

# **Soft USB Design Challenges**



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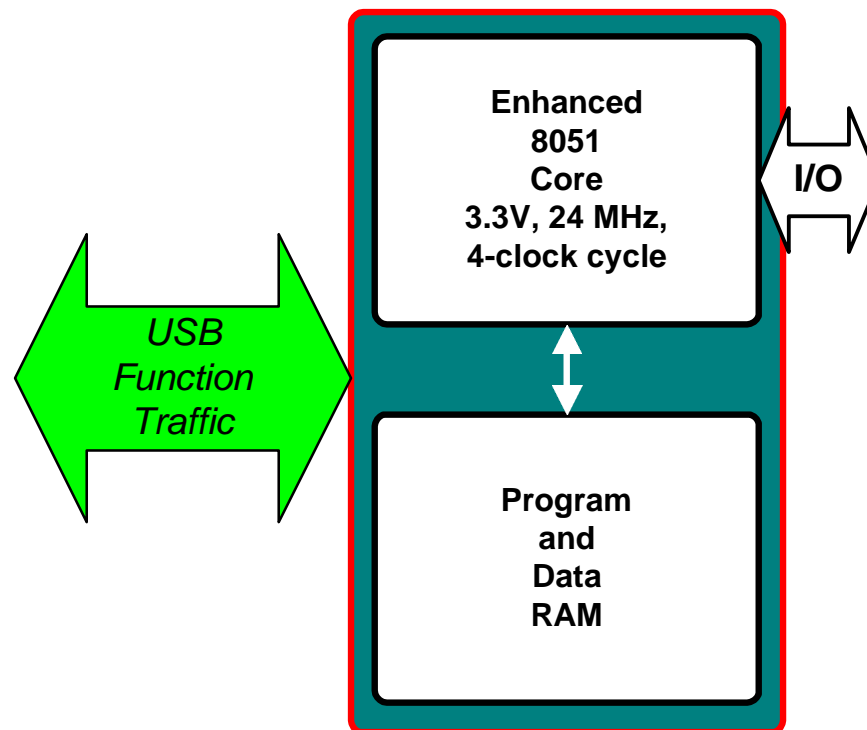
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# Soft USB Design Challenges

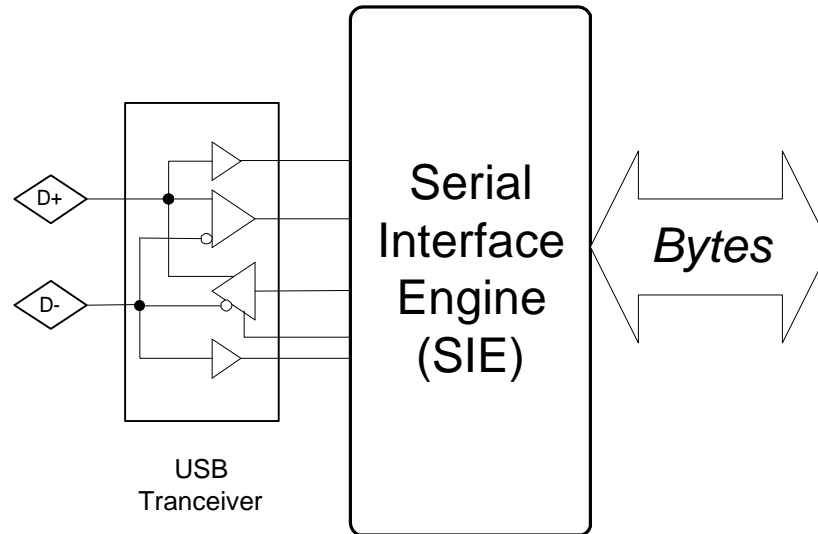
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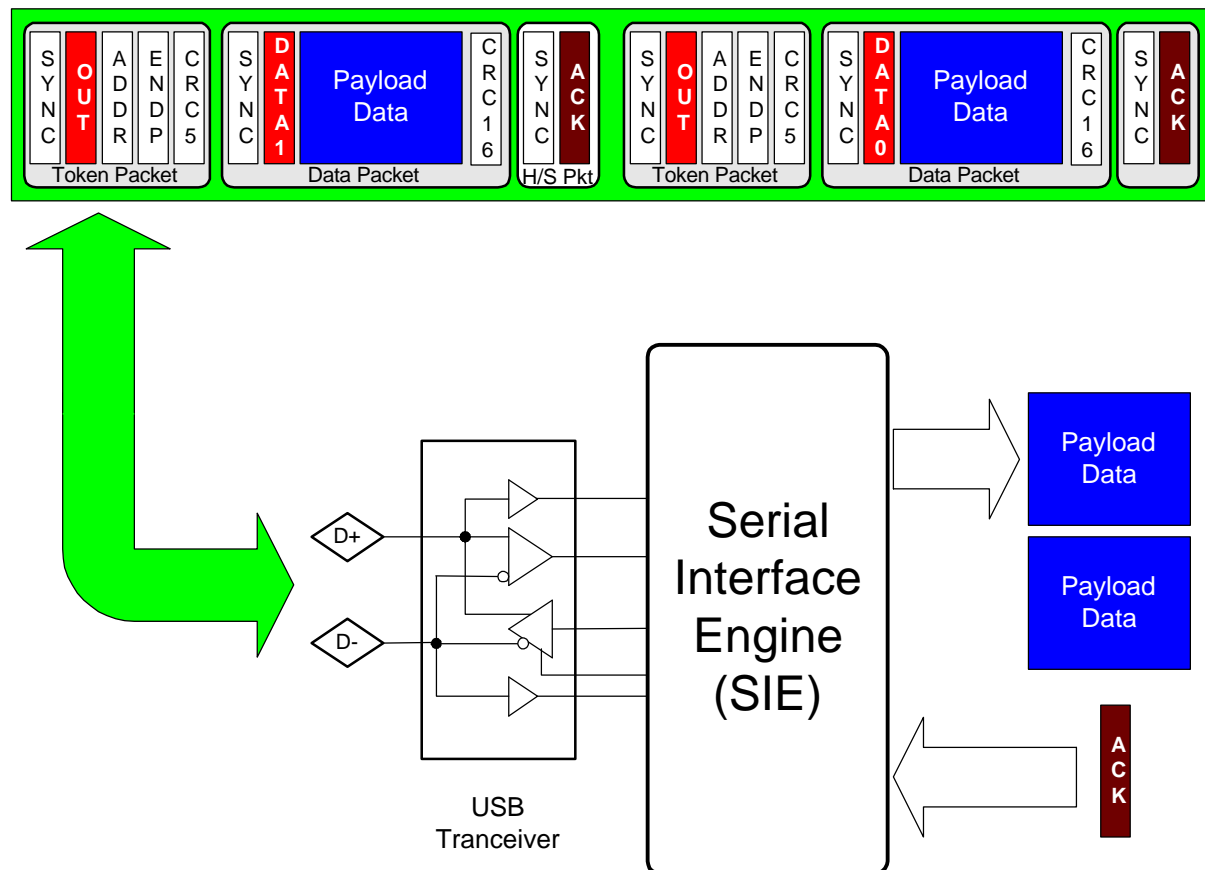
# The Objective: ***SOFT***



