Acceptance Filter (AF) in CAN Controller(11898-1)

Reference

AN10674 Manual

What is an AF in CAN?

- Recognition of received Identifiers, known in CAN terminology as Acceptance Filtering.

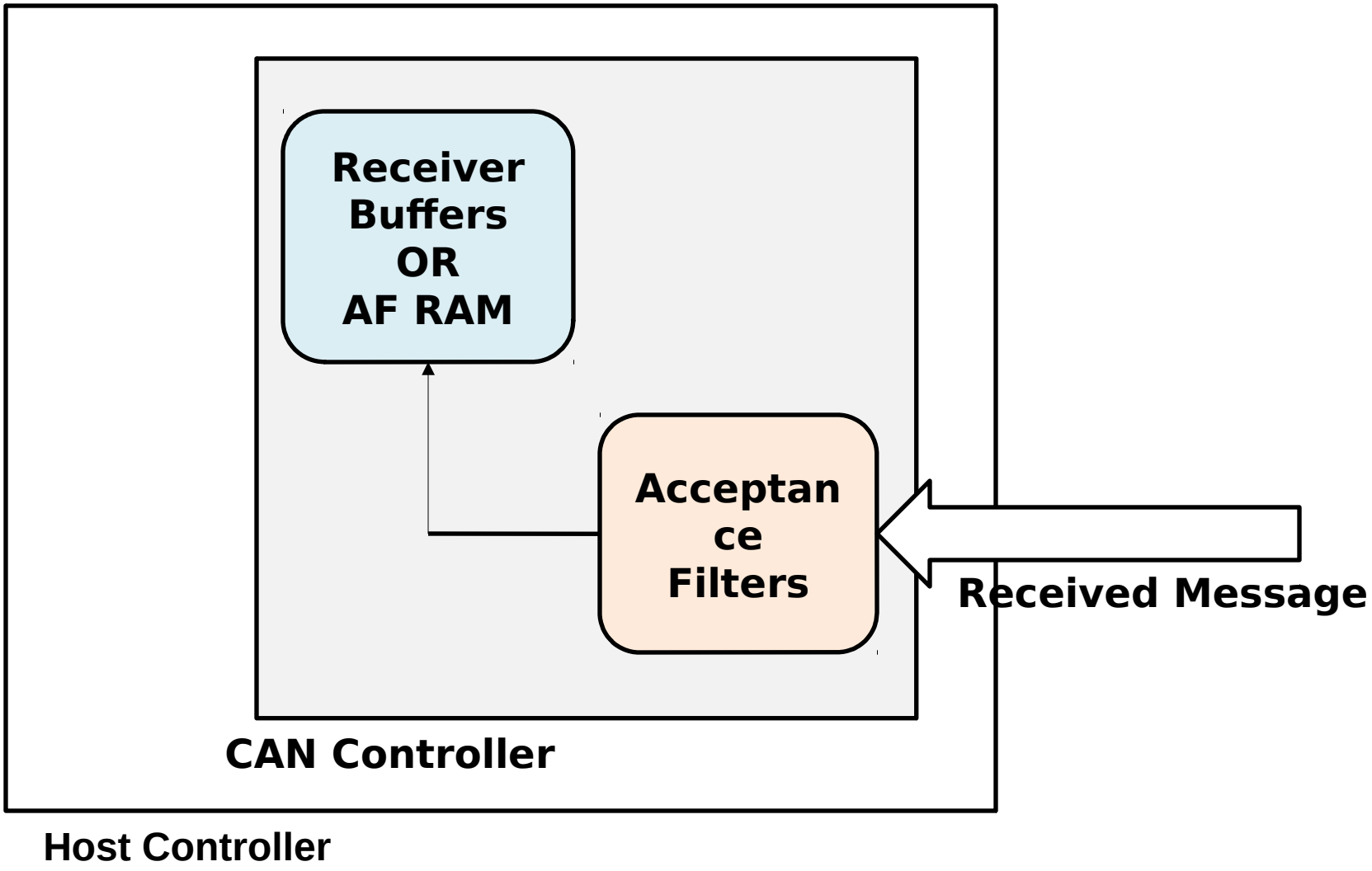
- The acceptance filter can be programmed to pass or block message identifiers before they enter the CAN controller for processing.

- This prevents unwanted messages entering the CAN receive buffer and consequently greatly reduces the overhead on the CPU.

- Acceptance Filter can provide FullCAN-style automatic reception for selected Standard Identifiers.

