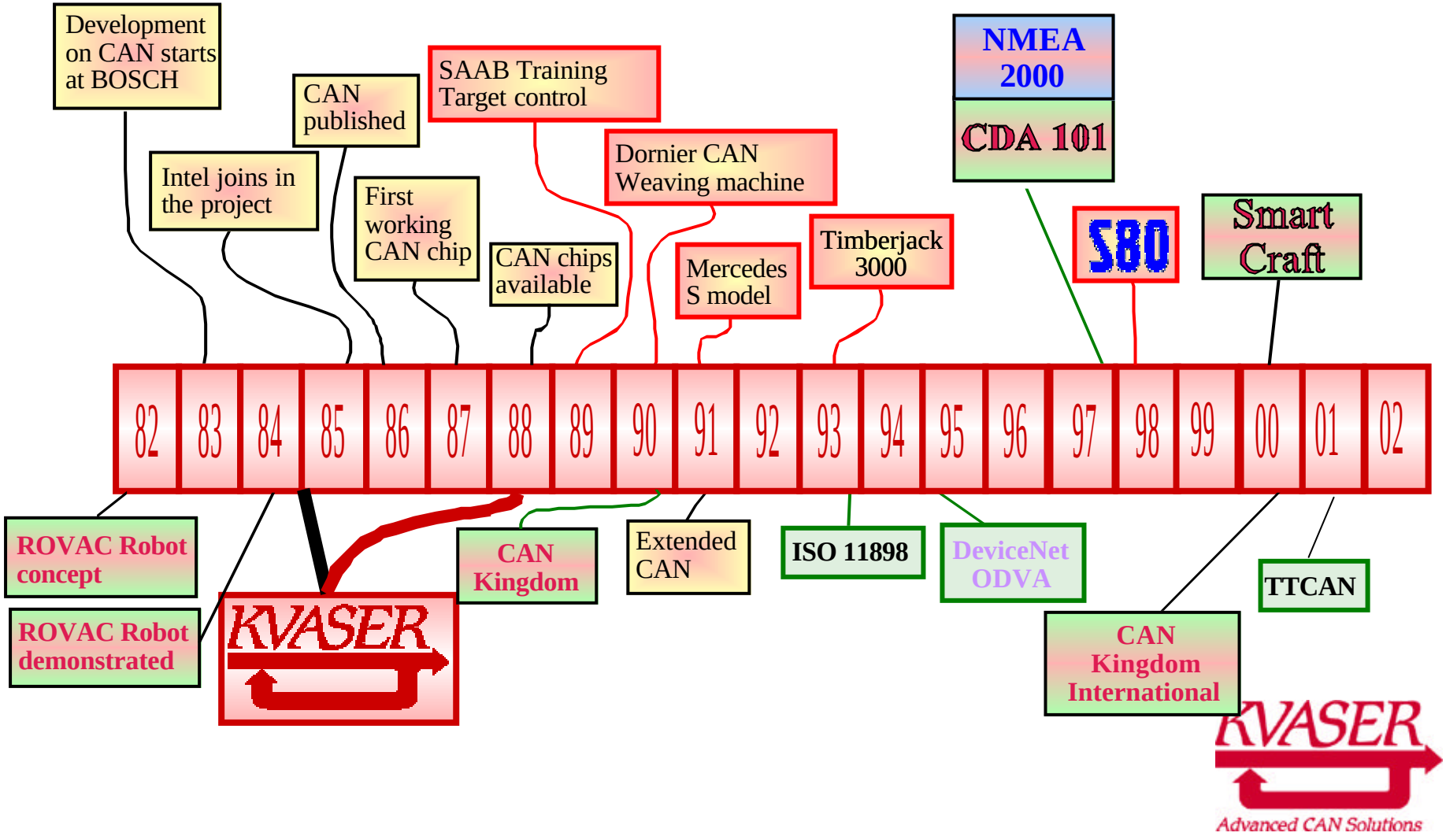
Controller Area Network

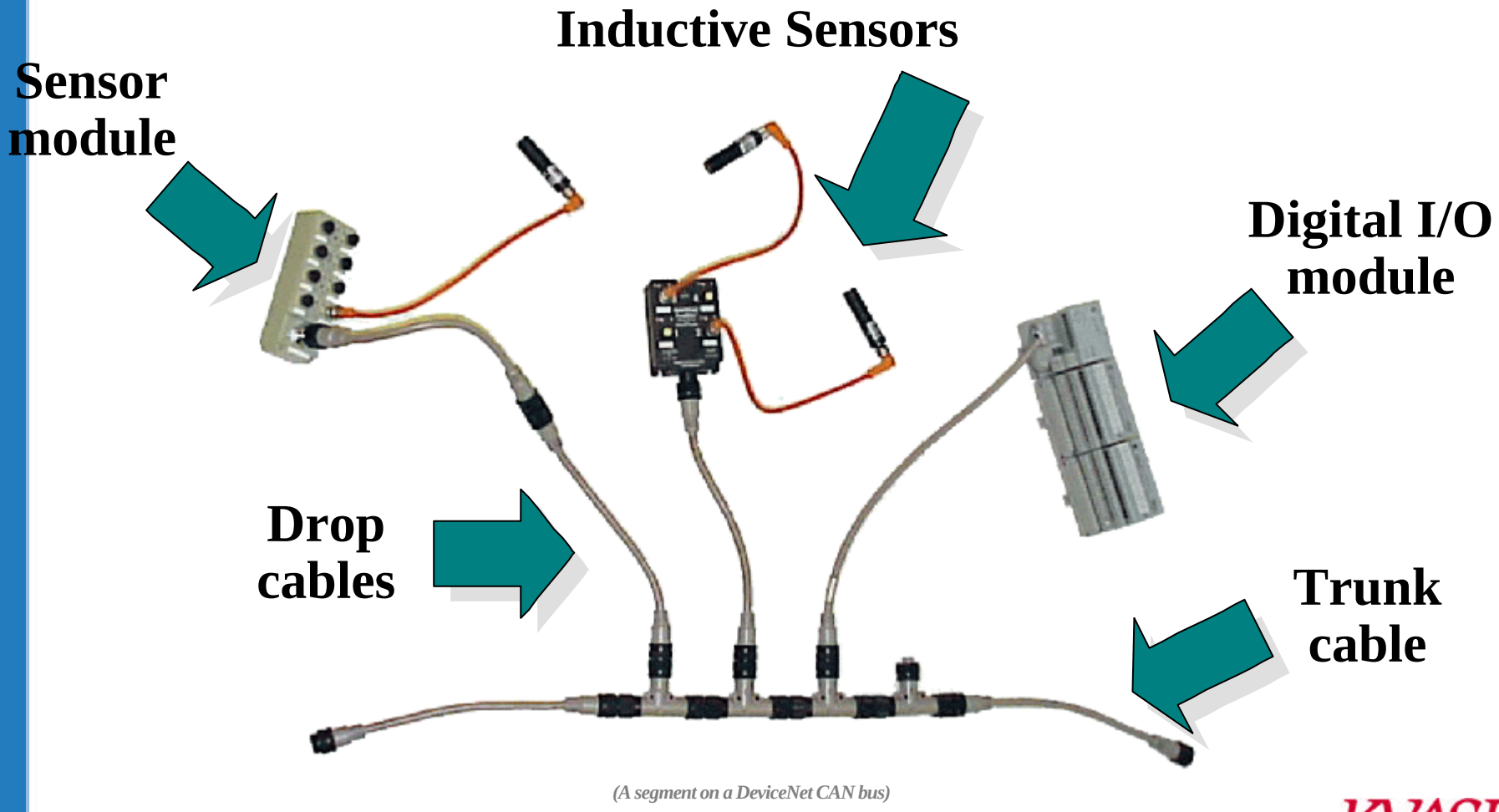
CAN

overview

Some CAN Milestones



Example of a CAN system



(A segment on a DeviceNet CAN bus)

