CAN BUS *ERROR HANDLING*

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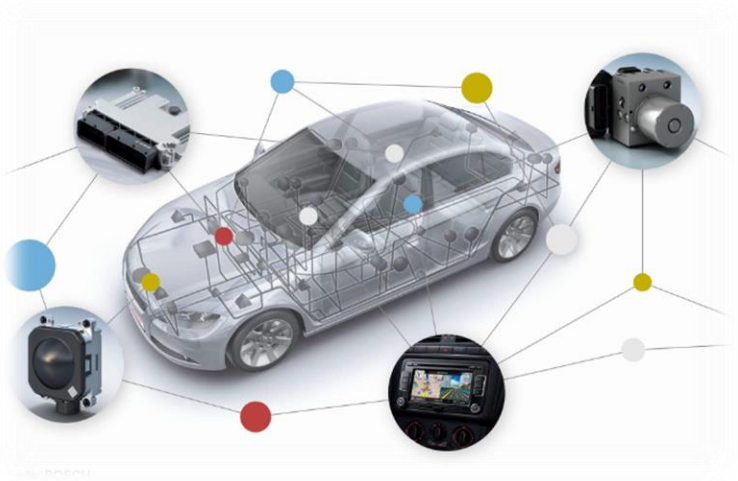
TOPICS COVERED

- How CAN deals with errors.
- CAN Error Detection Mechanisms.
- CAN Error Confinement Mechanisms.
- CAN Bus Failure Modes.

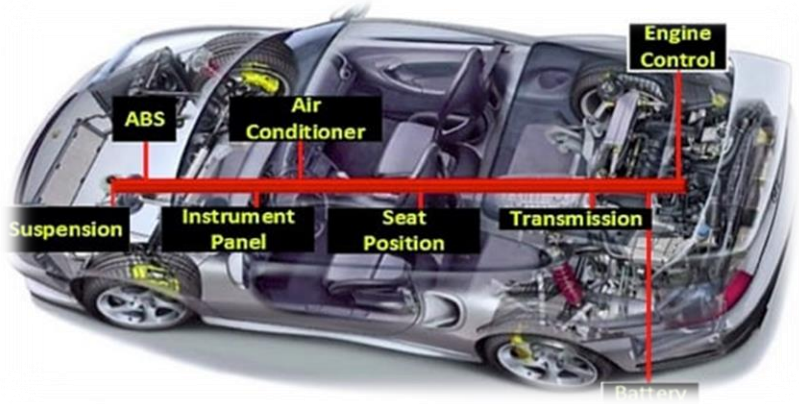


CAN & ERRORS I

HOW DOES CAN HANDLE ERRORS?

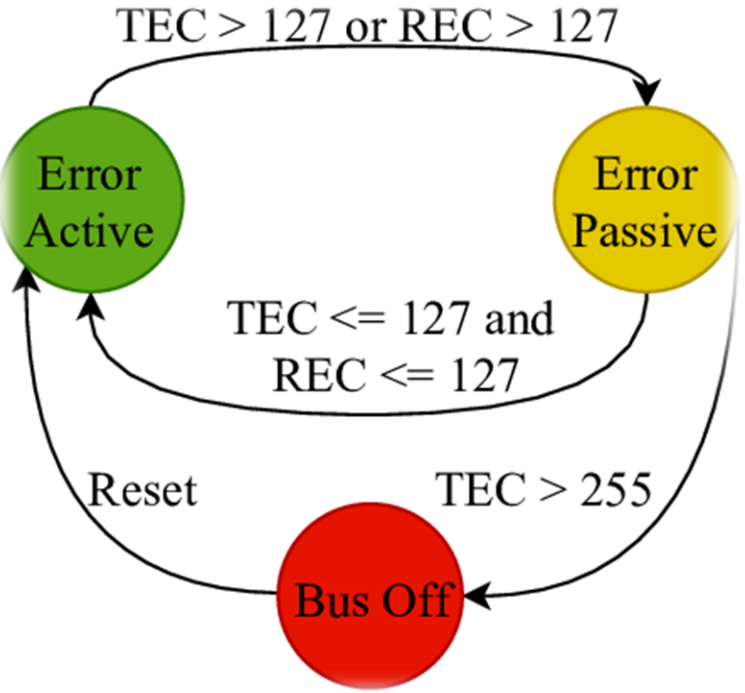
HOW CAN HANDLES ERRORS

- Series of error detection mechanisms.
- Detects errors in messages in the CAN bus.
- Error flags and bus traffic.



