Chapter 4: Hints & Answers

4.3   (a)   We have18 upstream channels at 8 Mbps each.

4.8   (a) Three bits on average need to be observed before the pattern is violated.

4.9   (b) The average number of frames observed before a location does not match the framing pattern is $p/(1 – p)$ where p is the result from part (a).
           (c) Approximately 256 bits.

4.12   Maximum payload rate is 50.128 Mbps; Minimum payload rate is 50.096 Mbps.

4.15   (b) BLSR is more efficient than UPSR.

4.20   (b) 400 wavelengths will carry 15.5 million telephone calls or 199 thousand MPEG2 video signals.

4.22   The spacing in wavelengths is 0.75 nm and in Hertz is 93.65 GHz.

4.28   (e) There is a typo here, replace *N/n* by *k*. P[*no path available*] = $[1 – (1 – p')(1 – p')]^k$.

4.29   The number of crosspoints in this problem ranges from 896 to 2108.

4.34   The number of channels can be doubled.

4.38   (b) For 1 microsecond hold time we obtain frames sizes of 10^3 bits and 10^6 bits for 1 Gbps and 1 Tbps respectively.

4.42   The telephone set is powered by the Central Office, which in turn has battery backup in case of power failures.

4.46   (a) 55 Mbps.

4.52   (d) Generally, if a line is free, a ring is sent to the dialer and receiver. If a line is busy, a busy signal is sent back to the dialer. If call waiting is activated, a tone from the local switch is sent to the receiving party (which briefly interrupts the current conversation).

The control plane treats this tone as a ring (that is, it sends a ring back to the dialing party and voicemail and call forwarding may still be activated). If the user accepts the new call, the current connection is "held" one hop upstream from the user at the local switch, and a second connection is made from the dialing party to the user.

At this point, both calls share the line that makes up the last hop to the user. Thus, the user can only talk to one party at a time. When one of the two connections is being used, the other is maintained in its incomplete state while the caller is on hold.

4.57   16 trunks.

4.62   (b) 56 channels.

4.65   (a) 370 Erlangs at 1% blocking probability.