# FPGA Telephony

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# Motivation

- Networking is Everywhere
  - Internet
  - Distributed Computing
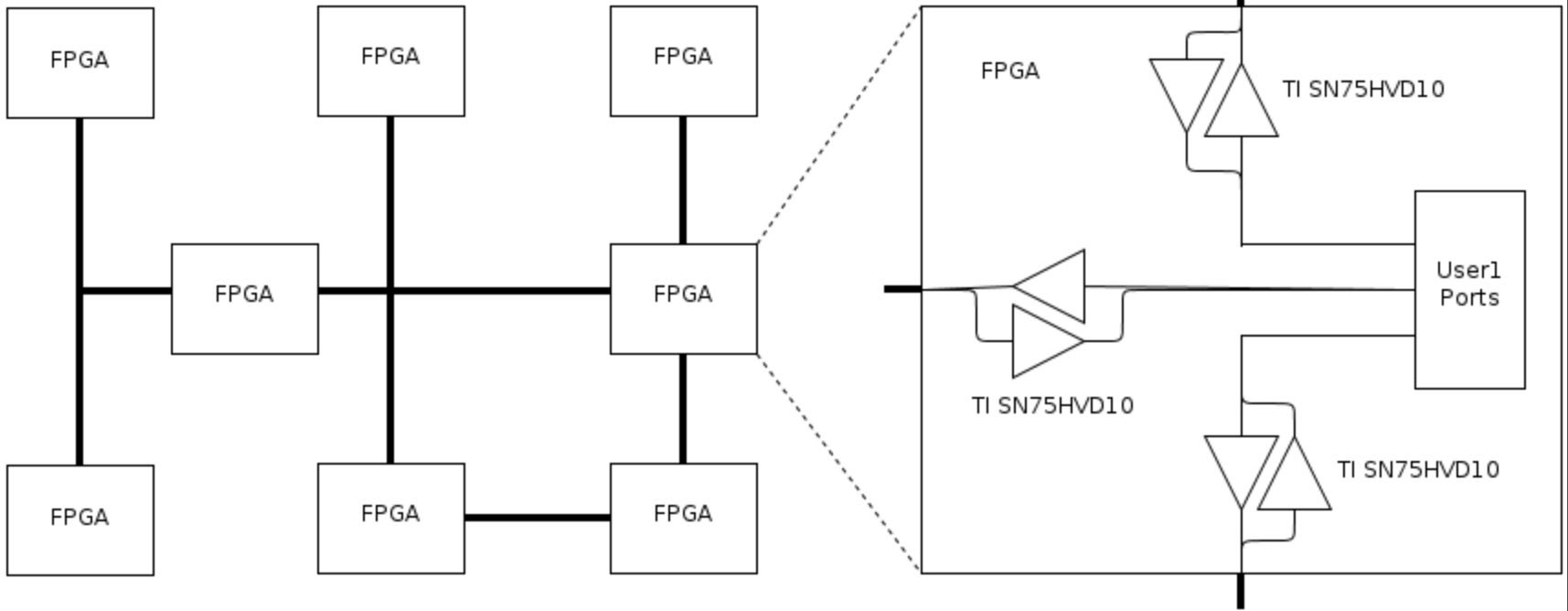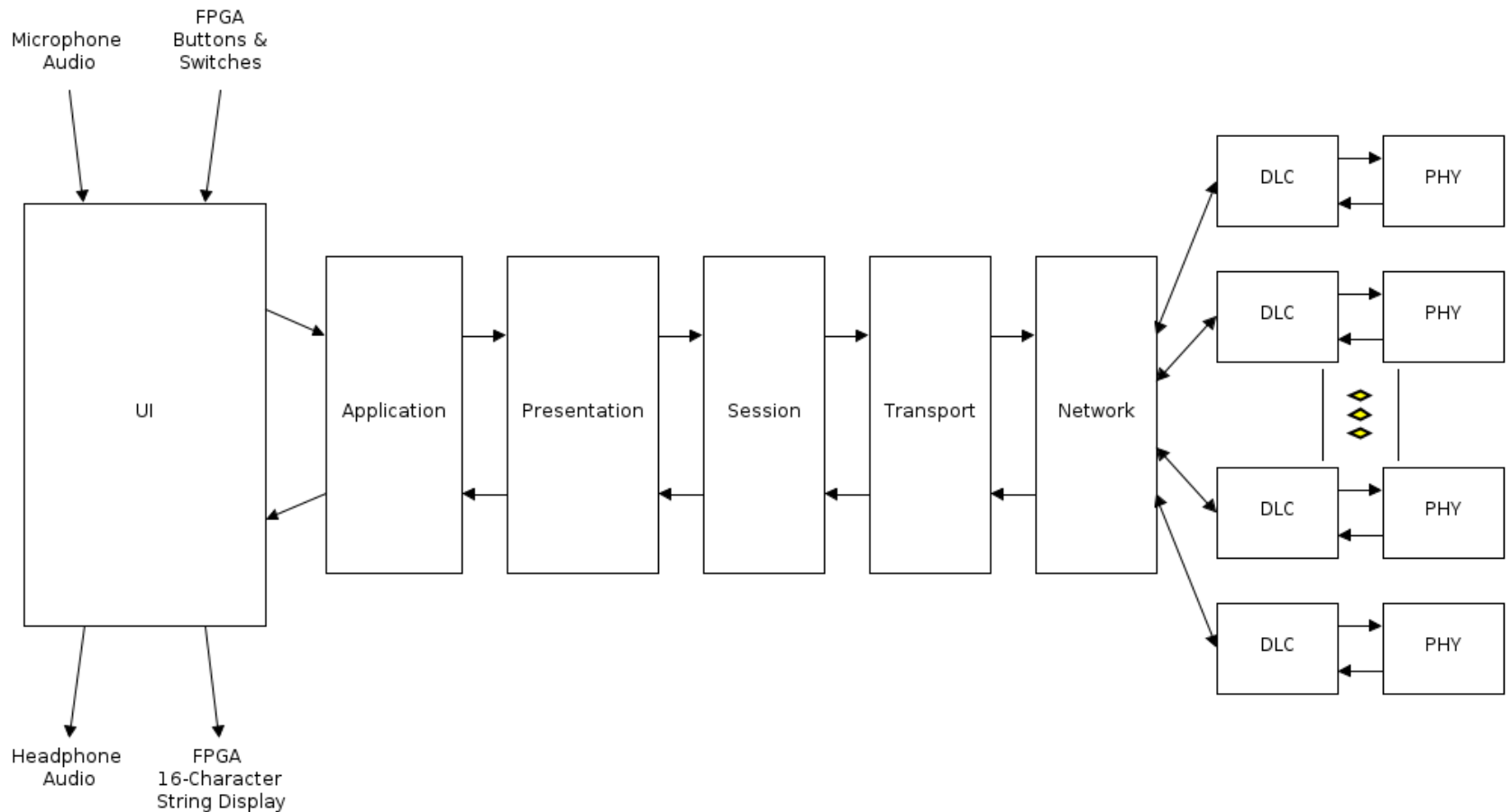- Familiarity
- Complexity

