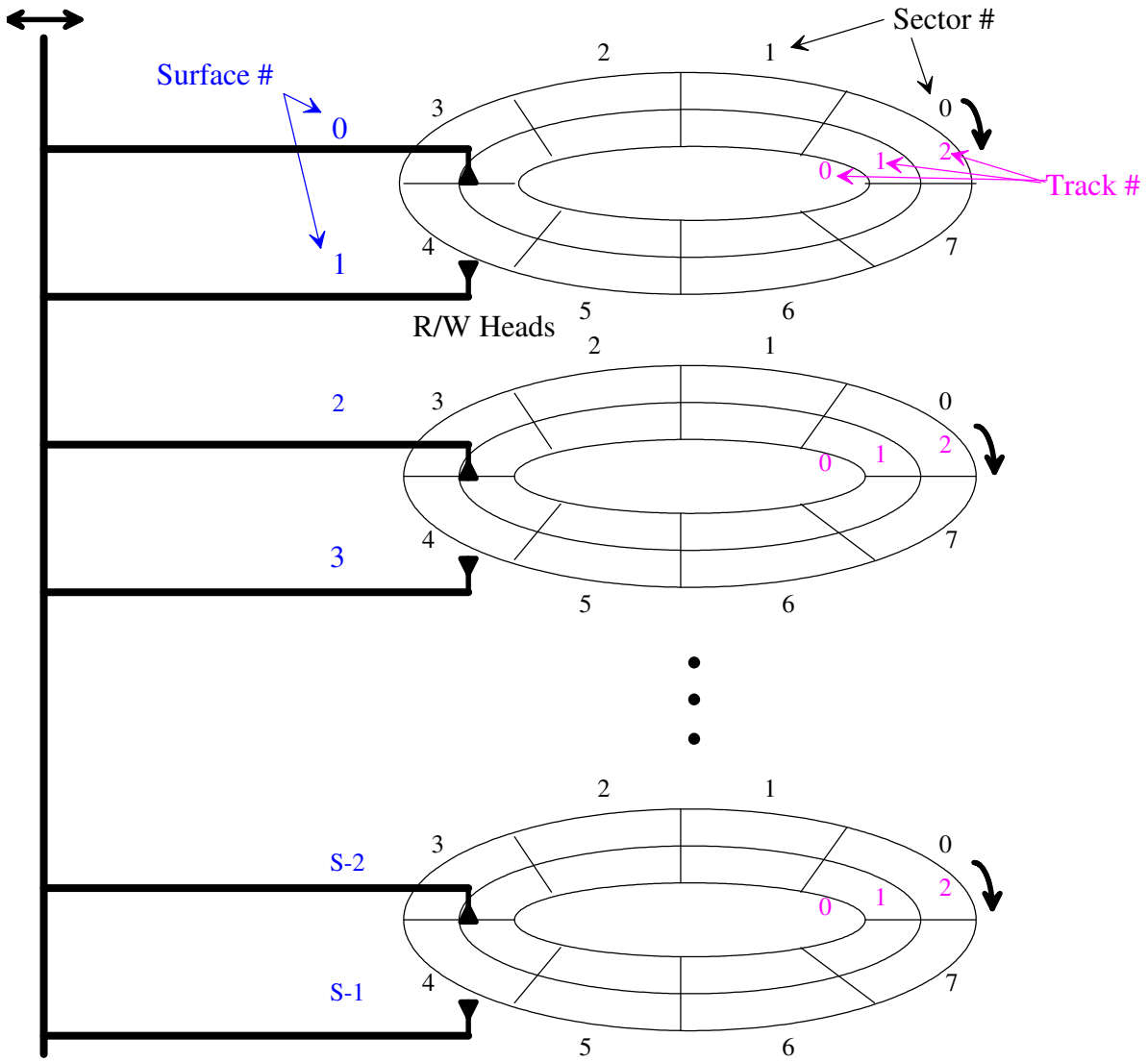
Magnetic/Hard Disk (Movable head)

(Track #, Surface #, Sector #) "Physical" View of Disk



Steps to perform a disk read (or write):

1) Move Read/Write (R/W) heads over correct track/cylinder ← seek time
2) Wait for start of specified sector to spin to R/W head ← rotational delay
3) Read (or write) specified sector as it spins under the R/W head ← data transfer time

