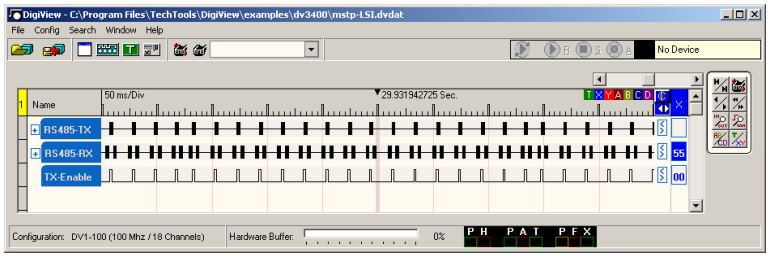
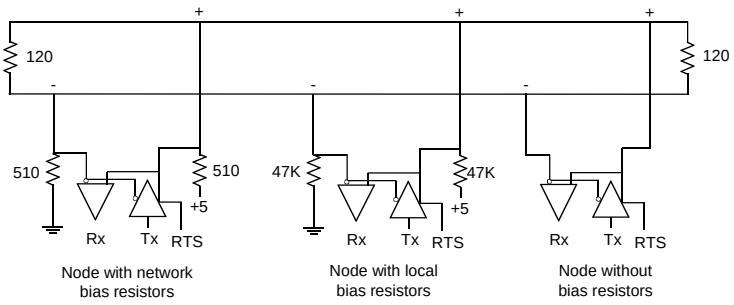
BACnet MS/TP

- Physical and Electrical considerations
- Packet structure
- Receive Frame State Machine
- Slave and Master Node State Machine
- Design issues (timing, buffering, MAC address)



BACnet MS/TP EIA-485



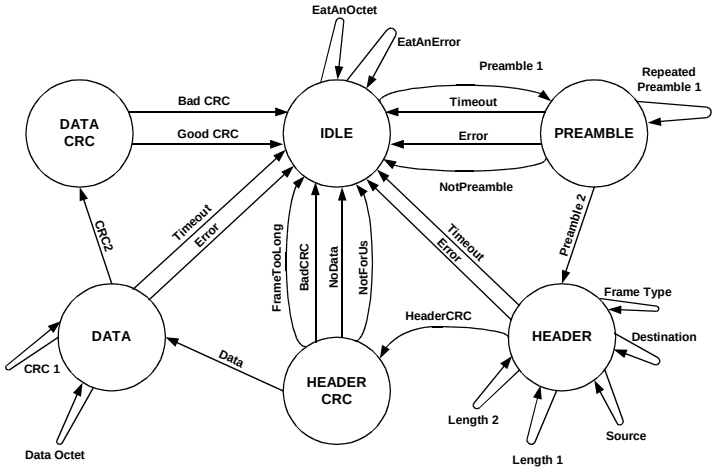
Baud Rates: 9600, 19200, 38400, 57600, 76800
Parity: no
Start Bits: 1
Stop Bits: 1
Least Significant Bit First (same as EIA-232)
Uses standard UART

This may not be the ideal circuit for EIA-485. There has been much debate in the BACnet MS/TP working group about it.

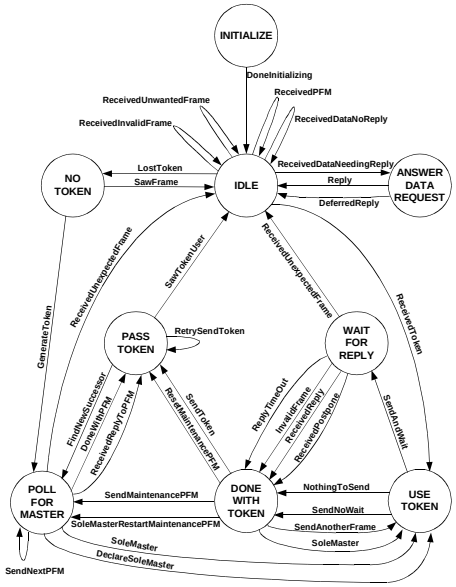
MS/TP Packet Structure

0x55	Preamble	2 octets
0xFF		
Frame Type		1 octet
Destination Address		1 octet
Source Address		1 octet
Length		2 octets, most significant octet first
Header CRC		1 octet
Data		(present if Length is non-zero) Length octets
Data CRC		(present if Length is non-zero) 2 octets
0xFF	pad	(optional) at most, 1 octet

