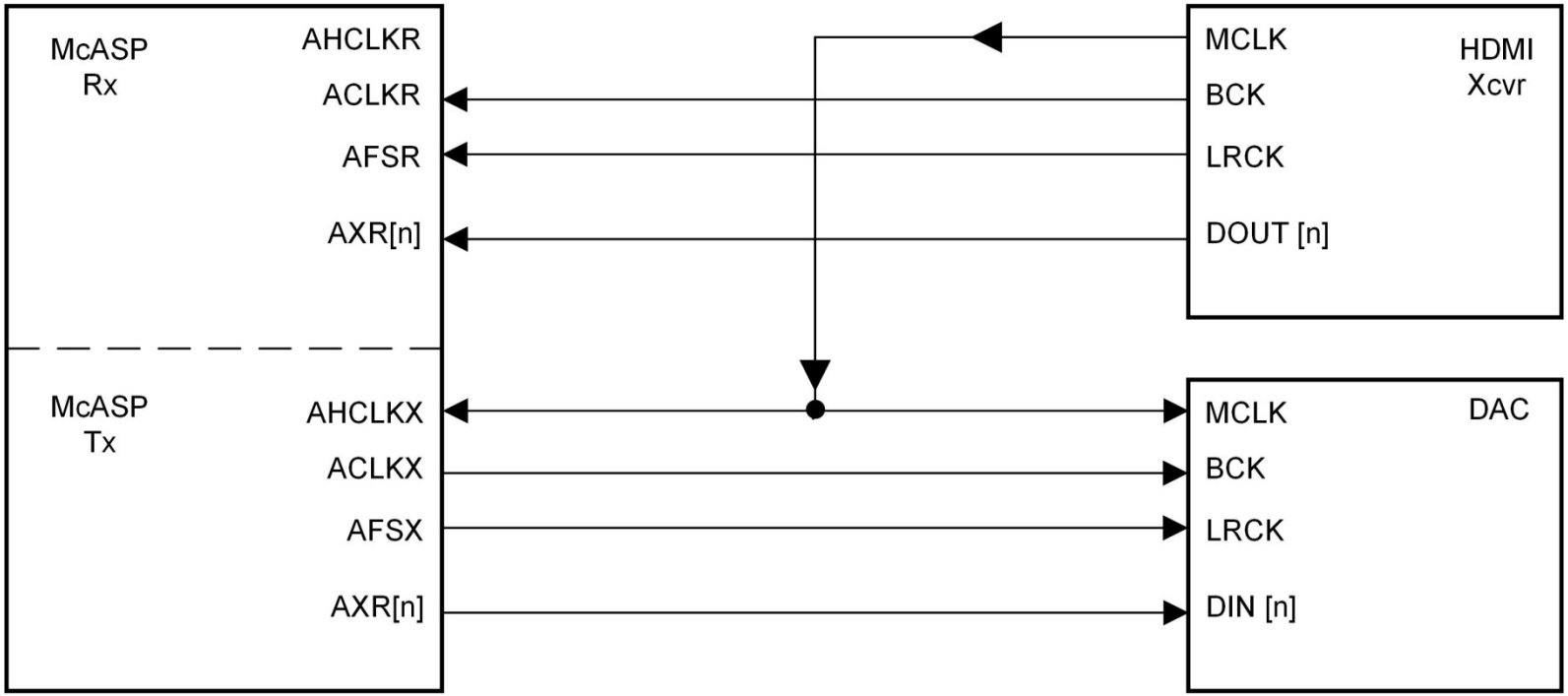
The McASP Primer

Practical examples: Transmitter, SYNC mode

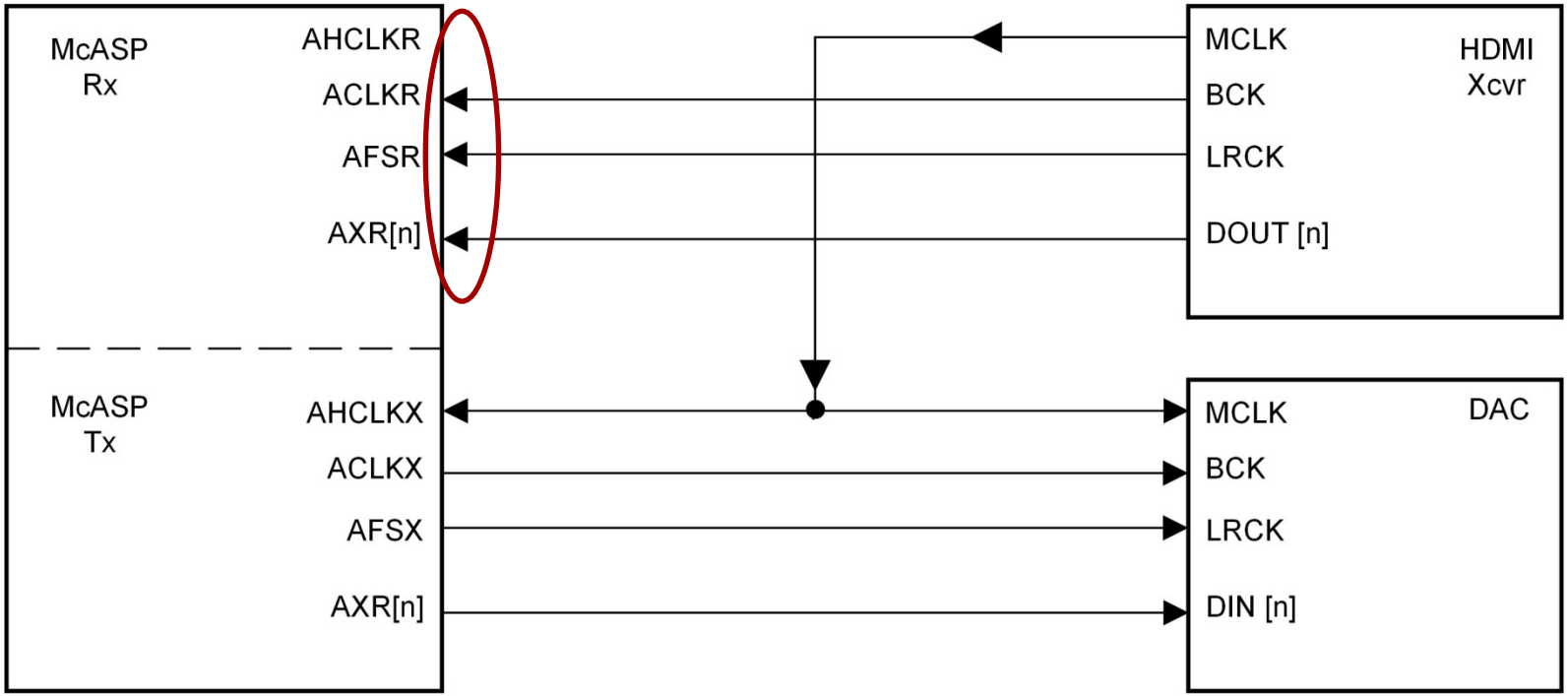
McASP as a transmitter

- Since McASP will be transmitting data, the Tx clock signals (AHCLKX, ACLKX, AFSX) will be used.
- In the “McASP as a receiver” section of this document, we looked at the receiving aspect of McASP in isolation. But this isn’t practical when discussing McASP as a transmitter, where we need to look at Rx and Tx at the same time.
  - In almost all cases, McASP will be transmitting data which has been received from an external audio device, processed on the TI device CPU, and then sent out to the next device.