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Some CAN cables and modules

9-pole DSUB

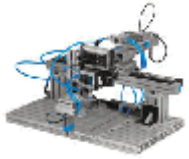
DN C-type connector

DN mini-style connector

CANHUG connector

I/O module

Sensor module



Pneumatic control

Motion Control

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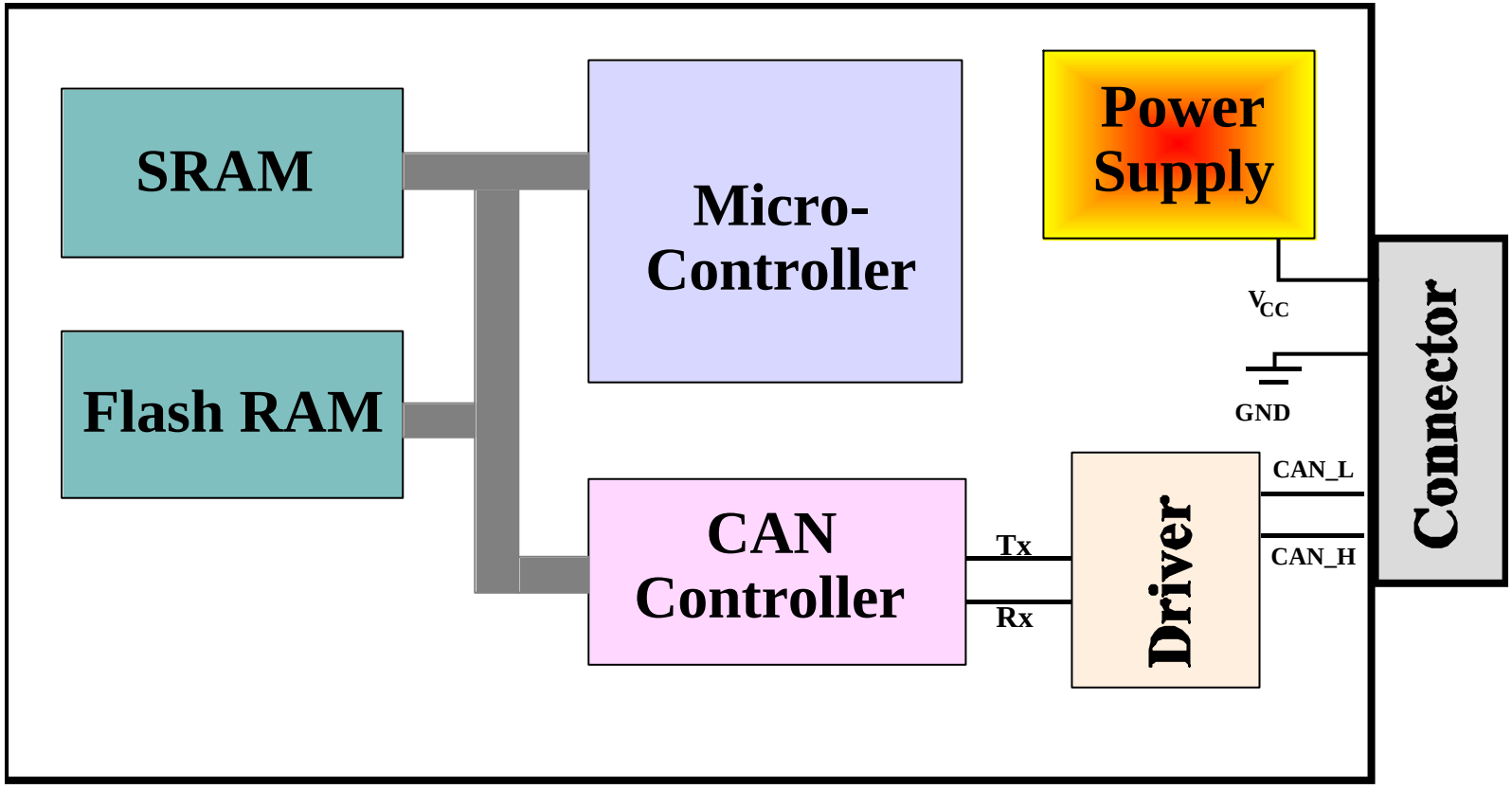
Schematic of a CAN module



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Message Transmission

The message will be sent to all modules by HW.

The transmitter will send messages bit by bit according to the CAN protocol.

- All modules, including the transmitter, will:
  - Be active in all bus activity.
  - Check for errors.
  - Force retransmit of an erroneous message.
- All modules, except for the transmitter, will:
  - Acknowledge a correct message reception.
  - Have a copy of a correct message.

