CSC0056: Data Communication

Lecture 03:
Point-to-Point Protocols

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Course information

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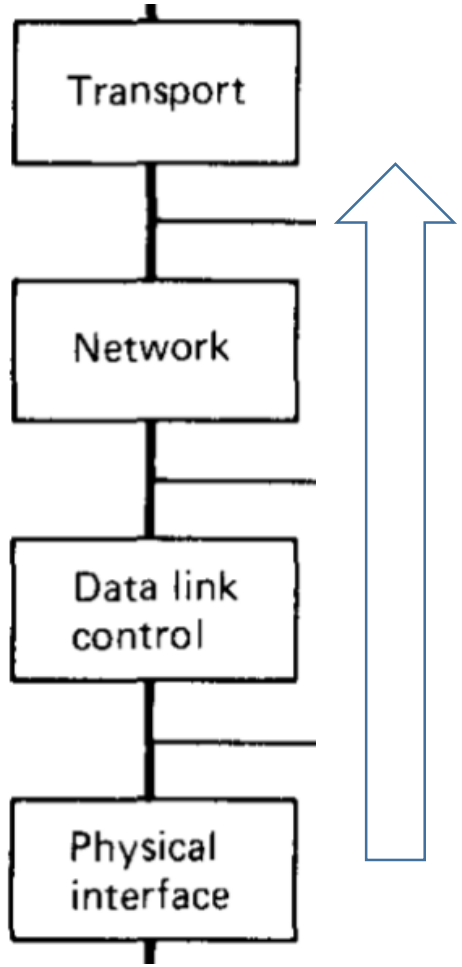
Acknowledgement: Some slides' materials in this course are borrowed with permission from the 2014 edition of the course taught by Prof. Yao-Hua Ho 賀耀華
Figures are obtained from the textbook available at http://web.mit.edu/dimitrib/www/datanets.html

Outline of lecture03

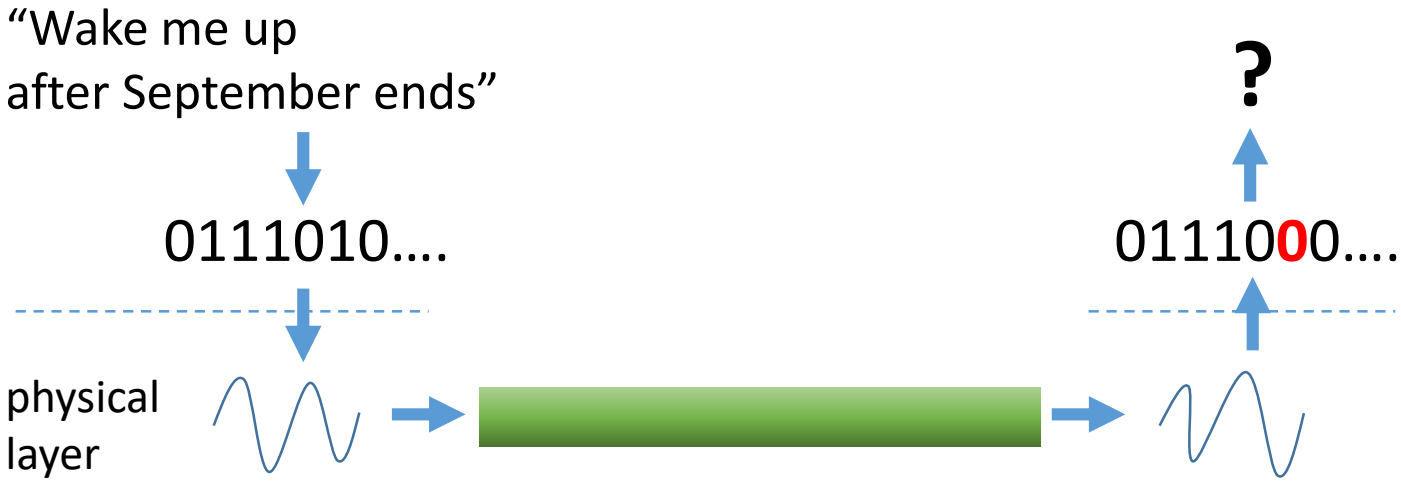
- Motivation to techniques in the data link layer and above
- Error detection (data link layer)
- Data retransmission strategies (data link layer)



Motivation: unreliable bit stream from the physical layer

- Techniques such as filtering may help the data receiving side to get back the exact original data, but
  - there are other causes of distortion (appear as noises to the system)
  - cost-effective to improve the physical layer so much to completely resolve signal distortion problem?

System design often has trade-offs!

