Demos of Noise Reduction for Voice Recognition

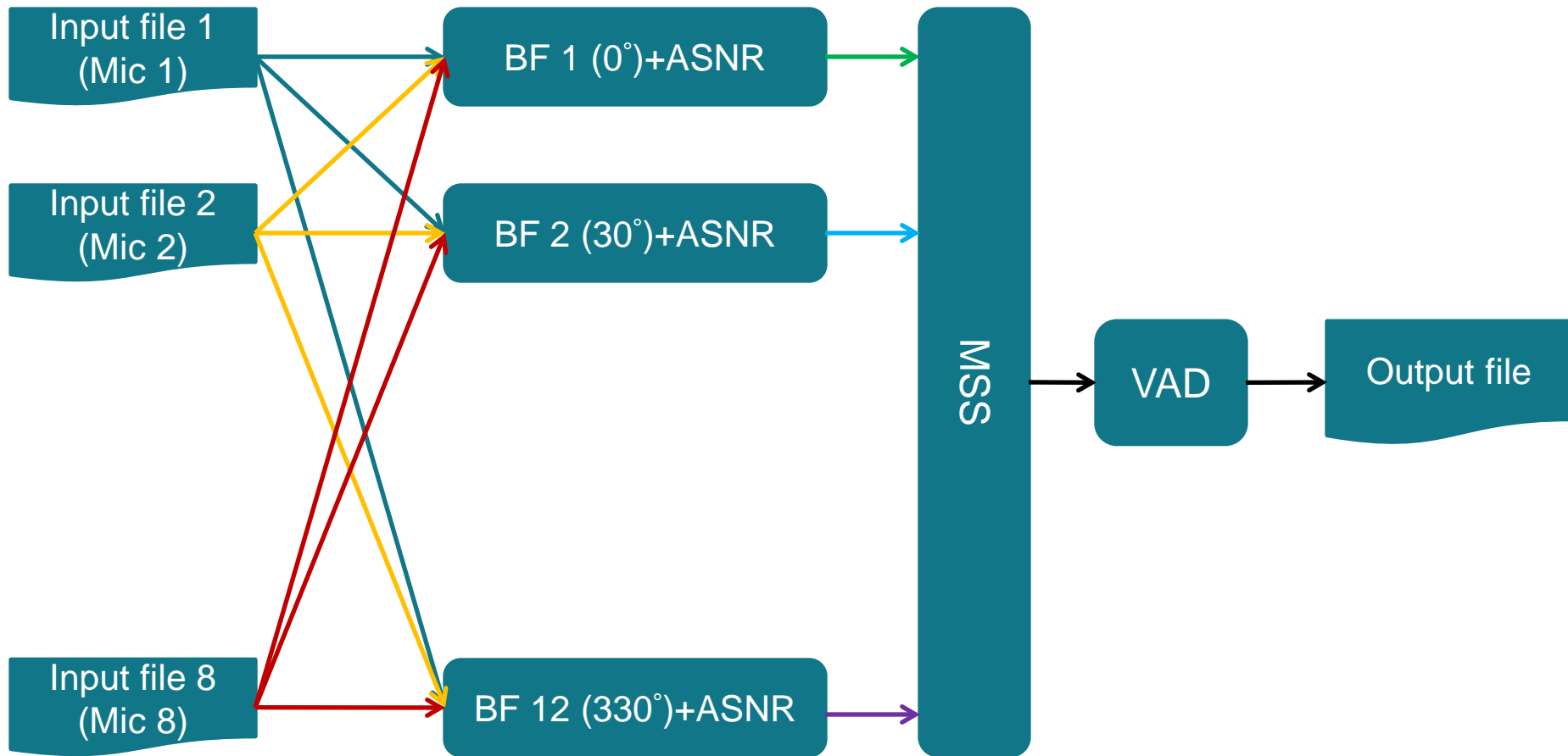**Ming Wei**

June 2016

TEXAS INSTRUMENTS

Demo Based on Canned Audio Input Files (Room Simulation and Input Audio File Generation)
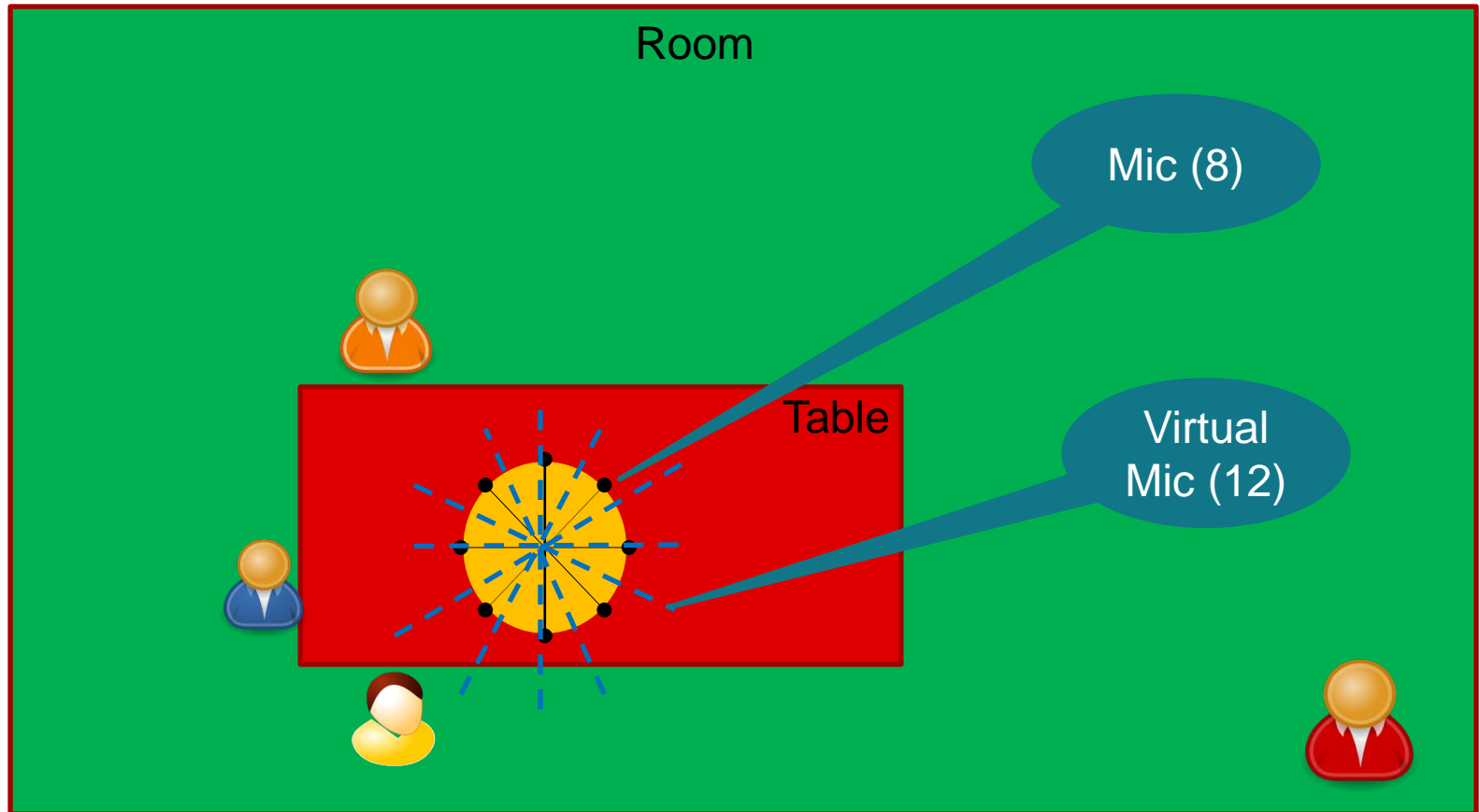
Demo Based on Canned Audio Input Files (Data Flow)

Input file 1 (Mic 1) → BF 1 (0°)+ASNR → MSS

Input file 2 (Mic 2) → BF 2 (30°)+ASNR → MSS

Input file 8 (Mic 8) → BF 12 (330°)+ASNR → MSS

MSS → VAD → Output file

Demo Based on Canned Audio Input Files (Control Flow)

BFLoadMicAll
(GEL Function

BFSaveOutput
(GEL Function)

Audio Input/Output Buffers
(SRAM/DDR)

Input Files
(Hard Drive)

BF+ASNR+MSS+VAU
(C64P/C66x)

Output file
(Hard Drive)

Working/Temp Buffers
(L2 Cache)