  - In order to avoid the need for Asynchronous Sample Rate Conversion (ASRC), the McASP transmit clocks must be synchronous with respect to the receive clocks. For this reason, the McASP transmit clocks are very often derived from whichever master clock is used to drive the device from which the McASP receives data.

McASP as a transmitter, HDMI transceiver + DAC



McASP as a transmitter, HDMI transceiver + DAC



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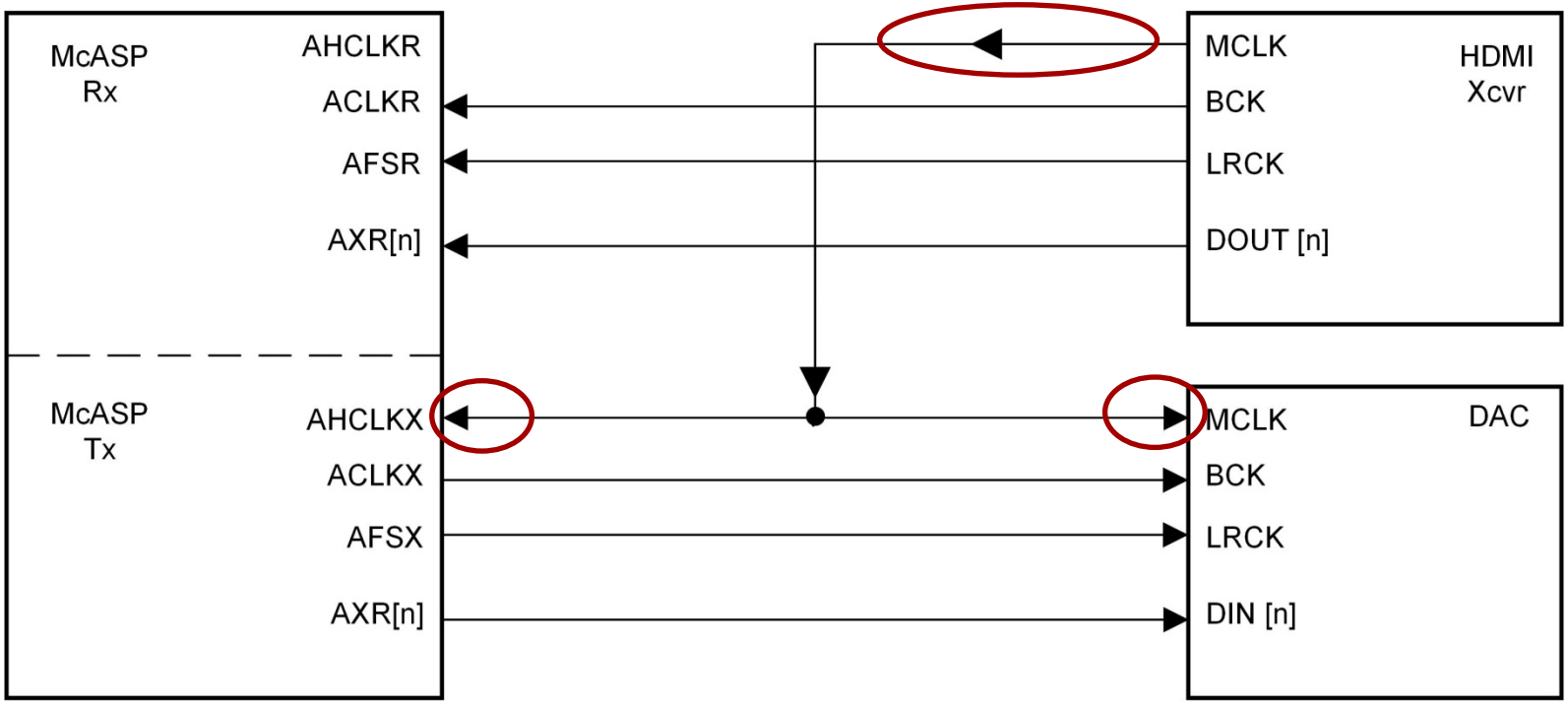

