distributed Data Interface

- Runs on fibre and not copper
- dual ring
  - two independent rings transmitting data in opposite direction
  - second not used for normal operation
  - used only if primary fails

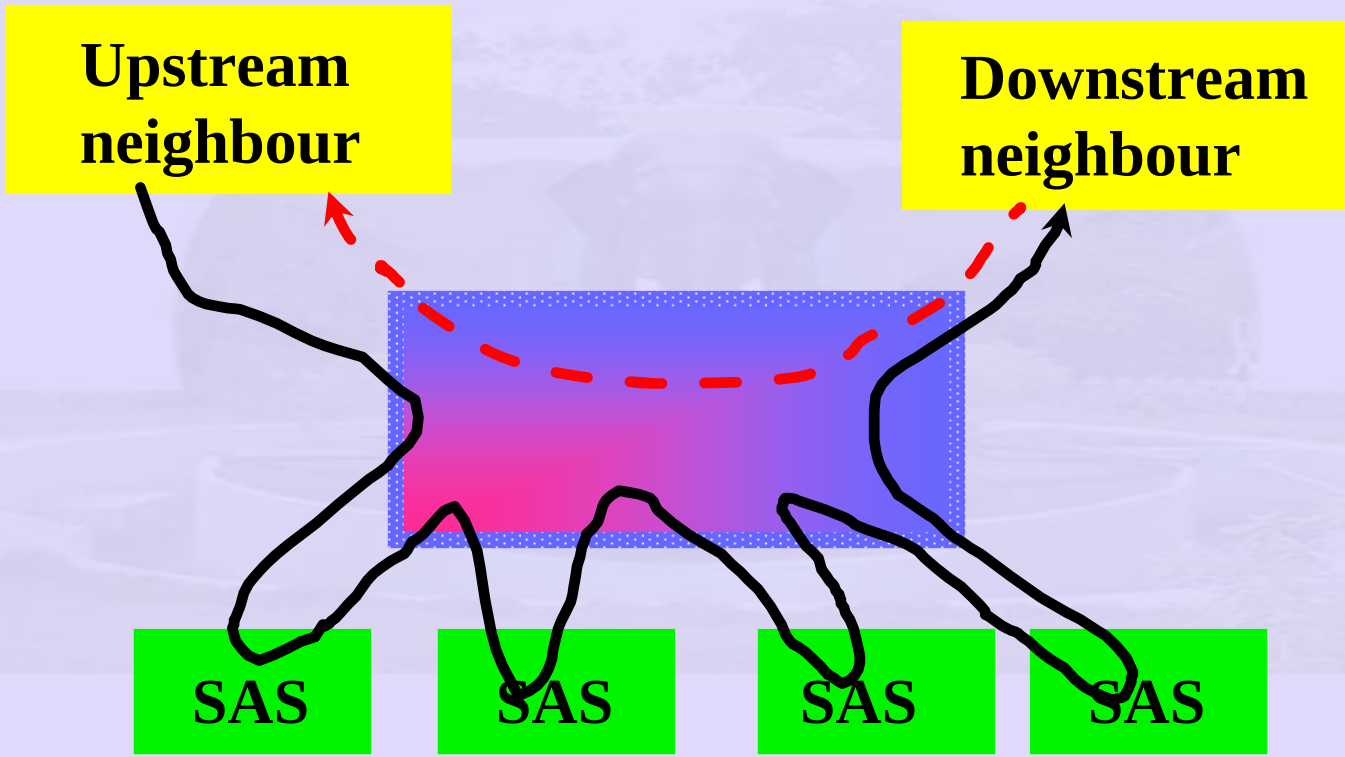
FDDI Ring



FDDI Ring

- Expensive – twice the amount of fibre
  - stations may be allowed to connect on a single cable
    - single attachment station (SAS)
- use concentrator to connect several SASs to dual ring

Fibre Concentrator



Concentrator detects failure of SAS
- Optical bypass to isolated failed SAS

FDDI Ring

- Each NE Adapter hosts some number of bits between its input and output interfaces
  - Variable buffer size
    - $9 \leq \text{buffersize} \leq 80$ bit
- Station transmits an amount equal to half buffer
- Total time depends on buffer

Delay in FDDI

- Example: 100 Mbps FDDI
- - 10 ns for bit time
- - Each station 10 bit buffer – waits until buffer half full before transmitting
  - station introduces 50 ns delay into TRT

FDDI –Physical Characteristics

- 500 stations with a maximum distance of 2km between any pair
- maximum network length : 200km
- 100 km connecting all stations (dual ring)

FDDI –Physical Characteristics

- FDDI encoding:
  - 4B/5B encoding
  - Replace 4B with 5B code such that no more than one leading zero,
  - no more than two trailing zeros and no more than 3 consecutive zeros

Asynchronous vs. Synchronous Traffic

- Synchronous traffic
  - Traffic is delay sensitive
  - station transmits data whether token is late or early
  - But synchronous cannot exceed one TTRT in one TRT
- Asynchronous traffic
  - Station transmits only if token is early

Measurement of Token Rotation Time (TRT)

- Target Token Rotation Time (TTRT – agreed upon time)
- Time between successive token arrival – TRT observed by any node
- TRT > TTRT
  - token late station does not transmit data
- TRT < TTRT
  - station holds token until TTRT
  - down stream station may not be able to transmit

Token Maintenance

- Process of setting up TTRT
- Monitor ring to ensure token has not been lost
- Fix TTRT – each node bids for the TTRT
- Idle time between valid transmissions that a given node experiences is
  - ring latency + time to transmit a full frame
  - 2.5 ms maximally sized ring
- If timer expired then claim token
  - TTRT lower used
  - Lower TTRT – new node enters the bidding process by

FDDI: Analysis

- Worst Case
  - Nodes with asynchronous traffic use one TTRT
  - Next nodes with synchronous traffic in one TTRT
- TRT at a node = 2 * TTRT
  - Synchronous traffic TTRT
  - Next no asynchronous – token late

FDDI Analysis

- No back to back transmission of TTRT
  - When does a node transmit asynchronous data
    - TRT + ε = TTRT => Transmit
    - Total TRT = TTRT + full FDDI frame
- if claim frame makes it all the way back to the original sende
  - node knows it is only active bidder => safely claim the token

FDDI Frame Format