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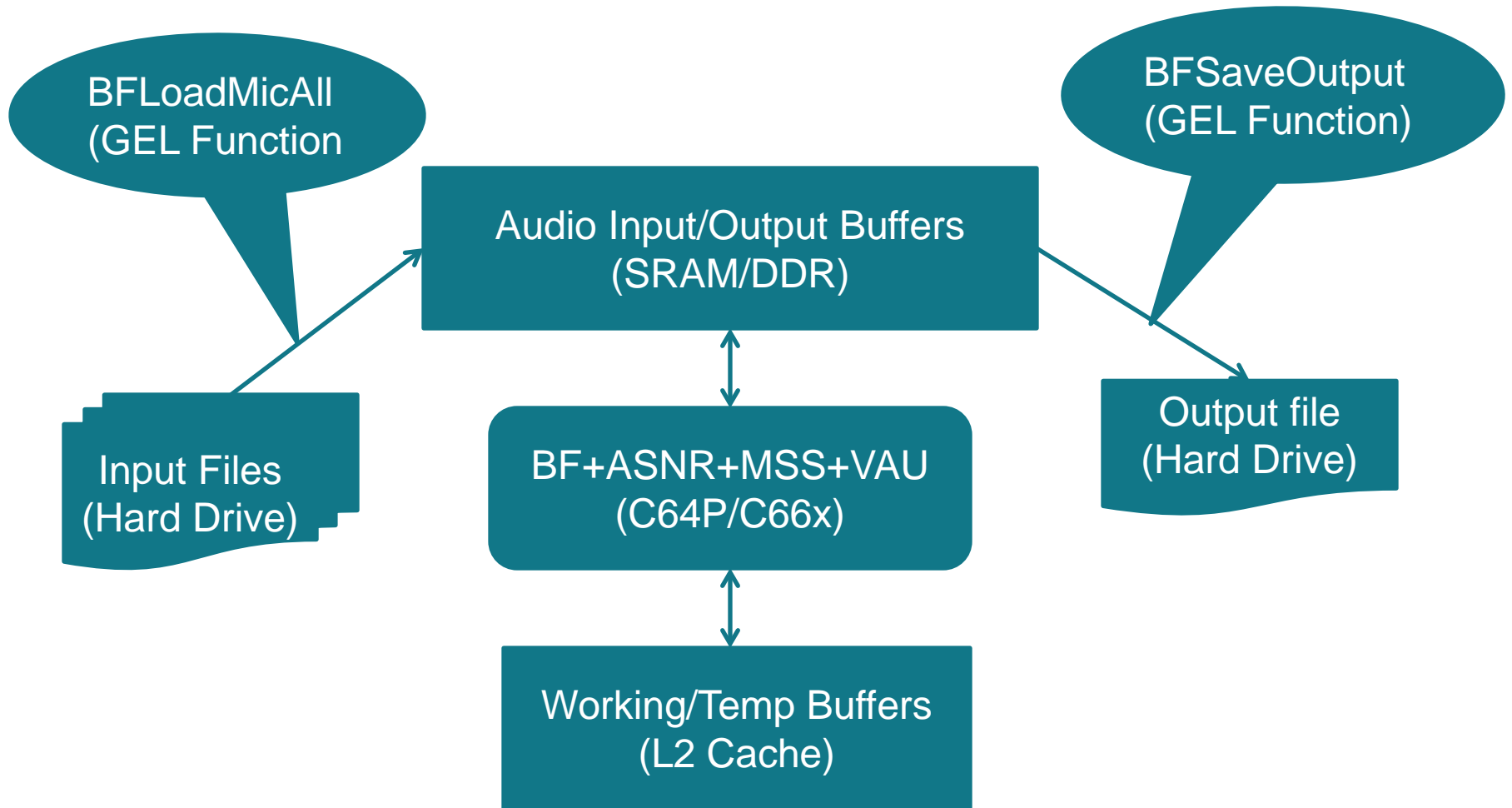
Demo Based on Canned Audio Input Files (Processing Steps) without SYS/BIOS

- Building Environment
  - CCS 6.1.3, CGT 8.1, XDCTools 3.24.07.73 and XDAIS 7.23.00.06
  - AER 17.0.0.0 (C64P)
  - VOLIB 2.1.0.1(C64P and C66x)

- Demo Platform
  - DA830 DSK and AM572x GP EVM
  - Blackhawk USB 560M JTAG emulator

- Run the Demo
  - Load the demo into RAM
  - Read 8 canned audio input files from hard drive into buffers in SRAM/DDR using GEL function
  - Execute the Demo
    - Generate 12 virtual mics using BF(Beamforming) (30° apart)
    - Apply ASNR(Adaptive Signal Noise Reduction) on each virtual mic
    - Use MSS(Multiple Source Selection)to select the best virtual mic from the 12 virtual mics
    - Do VAD(Voice Activity Detection) on the best virtual mic
    - Display the performance data
  - Write 1 processed audio channel from buffer in SRAM/DDR to hard drive using GEL function

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Demo Based on Canned Audio Input Files (Processing Steps) with SYS/BIOS

- Building Environment
  - CCS 6.1.3, CGT 8.1, SYS/BIOS 6.45.1.29, XDCTools 3.32.0.6 and XDAIS 7.24.00.04
  - AER 17.0.0.0 (C64P)
  - VOLIB 2.1.0.1(C64P and C66x)

- Demo Platform
  - DA830 DSK and AM572x GP EVM
  - Blackhawk USB 560M JTAG emulator

- Run the Demo
  - Load the demo into RAM
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    - Display the performance data
  - Write 1 processed audio channel from buffer in SRAM/DDR to hard drive using GEL function

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Demo Based on Canned Audio Input Files (Result Analysis)

- Compare the input files with the output file to see the ASNR effectiveness

- Compare the room setup and input file generation settings with MSS selection decision to check for the BF and MSS effectiveness

- Use profiling data to show the MIPS needed for each component

Demo Based on Canned Audio Input Files (Performance)

- Configurable for 8 (45° apart) or 12 (30° apart) Virtual Mics

- 16Khz Sampling Rate, 16 Bit Per Sample

- MIPS Required on AM572x GP EVM:
  - 39MIPS (8 Virtual Mics)
  - 58MIPS (12 Virtual Mics)

- MIPS Required on DA830 DSK:
  - 40MIPS (8 Virtual Mics)
  - 60MIPS (12 Virtual Mics)

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