# **Overview**

- Transfer speech across wired network
- Many topologies
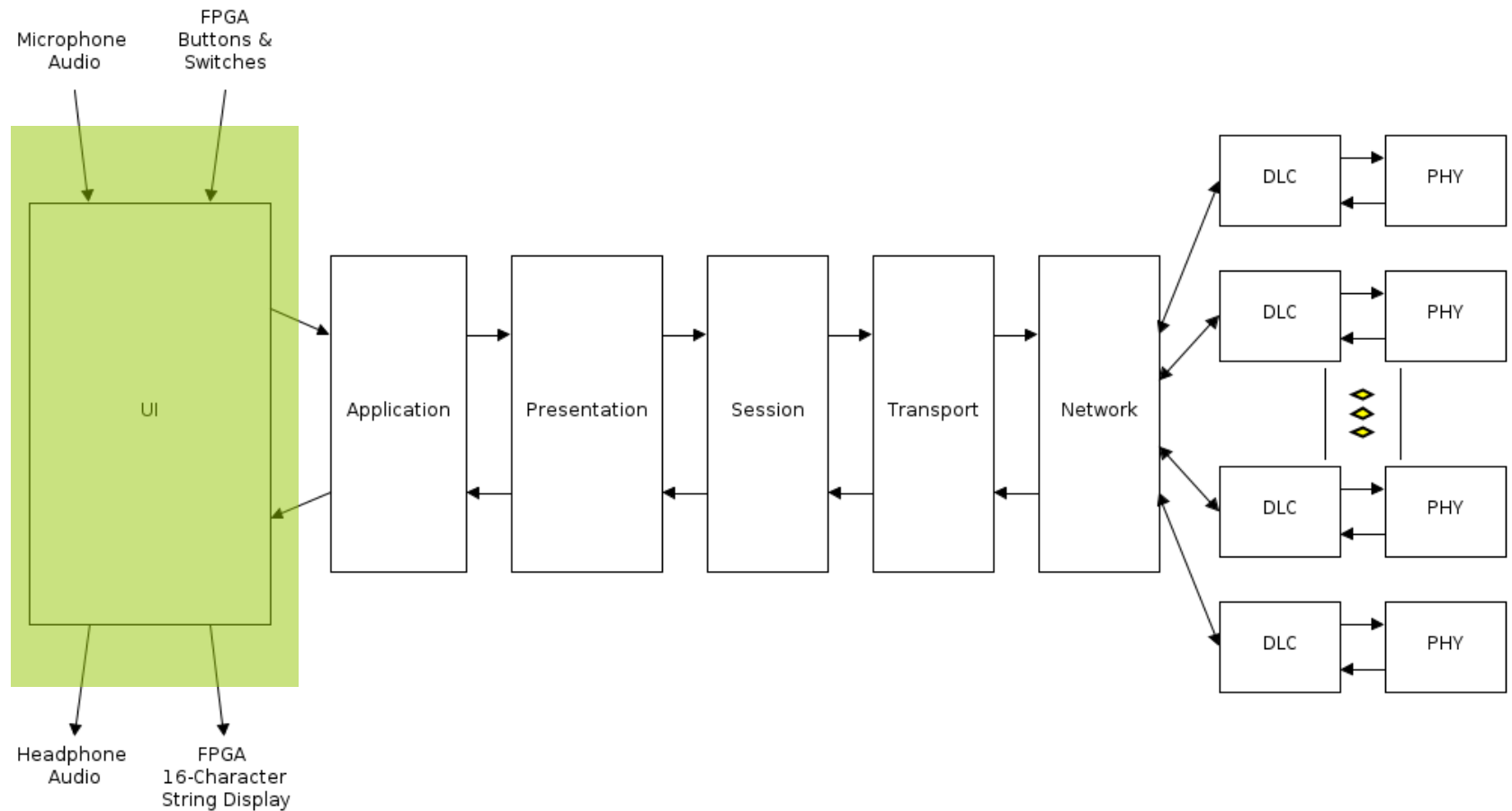- Open Systems Interconnection (OSI) model
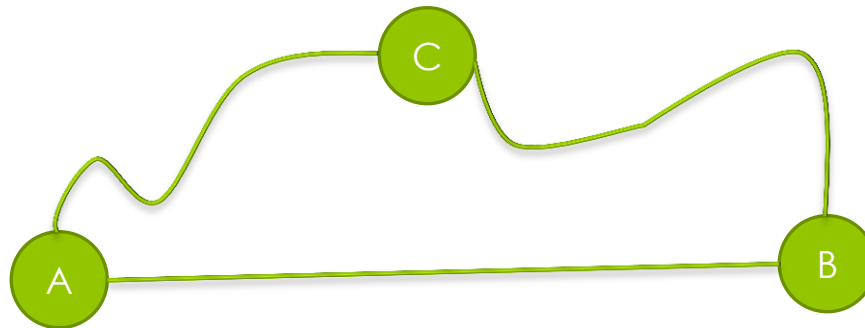
# Network Layout