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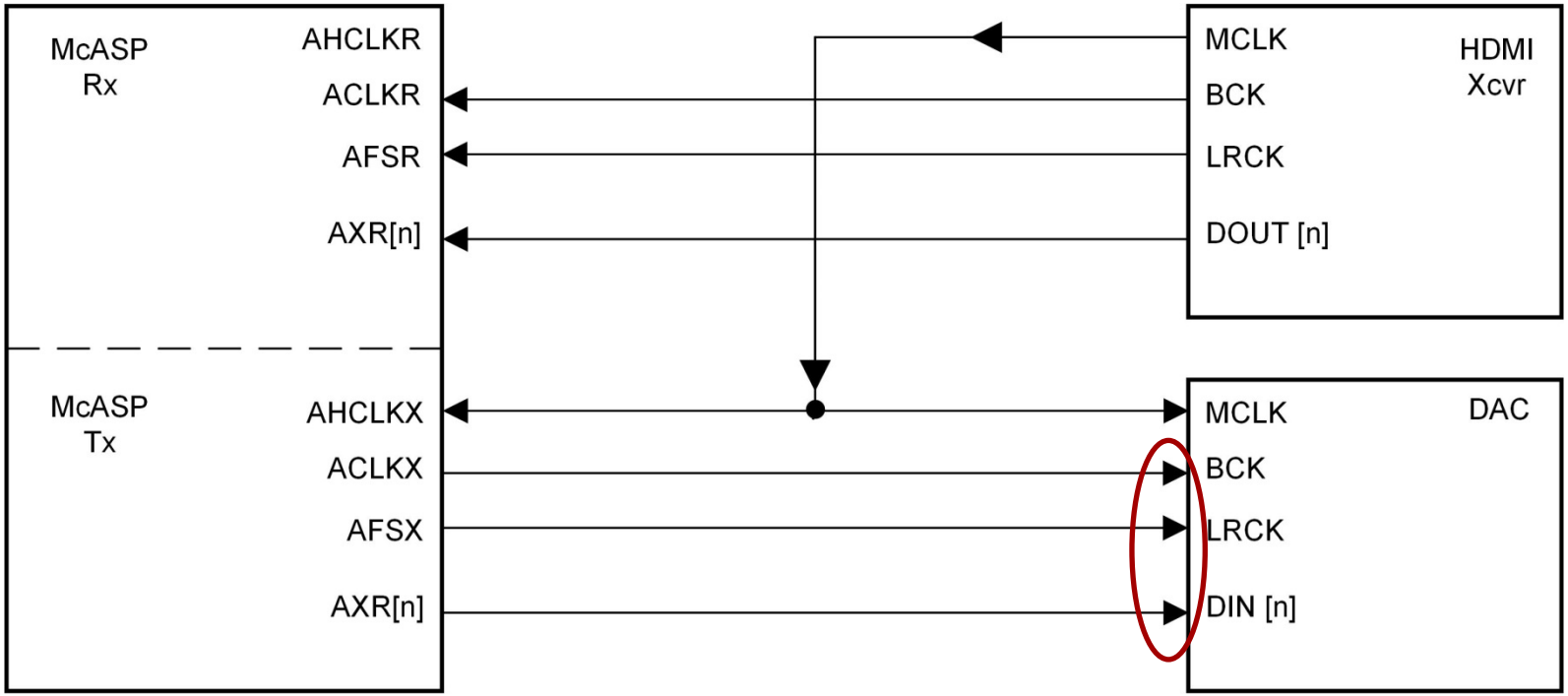