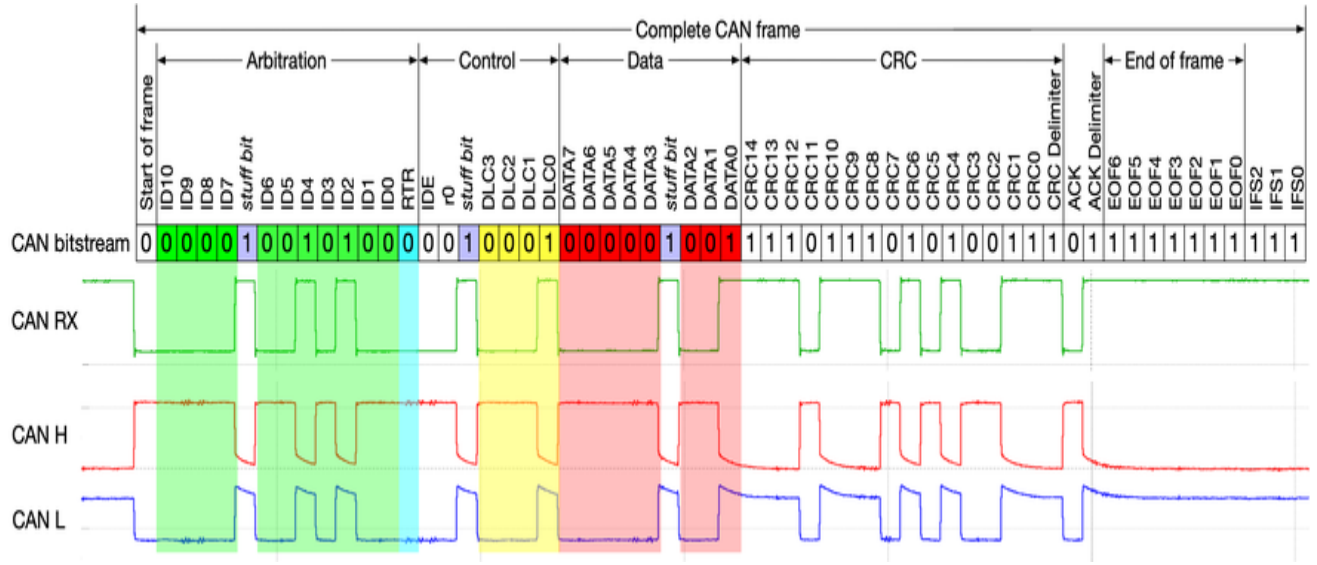
CAN & ERRORS II

HOW DOES CAN KNOW THAT ERRORS EXIST?



CAN ERROR DETECTION MECHANISMS

- Bit monitoring (bit level):
  - *Compares transmitted bit with current level found on the CAN bus.*
- Bit stuffing (bit level):
  - *Violation of the bit stuffing rule is treated as a "bit stuffing" error.*
- Frame check (message level):
  - *Each transmitting and receiving node checks for transmitted frame consistency.*
- Acknowledgement check (message level):
  - *Each receiving node sends an acknowledgement after checking CAN frame.*
- Cyclic Redundancy Check (CRC) check (message level):
  - *Each CAN frame contains a 15-bit CRC checksum.*