# High-Level Block Diagram

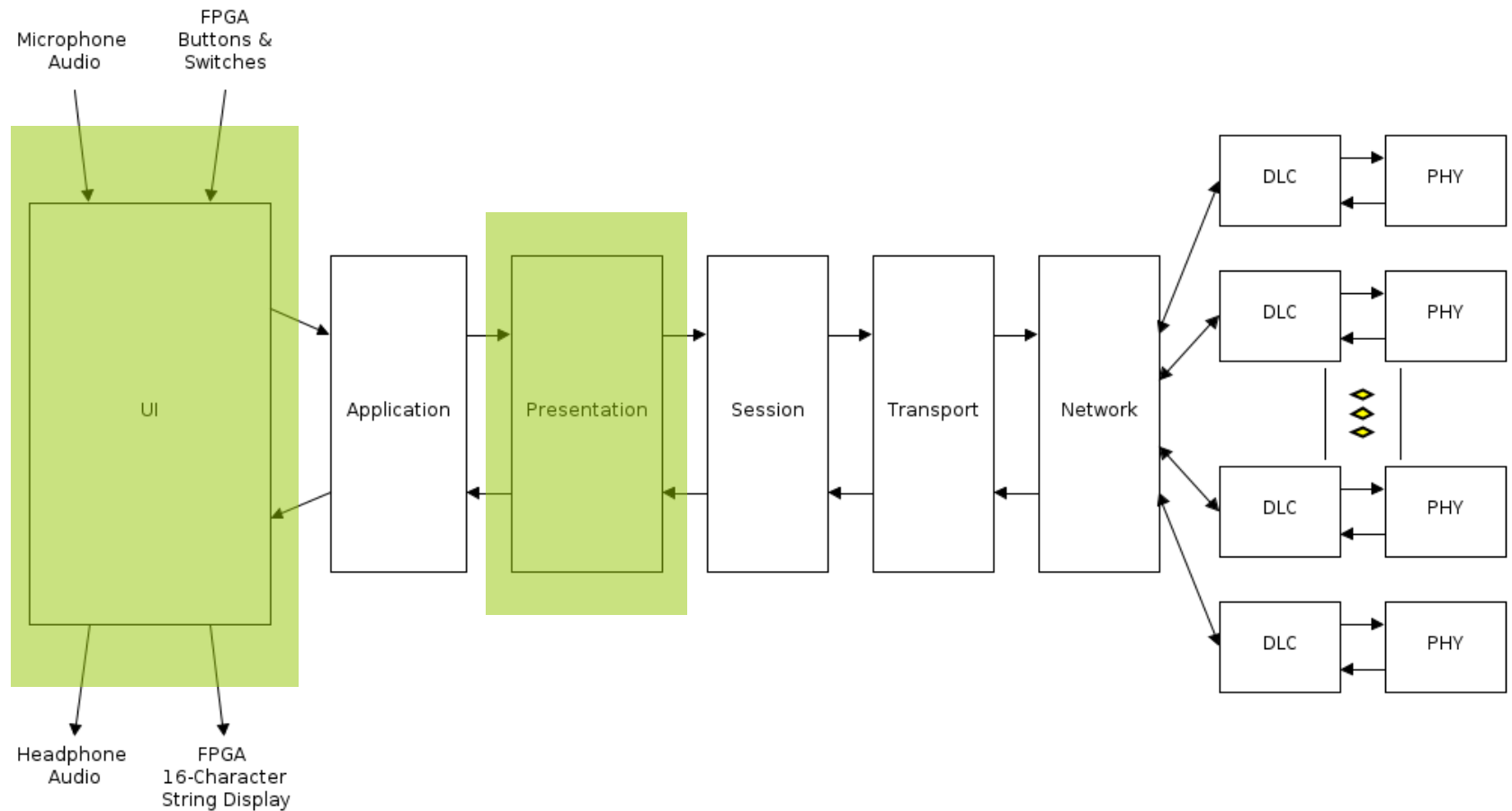# High-Level Block Diagram

# User Interface (UI)

- Simple & Intuitive, but Powerful
- Many Functions