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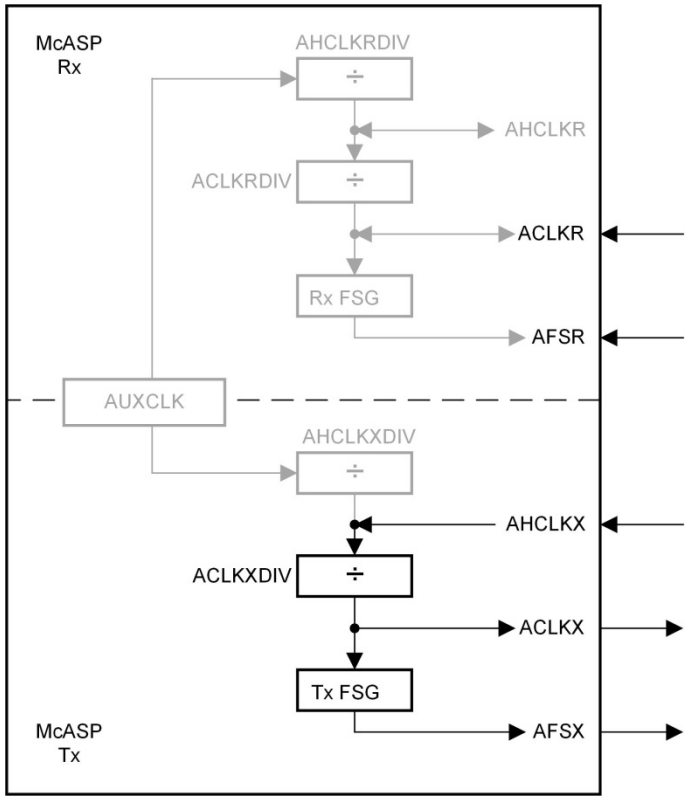
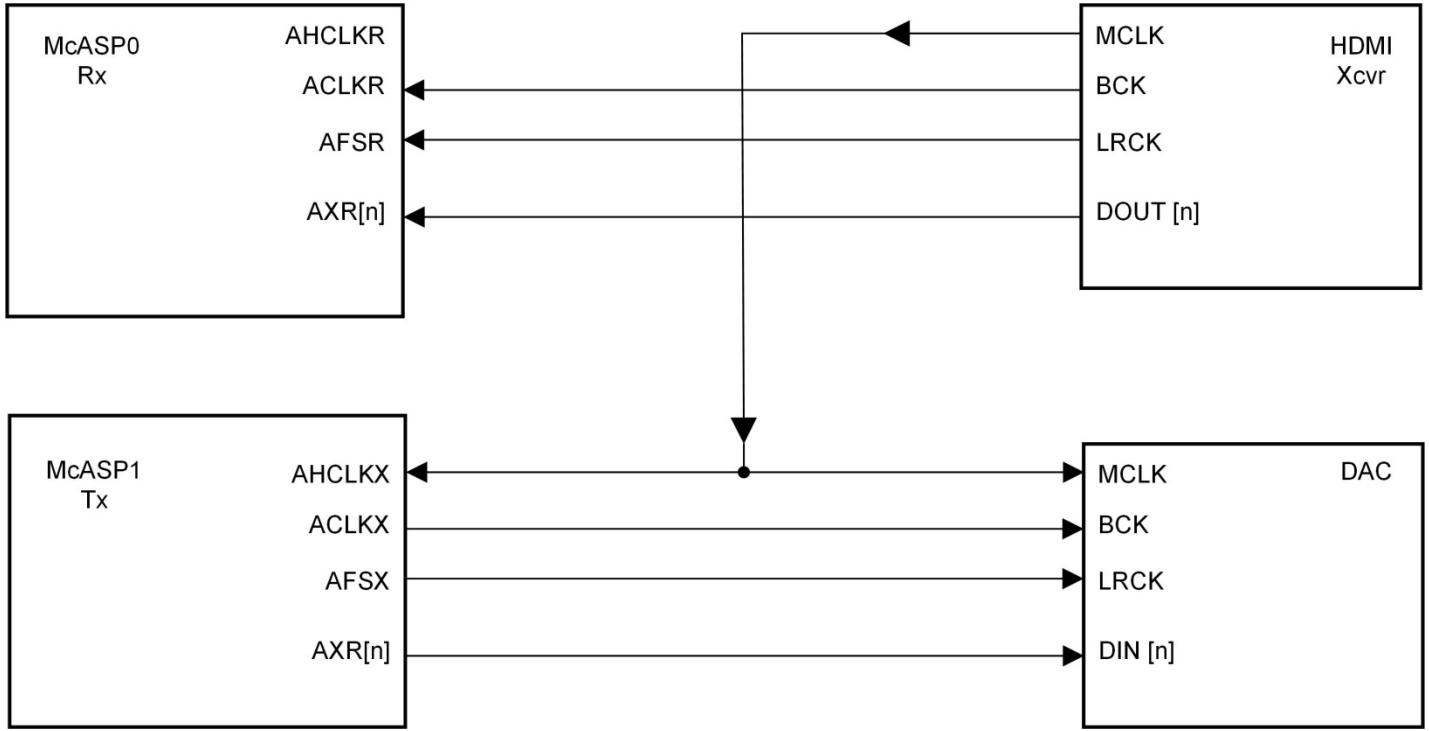
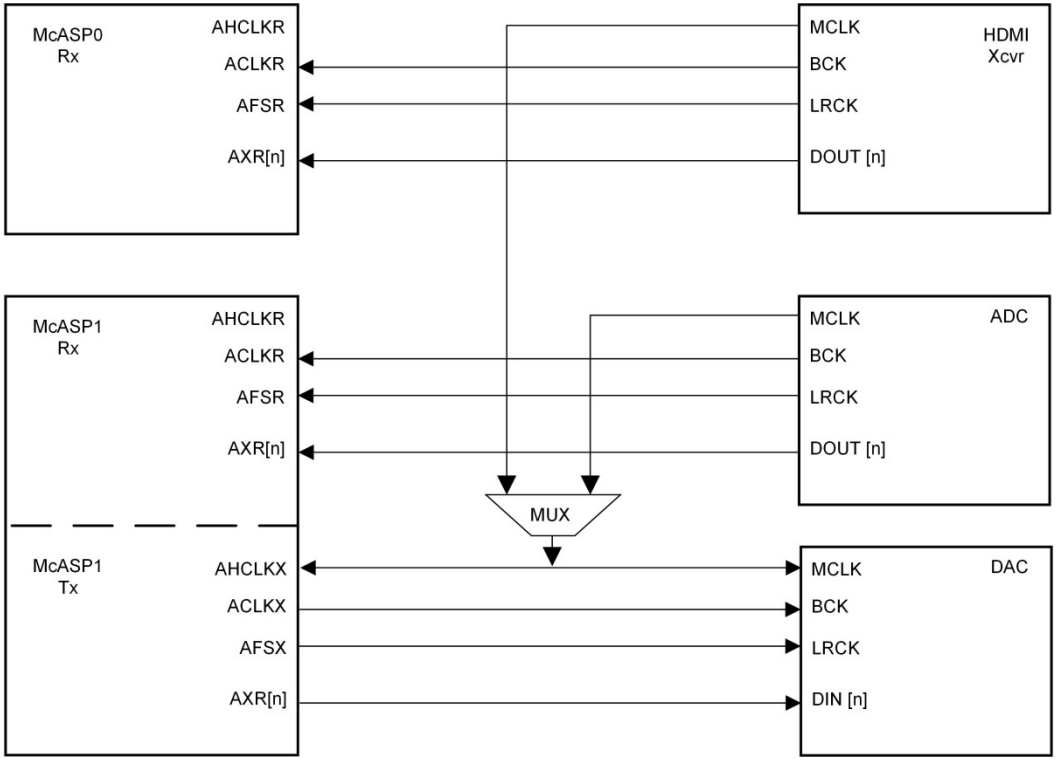