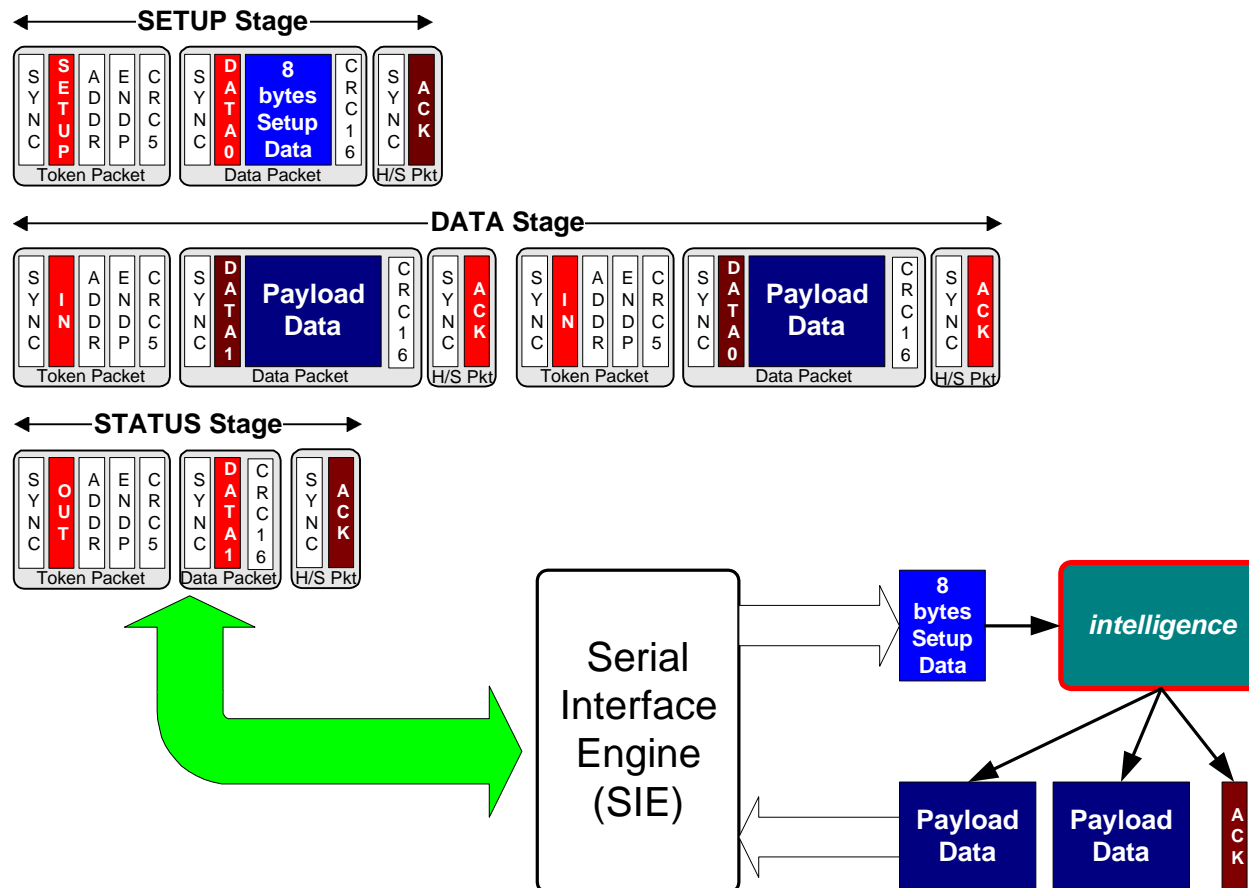
# The Basic USB Interface



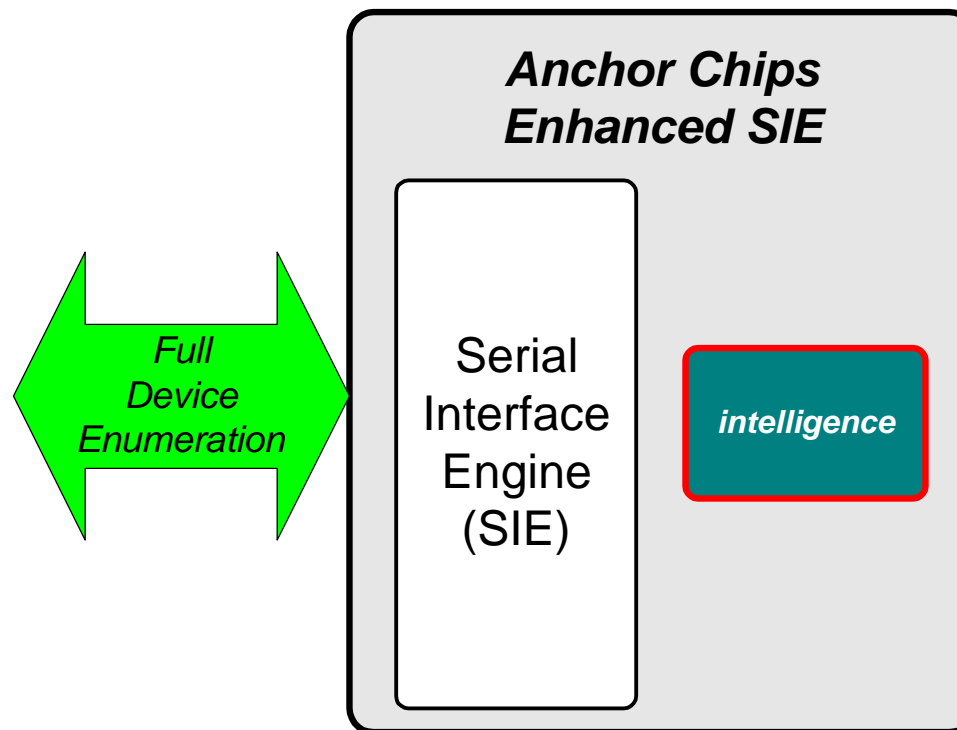
# What the SIE Does



# A USB Control Transfer



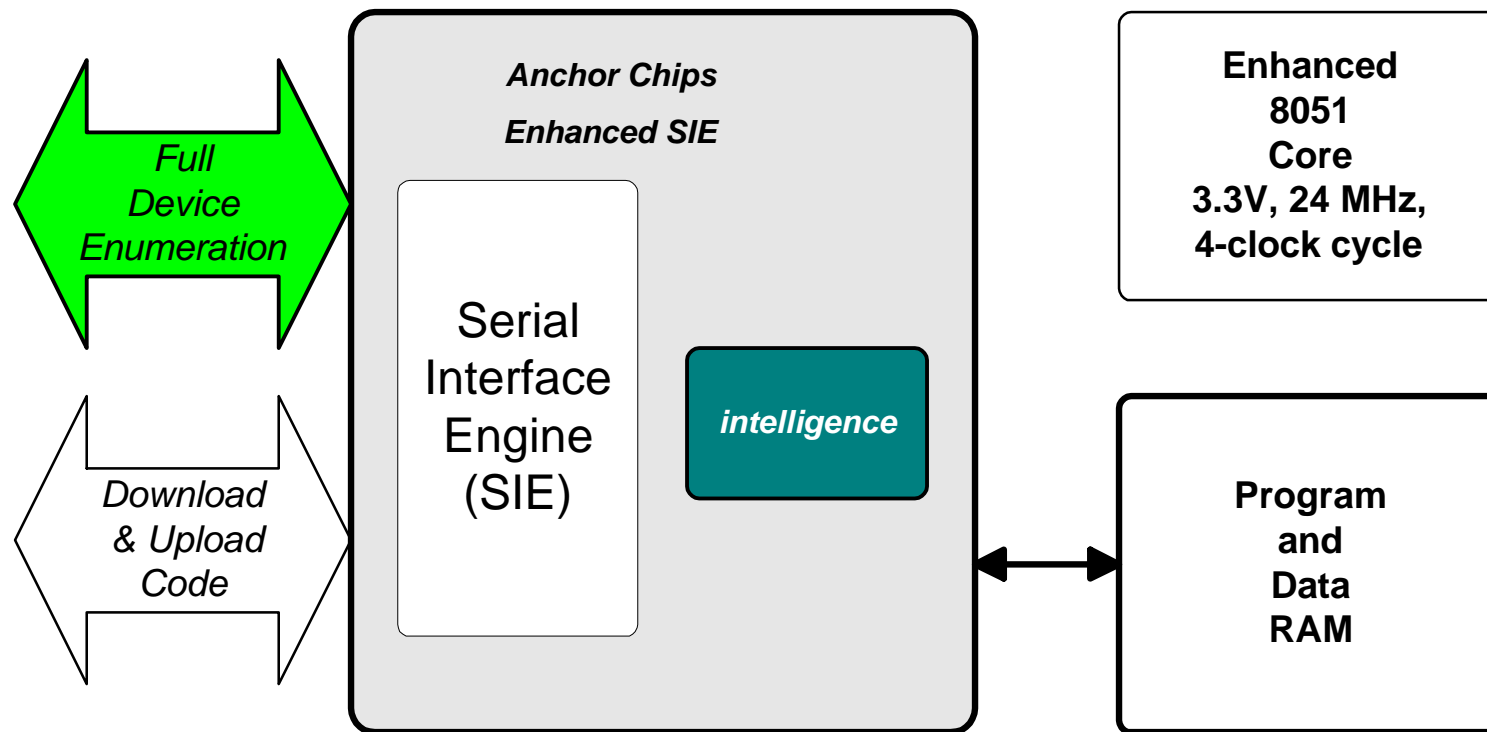
# EZ-USB Enhanced SIE



# Default Endpoints

Endpoint	Type	Alternate Setting		
		0	1	2
		Max Packet Size (bytes)		
0	CTL	64	64	64
1 IN	INT	0	16	64
2 IN	BULK	0	64	64
2 OUT	BULK	0	64	64
4 IN	BULK	0	64	64
4 OUT	BULK	0	64	64
6 IN	BULK	0	64	64
6 OUT	BULK	0	64	64
8 IN	ISO	0	16	256
8 OUT	ISO	0	16	256
9 IN	ISO	0	16	16
9 OUT	ISO	0	16	16
10 IN	ISO	0	16	16
10 OUT	ISO	0	16	16