CAN & ERRORS IV

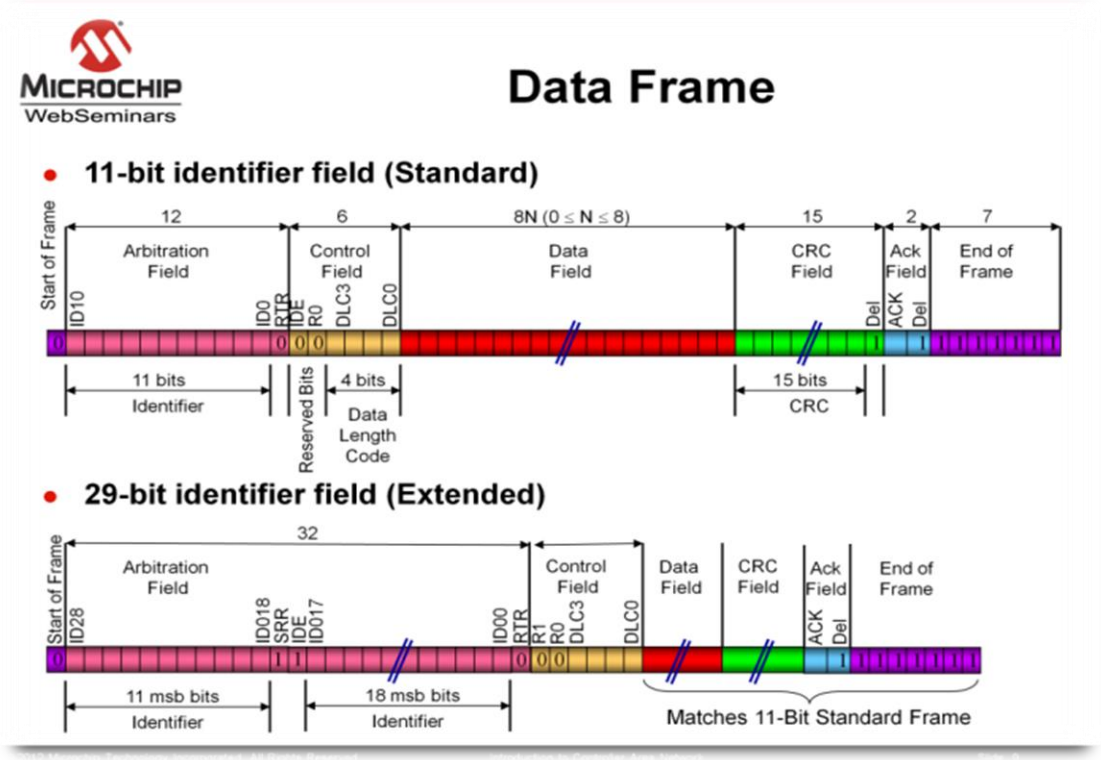
HOW DO MULTIPLE CAN CONTROLLERS HANDLE ERRORS?

CAN ERROR CONFINEMENT MECHANISMS

- Each node contains two error counters:
  - *Transmit Error Counter (TEC) & Receive Error Counter (REC).*
- Transmitting fault: TEC is incremented by 8 *(faster than the REC).*
- Receiving fault: REC is incremented by 1 *(slower than the TEC).*
- TEC or REC count > 127: node enters "Error Passive" state.
- TEC or REC count > 255: node enters "Bus Off" state.

CAN & ERRORS V

IS THERE MORE THAN ONE CAN ERROR?



CAN BUS FAILURE MODES

- ISO 11898 standard for some CAN failure modes:
  - *CAN_H interrupted.*
  - *CAN_L interrupted.*
  - *CAN_H shorted to battery voltage.*
  - *CAN_L shorted to ground.*
  - *CAN_H shorted to ground.*
  - *CAN_L shorted to battery voltage.*
  - *CAN_L shorted to CAN_H wire.*
  - *CAN_H and CAN_L interrupted at the same location.*
  - *Loss of connection to termination network.*

THANK YOU

QUESTION TIME!