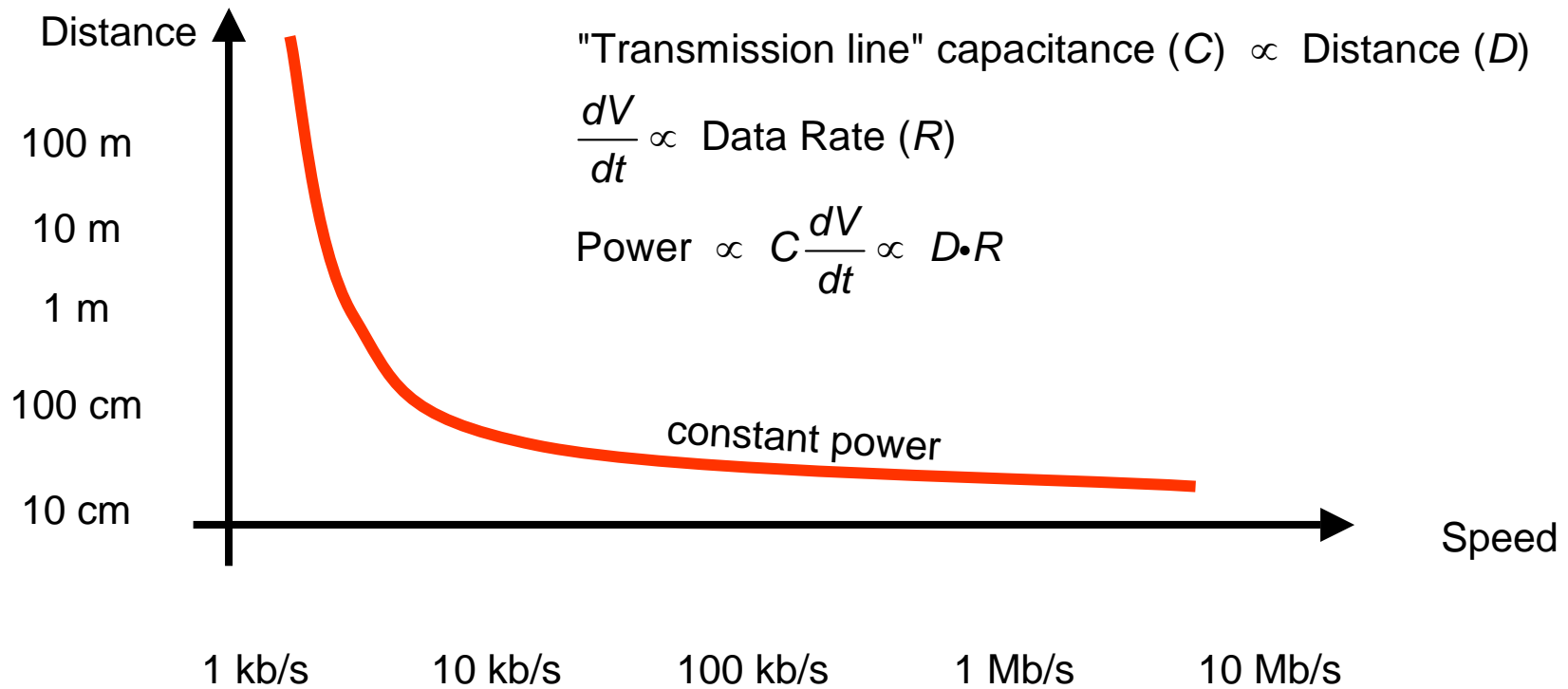


Architecture, Design and Implementation of Embedded Systems for Real-Time Applications