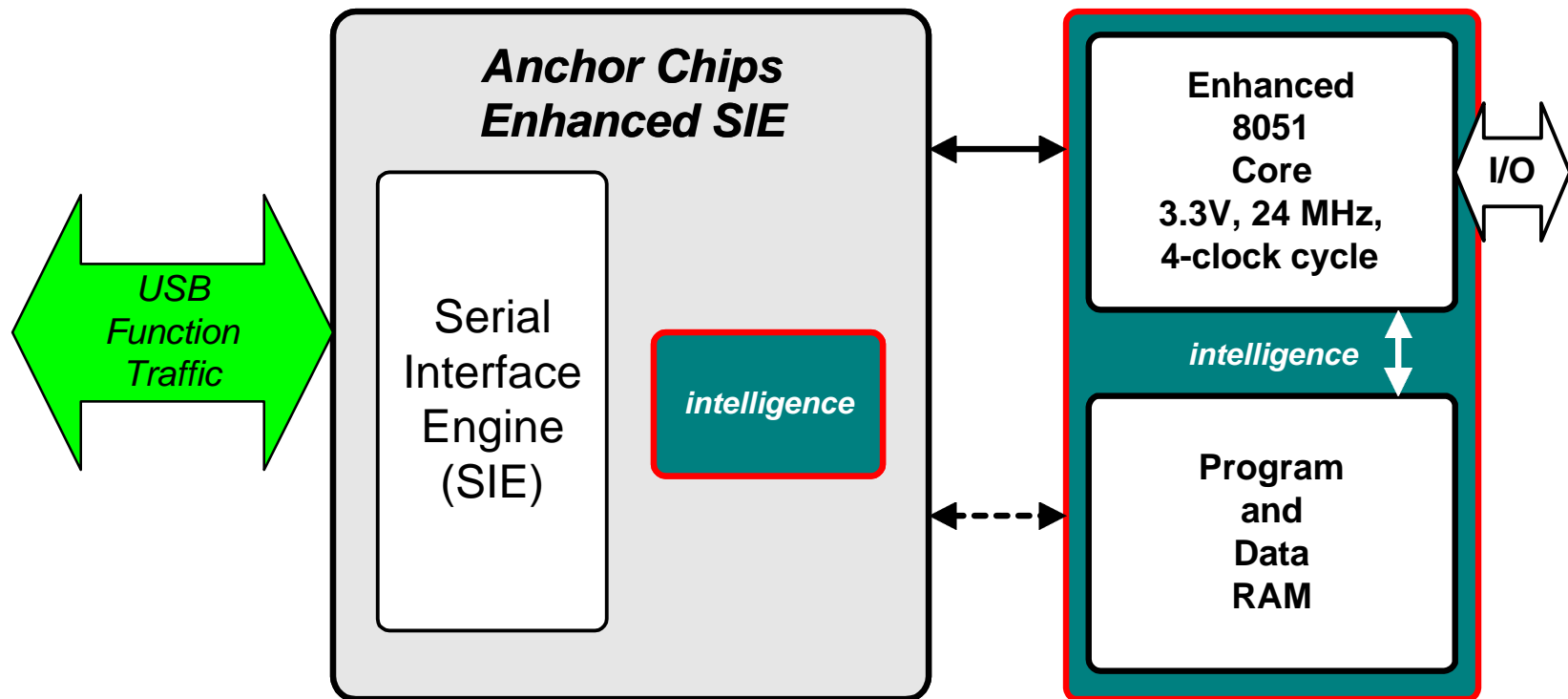
# Advanced SIE Enumerates & Loads Code



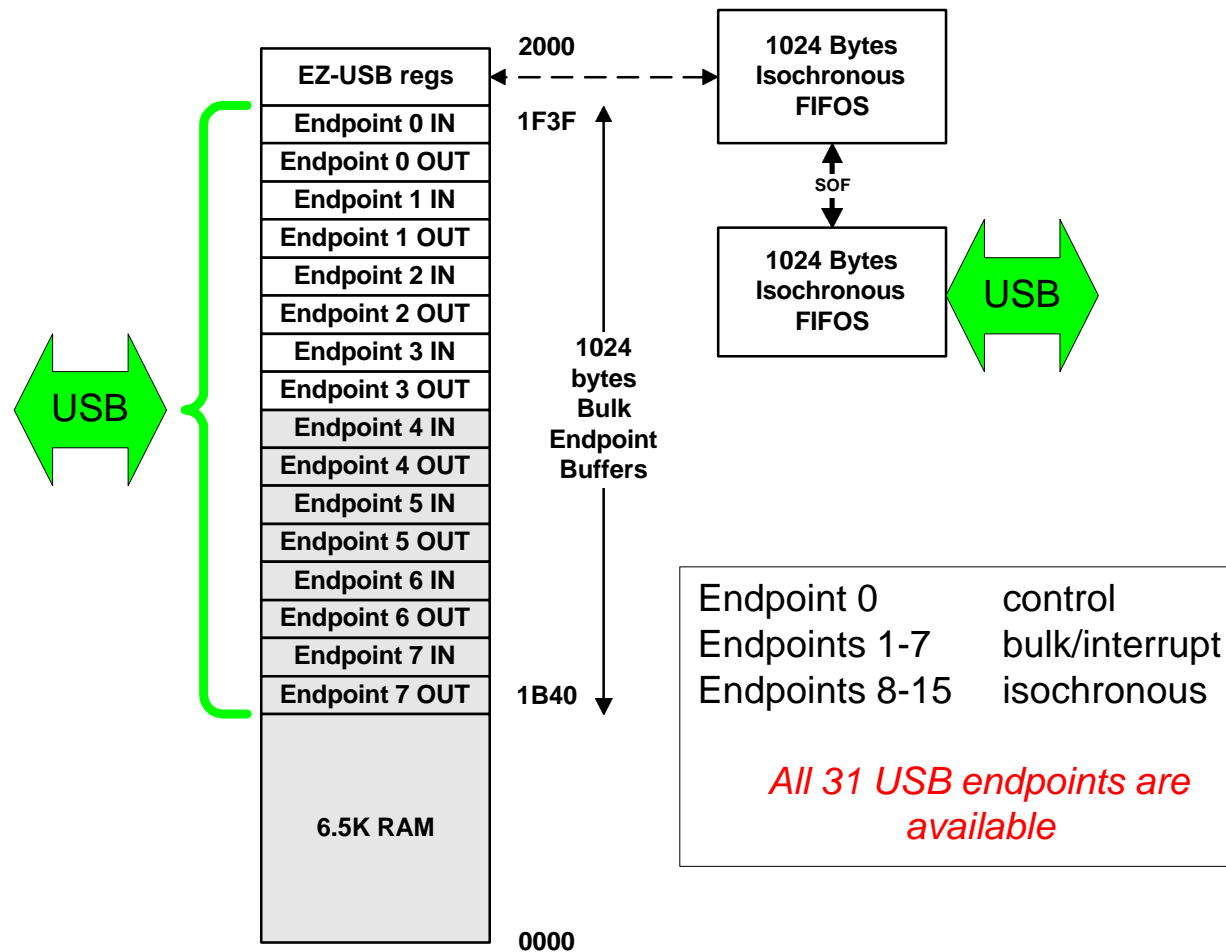
# The Download Request

Byte	Field	Value	Meaning
0	bmRequest	<b>0x40</b>	Vendor Request, OUT
1	bRequest	<b>0xA0</b>	“Anchor Load”
2	wValueL	<b>AddrL</b>	Starting address
3	wValueH	<b>AddrH</b>	
4	wIndexL	0x00	
5	wIndexH	0x00	
6	wLengthL	<b>LenL</b>	Number of Bytes
7	wLengthH	<b>LenH</b>	

