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Signal Functions

- CD: **Carrier Detect** The modem asserts this signal to indicate that it successfully made its connection to a remote device
- RI: **Ring Indicator** The modem asserts this signal to indicate that the phone is ringing at the other end of its connection
- DSR: Data Set Ready Modem to PC
- DTR: Data Terminal Ready PC to Modem
- RTS: Request To Send PC is ready for the modem to relay some received data
- CLS: Clear To Send Modem is ready for the PC to begin transmitting some data































Data Extraction Details

- Assume the UART's receiver has a clock running at a multiple of the baud rate (e.g., 16x).
- Starting in the idle state, the receiver "samples" its RX signal until it detects a high-low transition.
- Then, it waits 1.5 bit periods (24 clock periods) to sample its RX signal at what it estimates to be the center of data bit 0.
- The receiver then samples RX at bit-period intervals (16 clock periods) until it has read the remaining 7 data bits and the stop bit.
- From that point this process is repeated.
- Successful extraction of the data from a frame requires that, over 10.5 bit periods, the drift of the receiver clock relative to the transmitter clock be less than 0.5 periods in order to correctly detect the stop bit.



































31.5	SPI Inte SPI interrupts	rrupts				
	During SPI communication an interrupts ca Transmit Tx buffer ready to be loaded Data received in Rx buffer Master mode fault Overrun error TI frame format error Interrupts can be enabled and disabled sep	n be generated by the f varately.	ollowing events:			
	Table 157. SPI interrupt requests					
	Interrupt event	Event flag	Enable Control bit			
	Transmit Tx buffer ready to be loaded	TXE	TXEIE			
	Data received in Rx buffer	RXNE	RXNEIE			
	Master Mode fault event	MODF				
	Overrun error	OVR	EPPIE			
	CRC error	CRCERR	LIKKIE			
	TI frame format error	FRE				
Source: MCU User Ma	TI frame format error For code example, refer to A. 19.6: SPI internuction	FRE errupt code example.		38		

Comm. method	Shar es clock	Num. of wires	Speed	Dist	Pros	Cons
UART	No	2	115Kbits/ sec max	Medium, long	Simple; Widely supported; Large range of physical standard interfaces (TTL, RS-232, RS-422, RS-485);	It's asynchronous; Requires reasonable clock accuracy at both ends;
CAN	No	3	1 Mbits/sec	Long: 40m (1Mbit/sec) up to 10km (5Kbits/sec)	Highly reliable; Reduces amount of wiring; Multi-master capability;	Complex;
12C	Yes	2	100Kbits/ sec 400Kbits/ sec fast mode	Short, medium (< 6″)	Simple; Multi-master capability; Only 2 wires to support multiple devices; Robust in noisy or power- up/down situations;	More complex protocol than SPI; Harder to level-shift or opto-isolate due to bidirectional lines; Need for pull-up resistors can reduce power efficiency in some cases;
SPI	Yes	4	10- 20Mbits/s ec	Short	Fast, easy, simple; A lot of support; Self clocking; Flexible data word sizes;	Multiple devices need multiple select lines; No acknowledgement ability; No inherent arbitration; No flow control; Single master only;