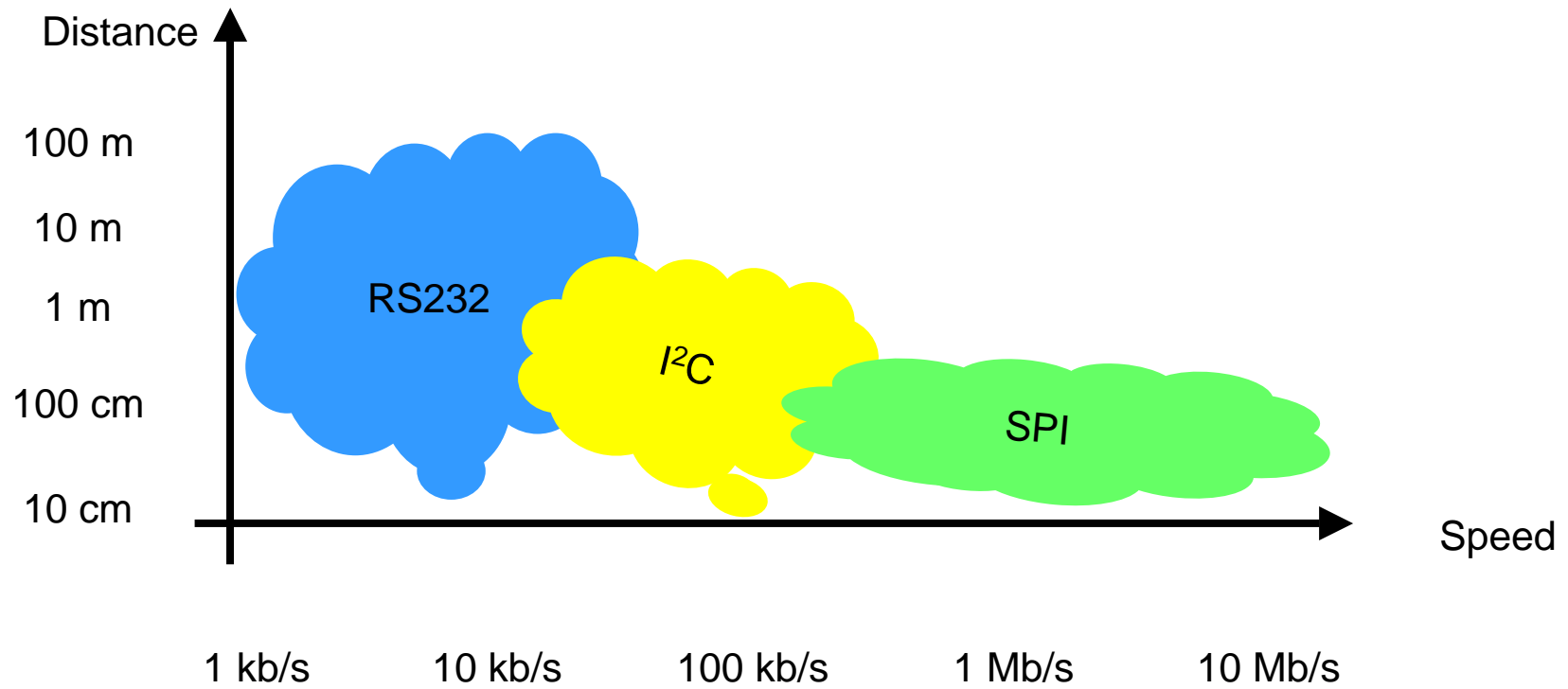
CpE-450 - Spring 05
Class 13/14

Bruce McNair
bmcnair@stevens.edu

Interfacing to Embedded Systems

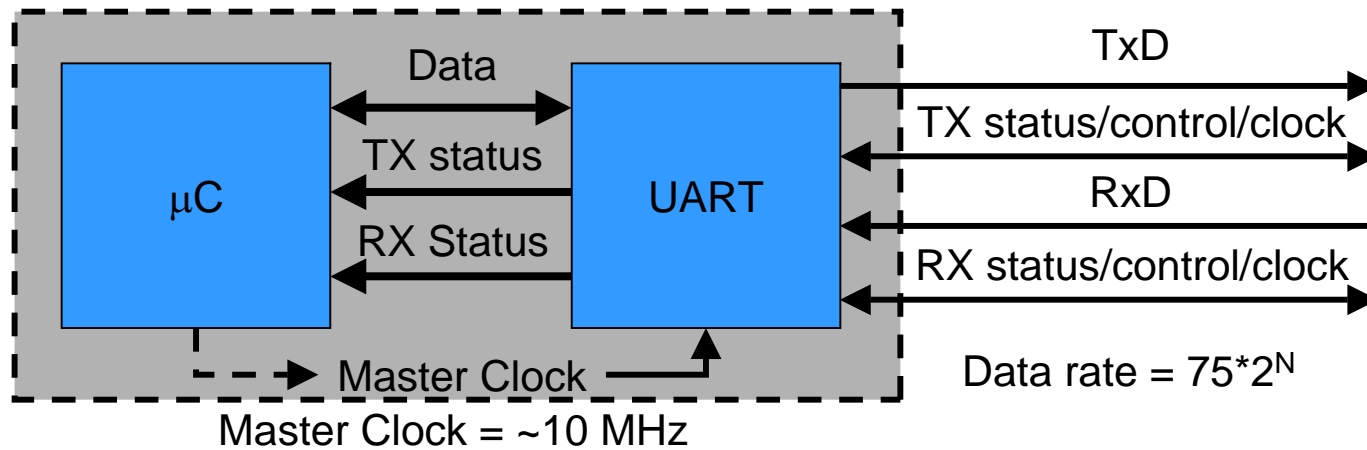


Interfacing to Embedded Systems



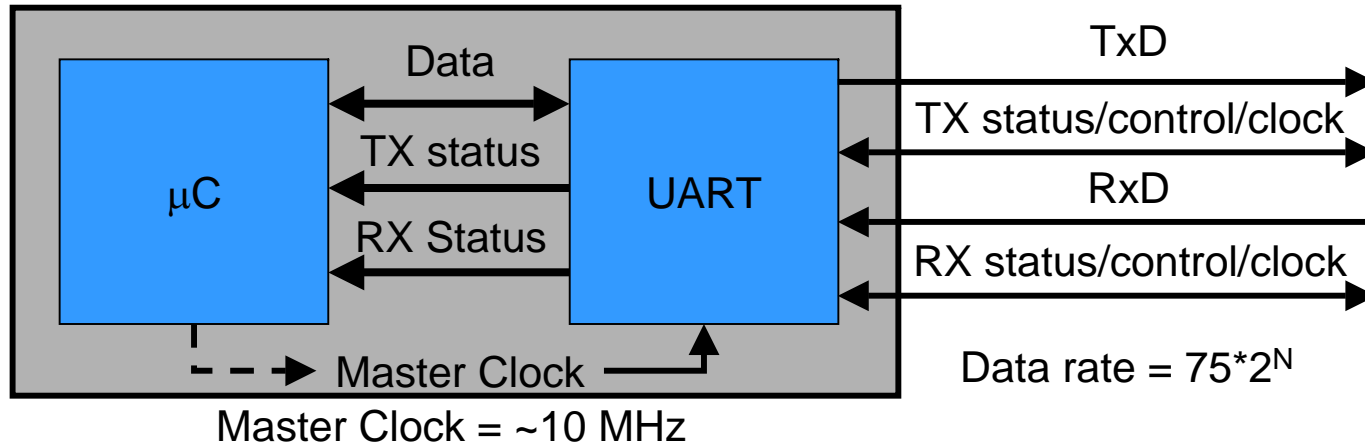
Embedded System Interfacing

- RS-232 Serial Communications



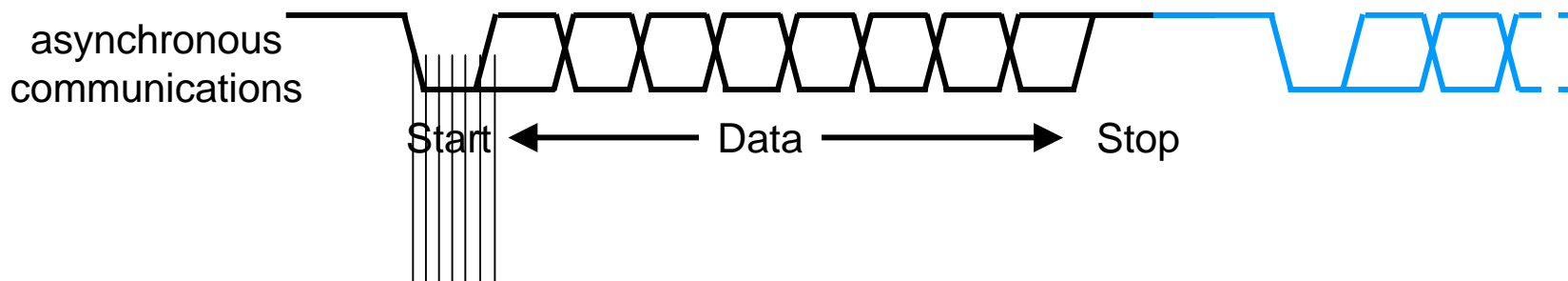
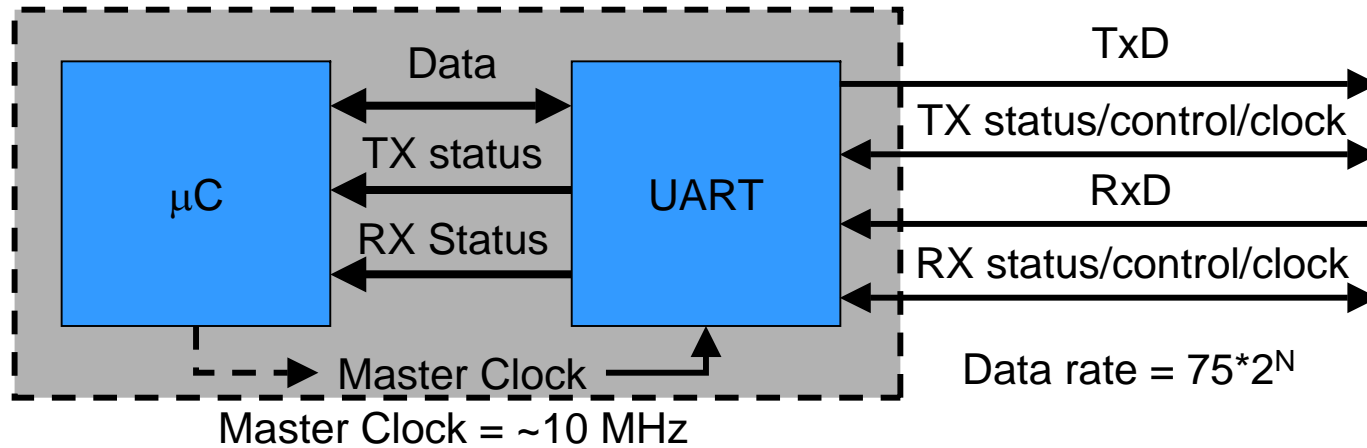
Embedded System Interfacing

- RS-232 Serial Communications



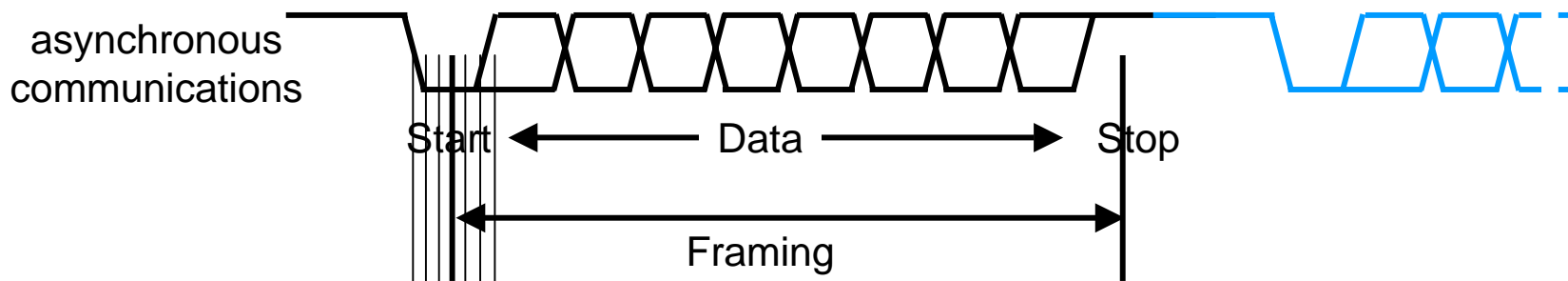
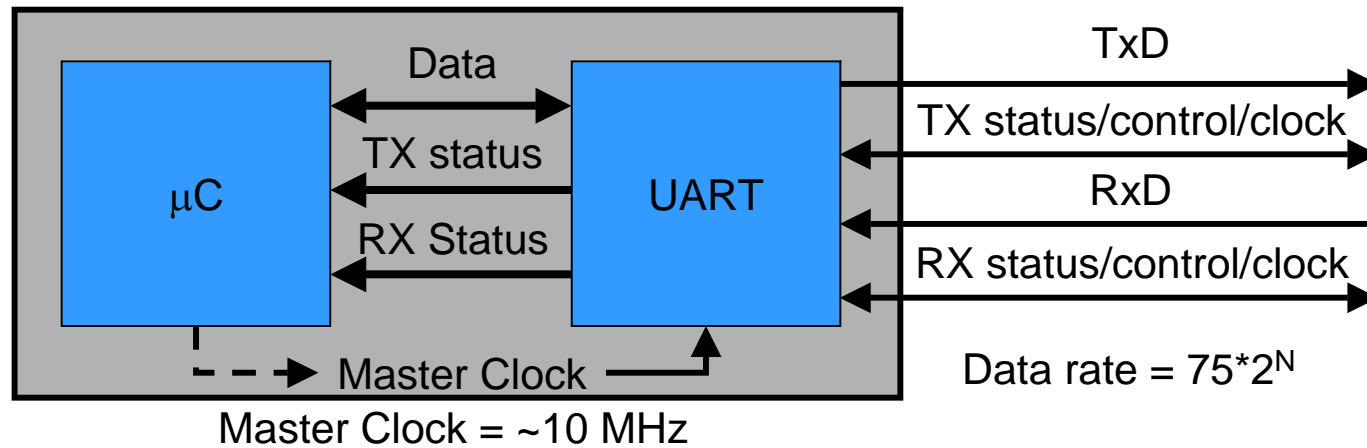
Embedded System Interfacing