- **What is full CAN?**
  - A full CAN controller is responsible for filtering of the received messages & for copying the contents of the received message into a particular RAM section.

AF in CAN Controller



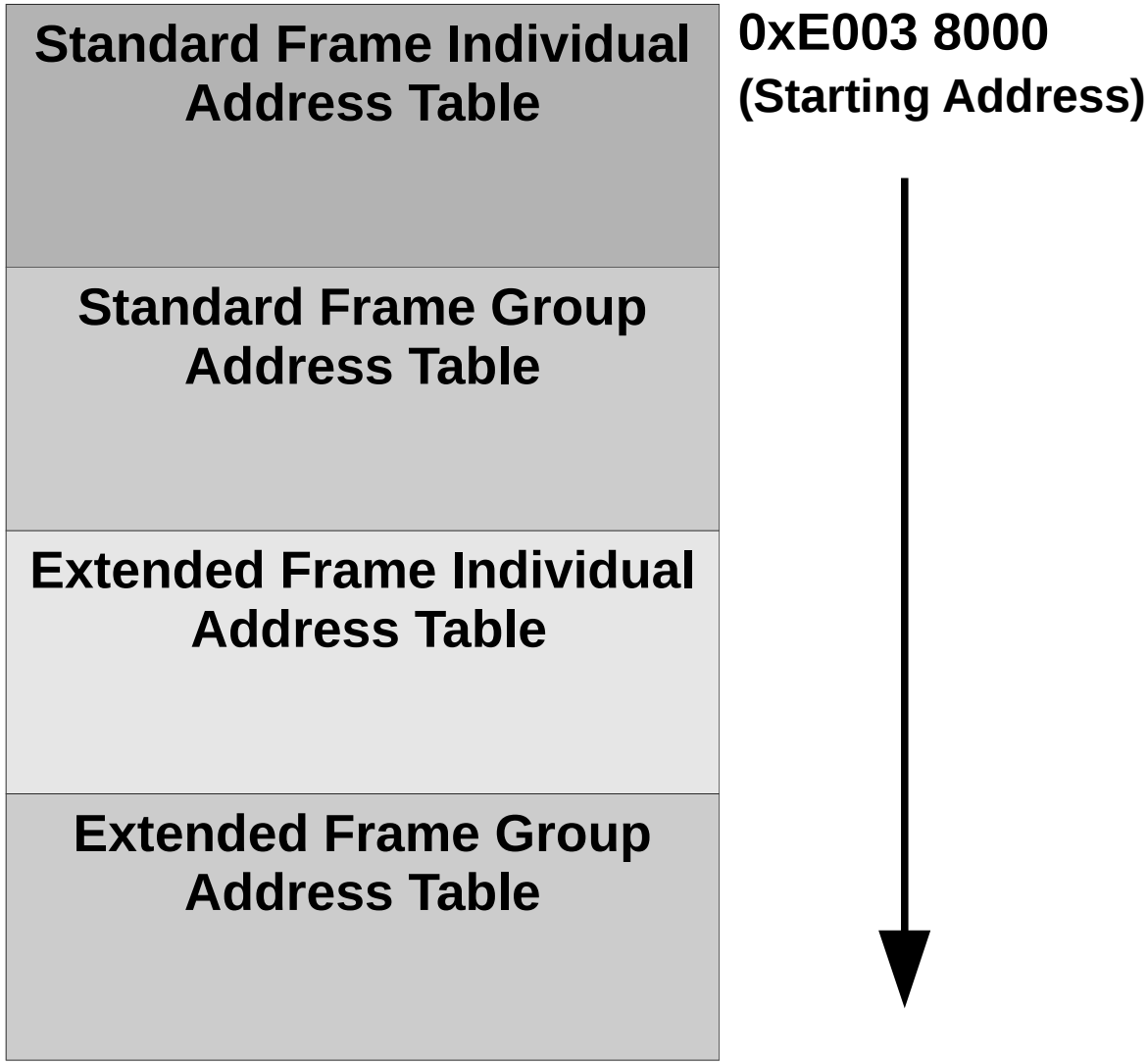
Configuring The Acceptance Filter

MEMORY MAP OF THE CAN BLOCK

The CAN Controllers and Acceptance Filter occupy a number of VPB slots, as follows:

Table 122: Memory Map of the CAN Block

Address Range	Used For
E003 8000 - 87FF	Acceptance Filter RAM
E003 C000 - C017	Acceptance Filter Registers
E004 0000 - 000B	Central CAN Registers
E004 4000 - 405F	CAN Controller 1 Registers
E004 8000 - 805F	CAN Controller 2 Registers
E004 C000 - C05F	CAN Controller 3 Registers (LPC2194/2294 only)
E005 0000 - 005F	CAN Controller 4 Registers (LPC2194/2294 only)

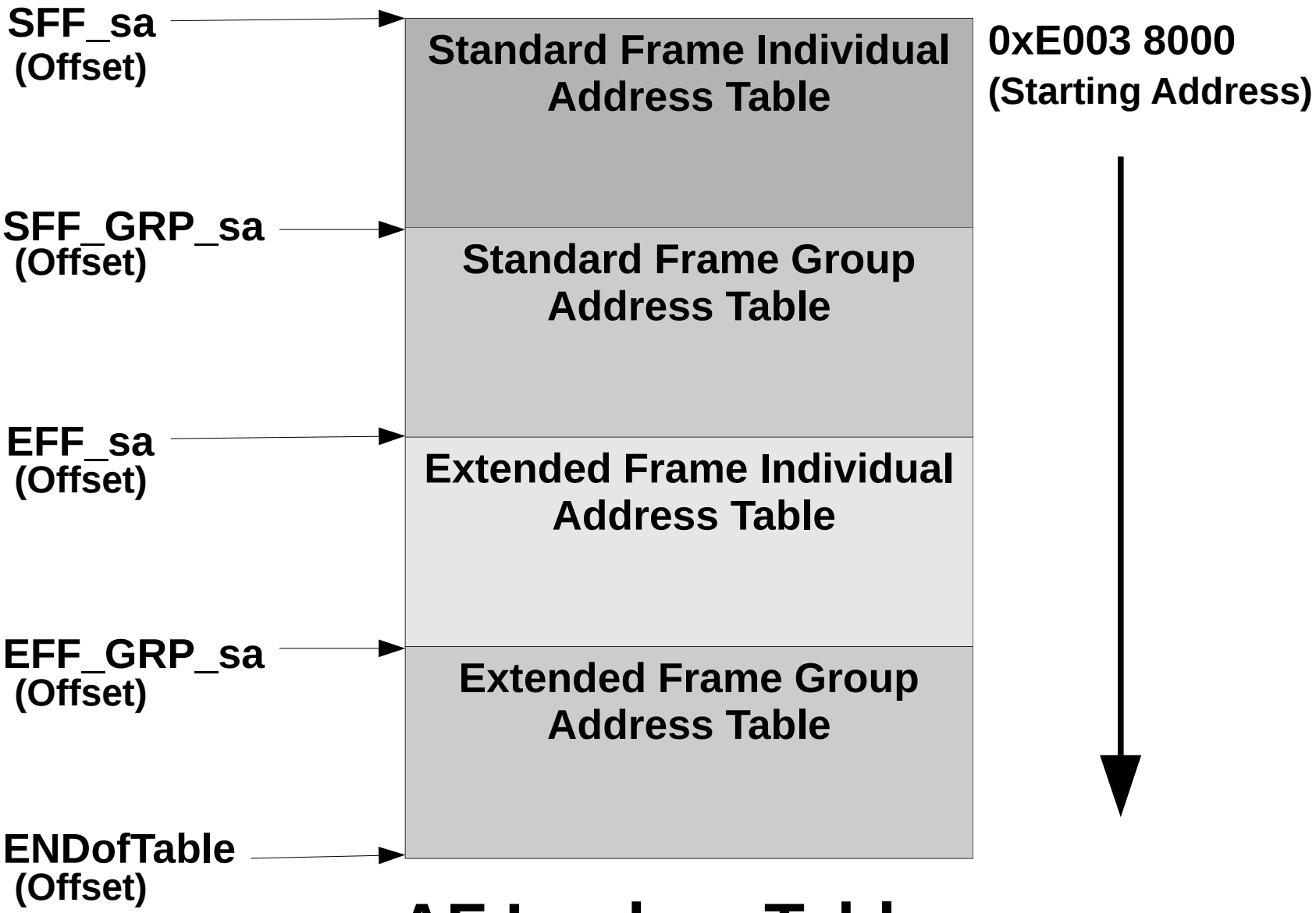


AF Lookup Table

Five Pointers

- **There are five pointers associated with the AF:**

- Standard frame Individual Start Address Register(SFF_sa)
- Standard Frame Group Start Address Register (SFF_GRP_sa)
- Extended Frame Individual Start Address Register(EFF_sa)
- Extended Frame Group Address Register (EFF_GRP_sa)
- End of AF Table Register (ENDofTable)



AF Lookup Table

Each of the pointers is used to define the start of a section. They are relative **(offset)** pointers to the starting address of the Filter Table. When a section is not defined, the register should be set to the current free entry in the Filter Table. It is assumed that for the FULLCAN message ID section the starting address (offset) is always 0.