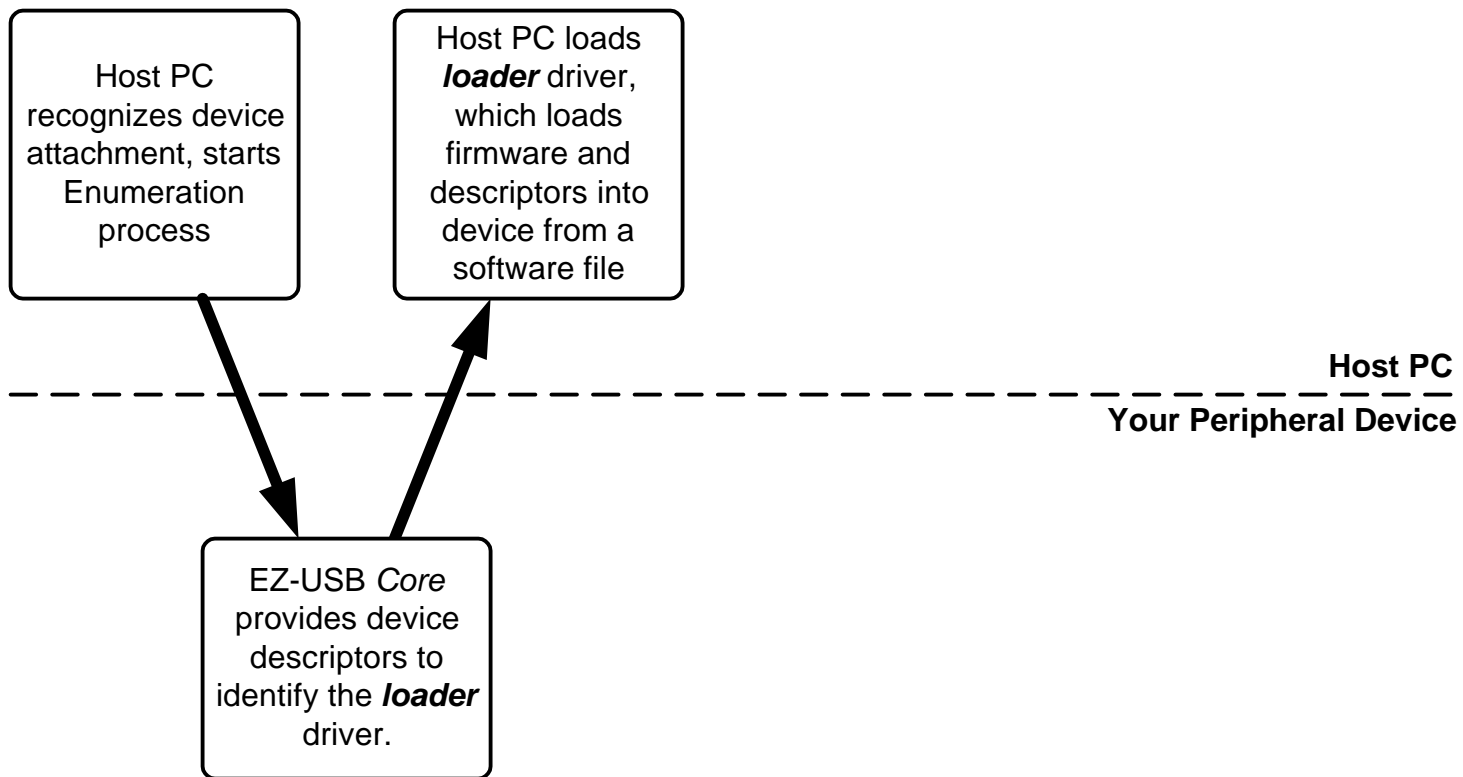
# Final USB Device



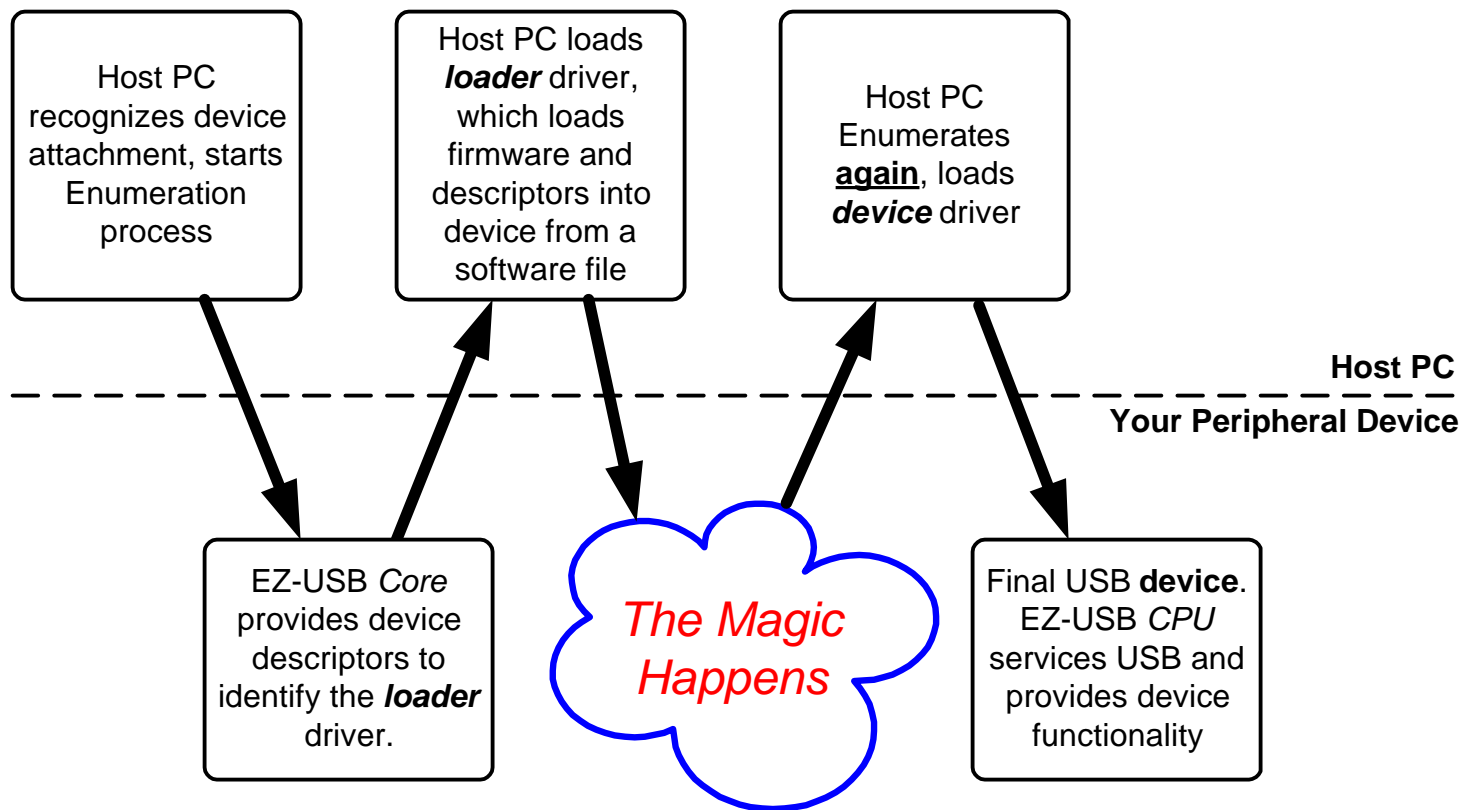
# AN2131Q Memory Map



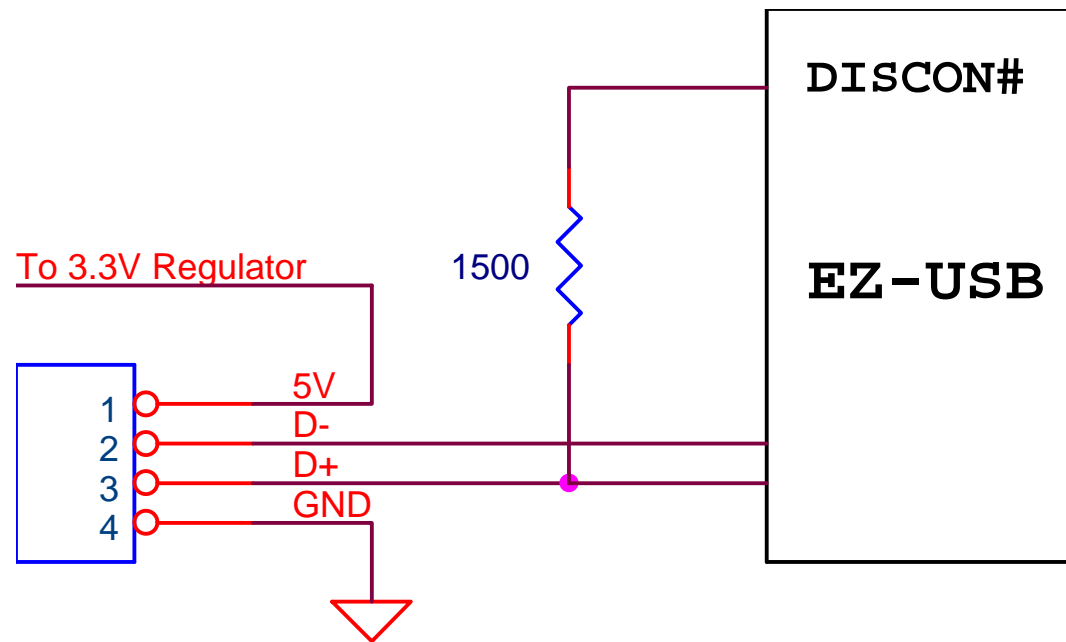
# Enumeration



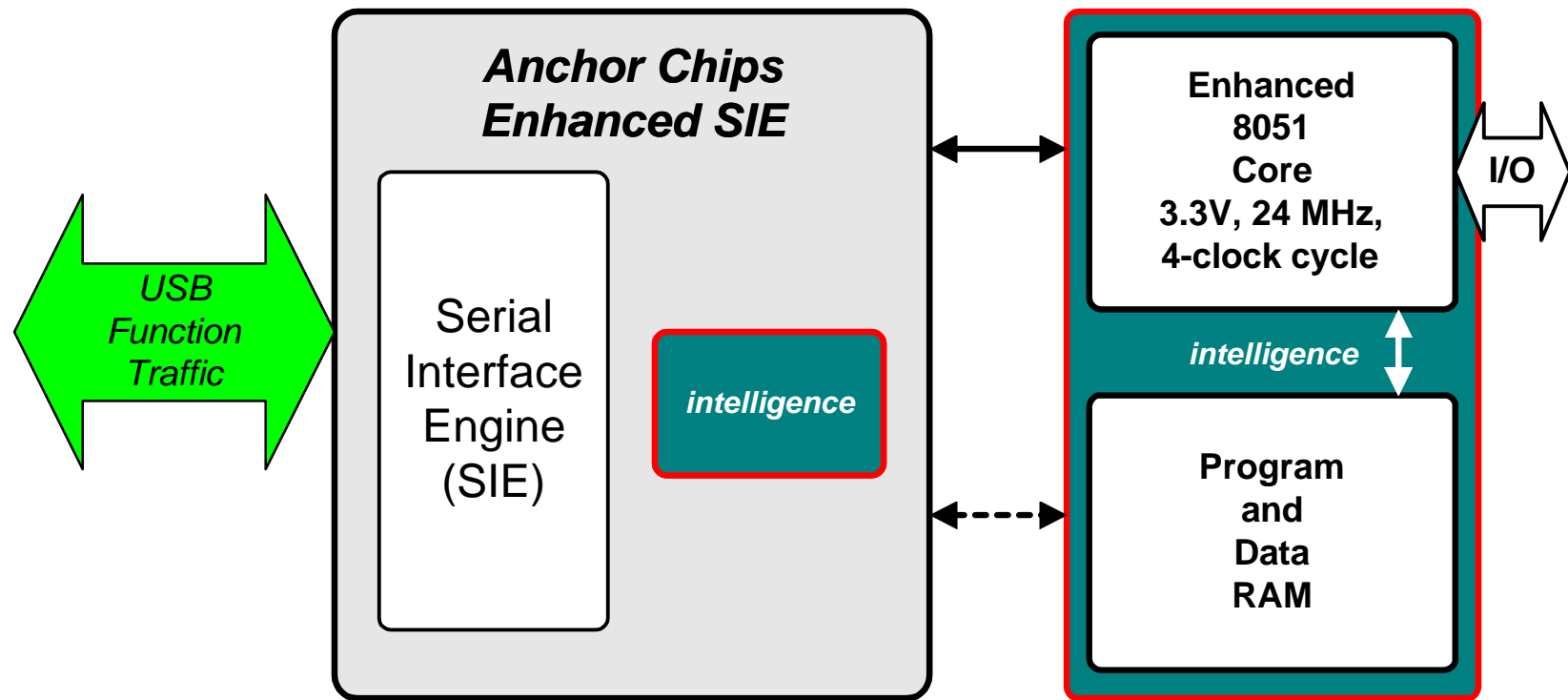
# The ReNumeration™ Process



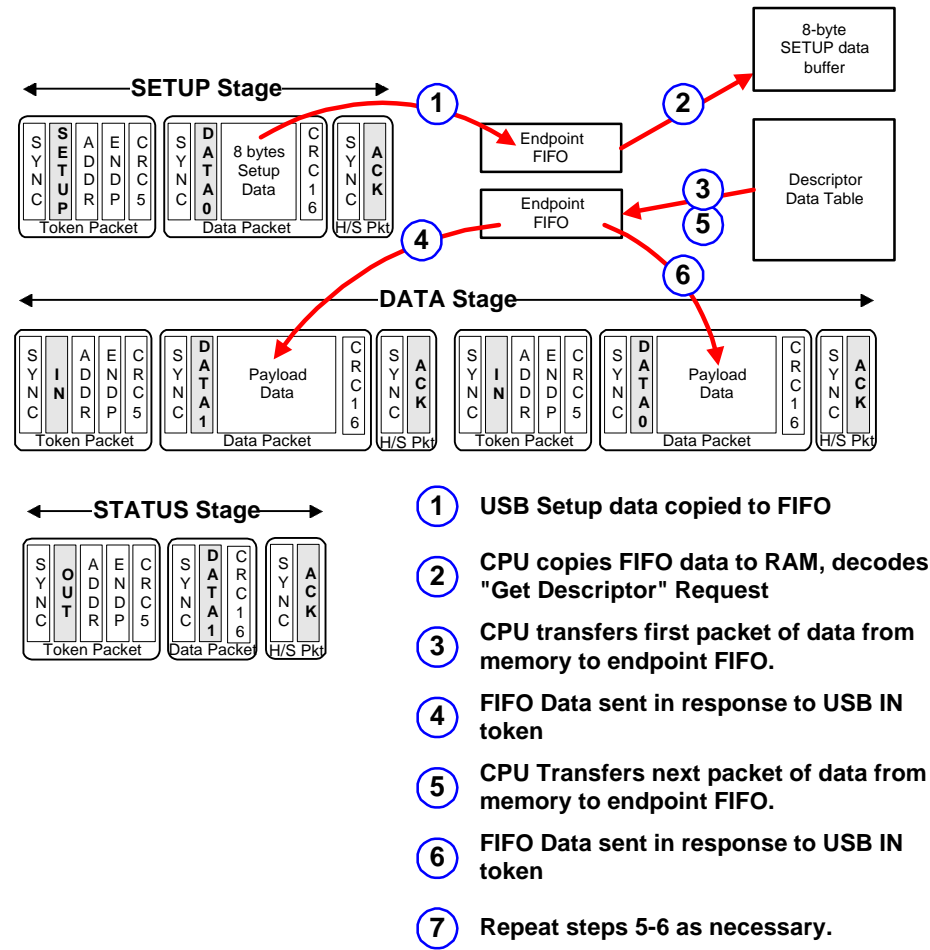