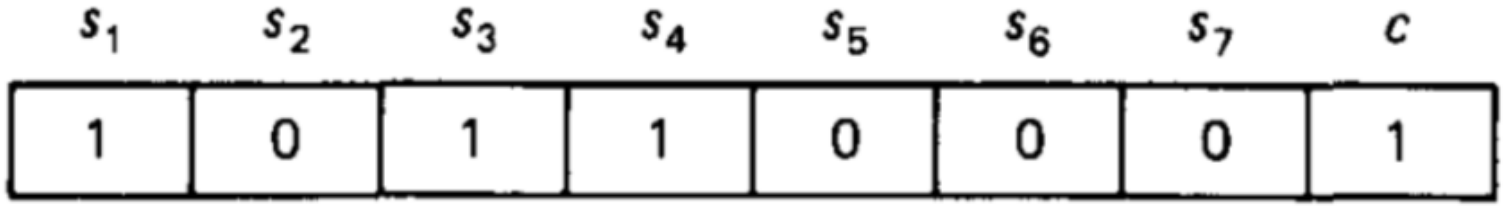


Introducing solutions at higher layers

- Identify and model the issue
- The issue we have here: unreliable bit streams
- What to do?
  - Detecting if a set of bits contains error(s)
  - Then
    - Correct the errors in place?
    - Ask the sender to resend?
    - …?

Error detection at the link layer

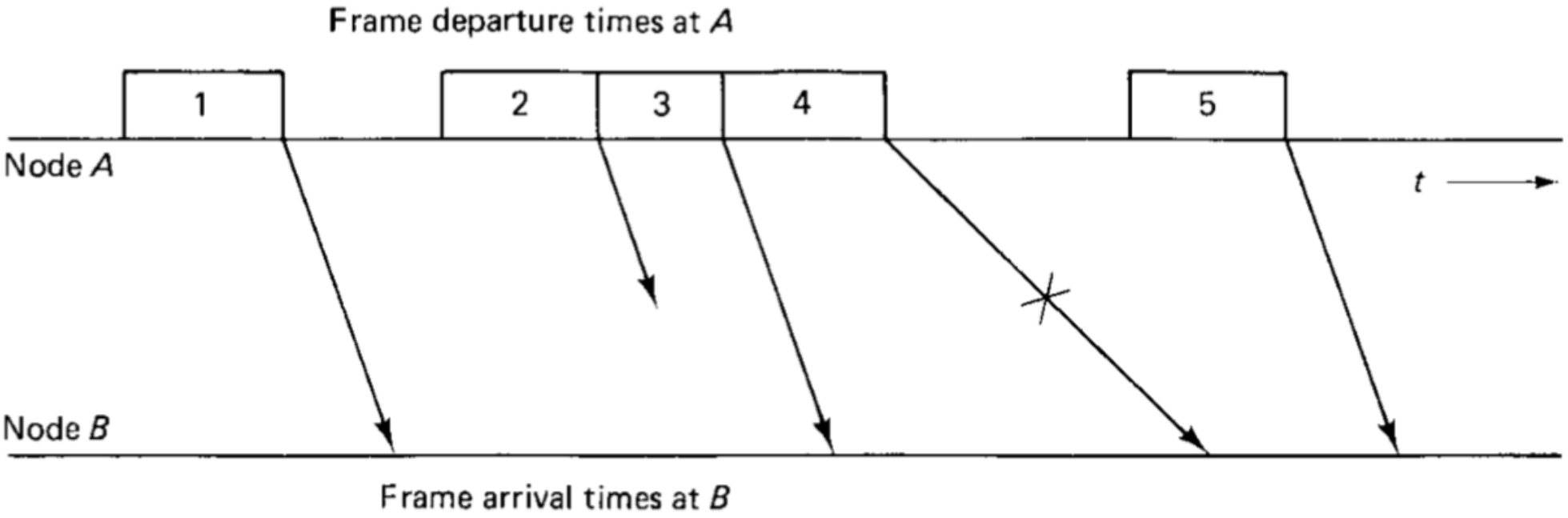
- Single parity checks
  - Append one single bit, called a *parity check*, to a string of data bits.
    - Set the parity check bit to be the sum of the bit values in the data bits modulo 2
    - In other words, set the parity check bit so that “data bits + parity check” has even number of 1s in total



Turn to the note of lecture 03.