This is CAN ::: everything else is HLP or application specific

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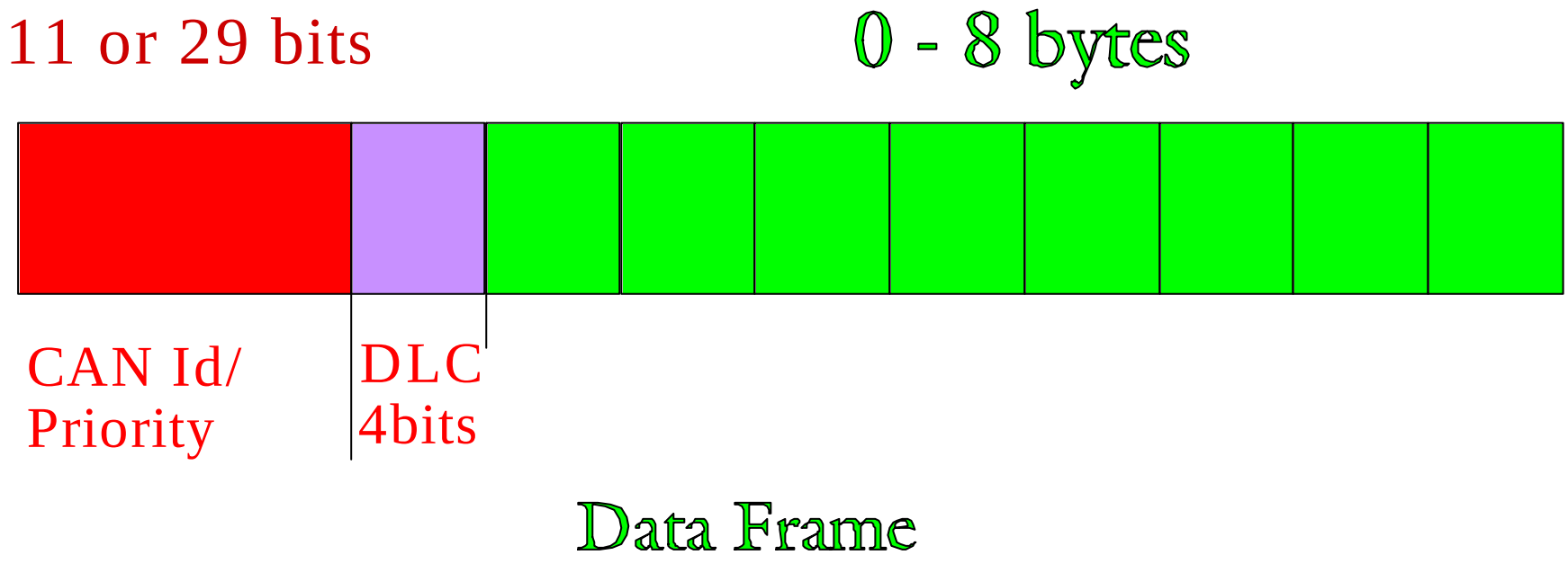
CAN message



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The Philosophy of CAN

If a module has information that is needed elsewhere in a system, make it available on the CAN bus

- New information = > send it on the CAN bus
- All modules will have identical information
- The receiving modules will store all needed data

In this way you will get a global database, where the same information is available in all modules.

The source and destination of the information are of no importance.

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A Telephone Network

- Who is the client?
- Who is the server?
- If the communication fails, what will happen?
- On errors, what can be done?

Get the phone number to the receiver
Dial the phone number = = >
< = = Get a ring or busy signal in return
< = = Answer and identify yourself
Tell that the temperature to display is 85?F = = >
< = = Acknowledge that the information is received
End the message transfer by saying “good bye” = = >
Disconnect the connection

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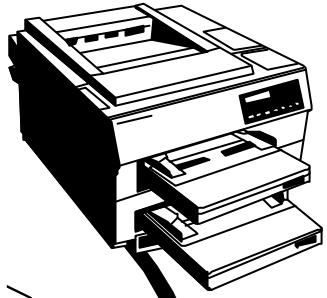
A Computer Network

- Who is the client?
- Who is the server?
- If the communication fails, what will happen?
- On errors, what can be done?

Get the printer device address
Establish a connection to the device = = >
< = = Acknowledge the existence of the device
Print the temperature value, 85?F = = >
< = = Acknowledge that the printing is done
End the transfer by disconnecting the device = = >
Disconnect the connection