- **SFF_sa** (Standard Frame Start Address Register) contains the address of the start of the individual Standard IDs in the AF Lookup Table memory. If Full CAN mode is enabled (eFCAN is set), this contains the size of the Standard ID table to search.

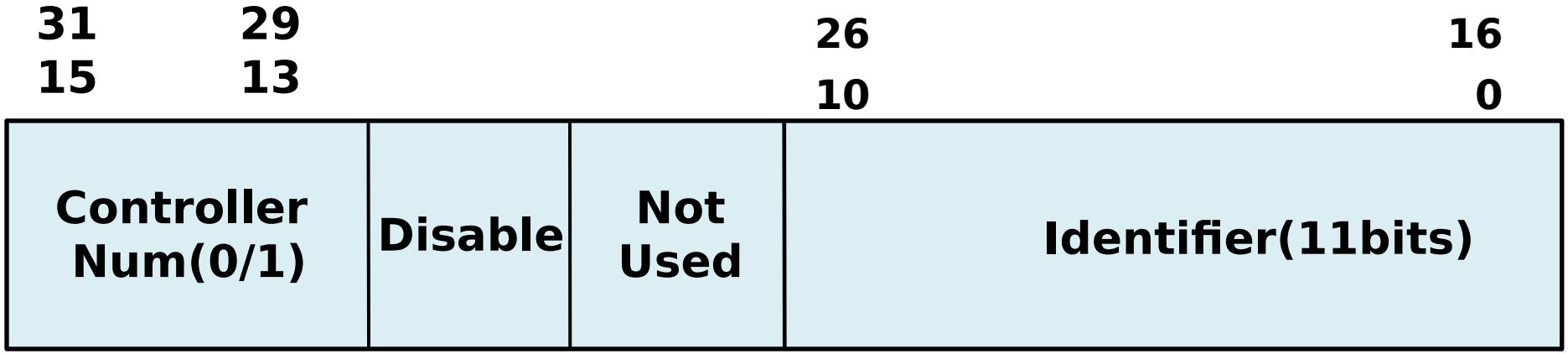
- **SFF_GRP_sa** (Standard Frame Group Start Address Register) contains the address of the start of the grouped Standard IDs in the AF Lookup Table memory.

- **EFF_sa** (Extended Frame Start Address Register) contains the address of the start of the individual Extended IDs in the AF Lookup Table memory.

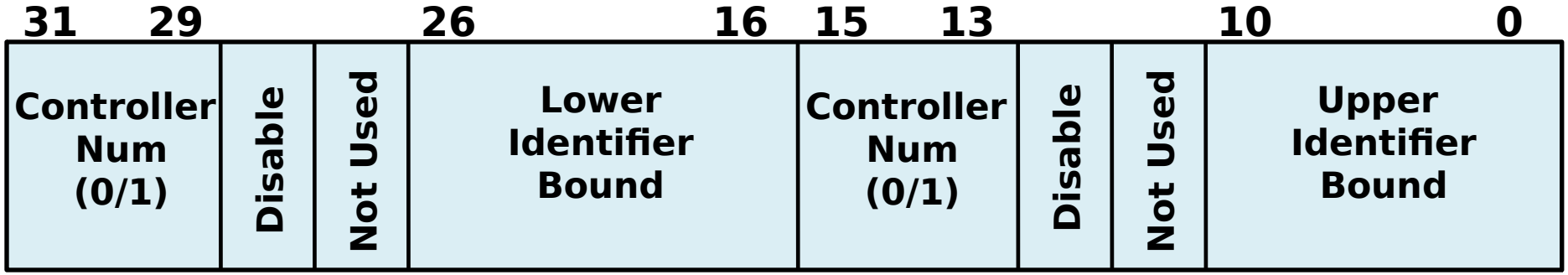
- **EFF_GRP_sa** (Extended Frame Group Start Addr Register) contains the address of the start of the grouped Extended IDs in the AF Lookup Table memory.