McASP as a transmitter, HDMI transceiver + DAC, using multiple McASPs



McASP as a transmitter, HDMI transceiver + DAC, using multiple McASPs with multiple sources



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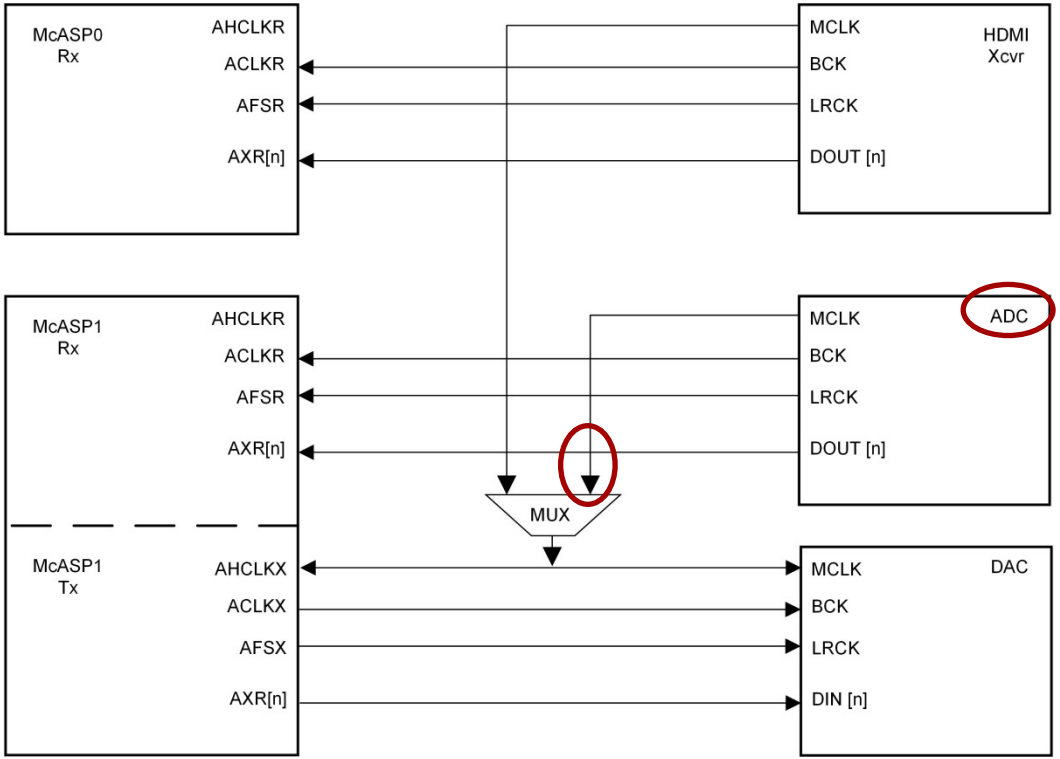