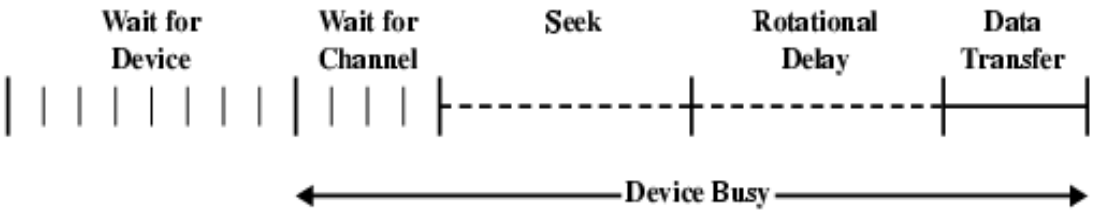
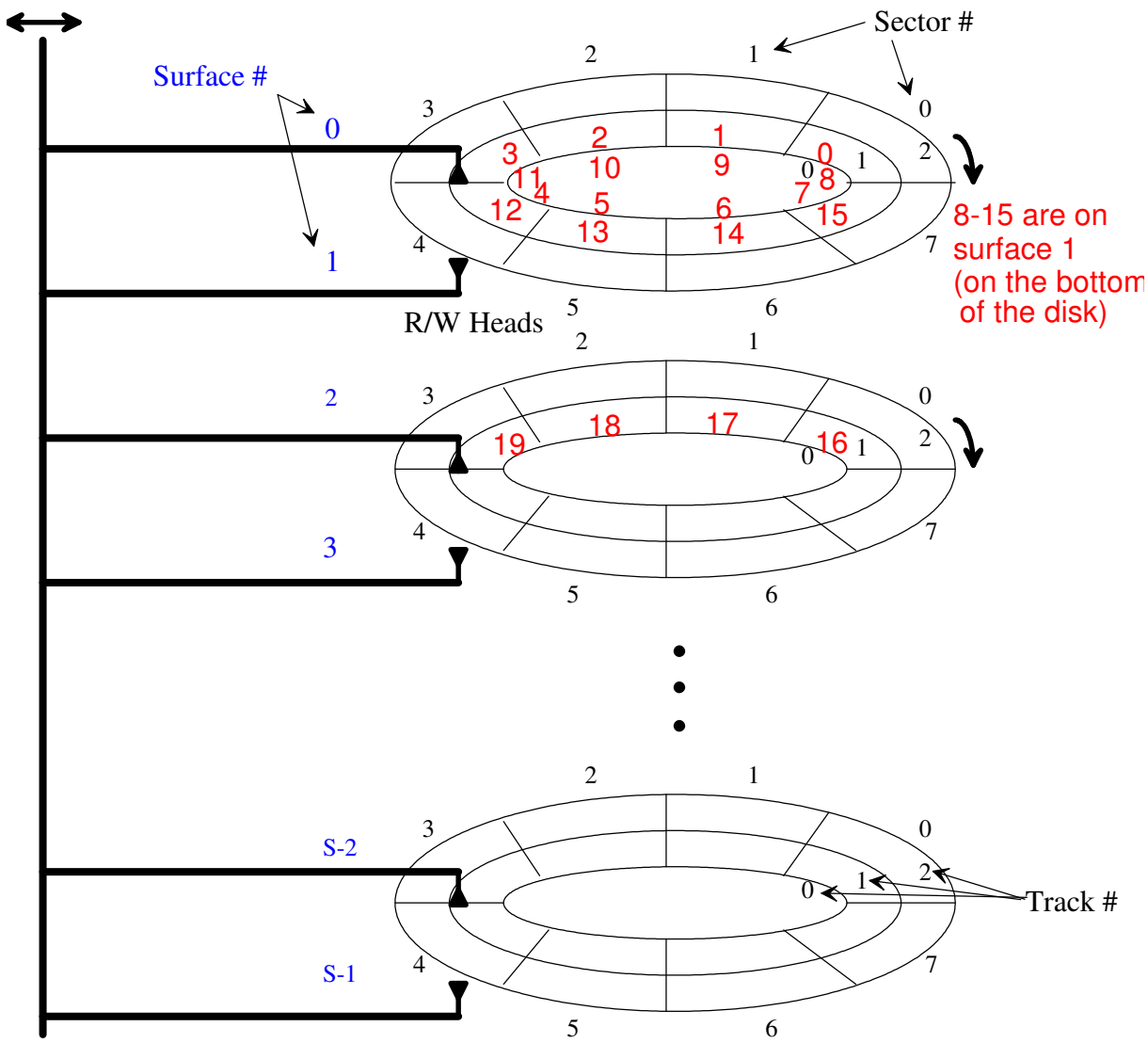


