

# Proposed Enhancements to the IEEE 1451.2 Standard for Smart Transducers

**Robert N. Johnson, Telemonitor, Inc.**  
**Stan Woods, Agilent Technologies, Inc.**

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## ***Most requested changes***

- Make the standard easier to implement
- Use less wires
- Other miscellaneous enhancements related to TEDS and commands

## *Observations*

- The standard specified a Smart Transducer Interface Module (STIM) with a digital interface. To implement this in products required one of two things:
  - that sensor vendors integrate their sensors with electronics
  - that data acquisition vendors integrate their electronics with sensors
- The digital interface was new so there was no off-the-shelf support for it

## ***Since IEEE 1451.2 was released***

- Off-the-shelf support has increased for simple digital hardware interfaces such as RS-485 (multi-drop) and RS-232 (point-to-point): more chips, smaller packages, increased ESD protection, etc.
- These hardware interfaces continue to be supported on microcontrollers
- Value of plug-and-play, self-identification, electronic data sheets and configuration tables is recognized

## *Opportunity*

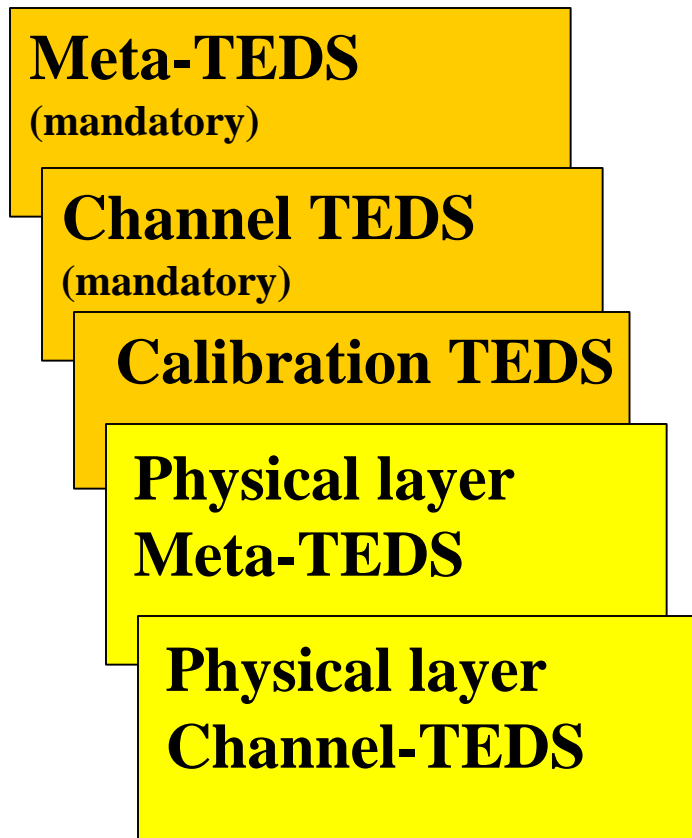
- Keep what is best about the original 1451.2
- Add support for off-the-shelf connectivity

## ***IEEE 1451.2-1997 valuable features***

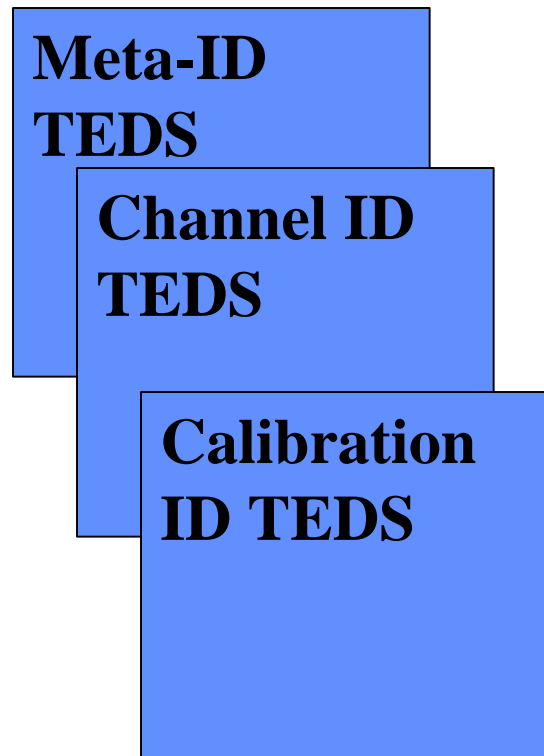
- Extensible Transducer Electronic Data Sheet (TEDS)
- General calibration/correction model for transducers
- Physical units representation based on SI units
- Triggering and control model defines how channels are accessed
- All channels may be triggered simultaneously, timing parameters are used to indicate channel differences
- Function models for different kinds of sensors
- Powerful concept/location of correction engine allows flexibility in system design

