



# Design considerations when adding CANbus to your System



## Overview

- Brief Introduction to **Controller Area Network (CAN)**
- Design Considerations When Connecting to CAN
- Summary
- Microchip Product Offering
- References



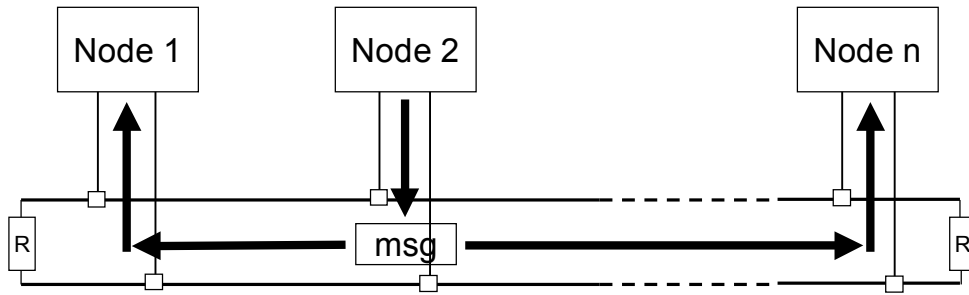
## Brief Introduction to CAN



# CAN Introduction

Introduced in 1996 by Bosch  
- Standardized by ISO 11898  
Control is distributed across the network

Message based system  
- Messages are broadcast  
- All receivers ACK valid messages  
- Receivers filter out unwanted messages

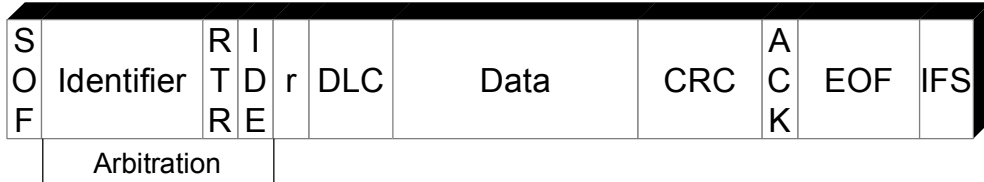


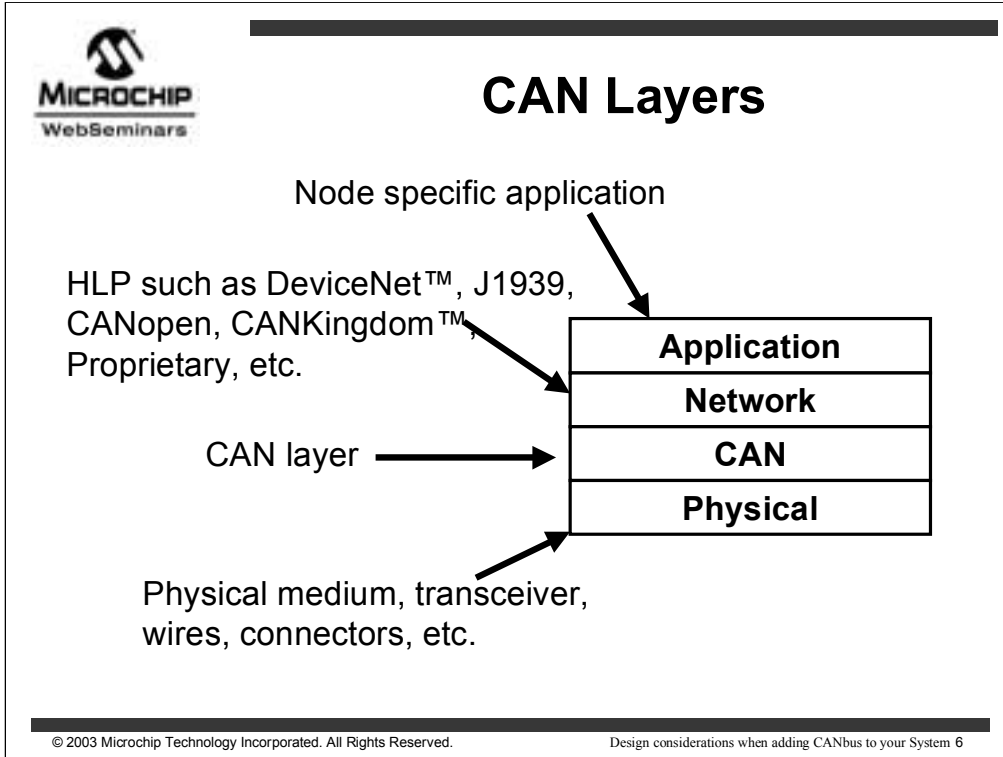
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# Message Format