- RS-232 Serial Communications



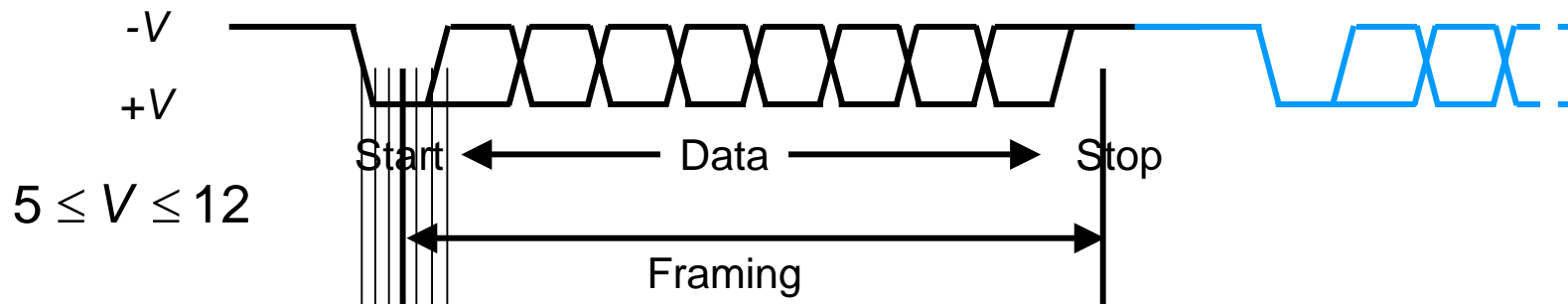
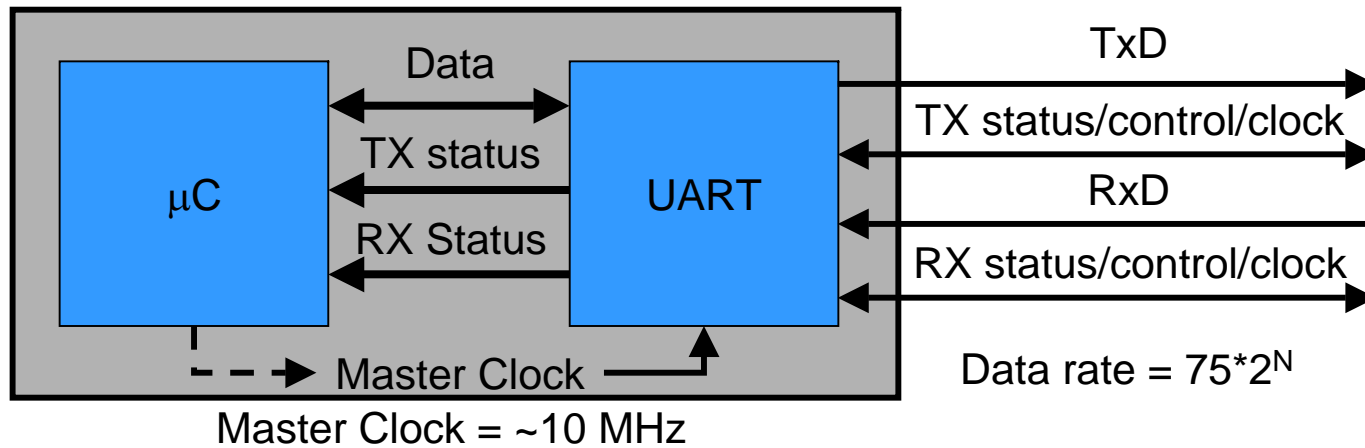
Embedded System Interfacing