## Proposed new IEEE 1451.2 TEDS blocks

Machine readable



Human readable



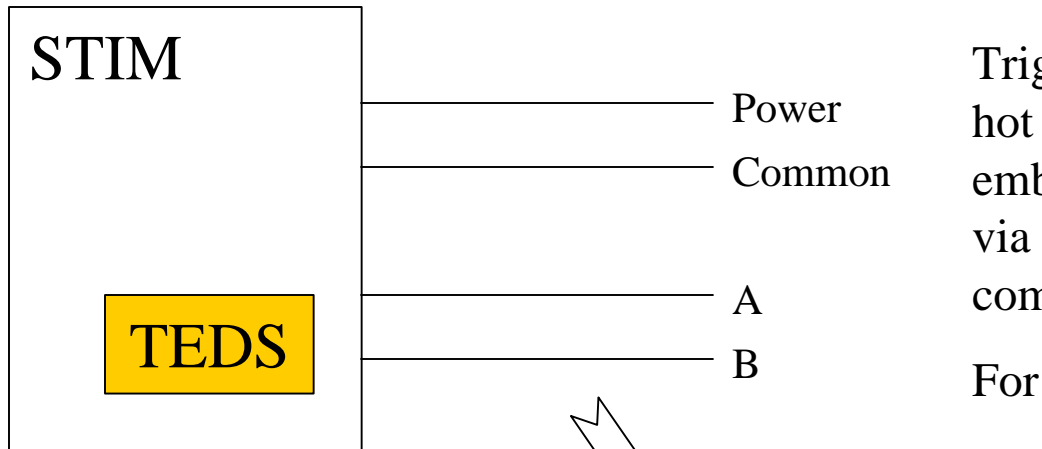
Application specific



Future extensions



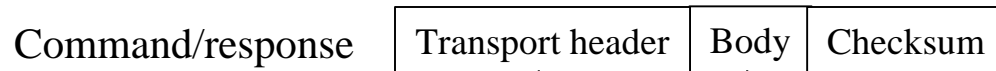
## Alternate physical layers



Triggering, trigger acknowledge, hot swap, and error reporting are embedded in messages exchanged via off-the-shelf asynchronous communication channel.

For example:

- RS-232
- RS-485
- USB



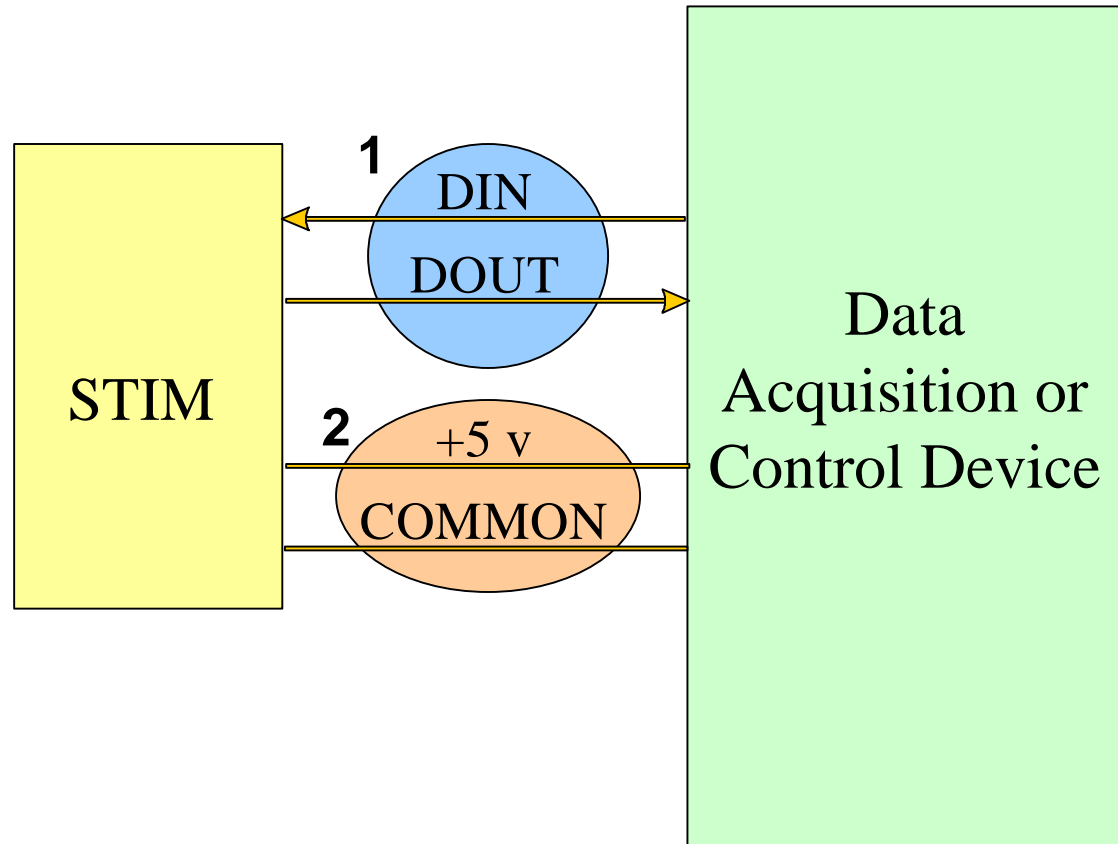
Device addressing, message sequence numbers