## Design Considerations When Connecting to CAN

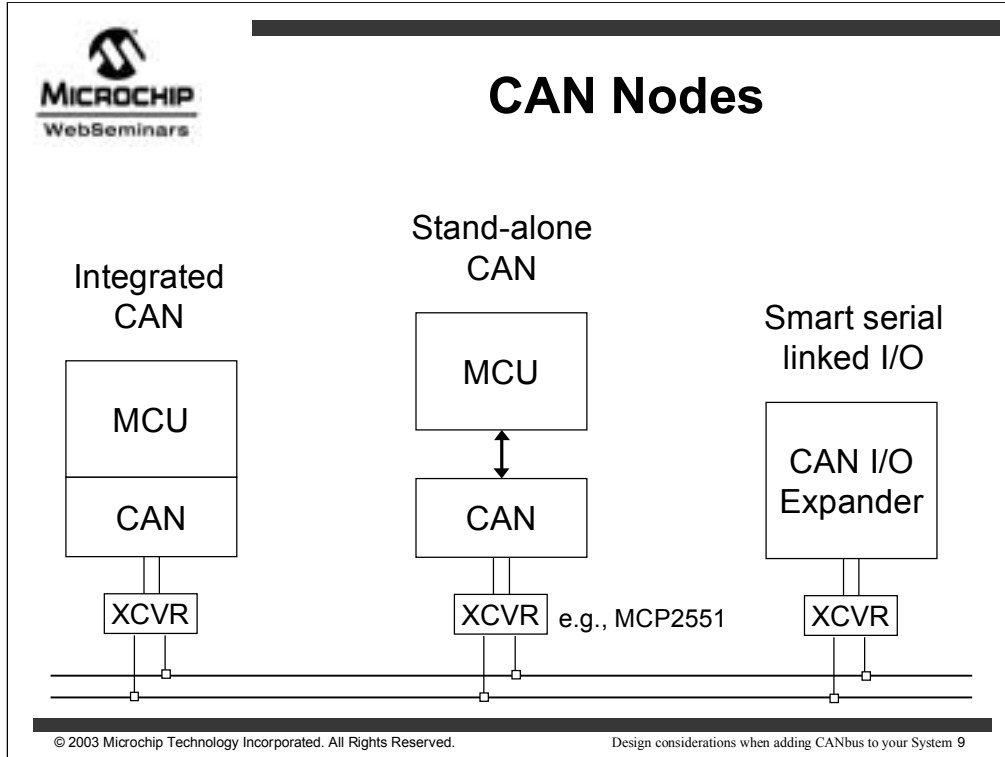
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## Some Considerations

- Adding CAN to an existing design, or to a new design?
- HLP requirements?
  - Non-proprietary: J1939, CANopen, DeviceNet, etc.
  - Proprietary: specialized HLP for specific system
- Node complexity?
  - Simple low cost sensor, high-end complex demanding node, etc.