- RS-232 Serial Communications



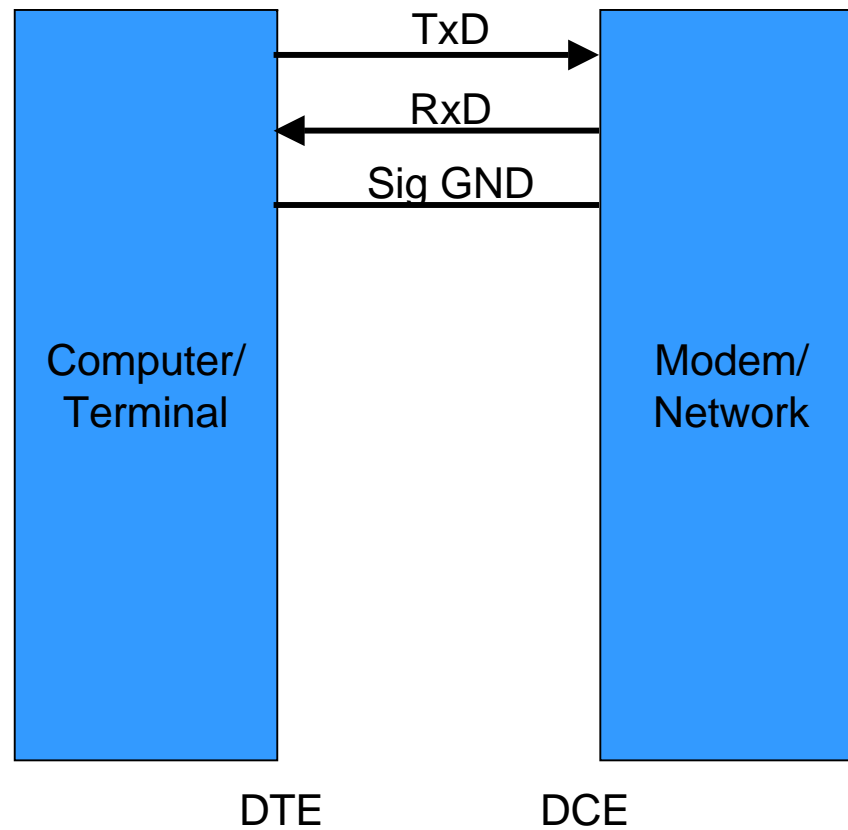
Embedded System Interfacing

- RS-232 Serial Communications



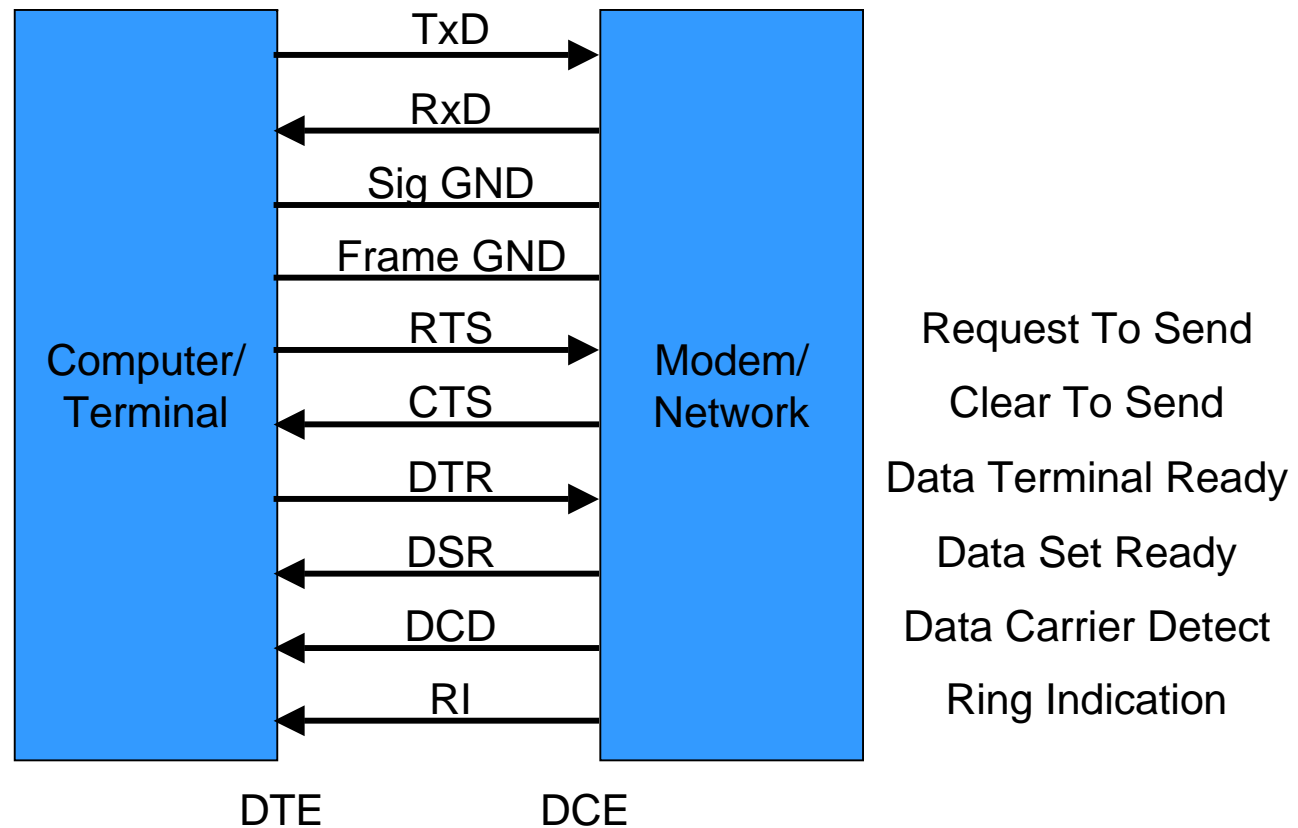
Embedded System Interfacing

- RS-232 Serial Communications



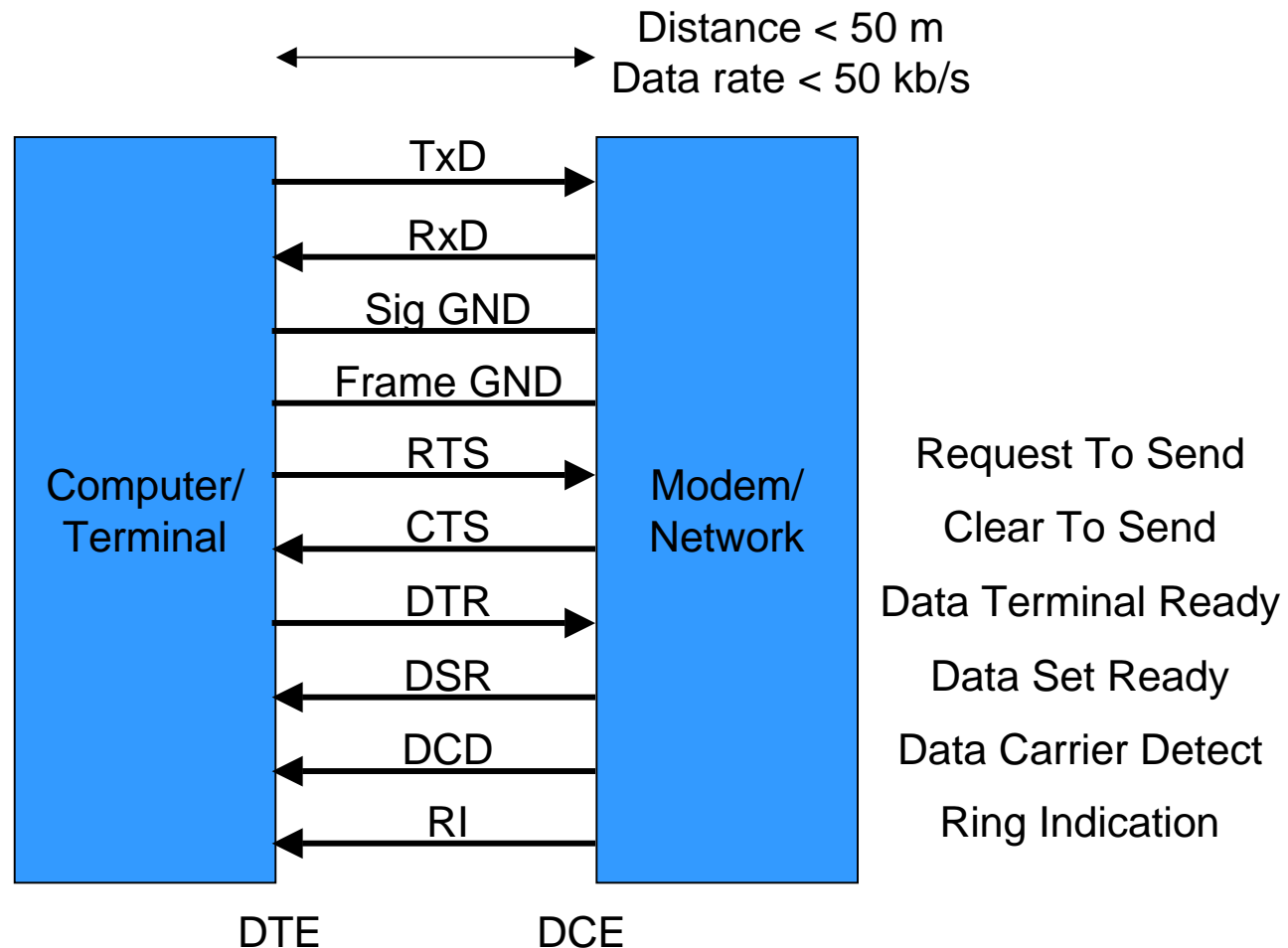
Embedded System Interfacing

- RS-232 Serial Communications



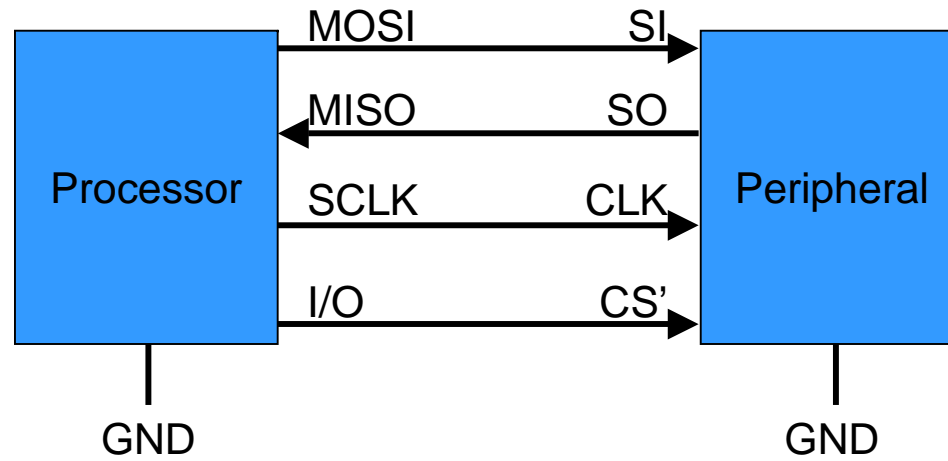
Embedded System Interfacing

- RS-232 Serial Communications



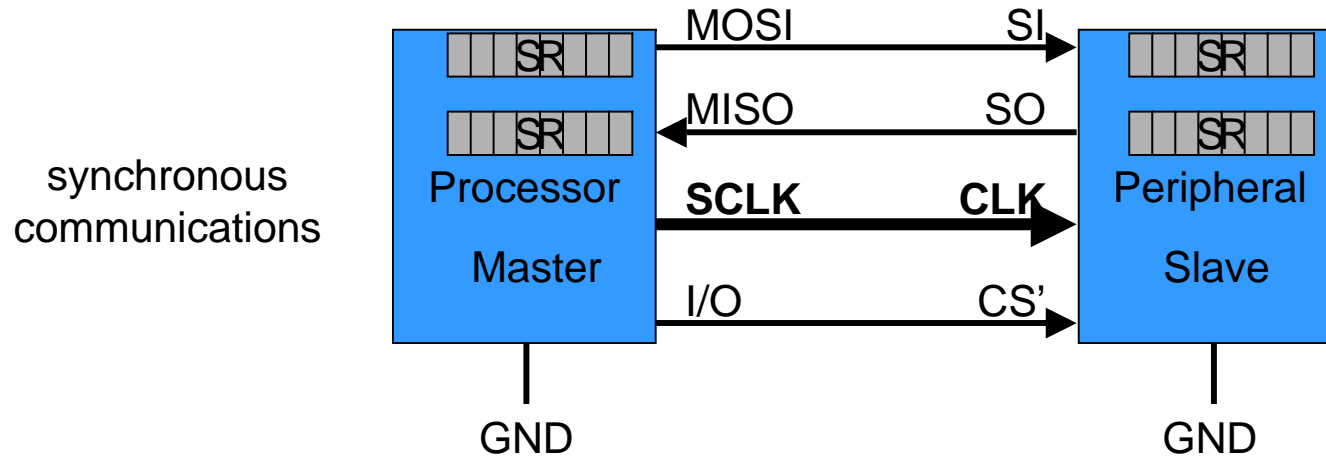