# Emulating a Physical Disconnect



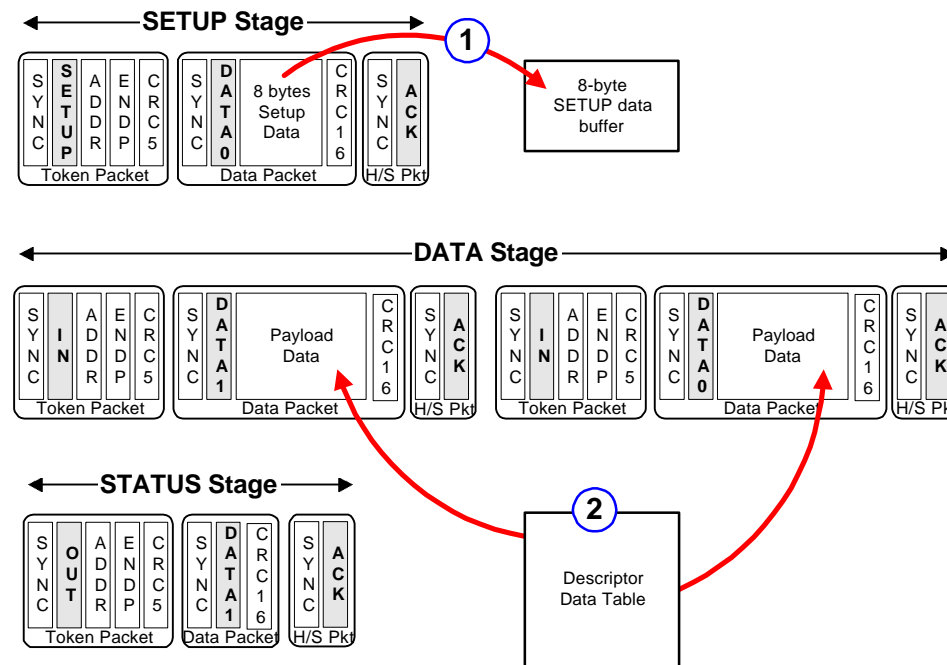
# Using the Enhanced SIE



# Get Descriptor--Without Enhanced SIE

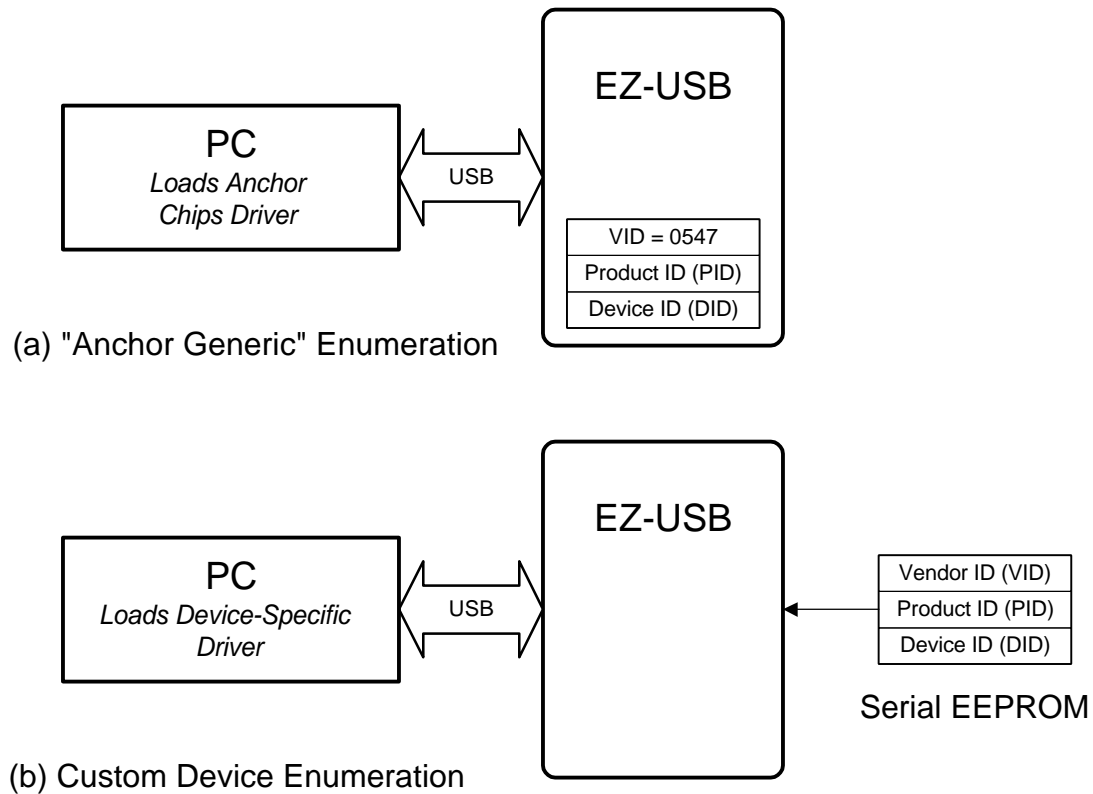


# Get Descriptor--With Enhanced SIE

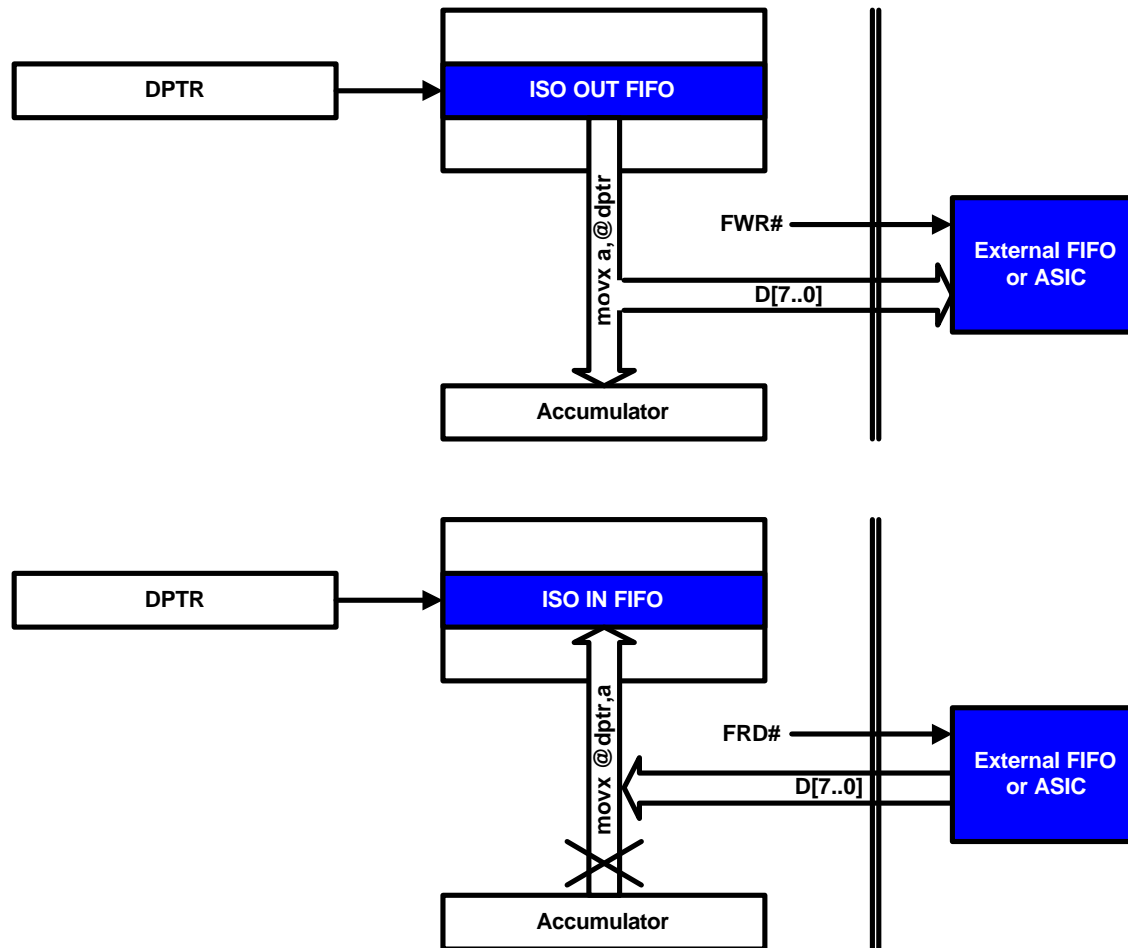