Figure 6.7 Timing of Disk I/O Transfer

Logical View of Disk as Linear Collection of Blocks



(track #, surface #, sector #) to Linear block # mapping

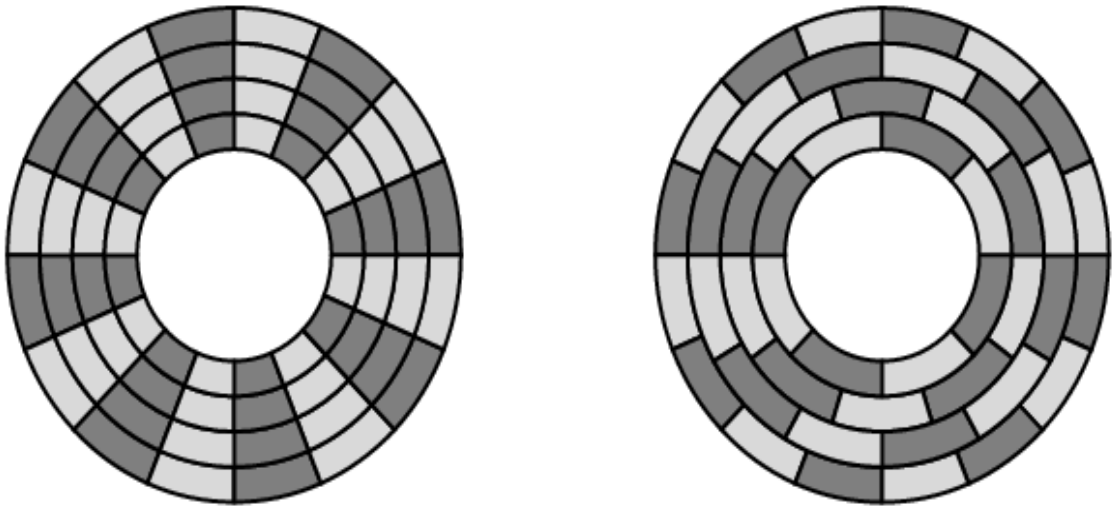
0	1	2	
(0,0,0)	(0,0,1)	(0,0,2)	. . .

← All of cylinder 0 → ← All of cylinder 1 →

Bits of linear block # :