Same command/response messages formats in the standard today

## *Proposed IEEE 1451.2 serial interface*

- 1) Communication, triggering, error reporting
- 2) Power

Signal names for 1) will depend on particular physical layer



## ***Support for serial IEEE 1451.2***

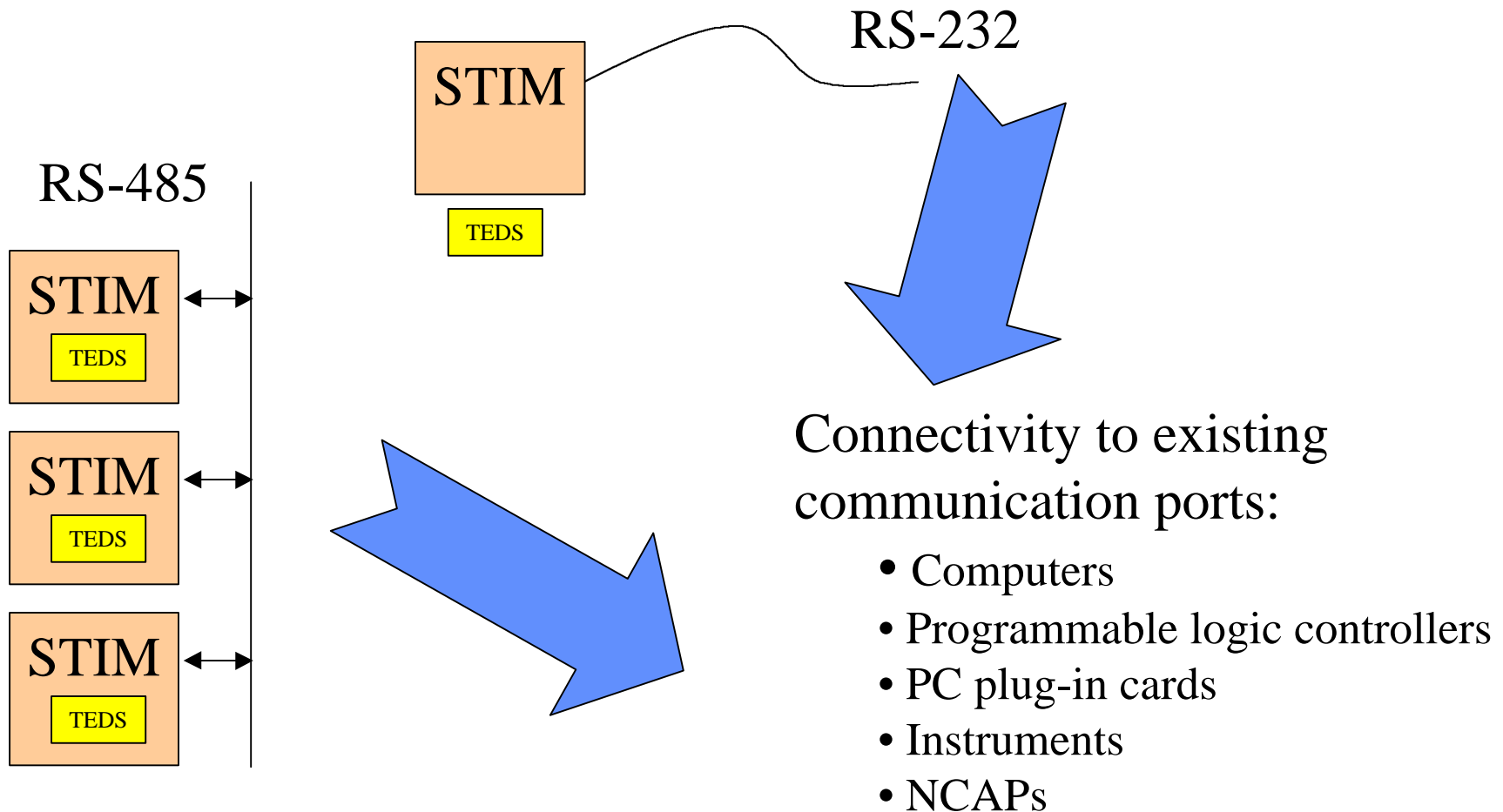
### **Trends in UART support:**

- present on most microprocessors
- chips have become smaller, less expensive, more robust
- multi-port UARTs
- supported in ADI Microconverter family

### **Where can we plug into serial ports?**

- Instruments
- I/O cards
- Computers
- VME, VXI, CPCI, PXI card cages
- Handhelds, PDAs

## *New connectivity enabled by enhancements*



## *Conclusions*

- IEEE 1451.2 established several valuable basic principles of smart transducers
- The most important of these is the TEDS
- We need to keep the best parts of the original standard while addressing the current needs of the marketplace
- The proposed enhancements will address the major requested changes and will result in:
  - More flexibility
  - Lower cost
  - Improved connectivity
- We need user comments and feedback on the proposed enhancements

***Questions/Comments?***

## Proposed serial version of IEEE 1451.2

