INF3190 Group lecture
Lecture #4

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Feel free to send questions, suggestions and feedback.

Contents

- A few things I forgot last time about C
- Layer 1 and 2 - physical and link
- Questions about the mandatory assignment/other things

Relevant Extracurricular reading

- "Silence on the Wire" - Michal Zalewski
- Takes up several security issues related to networking, programs and teaches you about the implementations along the way.
- Provides good background information for why things are as they are today.

C-programming

- ptr++; //1 == 4
- 1[*a*];
- Passing a pointer as argument - benefits and drawbacks
- epoll-example by Aleksi

Source code

- `https://github.com/TZer0/INF3190-groupcode`
- To get the source code run the following command in a terminal: git clone git://github.com/TZer0/INF3190-groupcode.git
- If this fails, install git-svn.

Layer 1 - physical

- Concerned with transfering data on the lowest level.
- Is in many cases able to send more than just a bit at once. If this is the case, it is said that one transfers a symbol.
- Clock-syncronization issues (what happens when you transmit multiple identical symbols or bits?) - multiple solutions: manchester (takes a lot of bandwidth!), NRZ.
- Traditionally the most vulnerable layer when given direct access.

Layer 1 - physical - Nyquist-Shannon theorem

- Given a sampling rate N and the possibility of M different measurement levels in the transmission, the maximum bandwidth will be $(log_2(M) + 1) * N/2$ bits/s.
- Reasoning: given a frequency of N hz, a sampling rate of 2N is required to be certain than the signal can be reconstructed.
- Given M possible levels per time step, a total of $log_2(M) + 1$ bits can be transfered.
- This estimate does not consider disturbances - this is an optimistic approximation.

Layer 1 - physical - Shannon-Heartley theorem

- Bandwidth $= (N/2) * log_2(1 + \frac{S}{N})$ bits/s
- S is the signal strength, N is the noise strength - both measured in Watt.
- $\frac{S}{N}$ is the signal-to-noise ratio.

Layer 2 - link

- As mentioned in a previous group lecture - this layer is concerned with local delivery of content.
- Offers either unreliable or reliable connectionless communication or reliable connection-based communication.
- Offers errors checking - checksum, CRC, parity (normal and 2D) and other.