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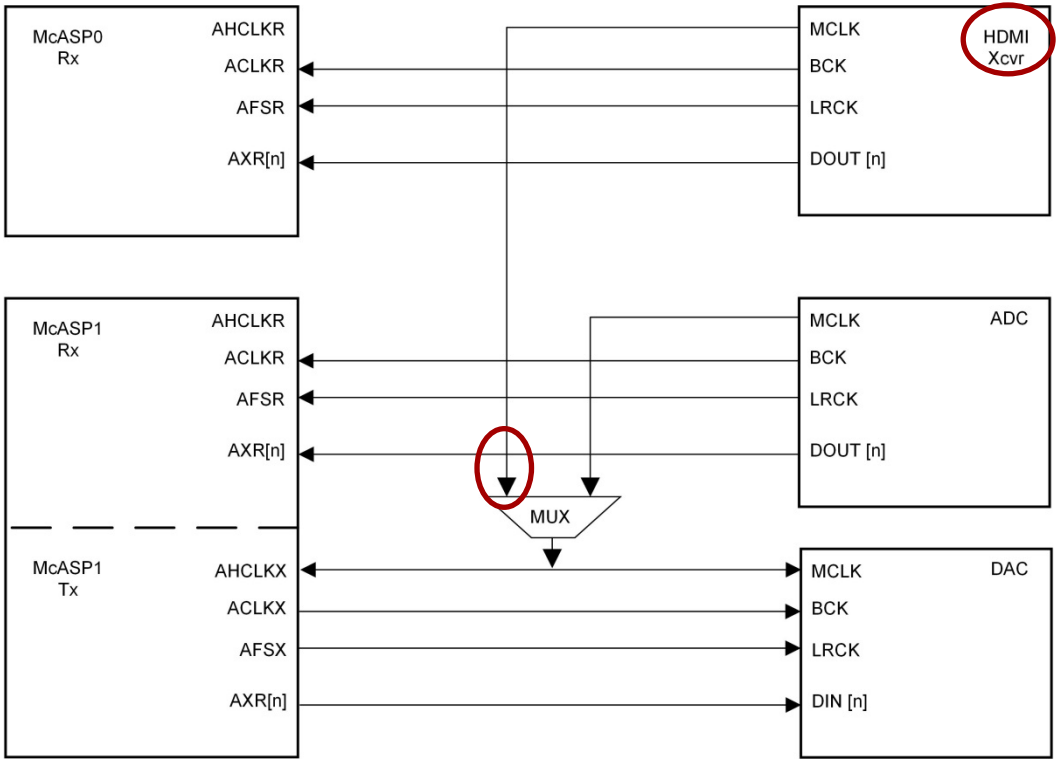
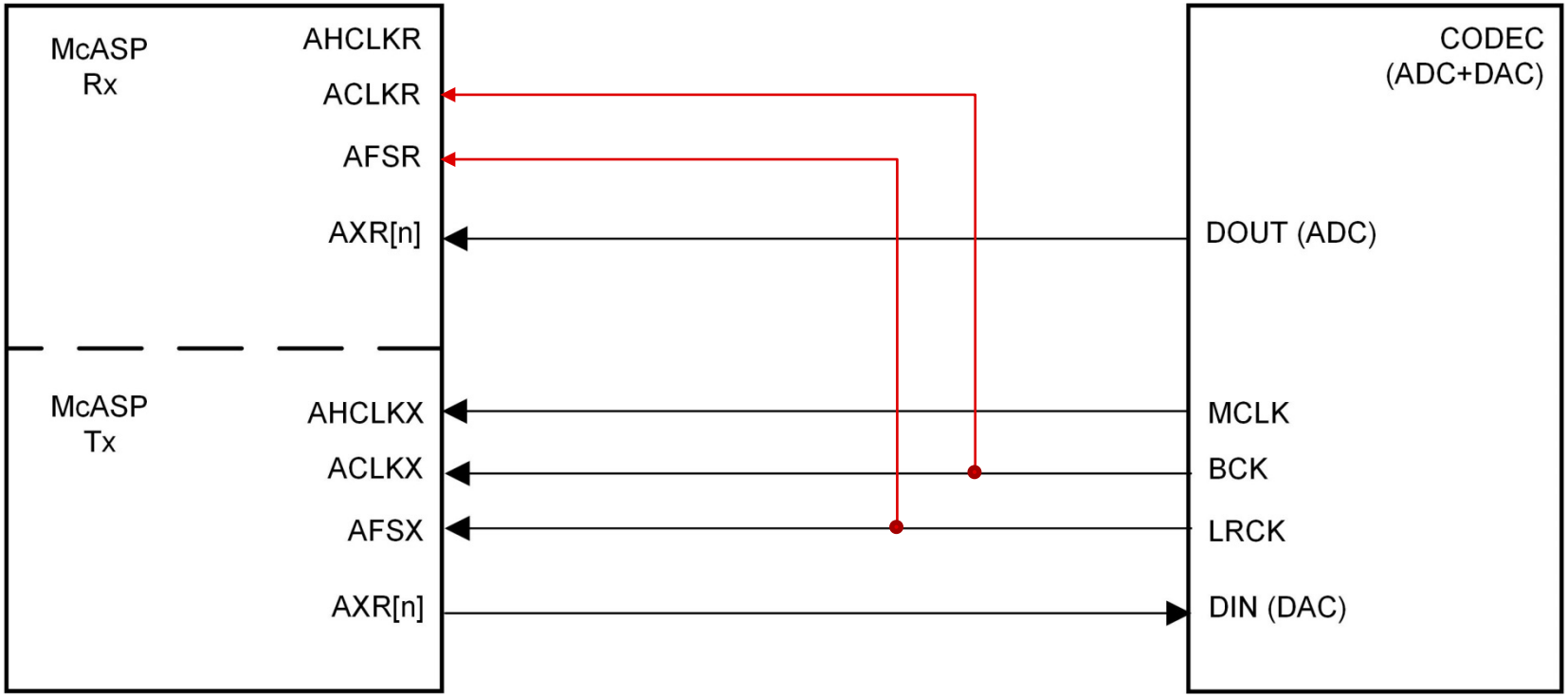


McASP in SYNC mode: Audio codec

- Sometimes, we want McASP's Rx and Tx clocking sections to operate fully synchronously with respect to each other by running off of the same clock signals.
- A typical example is the connection to an audio codec with integrated ADC and DAC:
  - Codecs often do not have independent Rx and Tx clock sections.
  - They usually have data input pins and data output pins, but only one MCLK, one BCK, and one LRCK for the whole device.