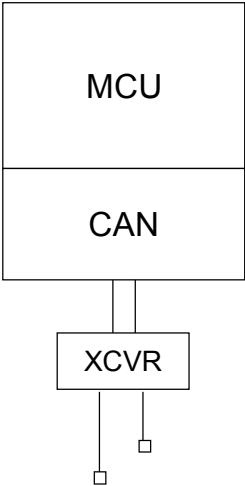




## Integrated Solution

PROS

- Two chip solution
- Fast access to the CAN peripheral



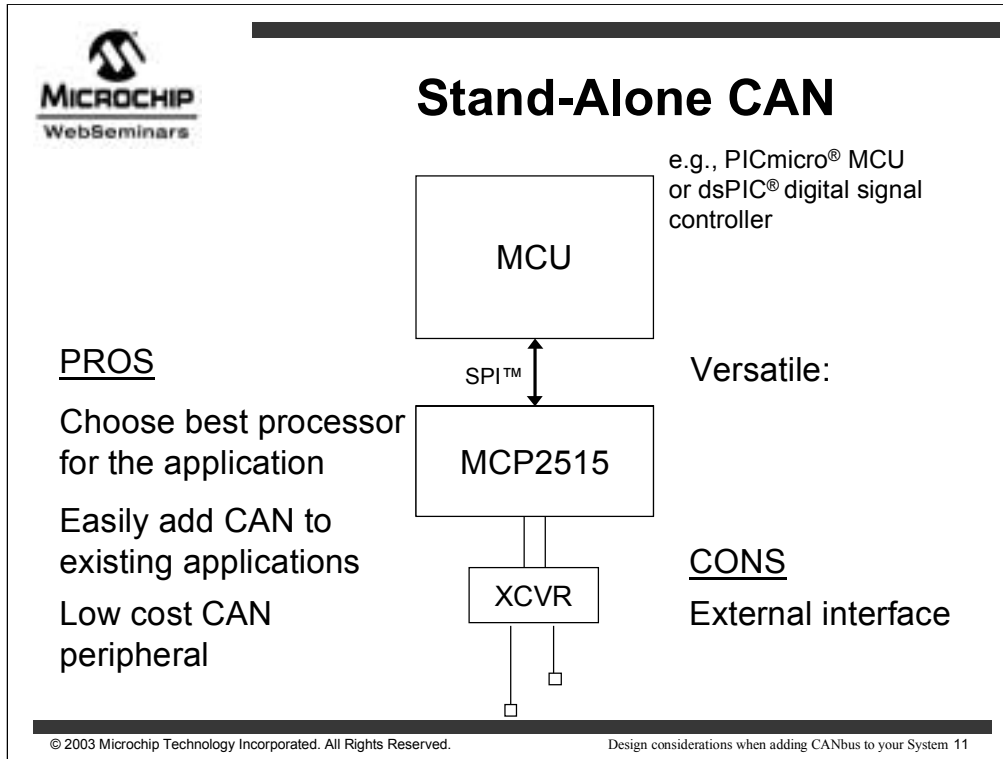
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graph TD; MCU[MCU] --- CAN[CAN]; CAN --- XCVR[XCVR]; XCVR --- Pin1[ ]; XCVR --- Pin2[ ]
```

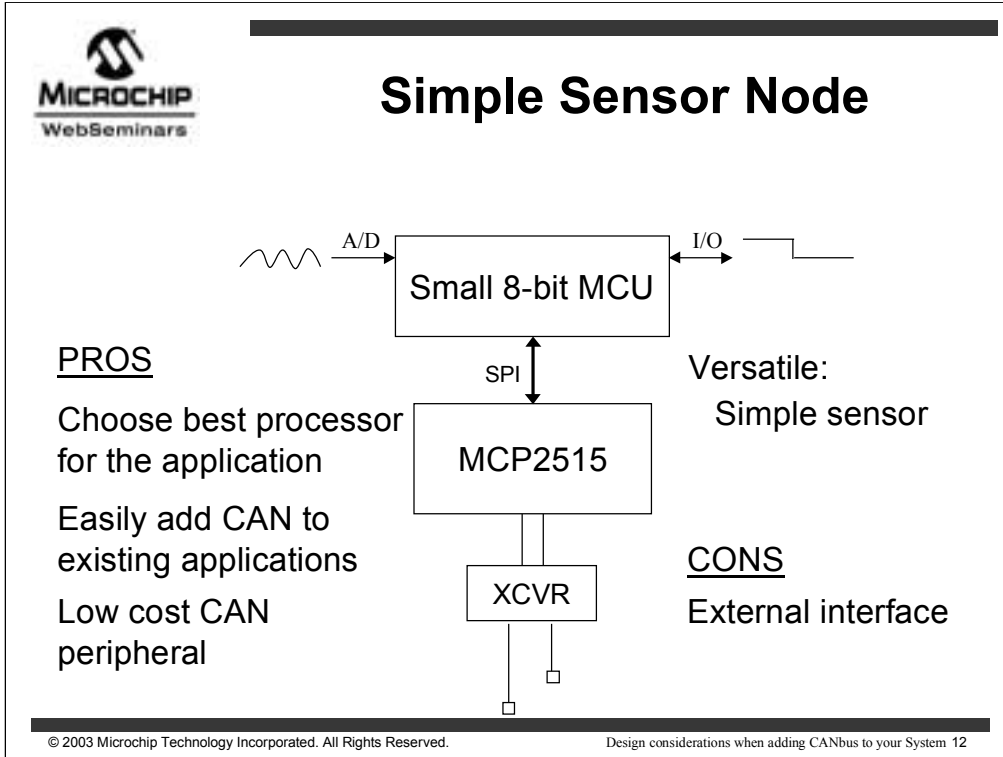
CONS

