Feasibility of Implementing an H.263+ Decoder on a TMS320C6X DSP

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H.263+: Video Coding at Low Bit Rates

- Negligible computational expense
- Real-time software decoding possible
- H.263+ adds 12 additional optional modes
  - Added error resilience
  - Supports custom source formats
  - Better compression possible
  - Scalable

Research

- Studied video coding concepts
- Found sources dealing with faster decoding algorithms (wavelet theory)
- Used Internet to look at standards web sites such as the MPEG and ITU-T site
  - Most information restricted to organization members or subscribers

Starting Point

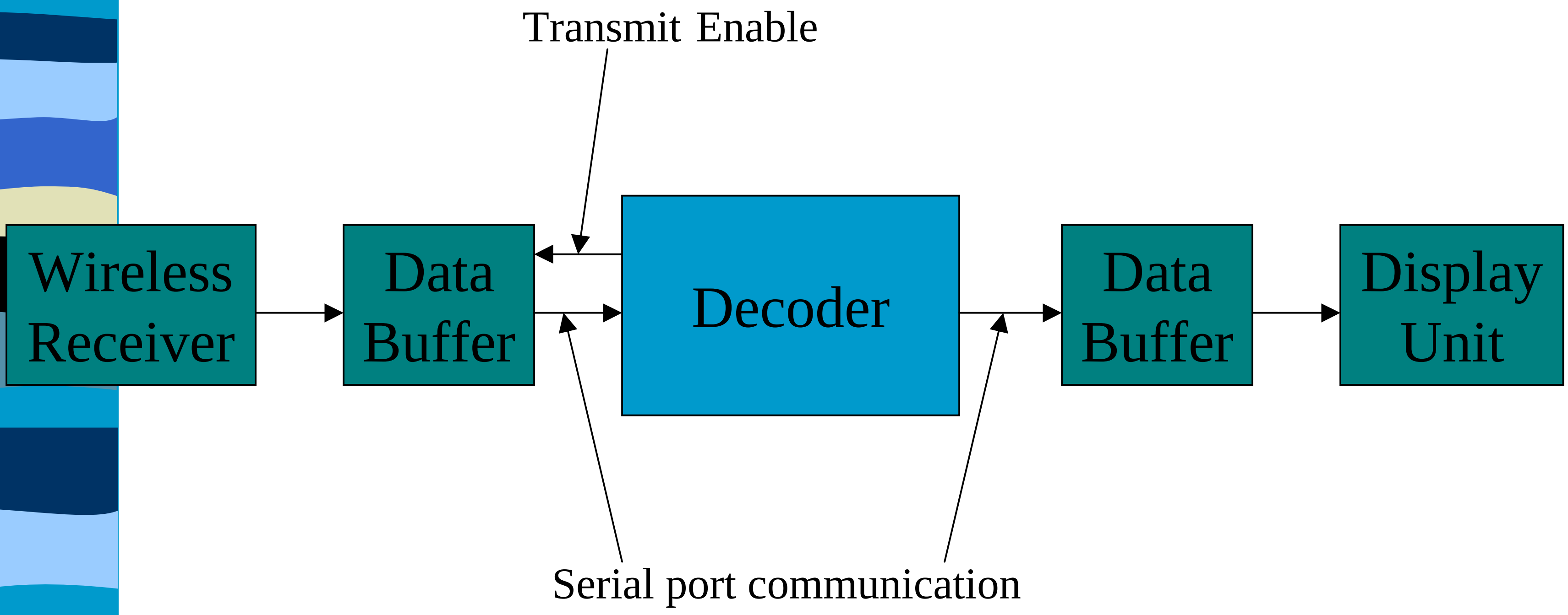
- Found public domain H.263+ encoder/decoder implementation by Kossentini, et al.[1]
- Code designed for Unix and Windows platform - must convert to work with C6x chip

[1] http://spmg.ece.ubc.ca/research/h263plus/main.html

Tools Needed

- C6x code compiler, assembler, and simulator from Texas Instruments
- C6x peripheral support libraries
- EVM kit expensive
- Used evaluation simulator and compiler tools for PC (some limited functionality)