- **ENDofTable** (End of AF Tables Register) contains the address above the last active address in the last active AF table. If Full CAN mode is enabled (eFCAN is set), this value marks the start of the area of Acceptance Filter RAM, where the Acceptance Filter will automatically receive messages for selected IDs on selected CAN buses.

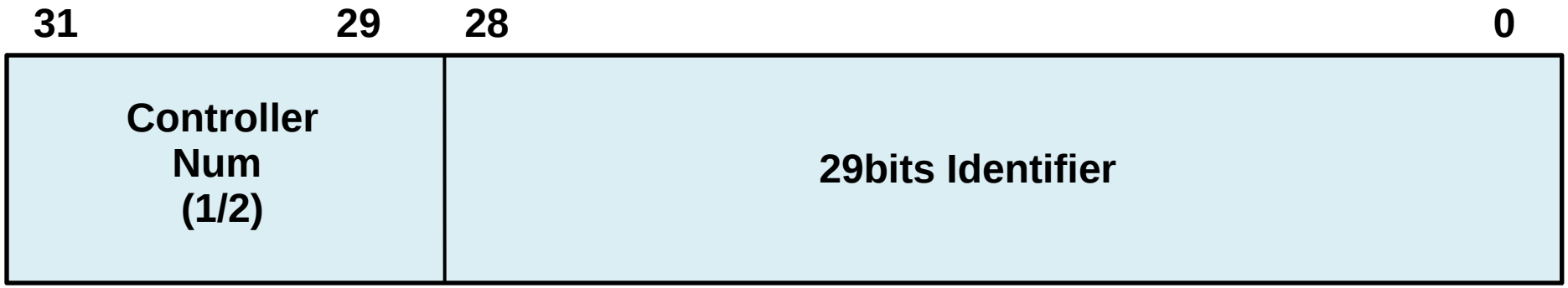
Entry in individual standard identifier table



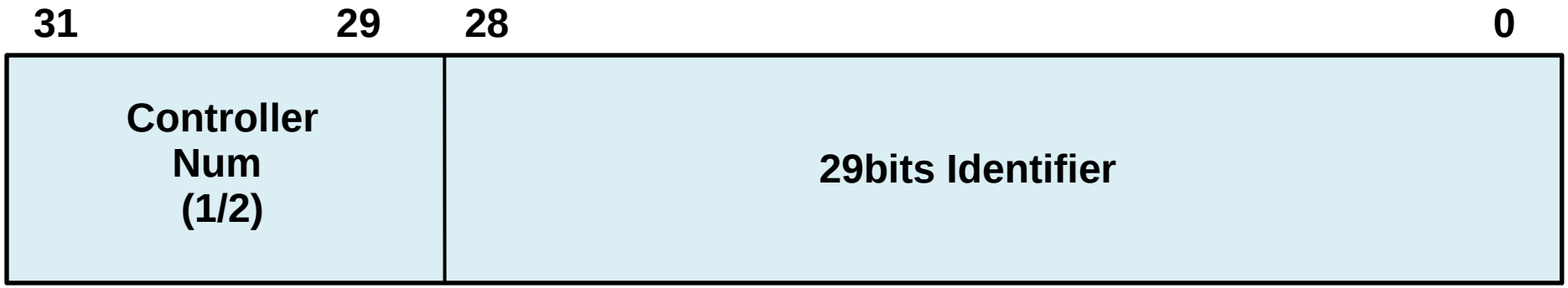
Entry in standard identifier range table



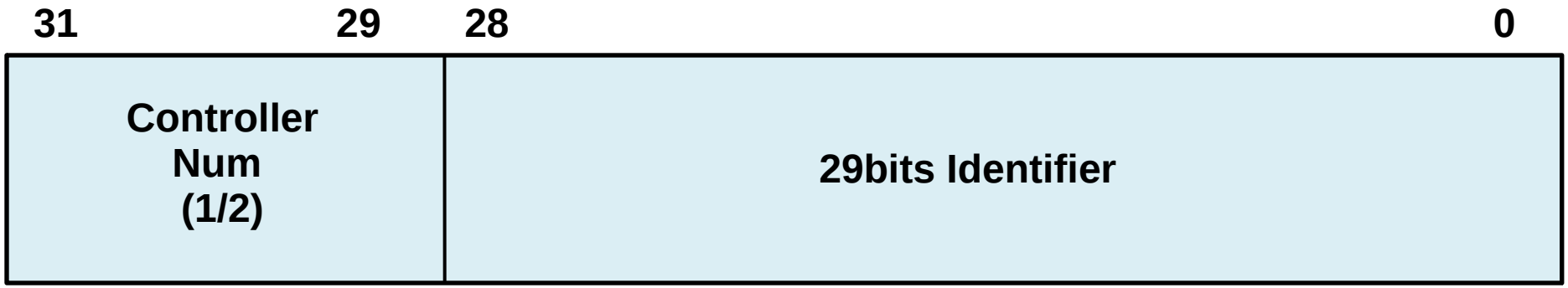
Entry in either extended indentifier table