Embedded Systems Interfacing

- SPI – Serial Peripheral Interface



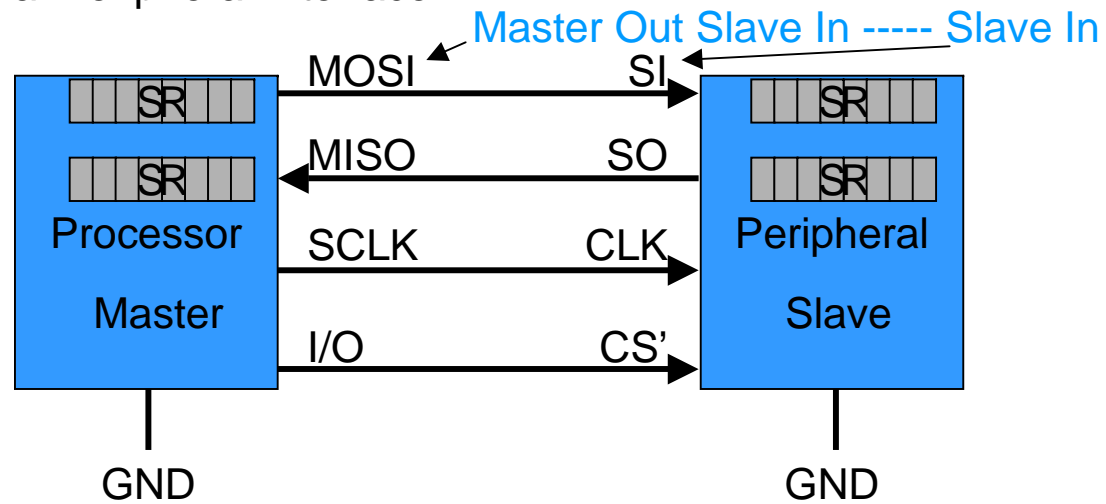
Embedded Systems Interfacing

- SPI – Serial Peripheral Interface



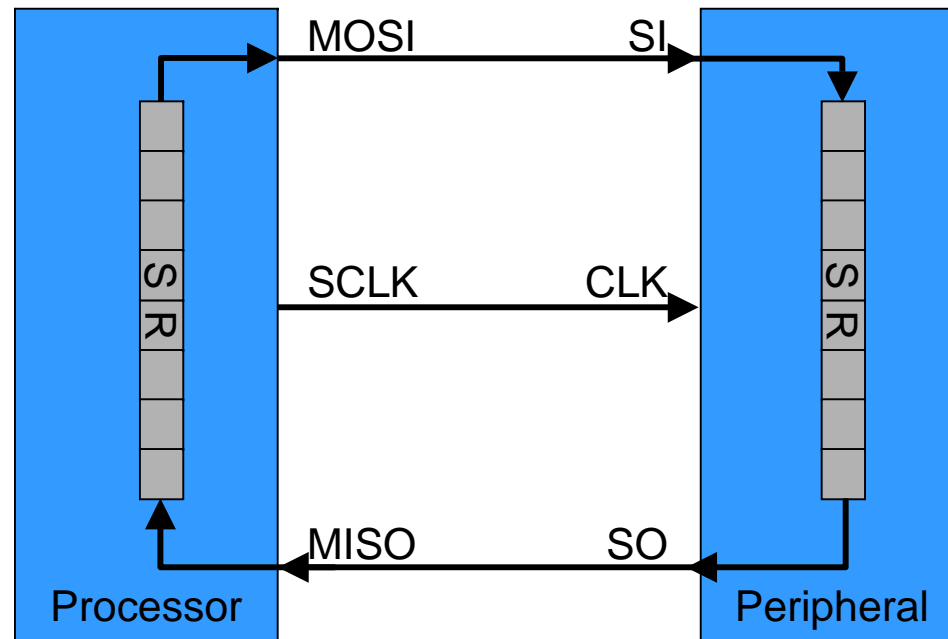
Embedded Systems Interfacing

- SPI – Serial Peripheral Interface



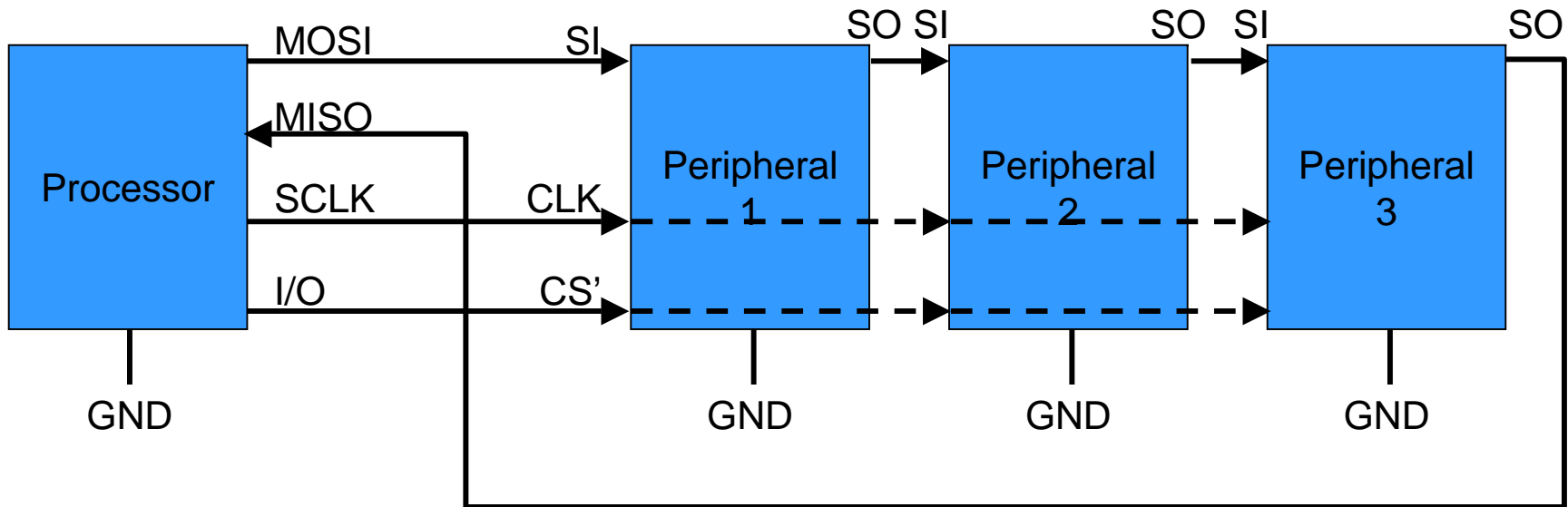
Embedded Systems Interfacing

- SPI – Serial Peripheral Interface



Embedded Systems Interfacing

- SPI – Serial Peripheral Interface