Wireless Video System Model



Transmit Enable

Wireless Receiver

Data Buffer

Decoder

Data Buffer

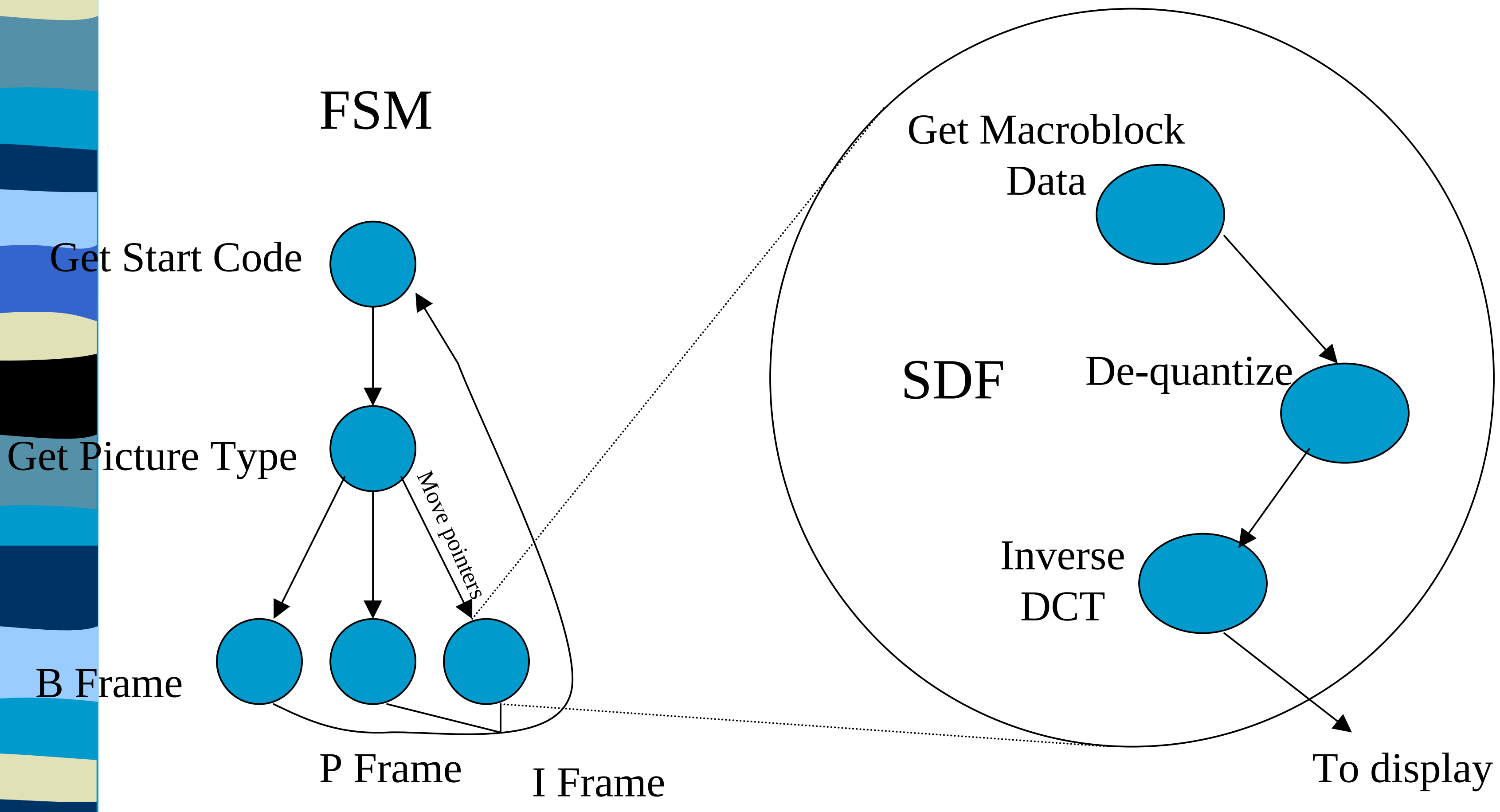
Display Unit

Serial port communication

Implementation

- Streamlined code
  - – Removed custom picture format capability
  - – Eliminated command-line processing
  - – Rewrote code to avoid compiler bugs
- Altered code to access bit-streams using serial ports on DSP
- Mapped serial ports to files in C6x simulator

Dataflow Within Decoder



Results

- Program memory size allowable
  - approx. 1Mbits
- Too much data memory required
  - approx. 9Mbits
- Simulator runs extremely slowly
- Mapping of serial port to a file did not work in simulator (TI Tech Support no help)

Conclusion

- Can implement decoder using the External Memory Interface (EMIF)
  - Need to consider power consumption and size more carefully
- Can rewrite code to reduce data memory usage as much as possible
  - May need to minimize implementation to only support basic H.263 bit-stream decoding