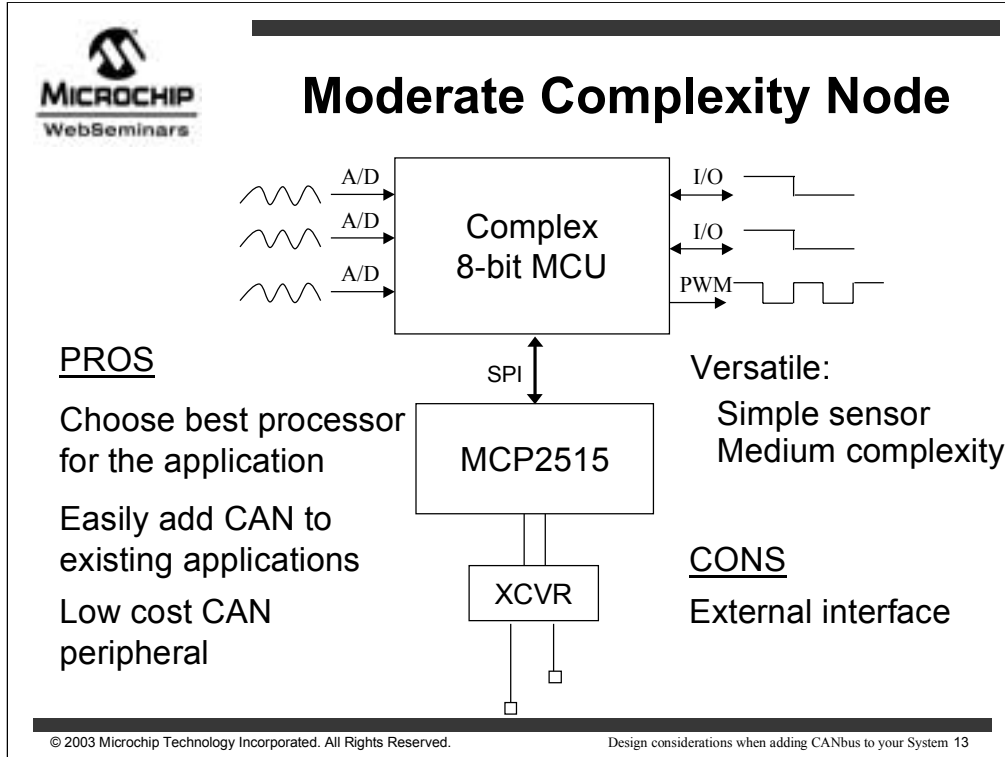
- MCU may not fit the application
- May be cost prohibitive

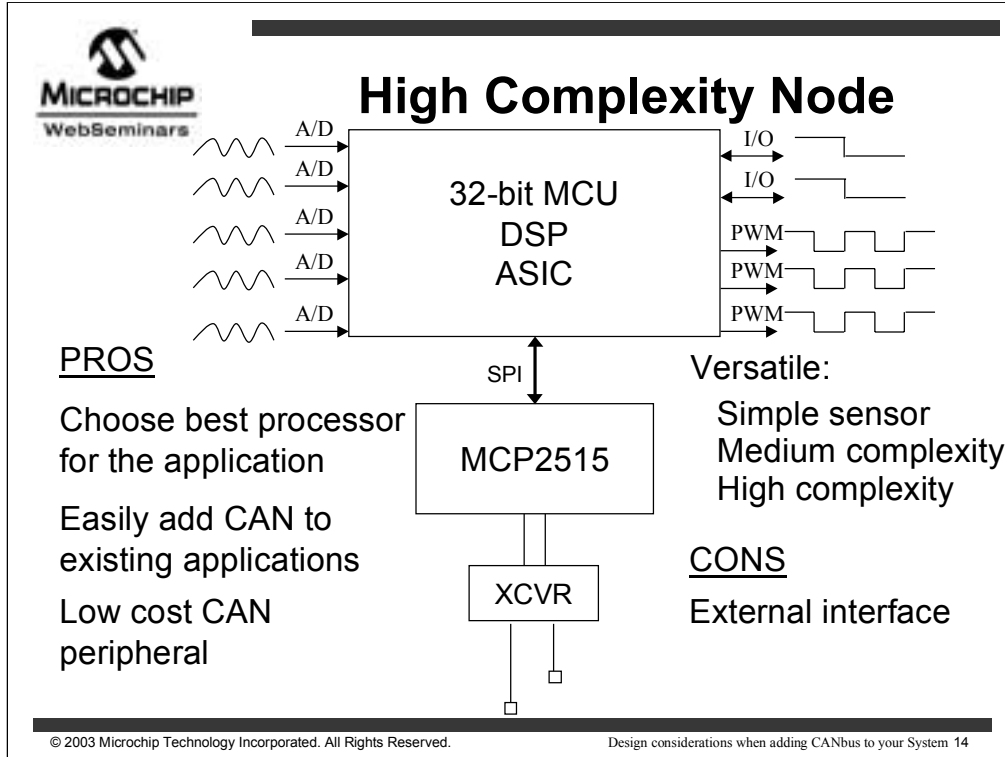
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## Can I/O Expander

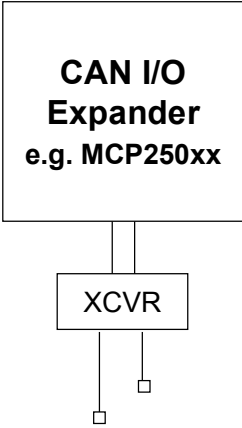
Provides I/O expansion for a CAN network

Smart sensor node

No MCU interface

Peripherals: GPIO, A/D, PWM


Automatic message transmission