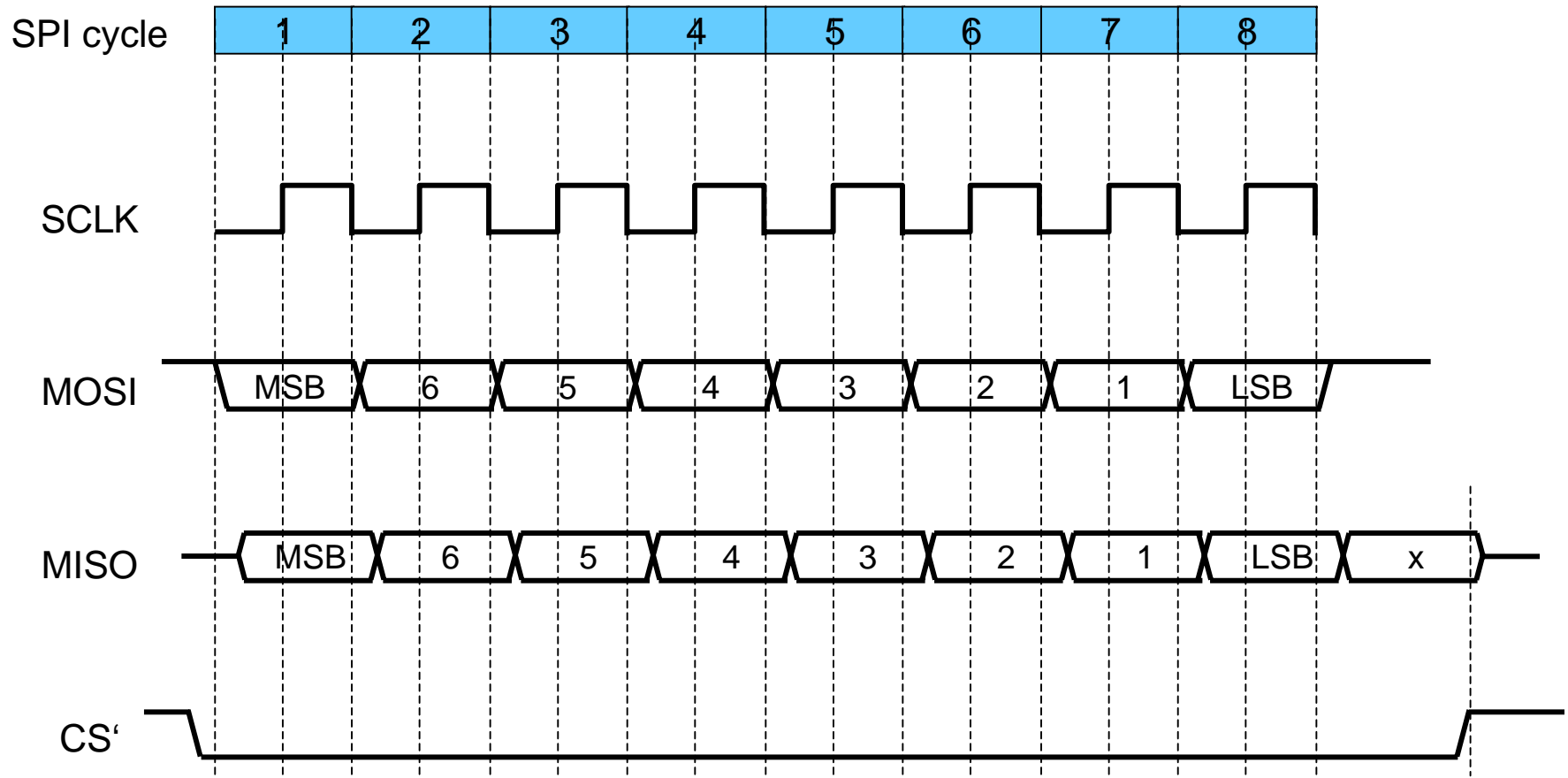
Extension to multiple peripherals:

- Real Time Clocks (time of day)
- Sensors (e.g. potentiometers)
- FLASH memory

- Interface speed limited by device technology Mb/s, compared to kb/s for RS-232

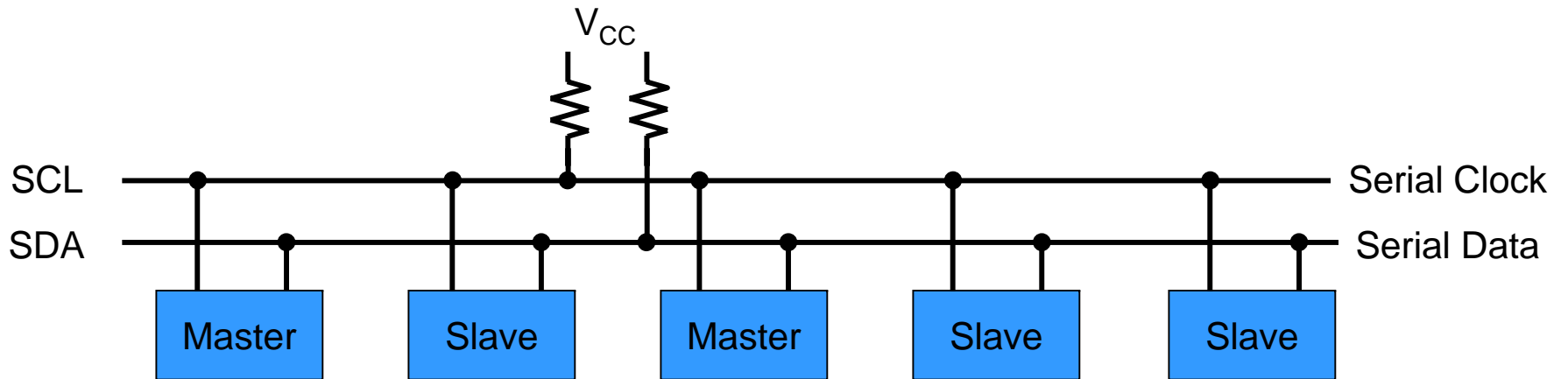
Embedded Systems Interfacing

- SPI timing (Clock low, Clock phase 0)



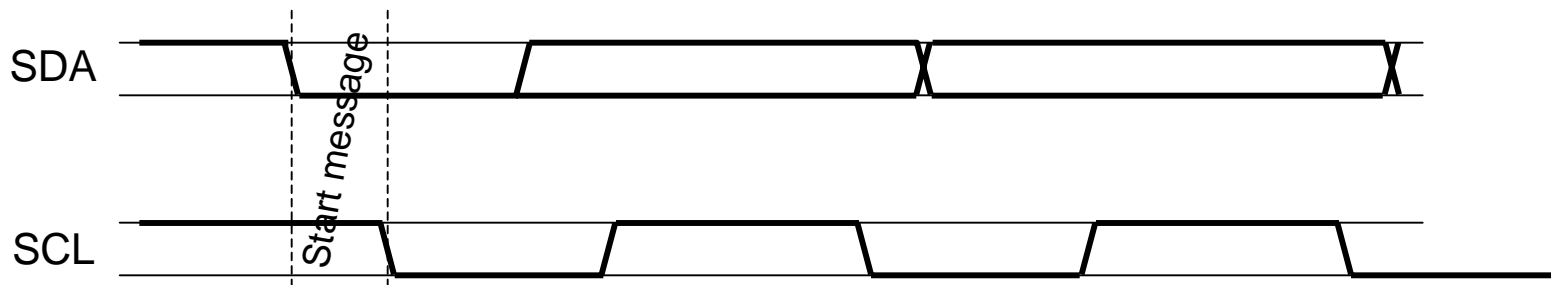
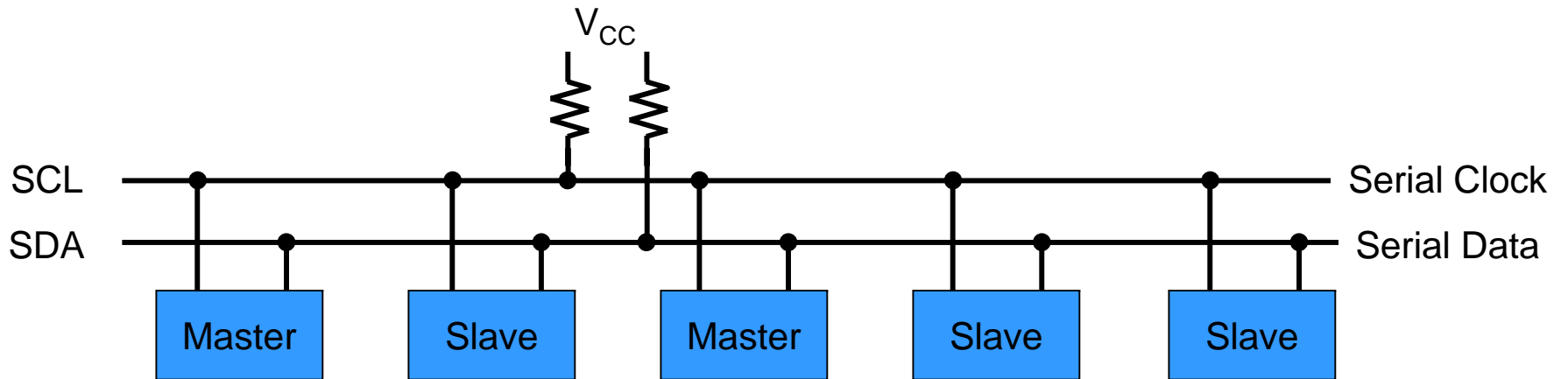
Embedded Systems Interfacing

