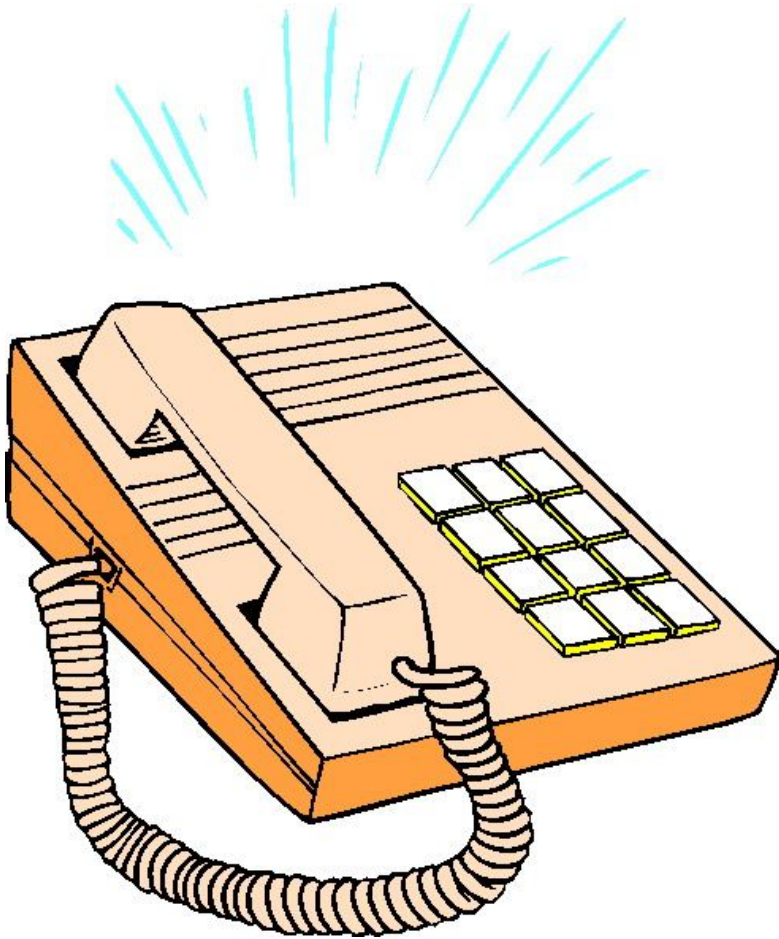


FPGA Telephone



Rumen Hristov, Alan Medina

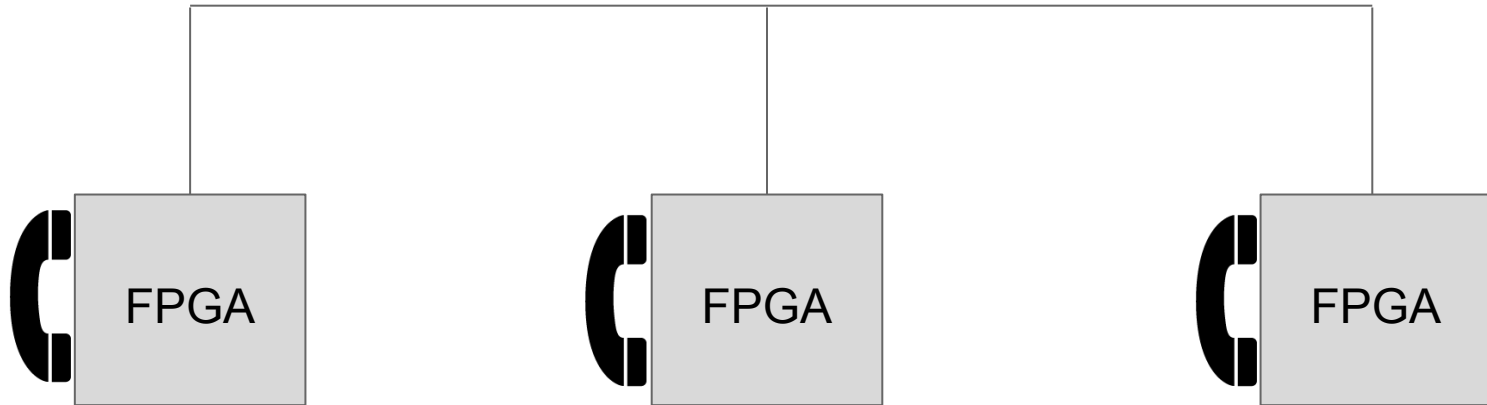