    - Standard Features (Hold, Waiting, Forwarding)
    - Voicemail
    - Conference Call
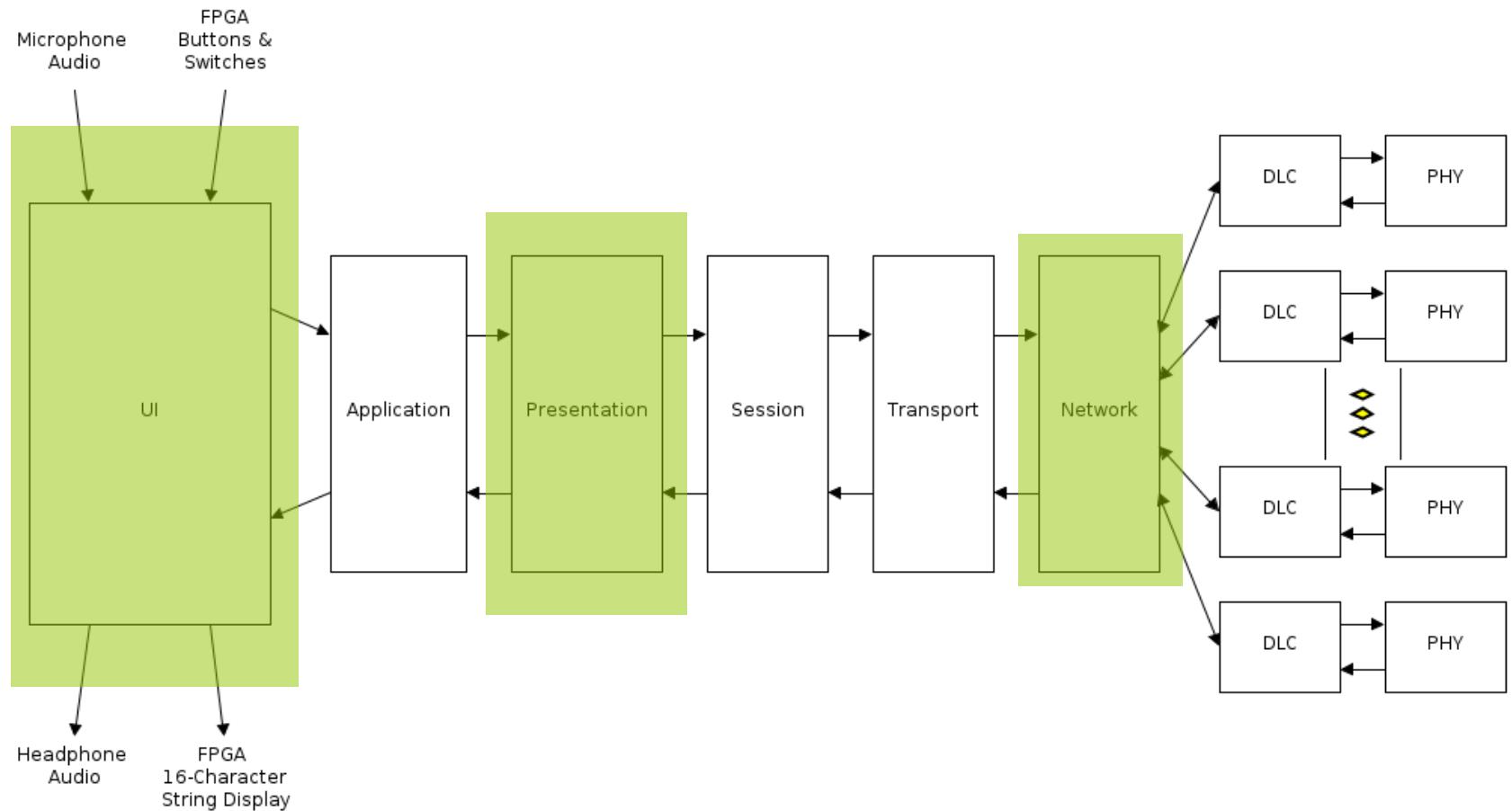
# High-Level Block Diagram