- I²C – Inter Integrated Circuit



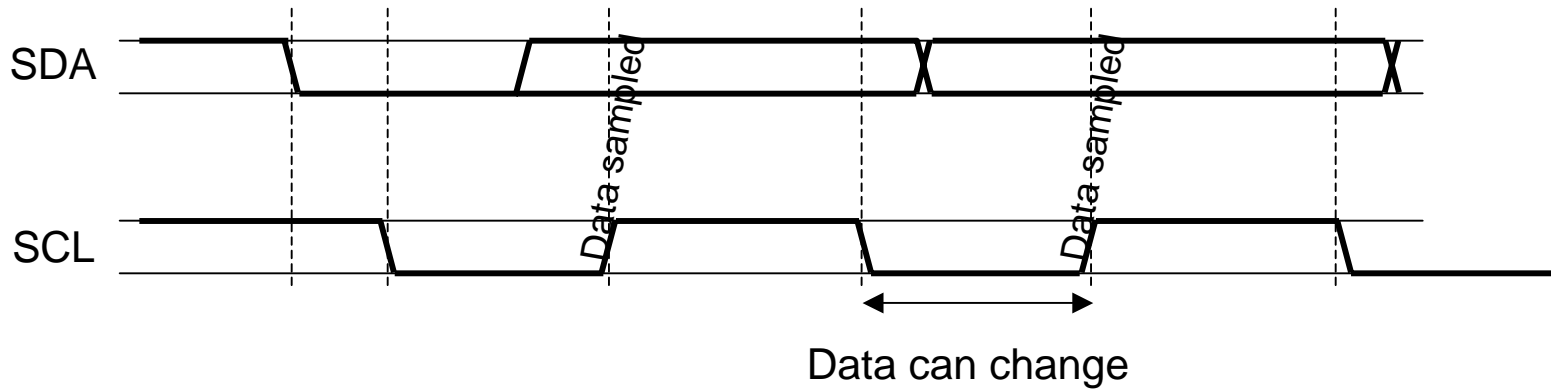
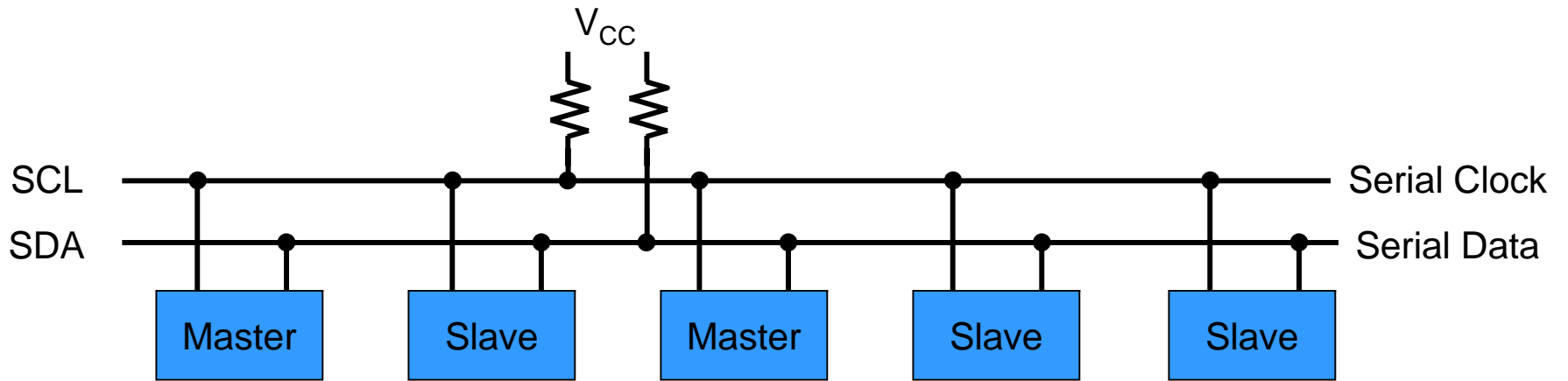
Embedded Systems Interfacing