```
graph TD; A["CAN I/O Expander  
e.g. MCP250xx"] --- B["XCVR"]; B --- C[ ]; B --- D[ ]
```

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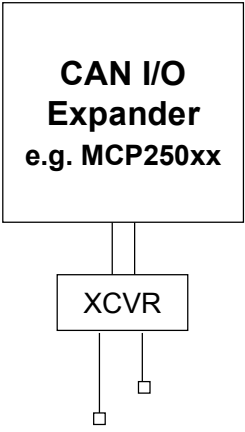
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## Can I/O Expander

PROS

- One chip solution
- No MCU firmware to write or debug
- Low cost, simple sensor applications
- Ideal for proprietary HLPs



**CAN I/O Expander**  
e.g. MCP250xx

XCVR

CONS

- Less flexibility with non-proprietary HLPs

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## Summary

- CAN is a robust data communications protocol which is suitable for:
  - Simple sensor and display applications
  - Distributing control across the network
  - System critical applications in automotive and industrial industries.
  - Etc.
- Knowing the node and/or system requirements can help determine the best solution



## Microchip's CAN Products

- MCP2515 Stand-alone CAN controller
- MCP250xx CAN I/O Expander (four devices)
- MCP2551 CAN Transceiver
- PIC18CXX8 (two devices)
- PIC18FXX8 (four devices)
- PIC18FX680 and PIC18FX585 ECAN (four devices)
- dsPIC30F601X 16-bit DSC with CAN

Future Devices:

- PIC18F2680/4680 and PIC18F2585/4585 ECAN
- dsPIC30F401X
- dsPIC30F501X



## References

- Application Notes
  - *ADN004, Ease into the Flexible CANbus Network*
  - *AN713, An introduction to the CAN protocol that discusses the basics and key features.*
  - *AN212, Smart Sensor CAN Node using the MCP2510 and PIC16F876*
  - *AN215, A Simple CAN Node using the MCP2510 and PIC12C67X*
  - *AN228, A CAN Physical Layer Discussion*
  - *AN754, Understanding Microchip's CAN Module Bit Timing*
  - *AN815, Understanding the MCP250xx Devices*
  - *AN816, A CAN System Using Multiple MCP25050 CAN I/O Expanders*
  - *AN872, Upgrading from the MCP2510 to the MCP2515*



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## **WebSeminar: November 19, 2003**

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