Capabilities



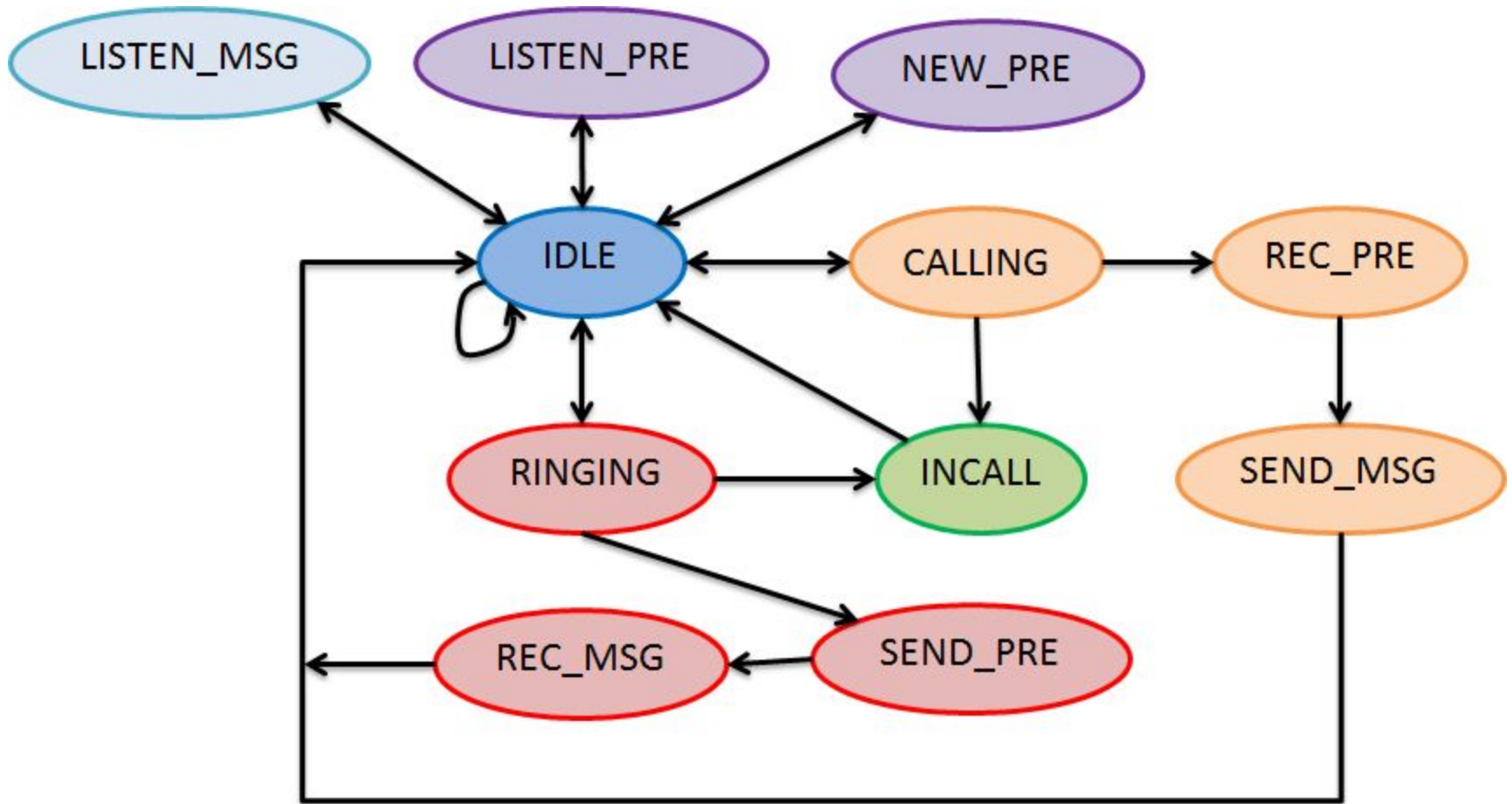
- Call other FPGAs
- Leave a message
- Listen to saved messages
- Personalize voicemail