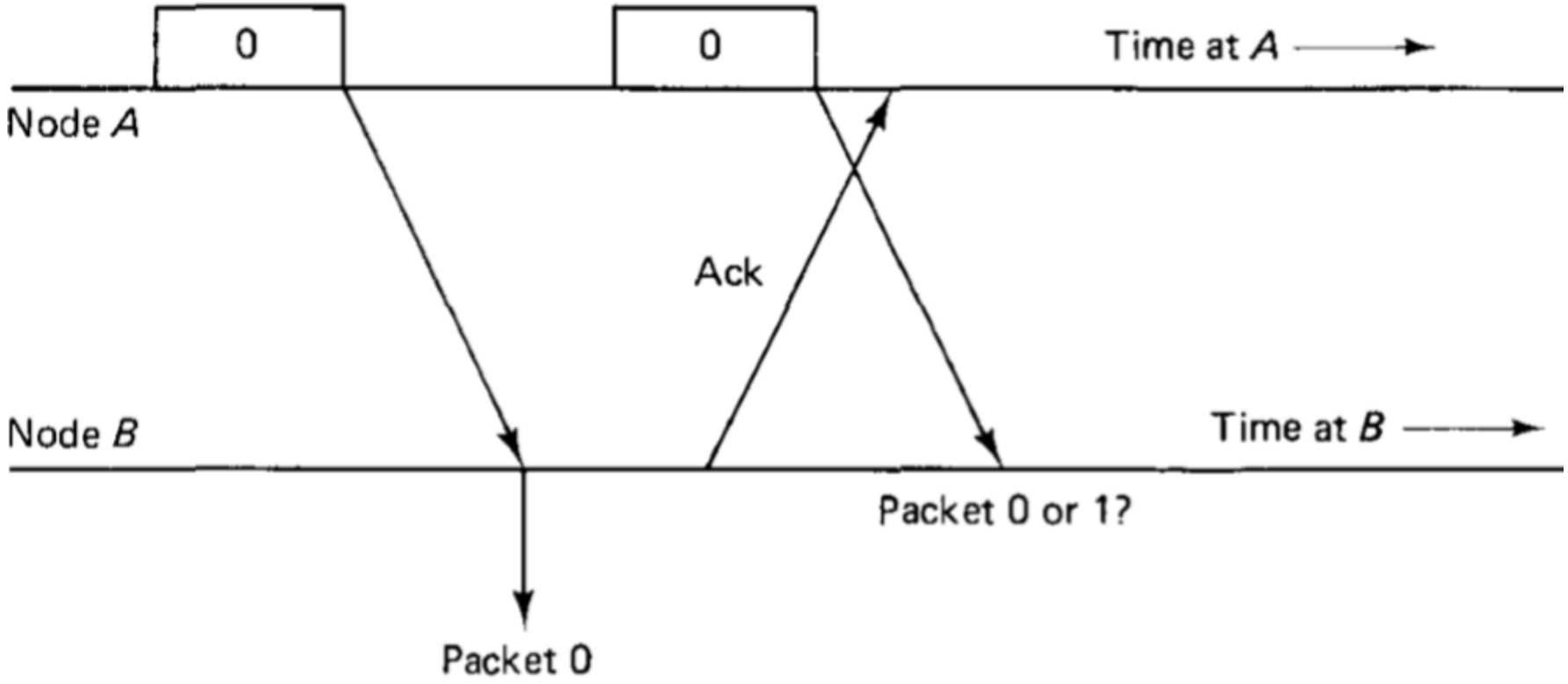
ARQ: *A*utomatic *R*epeat Re*q*uest

- Model of data (frame) transmissions



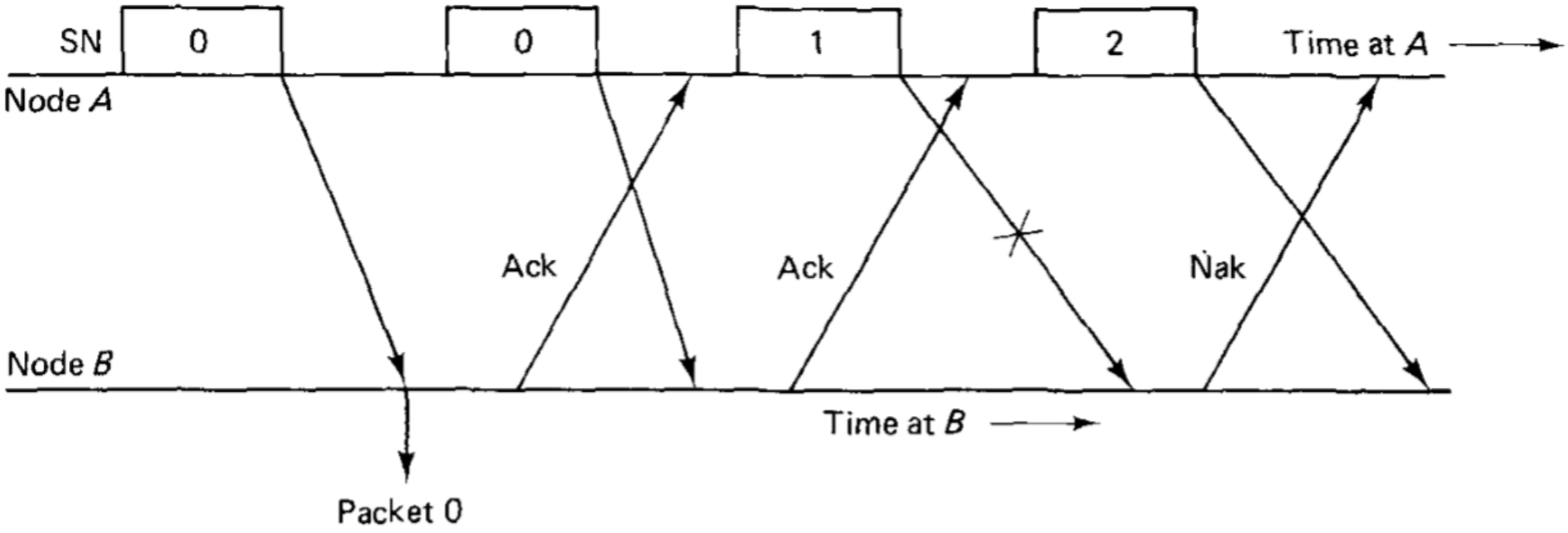
Challenges for data retransmission

- The trouble with unnumbered packets