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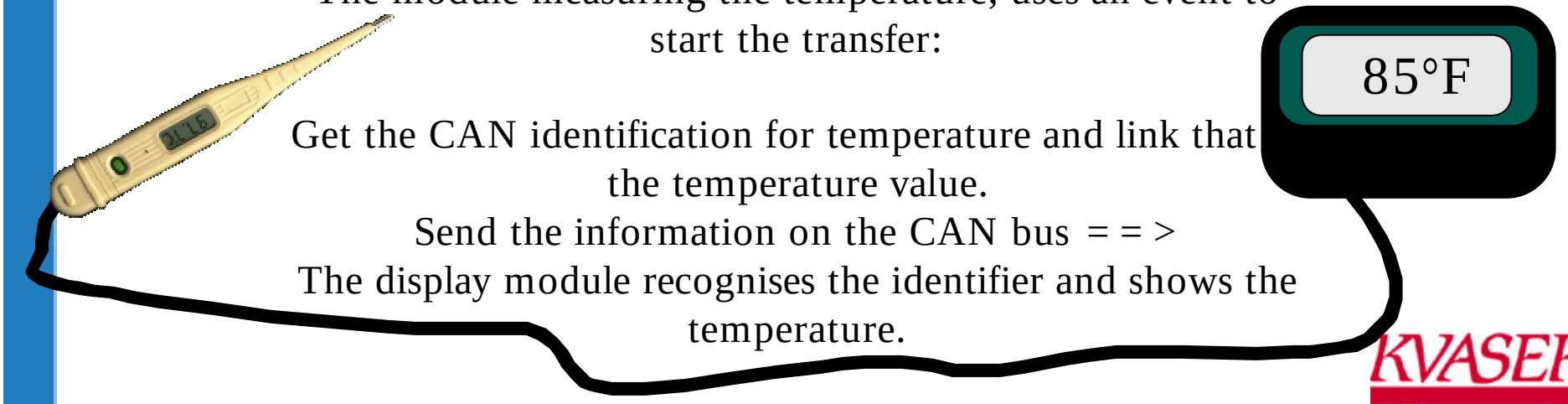
How this is done in a CAN System!

- Who is the client?
- Who is the server?
- If the communication fails, what will happen?
- On errors, what can be done?

The module measuring the temperature, uses an event to start the transfer:

Get the CAN identification for temperature and link that the temperature value.
Send the information on the CAN bus = = >
The display module recognises the identifier and shows the temperature.



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The Remote Frame

The CAN hardware of some CAN controllers supports a certain kind of events: The remote frame

- An identifier with request RTR will force the same identifier with data to be sent.
- The remote frame can be transmitted by any module, possible at the same time.
- The DLC (Data Length Code) has to have the same value in the remote frame as in the data frame, but will have no data bytes.

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Filtering and Selection

The filtering and selection in the receiver will be according to the information available in the message. The information in a CAN message can belongs to any of three main parts:

- PRIO
  - priority / identifier
- DLC
  - Data Length Code [0..8]
- Data
  - Number of bytes according to the DLC

Filtering and selection can be made in all three parts.

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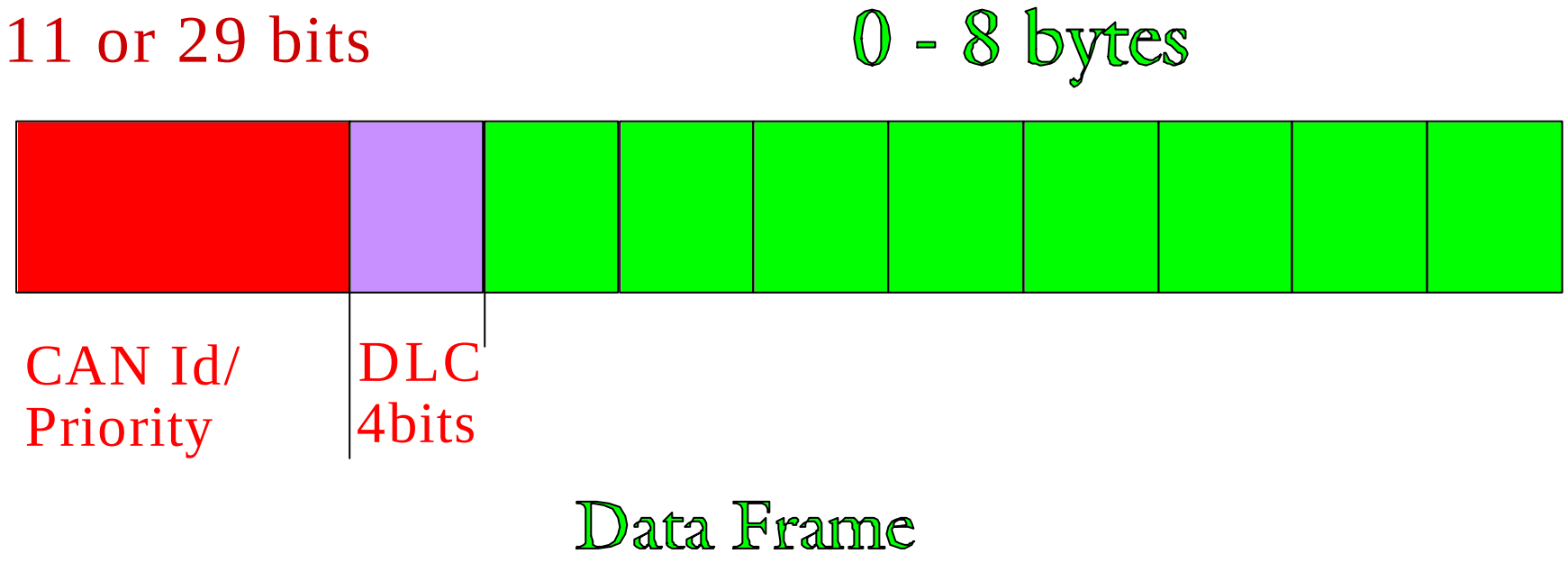
CAN message