Building Blocks

- Several FPGAs
- Microphone and Headphones
- Buttons
- LEDs
- Wire



Finite State Machine



Inputs:

Mic

BTNs

FPGA

Filter

Debouncer

Serial
to Data

EC

Timer

Finite state machine

Memory

EC

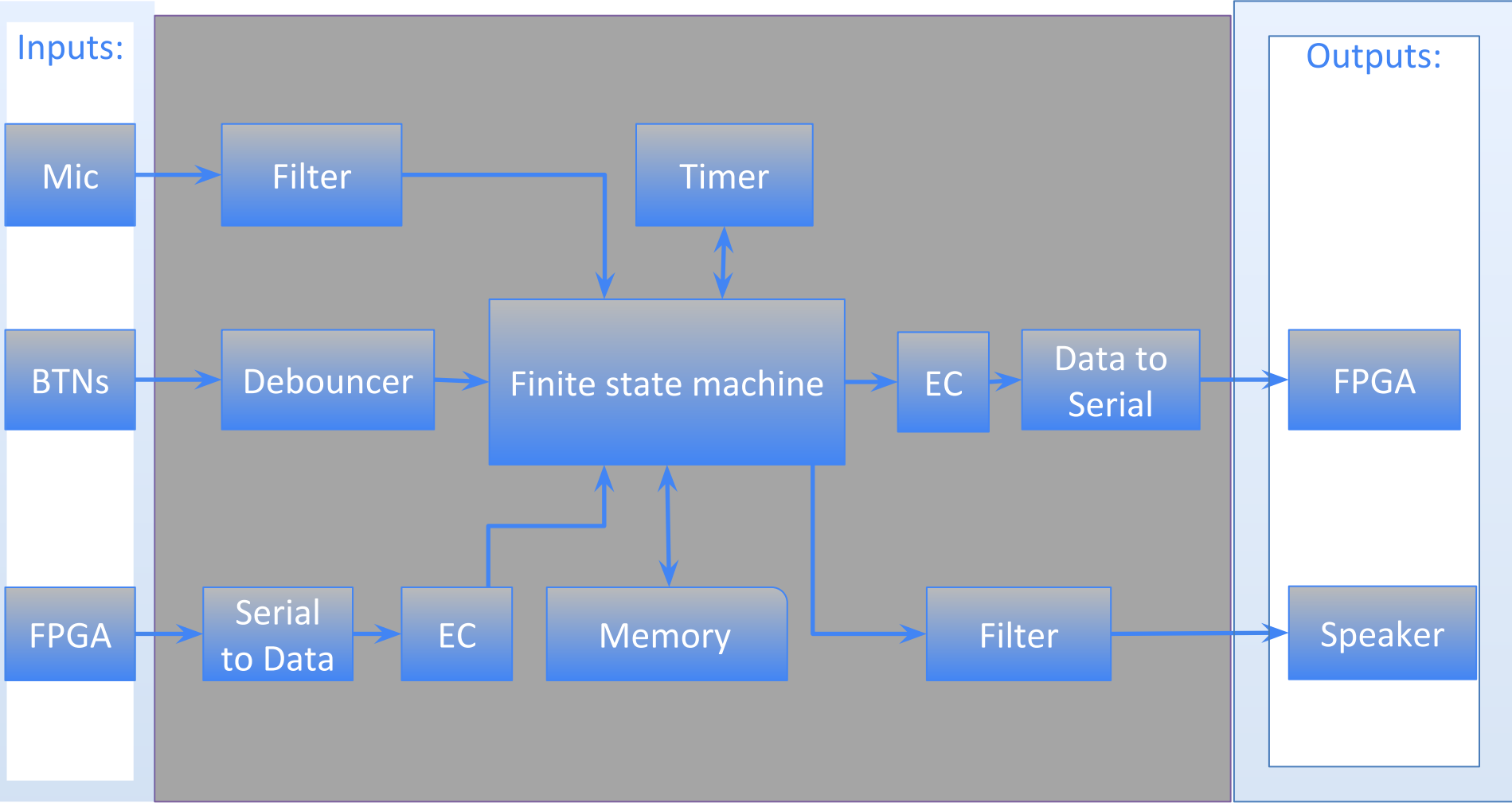
Data to
Serial

Filter

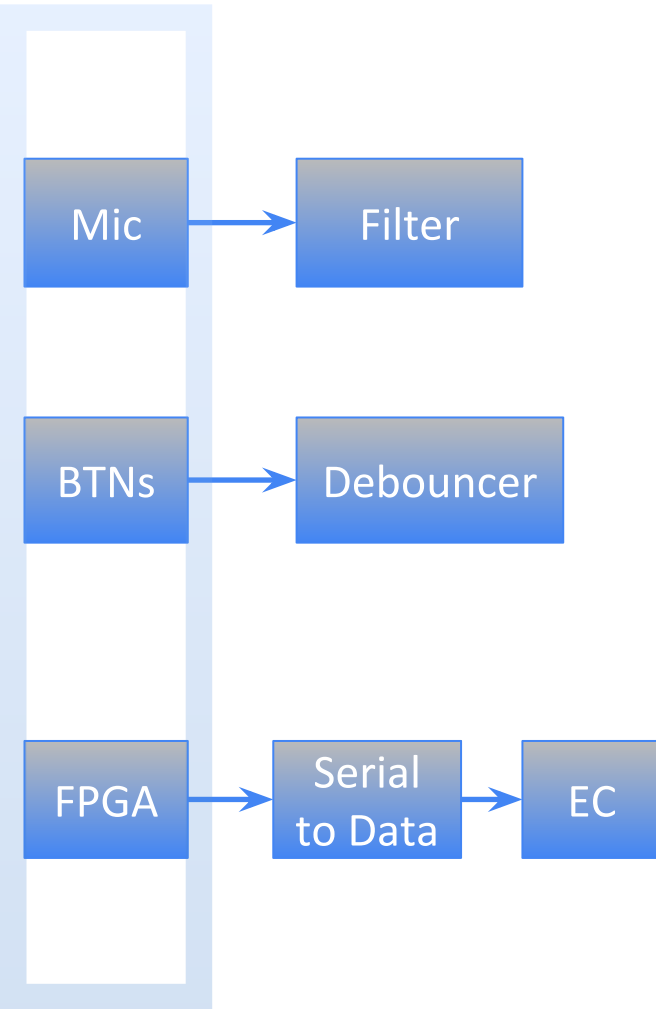
Outputs:

FPGA

Speaker



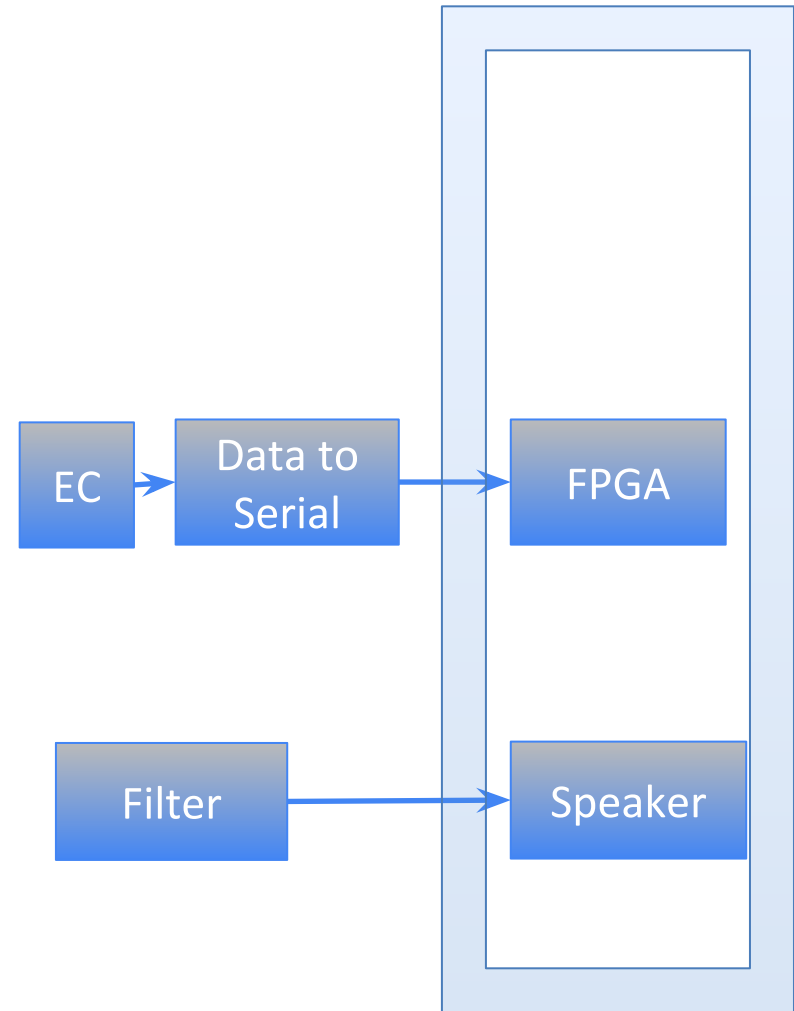
Inputs



- Lead Conversation
- Initiate conversation or record/listen to messages
- Data from the other FPGAs

Outputs

- Send data to the other FPGAs
- Produce sound on the speakers

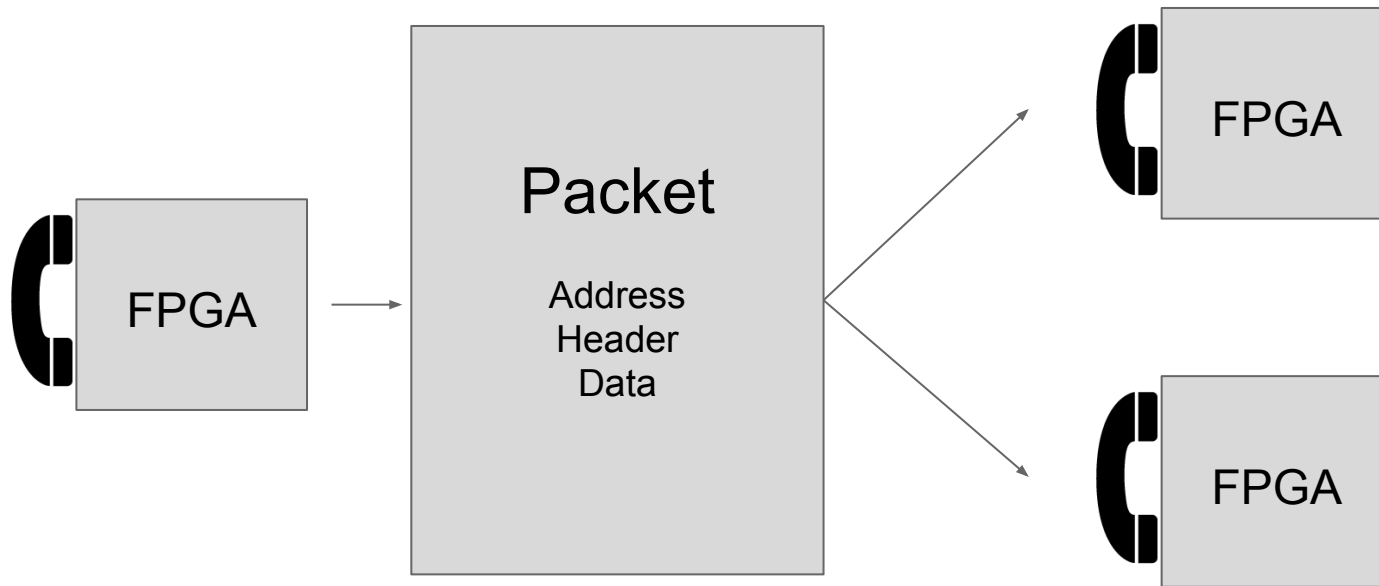


Error Correction

Good audio quality requires good data transmission between the FPGAs.

Error correction algorithms send extra information, which helps to detect and fix errors in the transmission.

Sending Data



Memory

- 128 Mbits of flash memory
- 1 minute messages downsampled to 6kHz
- Using 8 bit audio
 - 43 messages + 1 personal voicemail
- Using 12 bit audio
 - 28 messages + 1 personal voicemail

Stretch Goals

- Make it work with more than two FPGAs
- Using a display (current state, caller ID, etc.)
- No downsampling of the audio from the microphone
- Simulate real telephone system by separating the FPGAs by bigger distance

Questions?