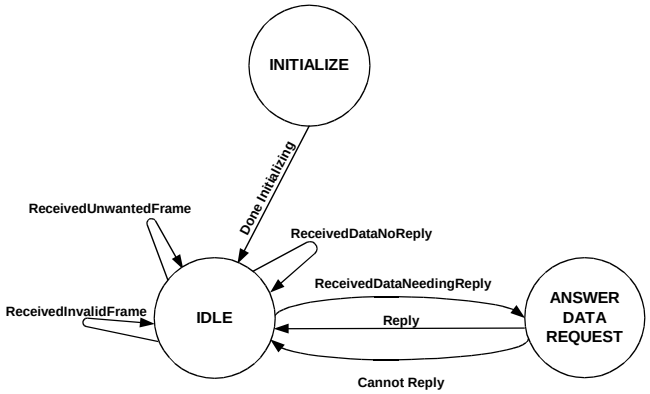
Receive Frame State Machine



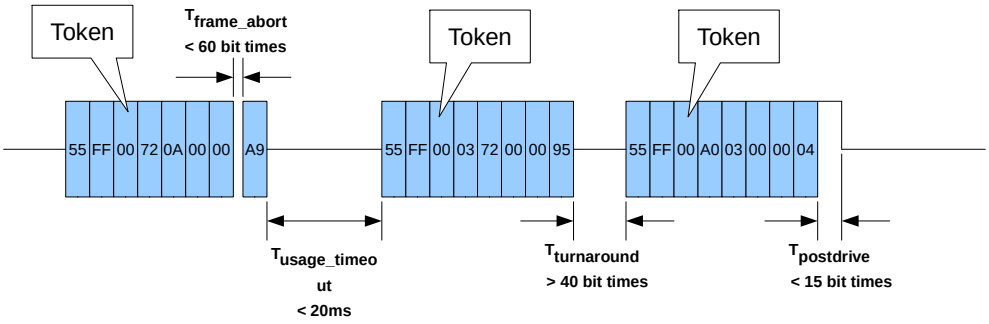
Master Node State Machine



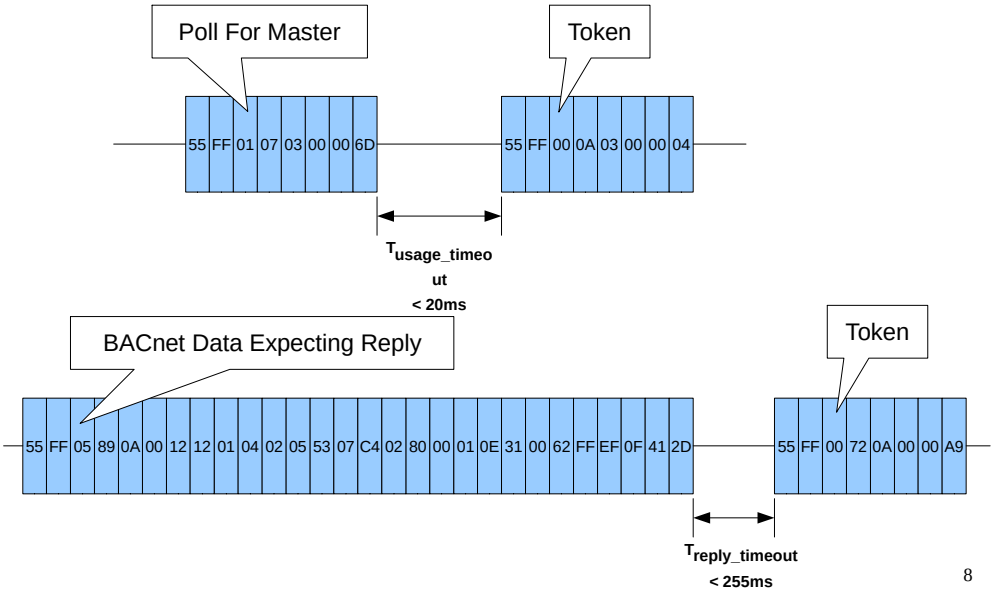
Slave Node State Machine



MS/TP Timing


Token
T_{frame_abort}
< 60 bit times
Token
Token
55 FF 00 72 0A 00 00
A9
55 FF 00 03 72 00 00 95
55 FF 00 A0 03 00 00 04
$T_{usage\_timeout}$
< 20ms
$T_{turnaround}$
> 40 bit times
$T_{postdrive}$
< 15 bit times

MS/TP Timing


Poll For Master
Token
55 FF 01 07 03 00 00 6D
55 FF 00 0A 03 00 00 04
T usage_timeout
< 20ms
BACnet Data Expecting Reply
Token
55 FF 05 89 0A 00 12 12 01 04 02 05 53 07 C4 02 80 00 01 0E 31 00 62 FF EF 0F 41 2D
55 FF 00 72 0A 00 00 A9
T reply_timeout
< 255ms

BACnet Data Expecting Reply

- May use Reply Postponed
- Practical use only in RTOS or queued data
- Single buffer, single thread, just reply
- Buffer, queue - match packet signature

MS/TP MAC Address

- Master Node MAC 0-127 (0x00 - 0x7F)
- Slave Node MAC 0-254 (0x00-0xFE)
- Broadcast 255 (0xFF)
- DIP switch, dials, LCD
- Non-volatile, same after power cycle or reset
- Proposed Auto Addressing (DHCP, ZeroConfig)