Entry in lower extended indentifier range table



Entry in upper extended indentifier range table



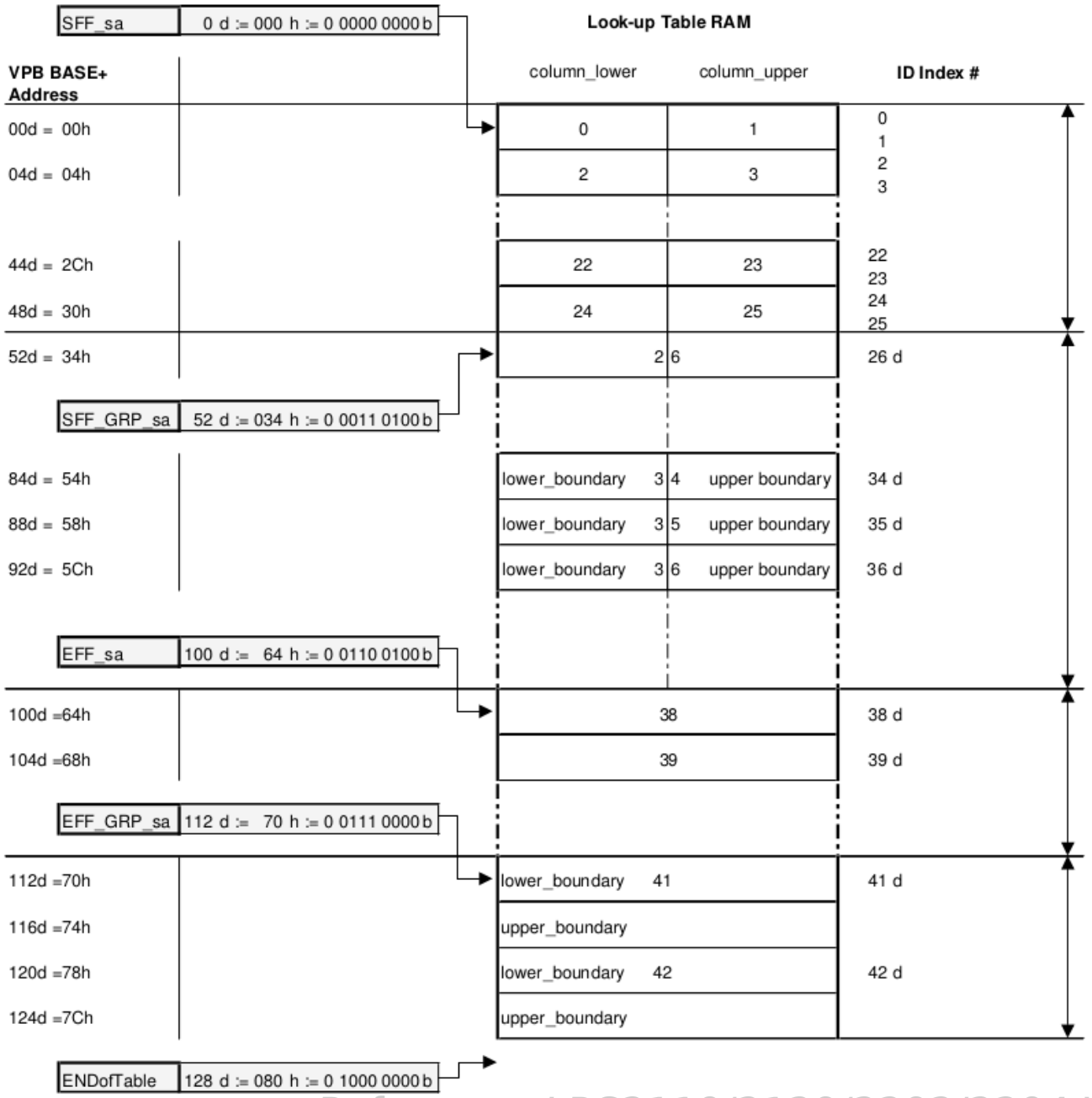


Figure 38: Detailed Example of Acceptance Filter Tables and ID Index Values

Example

- The following figure shows the configuration of the filter table when the following filters are defined:

  1. FullCAN ID’s: 0x20,0x1BC,0x255,0x26F

  2. Explicit 11-bit ID: 0x10,0x1AC,0x245,0x25F

  3. 11-bit groups: 0x300-0x3FF, 0x400-0x47F

4. Explicit 29 bit ID: 0x18EF101E, 0x18EF1E10,0x18EFFF10,0x18FFFC2

5. 29-bit groups: 0x7700-0x77FF, 0x85F7-0x8802

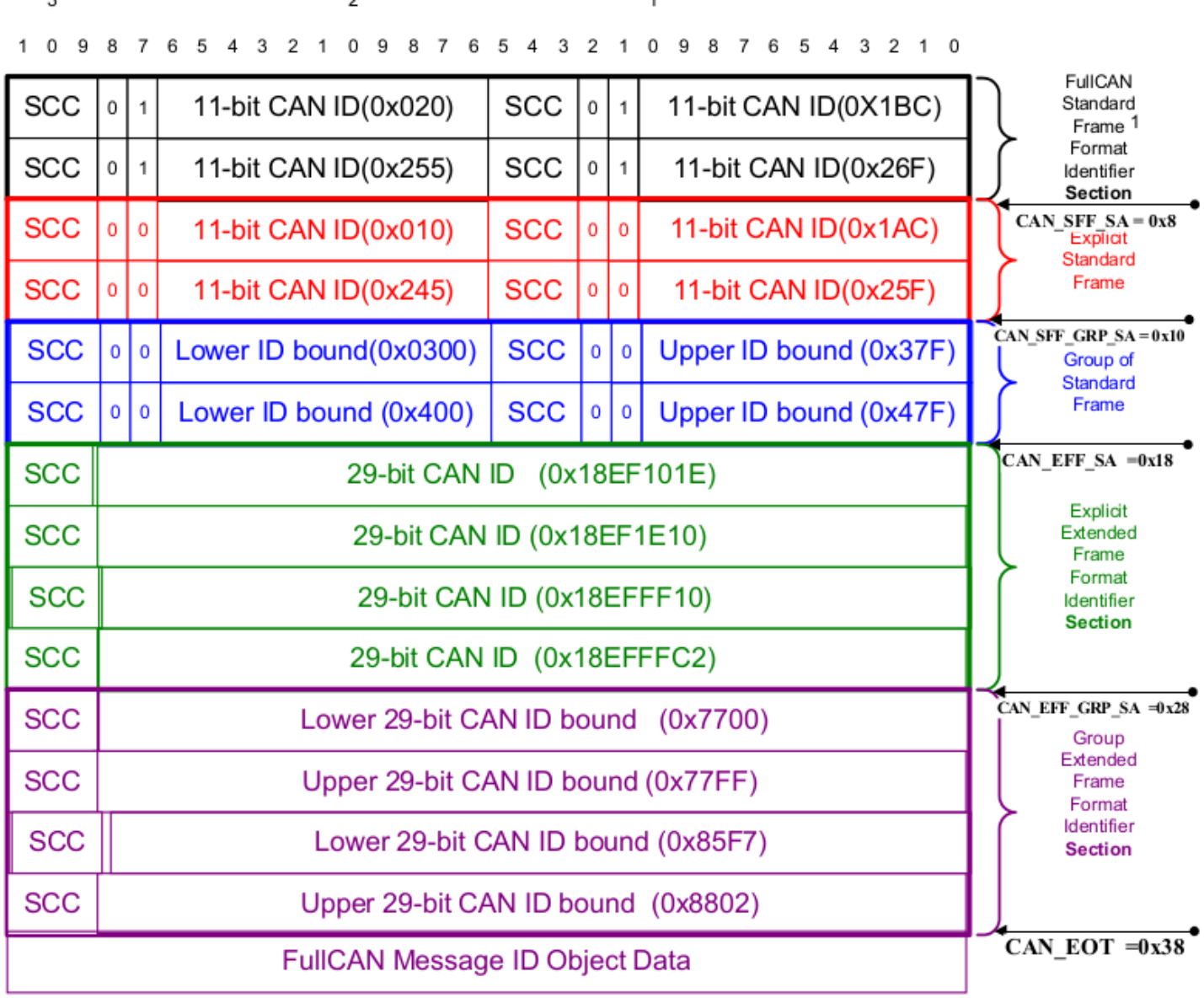
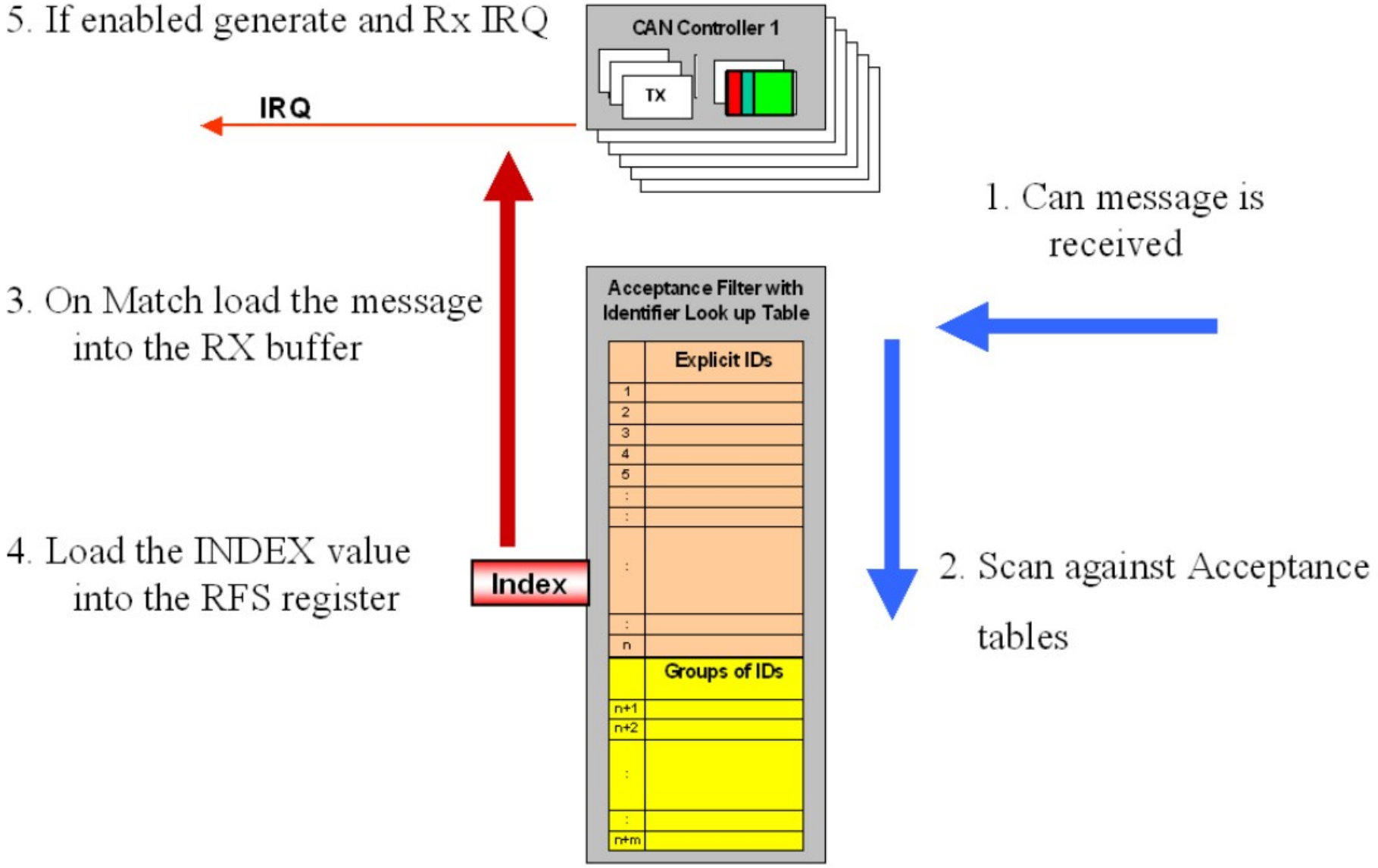


Fig 9. Configuration of the filter table – example1



Sequence of Accepting Messages

Reference: An Engineer's Introduction To The LPC2100 Series (page 120)

How AF works?

As a message passes through the acceptance filter, it is assigned an ID Index. This is an integer number that relates to the message ID's offset in the acceptance filter table. This number is stored in the RX Frame Status register. So rather than decode the raw message ID, it is easier and faster to use the index value to decide what message has been received.

Thank You