McASP in SYNC mode, audio codec as master



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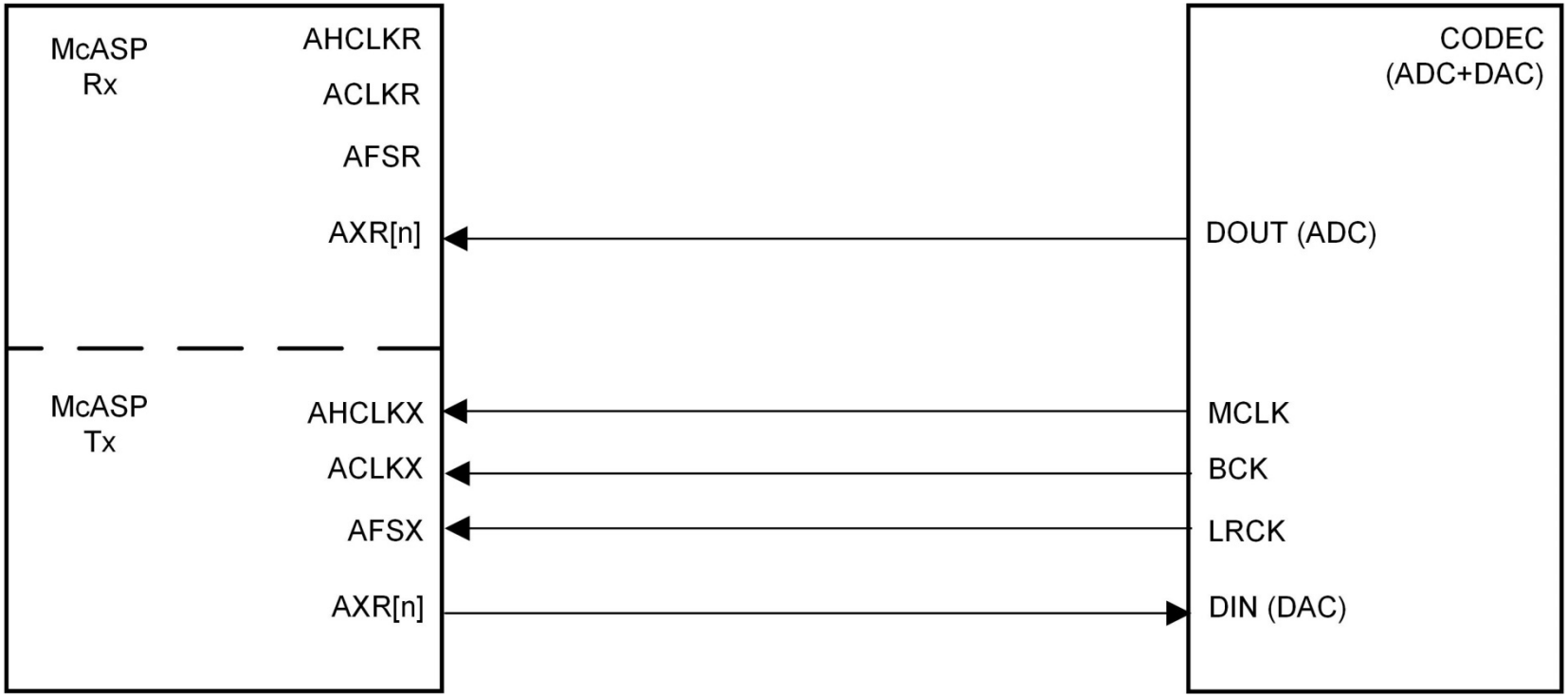

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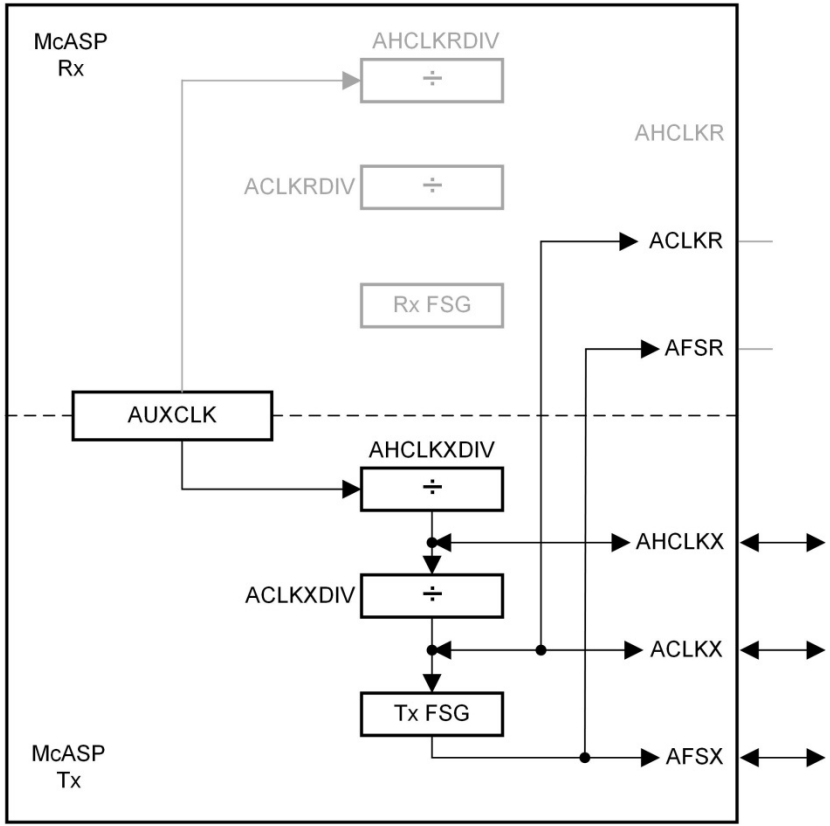