track #	surface #	sector #

Figure 6.3 Disk Layout Methods

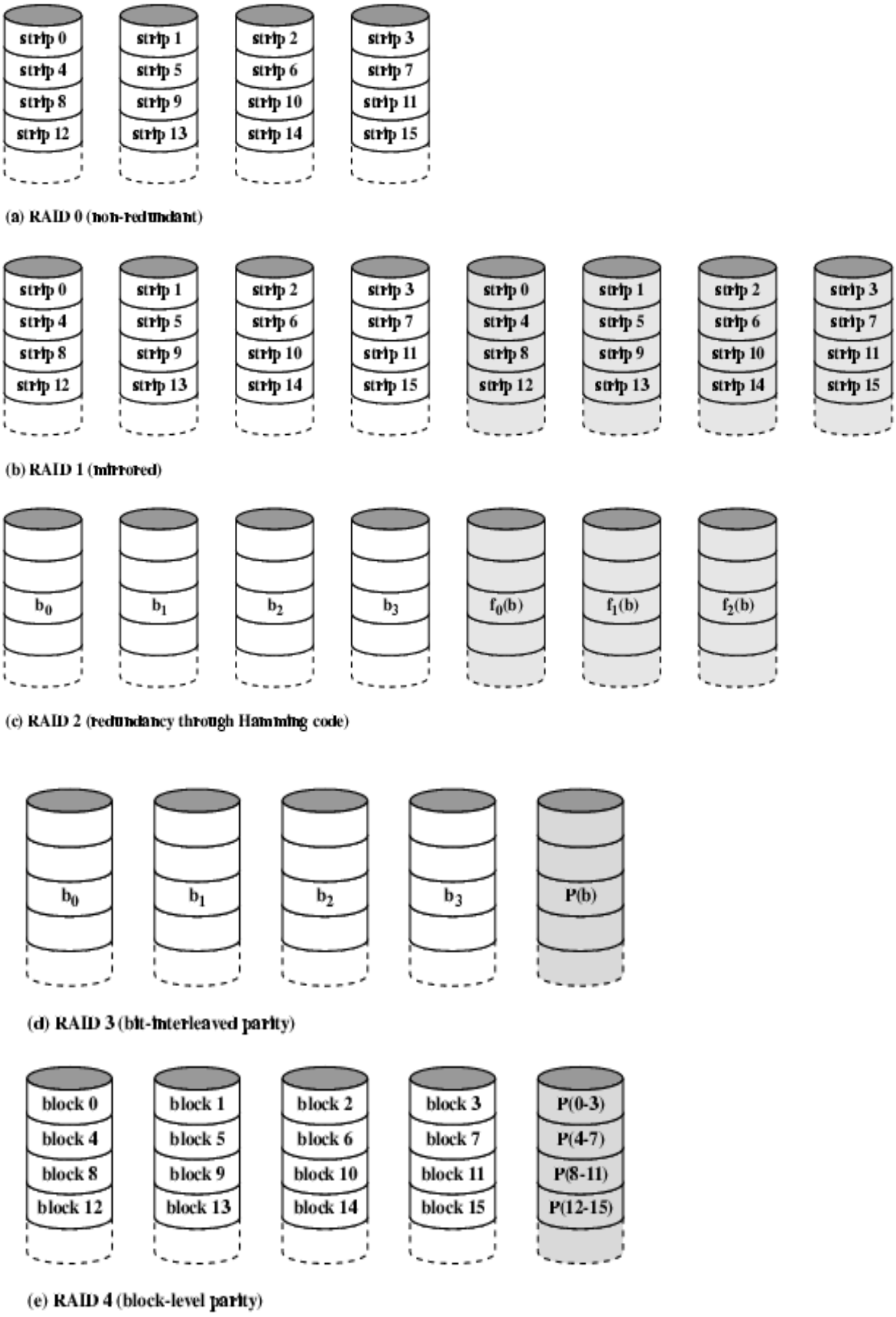


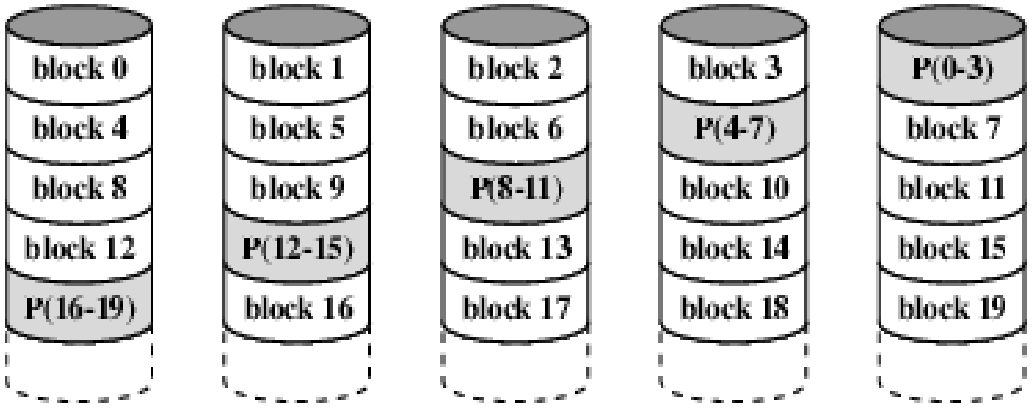
(a) Constant angular velocity (b) Multiple zoned recording

RAID - Redundant Array of Independent/Inexpensive Disks

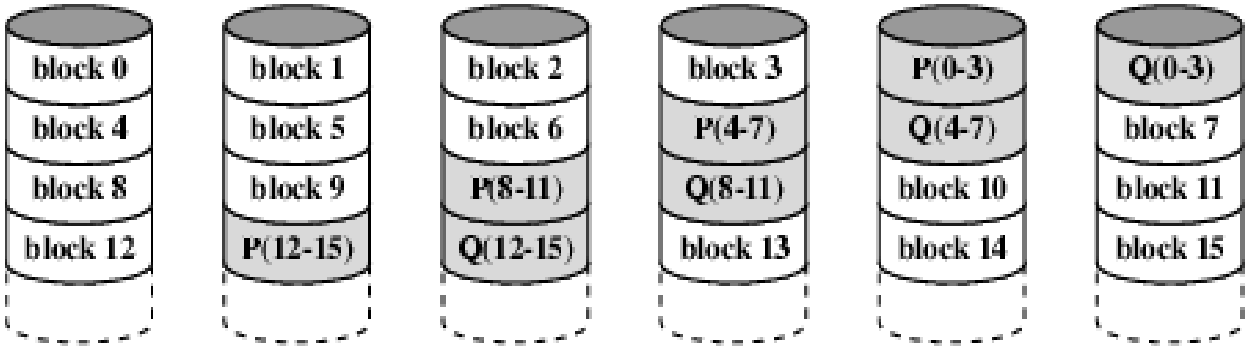
- 6 levels in common use
- Not a hierarchy
- Set of physical disks viewed as single logical drive by O/S
- Data distributed across physical drives
- Can use redundant capacity to store parity information
- Selection of RAID level can optimize for **one** of the following:
  (1) fast response time for many small I/O requests, e.g., database access, or
  (2) very high data-transfer rates for single large I/O request, e.g., CAD

Figure 6.8 RAID Levels





(f) RAID 5 (block-level distributed parity)



(g) RAID 6 (dual redundancy)