PREHĽAD PRIEMYSELNÝCH ROZHRANÍ

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KTORÉ ROZHRANIE ?

- A-bus
- Arcnet
- Arinc 625
- ASI
- Batibus
- Bitbus
- CAN
- ControlNet
- DeviceNet
- DIN V 43322
- DIN 66348
- FAIS
- EIB
- Ethernet
- Factor
- Fieldbus Foundation
- FIP
- Hart
- IEC 61158

- IEEE 1118
- Instabus
- Interbus-S
- ISA SP50
- IsiBus
- IHS
- ISP
- J-1708
- J-1850
- LAC
- LON
- MAP
- Master FB
- MB90
- MIL 1553
- MODBUS
- MVB
- P13/42
- P14

- Partnerbus
- P-net
- Profibus-FMS
- Profibus-PA
- Profibus-DP
- PDV
- SERCOS
- SDS
- Sigma-i
- Sinec H1
- Sinec L1
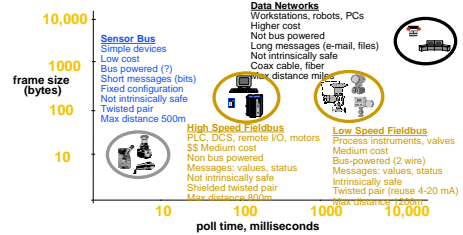- Spabus
- Suconet
- VAN
- WorldFIP
- ZB10
- ...

NAJPOUŽÍVANEJŠIE FIELD BUSSES

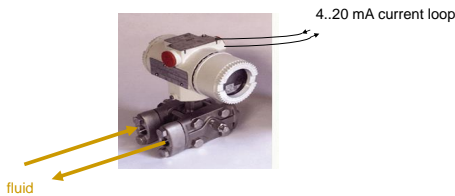| Bus	User*	Application	Sponsor
CANs	25%	Automotive, Process control	CiA, OVDA, Honeywell
Profibus (3 kinds)	26%	Process control	Siemens, ABB
LON	6%	Building systems	Echelon, ABB
Ethernet	50%	Plant bus	all
Interbus-S	7%	Manufacturing	Phoenix Contact
Fieldbus Foundation, HART	7%	Chemical Industry	Fisher-Rosemount, ABB
ASI	9%	Building Systems	Siemens
Modbus	22%	obsolete point-to-point	many
ControlNet	14%	plant bus	Rockwell

Sum > 100%, since firms support more than one bus

RÔZNE TRIEDY FIELD BUSSES

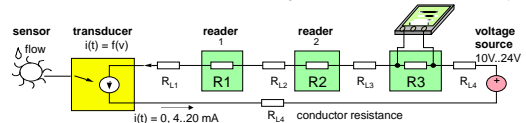*Nejestvuje jediný typ fieldbus vhodný pre všetky možné aplikácie*

Sensor Bus
Simple devices
Low cost
Bus powered (?)
Short messages (bits)
Fixed configuration
Not intrinsically safe
Twisted pair
Max distance 500m

Data Networks
Workstations, robots, PCs
Higher cost
Not bus powered
Long messages (e-mail, files)
Not intrinsically safe
Coax cable, fiber
Max distance miles

High Speed Fieldbus
PLC, DCS, remote I/O, motors
$$ Medium cost
Non bus powered
Messages: values, status
Not intrinsically safe
Shielded twisted pair
Max distance 800m

Low Speed Fieldbus
Process instruments, valves
Medium cost
Bus-powered (2 wire)
Messages: values, status
Intrinsically safe
Twisted pair (reuse 4-20 mA)
Max distance 1200m

frame size (bytes): 10,000 · 1000 · 100 · 10
poll time, milliseconds: 10 · 100 · 1000 · 10,000

source: ABB

PRÍKLAD ZARIADENIA – DIFERENČNÝ TLAKOVÝ SNÍMAČ

4..20 mA current loop

fluid

ANALÓGOVÁ 4-20 mA SLUČKA

The 4-20 mA is the most common analog transmission standard in industry

sensor — transducer $i(t) = f(v)$ — reader 1 — reader 2 — voltage source 10V..24V

R_{L1} — R1 — R_{L2} — R2 — R_{L3} — R3 — R_{L4} — +

$i(t) = 0, 4..20$ mA

R_{L4} conductor resistance

The transducer limits the current to a value between 4 mA and 20 mA, proportional to the measured value, while 0 mA signals an error (wire break)

The voltage drop along the cable and the number of readers induces no error.

Simple devices are powered directly by the residual current (4mA), allowing to transmit signal **and** power through a single pair of wires.

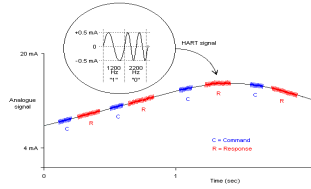Remember: 4-20mA is basically a point-to-point communication (one source)

HART

DATA OVER 4..20 MA LOOPS

HART - PRINCIPLE

HART (Highway Addressable Remote Transducer) was developed by Fisher-Rosemount to retrofit 4-to-20mA current loop transducers with digital data communication.


HART modulates the 4-20mA current with a low-level frequency-shift-keyed (FSK) sine-wave signal, without affecting the average analogue signal.

HART uses low frequencies (1200Hz and 2200 Hz) to deal with poor cabling, its rate is 1200 Bd - but sufficient.

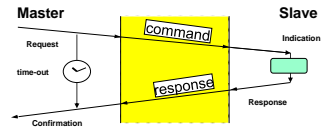Novšia verzia využíva 8PSK - nosná 3200Hz, 8 rovnomerne rozdelených pozícií - prenosová rýchlosť 9600bps

Bezdrôtová verzia v pásme 2,4GHz a verzia s IP

Transmission of device characteristics is normally not real-time critical

WIRELESSHART A IPHART
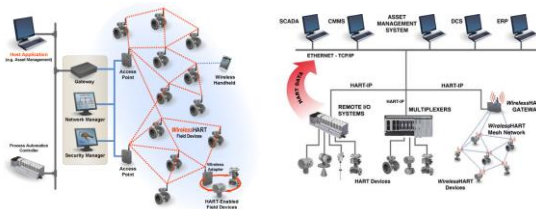
HART - PROTOCOL

Hart communicates point-to-point, under the control of a master, e.g. a hand-held device

Hart frame format (character-oriented):

preamble	start	address	command	bytecount	[status]	data	data	checksum
5..20 (xFF)	1	1..5	1	1	[2] (slave response)	0..25 (recommended)		1

HART - COMMANDS

Universal commands (mandatory):
  identification,
  primary measured variable and unit (floating point format)
  loop current value (%) = same info as current loop
  read current and up to four predefined process variables
  write short polling address
  sensor serial number
  instrument manufacturer, model, tag, serial number,
  descriptor, range limits, ...

Common practice (optional)
  time constants, range,
  EEPROM control, diagnostics,...

total: 44 standard commands, plus user-defined commands

Transducer-specific (user-defined)
  calibration data,
  trimming,...

Hart frame format (character-oriented):

Practically all 4..20mA devices come equipped with HART today

About 40 Mio devices are sold per year.

more info:
http://www.hartcomm.org/

FORMAT SPRAVY

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