- 1 EZ-USB core copies Setup data directly to RAM, eliminating the FIFO-to-RAM copy step. 8051 decodes the "Get Descriptor" request.
- 2 8051 sets pointer to descriptor table in RAM, EZ-USB core does entire multi-packet transfer.

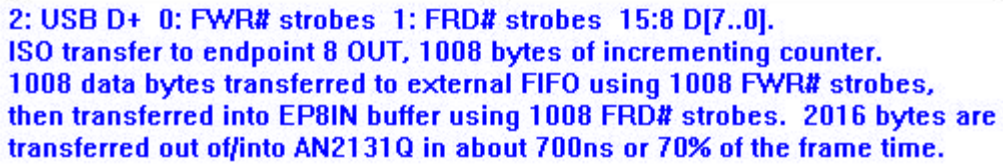
# Watch Those VID-PID-DIDs



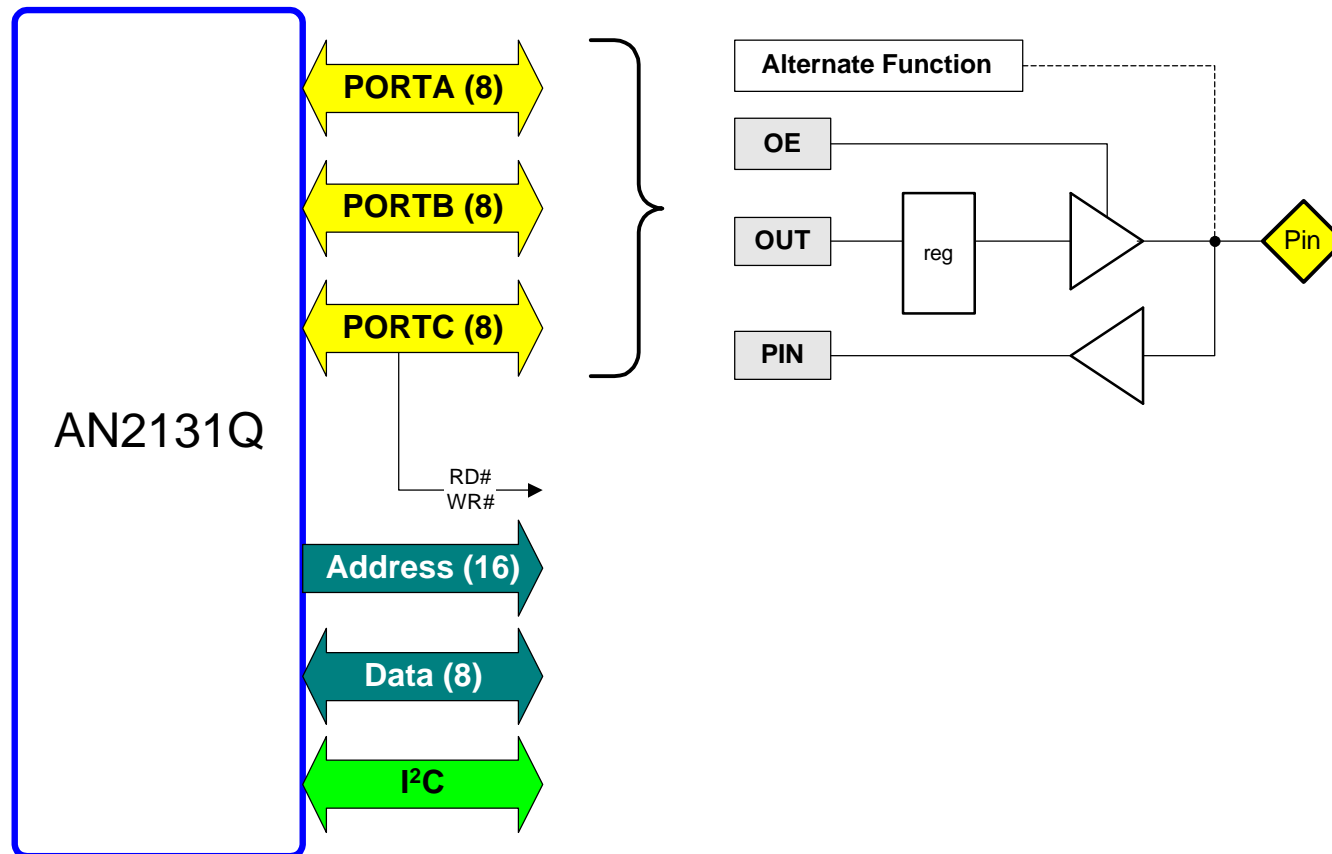
# IO Bandwidth Is Important



1. *Journal of the American Medical Association*, 1997; 277: 1039-1043.



# Expanding the AN2131Q





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