# **Presentation Layer**

- Internet Low Bitrate Codec (iLBC)
- 16-bit, 8 kHz audio
- 15.2 kbps bit rate
- Robust to Packet Loss
- 3-clause BSD License
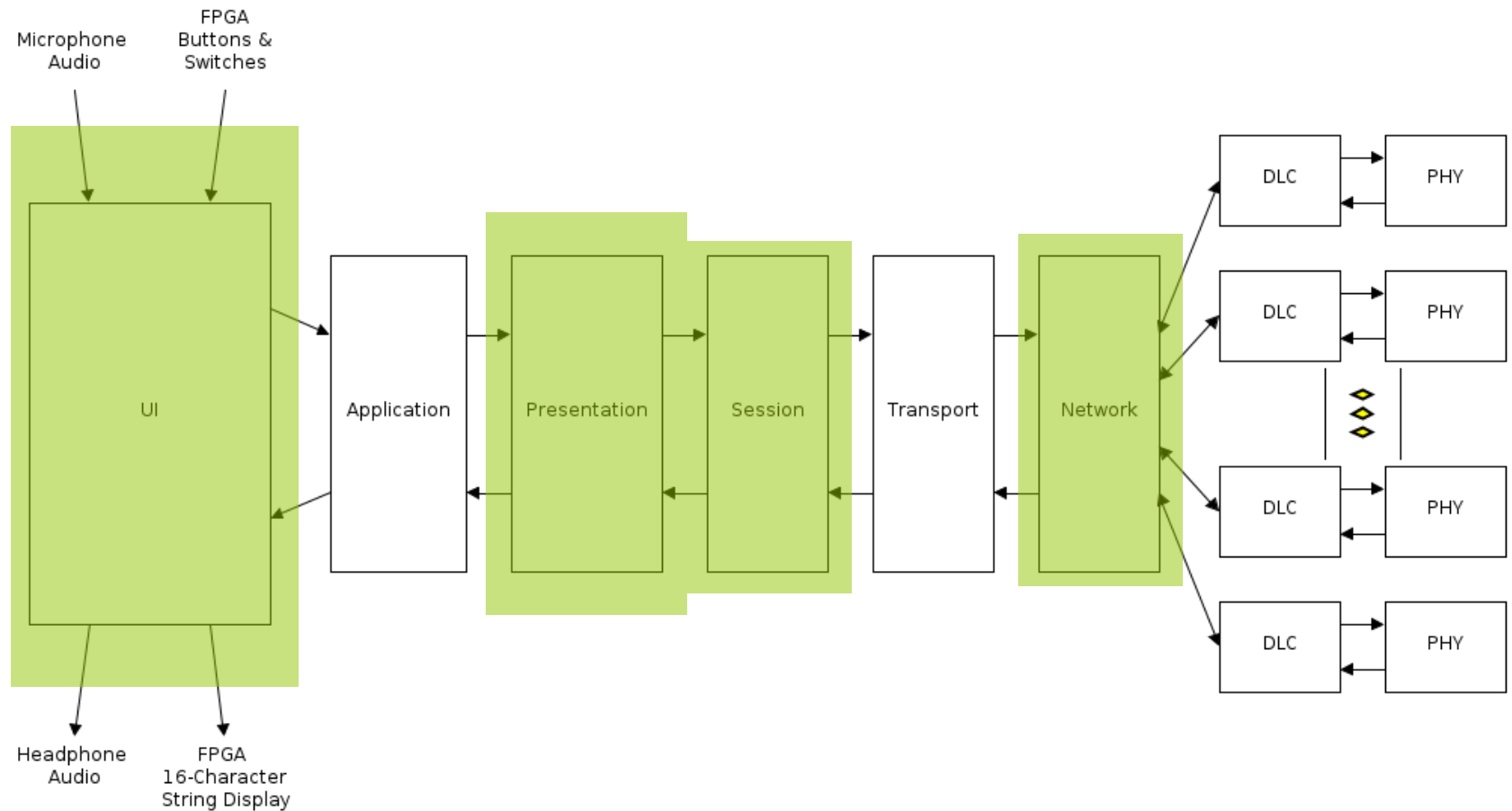- Floating-Point Operations

# High-Level Block Diagram

# Network Layer

- Reliable end-to-end packet transfer
- Virtual Circuit routing (Connection-Oriented)
    - Shortest-Path routing
    - Optimal routing
- Network initialization
- Reroute on link/node failure
- Flow control

# High-Level Block Diagram

# Session Layer

- Synchronization
- Token Management
- Conference Calling
- Unicast v. Multicast

# Timeline

- Week of 11/12
  - PHY, DLC, Transport, UI
- Week of 11/19
  - Network, Session, Application, UI
- Week of 11/26
  - Presentation, Application, UI, Debugging
- Week of 12/3
  - Debugging, Extensions

# Image Citations

- Slide 1: http://www.how-to-draw-funny-cartoons.com/cartoon-telephone.html
- Slide 2: https://www.wbginvestmentclimate.org/advisory-services/regulatory-simplification/business-regulation/norevents.cfm
- Slide 3: http://meship.com/Blog/2011/05/02/the-small-business-guide-to-voip/

# Questions?