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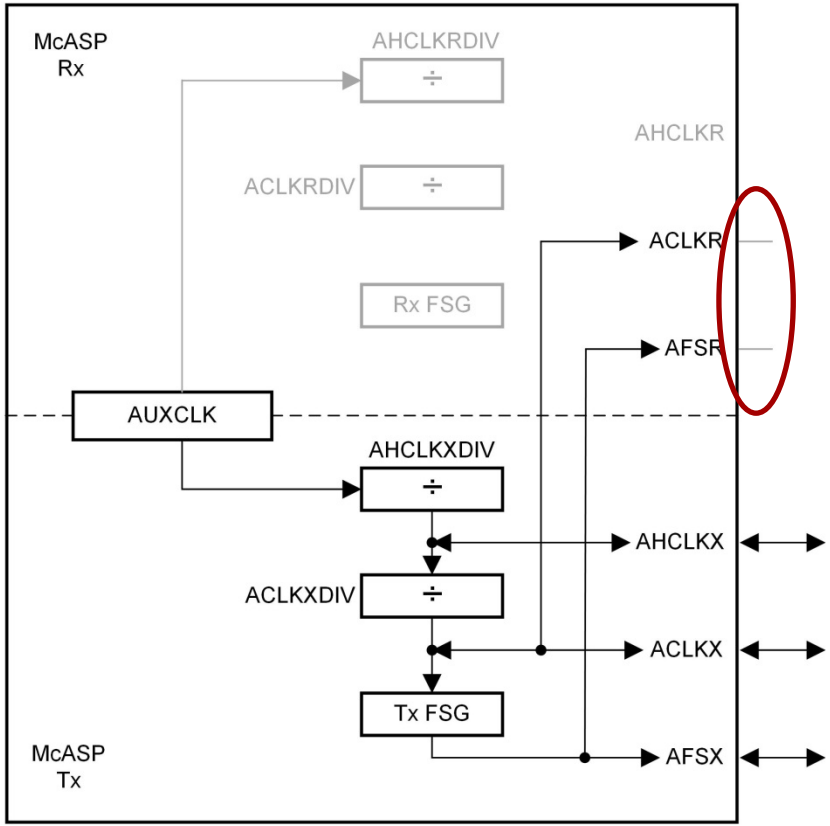

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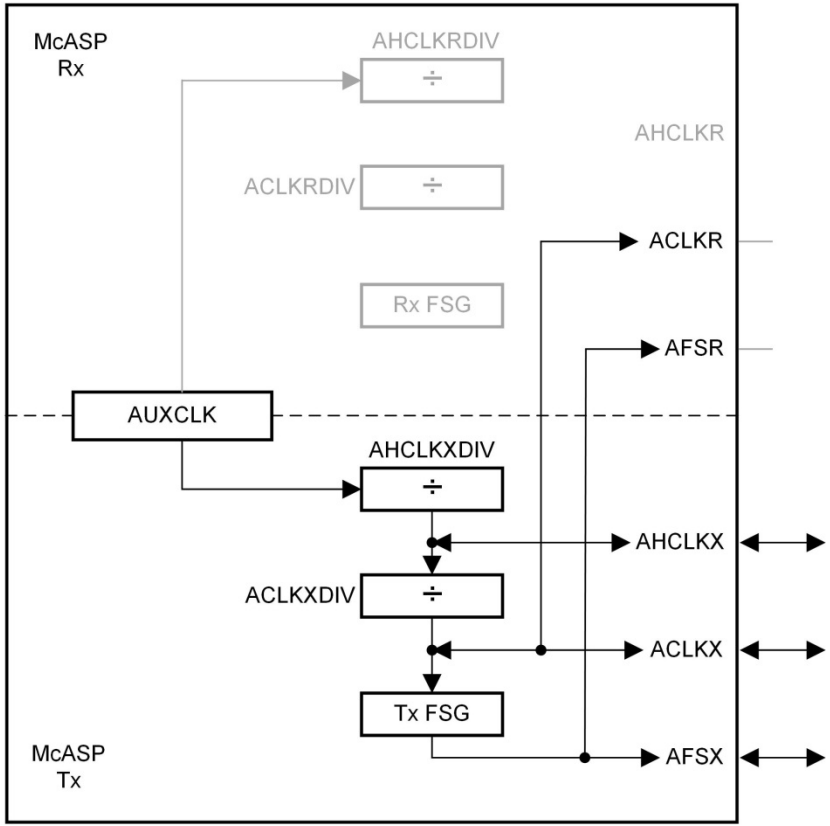

In SYNC mode, ACLKR and AFSR cannot be driven out of their respective device pins.

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- Look at the external audio device's data manual to determine if it needs to be a clock master or a clock slave, then configure the McASP clock pins accordingly. If the audio device can be configured as either, choose whichever configuration is easier (and more cost-effective) to implement.

McASP design guide: Key points

- If McASP is receiving data, use the Rx clock pins. If it's transmitting data, use the Tx clock pins.
- Look at the external audio device's data manual to determine if it needs to be a clock master or a clock slave, then configure the McASP clock pins accordingly. If the audio device can be configured as either, choose whichever configuration is easier (and more cost-effective) to implement.
- If McASP will be transmitting data that is derived from some external audio source, the transmitting McASP clock section must be synchronous with respect to the receiving McASP clock section.

For more information

- McASP Design Guide: Tips, Tricks, and Practical Examples
  http://www.ti.com/lit/sprack0

- For questions about this training, refer to the E2E Community Forums at
  http://e2e.ti.com