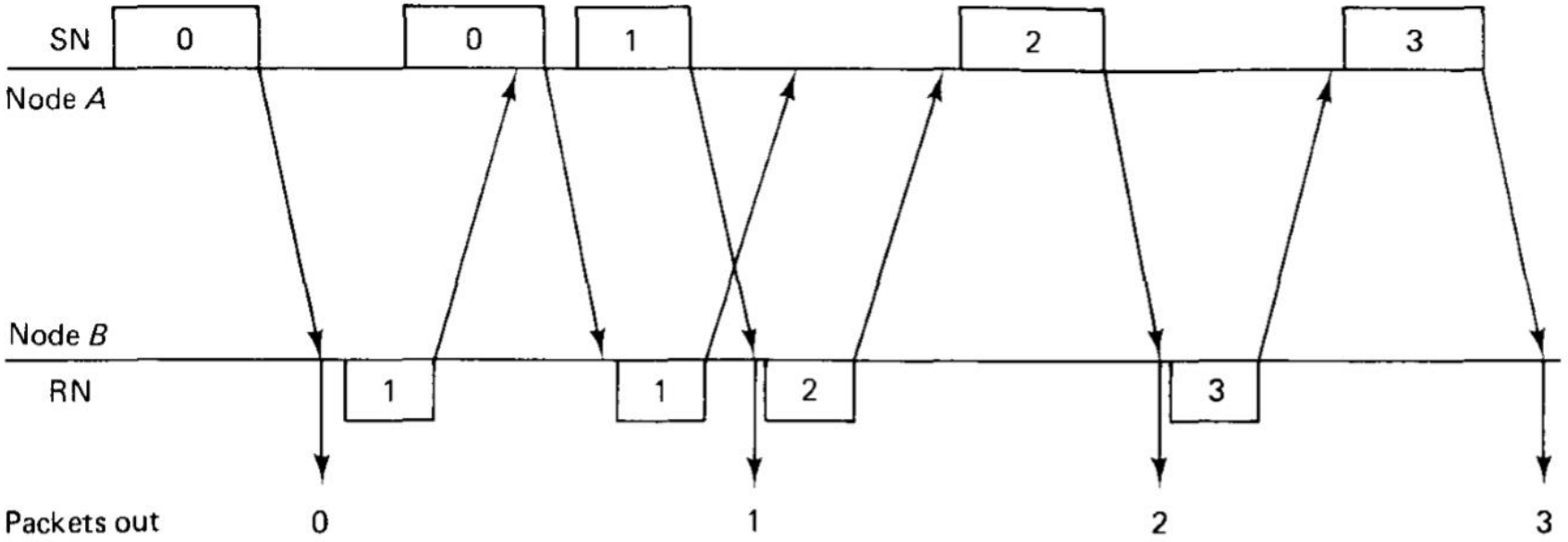
Challenges for data retransmission (cont.)

- The trouble with unnumbered acks



Stop-and-wait ARQ

- Using sequence and request numbers to coordinate between A and B
- A *distributed* algorithm



More on ARQ in lecture 04.