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Filtering and Selection

- Filtration by CAN controllers
  - All CAN controllers support some kind of filtration in the priority / identifier.
  - Some CAN controllers support filtration in some of the data bytes.
- Filtration by module software
  - All kinds of filtration, but the above mentioned, have to be taken care of by module software.
  - The three parts – PRIO, DLC, the data bytes – are available for filtration handled by module software.

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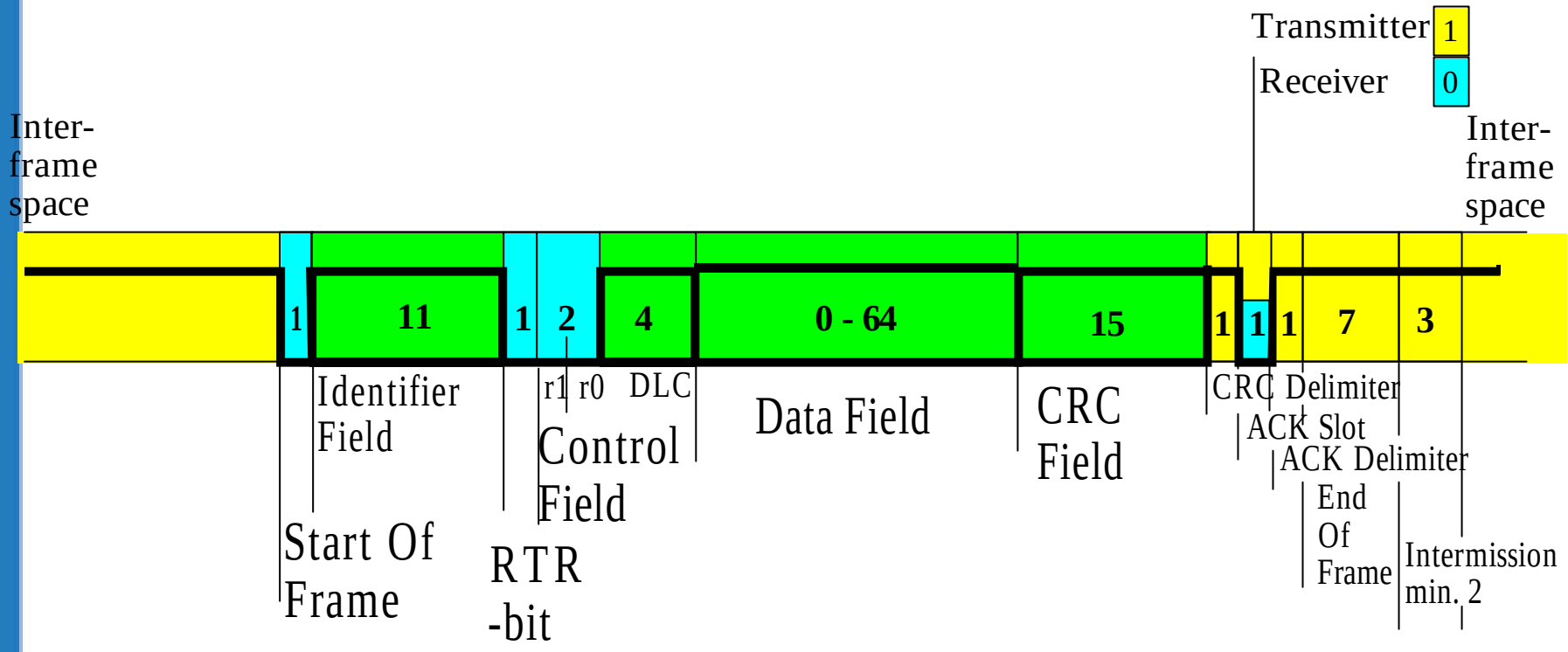
CAN Data Frame Std