- I²C – Inter Integrated Circuit



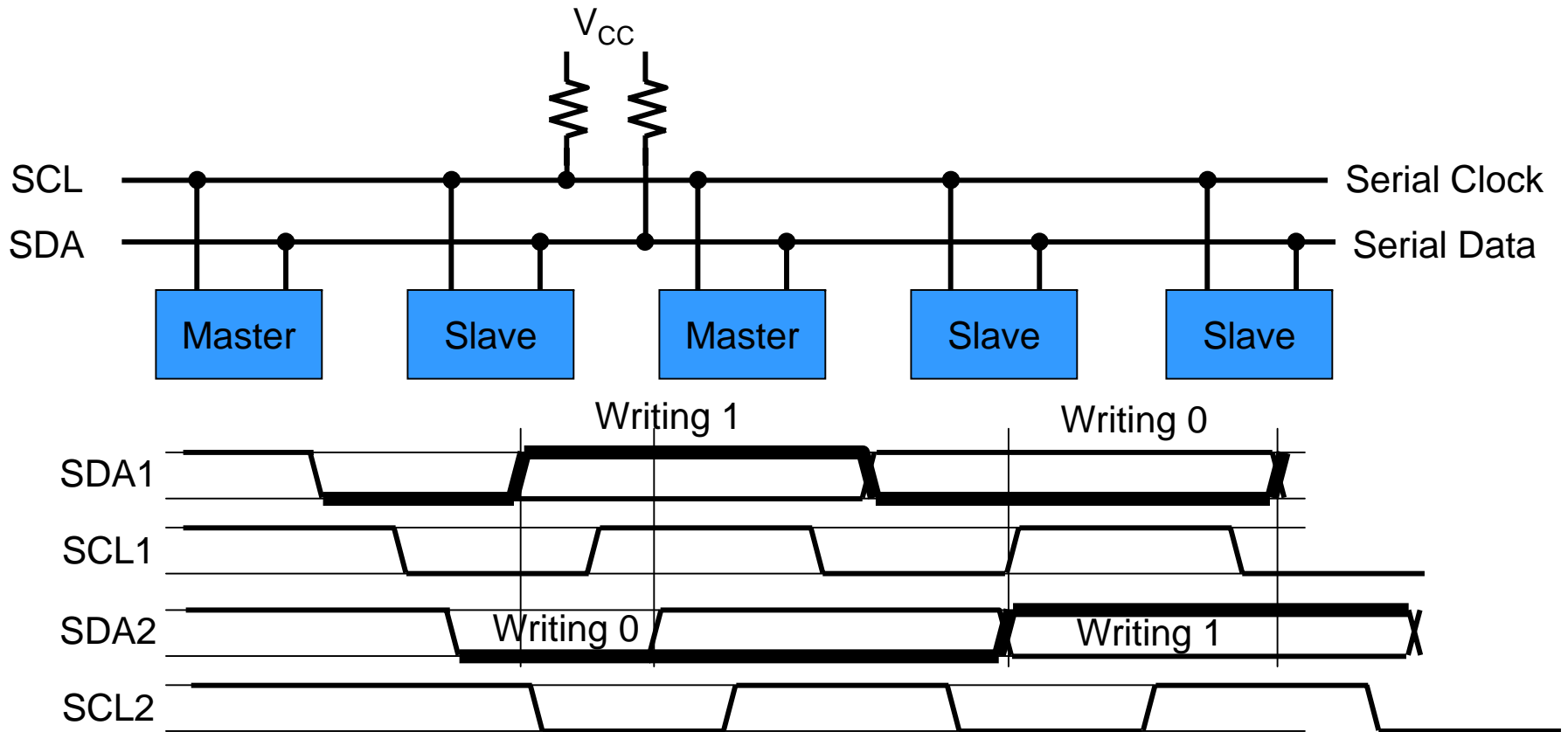
Embedded Systems Interfacing

- I²C – Inter Integrated Circuit



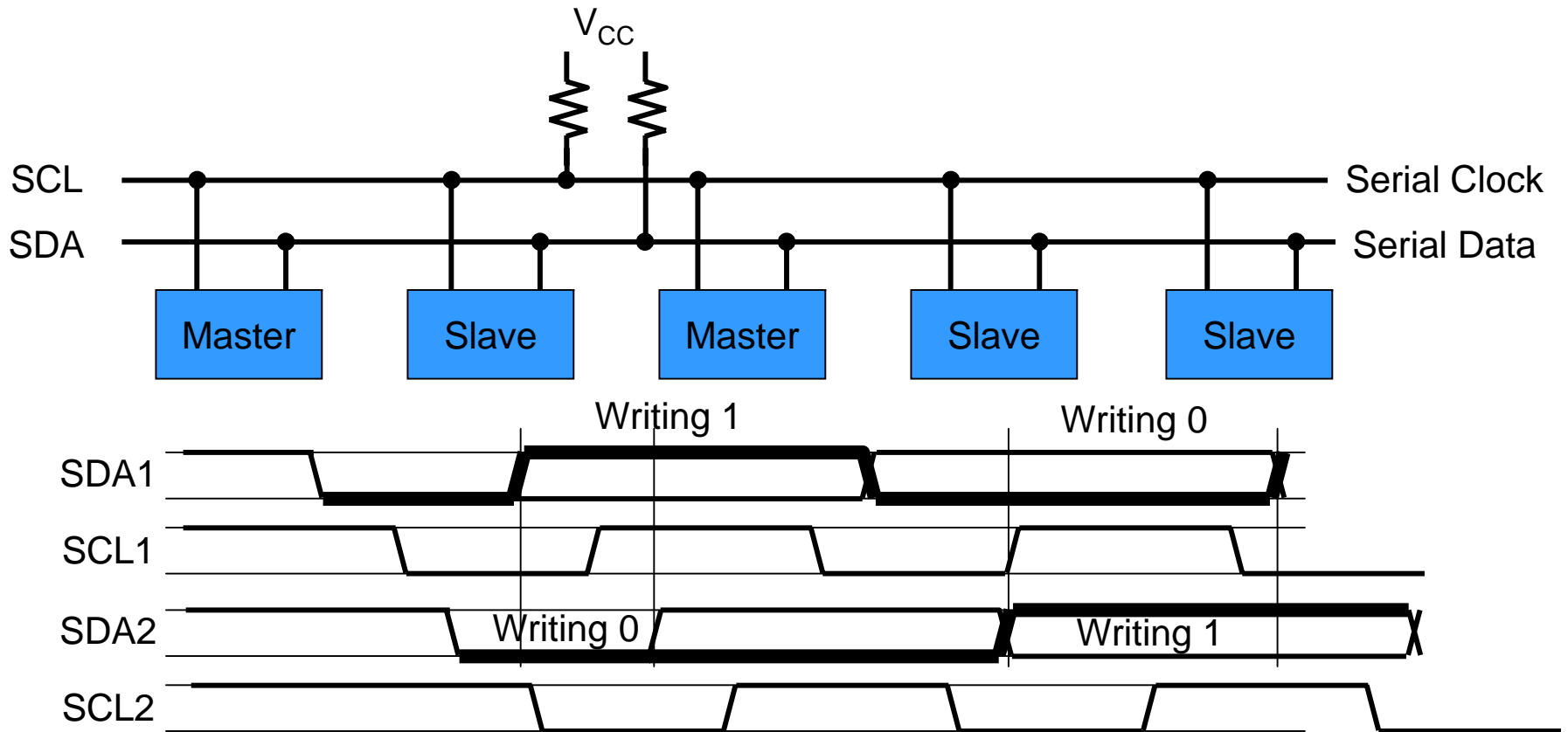
Embedded Systems Interfacing

- I²C – Inter Integrated Circuit – Multi-master bus



Embedded Systems Interfacing

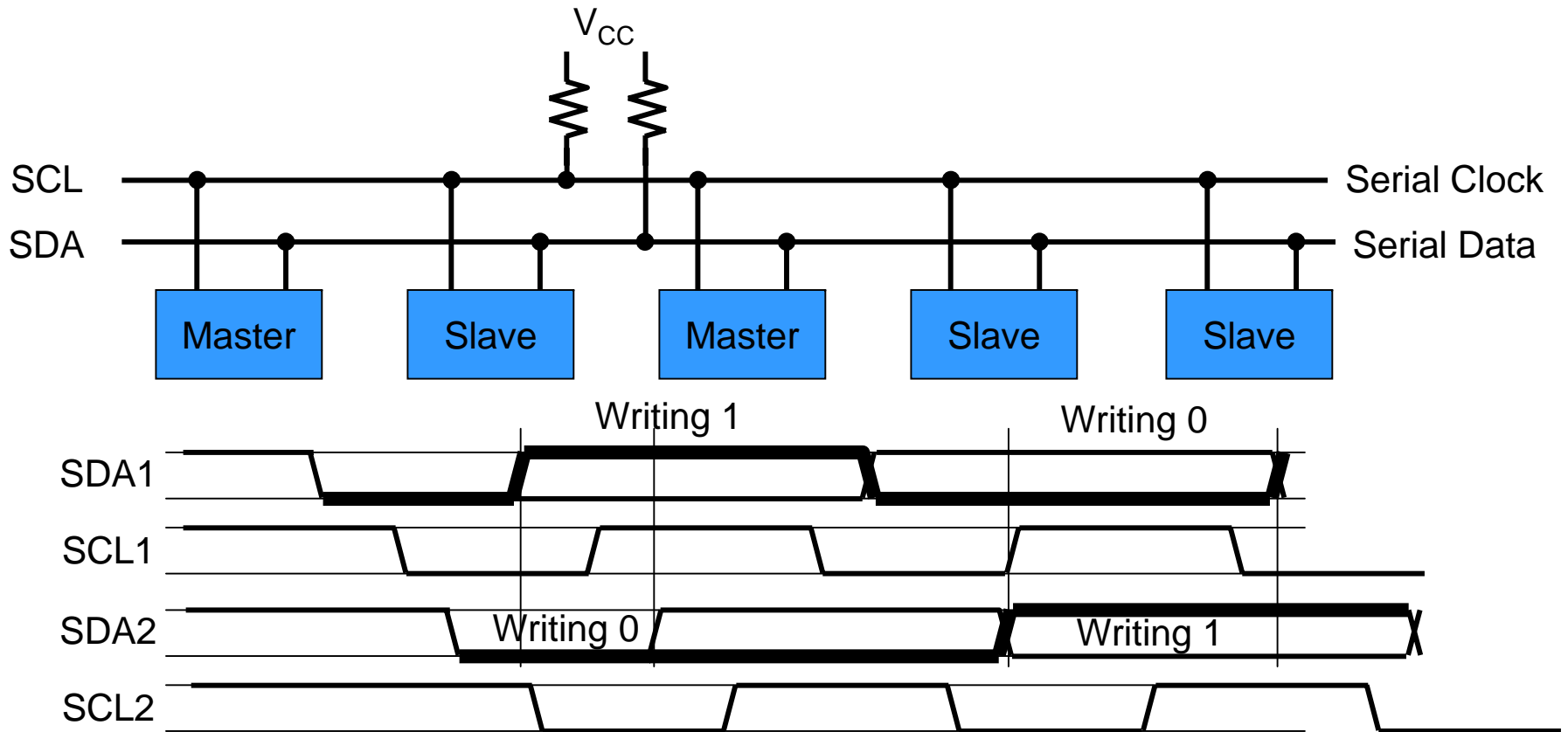
- I²C – Inter Integrated Circuit – Multi-master bus



- Device writing “1” passively allows pullup resistors to pull bus to “1”
- Device writing “0” actively sets bus to “0”

Embedded Systems Interfacing

- I²C – Inter Integrated Circuit – Multi-master bus



- Device writing “1” passively allows pullup resistors to pull bus to “1”
- Device writing “0” actively sets bus to “0”
- Device that writes “1” but hears “0” aborts transmission and tries later