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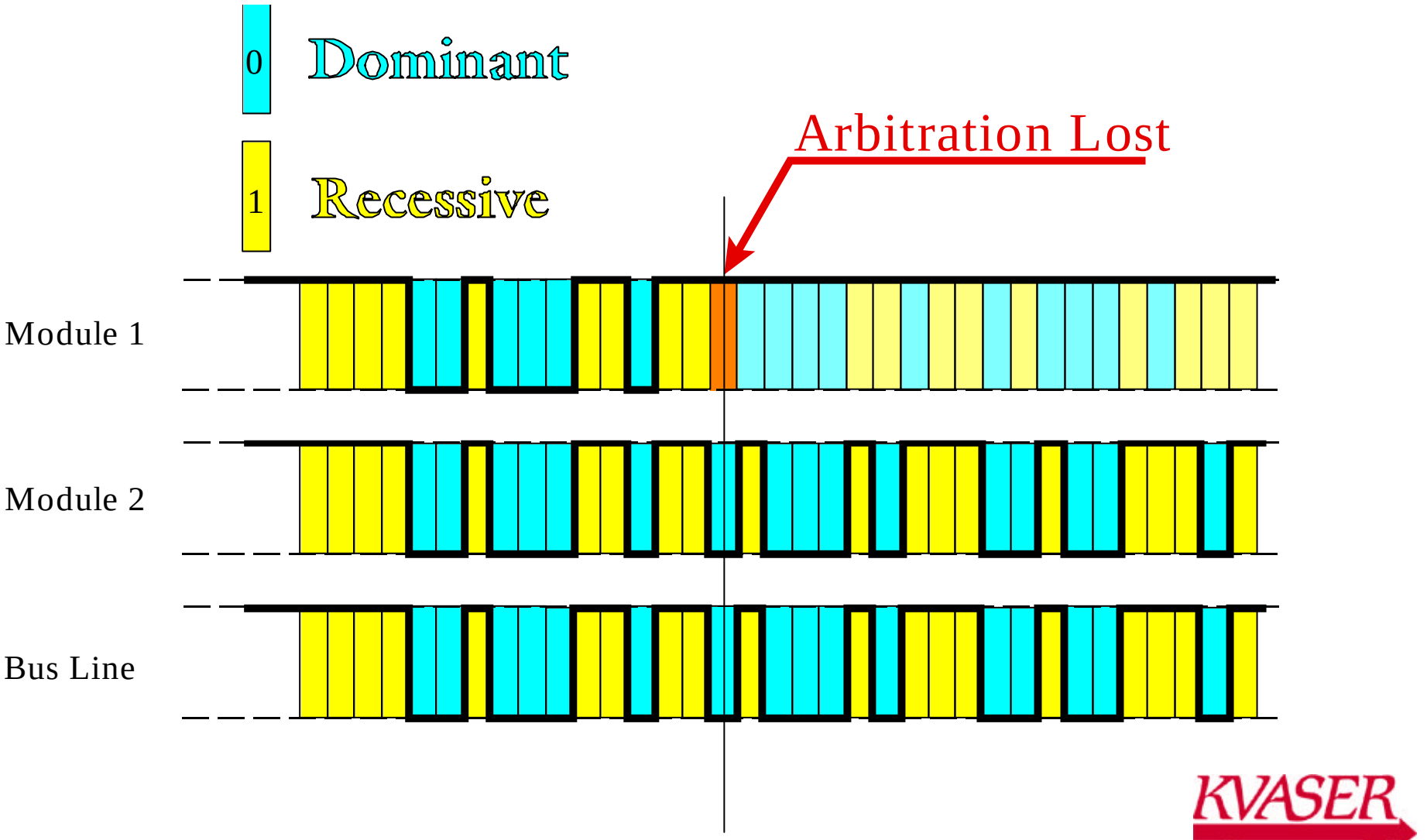
Bit-wise Arbitration



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