

AN402 - How to Configure AX1411xx CAN Receive Filtering

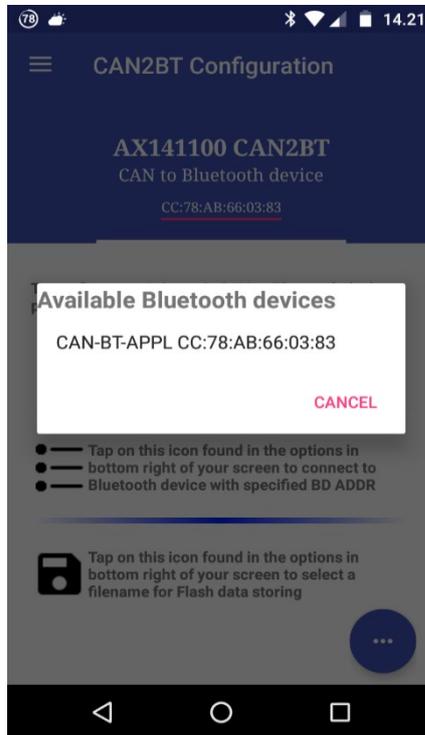
Introduction

Axiomatic's AX1411xx series of CAN-Bluetooth gateways can be used to forward the received CAN messages over the Bluetooth link to a smart device or to a PC. Depending on which CAN messages need to be forwarded over the link, the device can be configured to work in Bridge Mode (in which all messages pass), or else a custom CAN receive filtering can be configured.

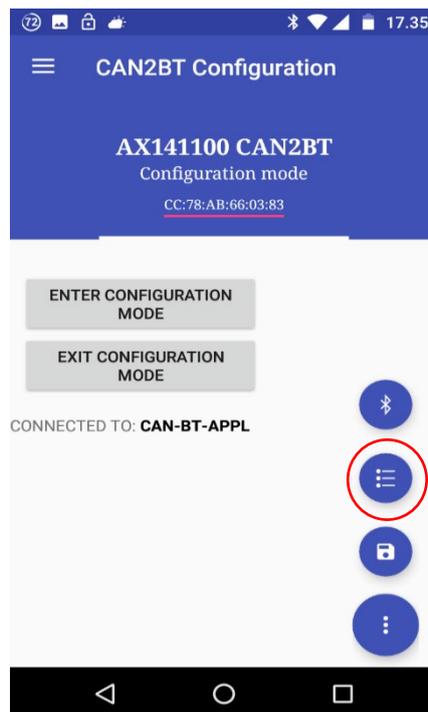


Configure Master

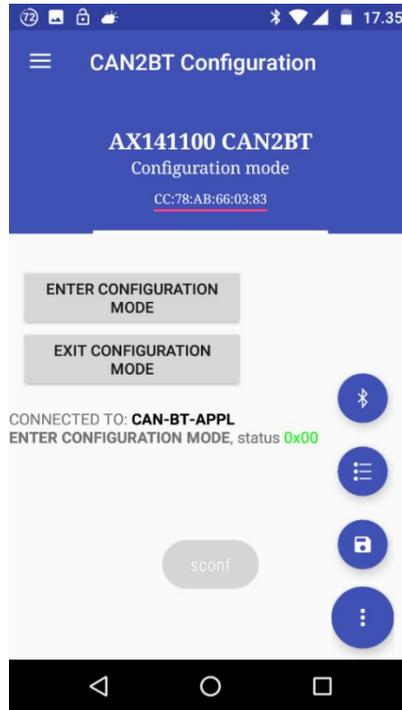
1. Use the CAN2BT Configuration app to scan the available devices and connect to the AX1411xx device.



2. After connecting, the App should report "CONNECTED TO: CAN-BT-APPL". In case this text is not shown, please reconnect by selecting the node from the list of previous scan results (using the button highlighted by the red circle below).

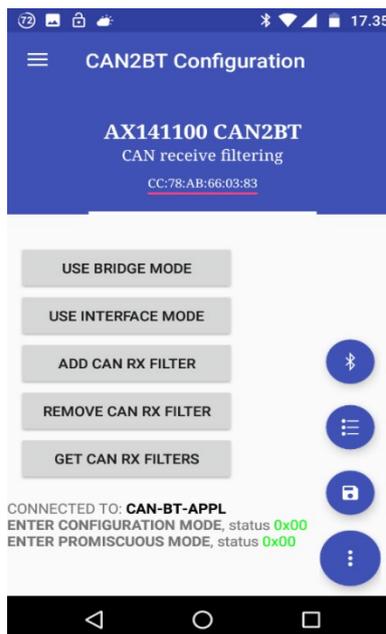


3. If the connection is okay, the App will prompt "ENTER CONFIGURATION MODE, status 0x00" after entering the configuration mode. If this text is not shown, please reconnect. Also cycling AX1411xx power is known to help; especially after the very first connection and pairing process, the AX1411xx automatically closes the SPP connection.



Configure Slave

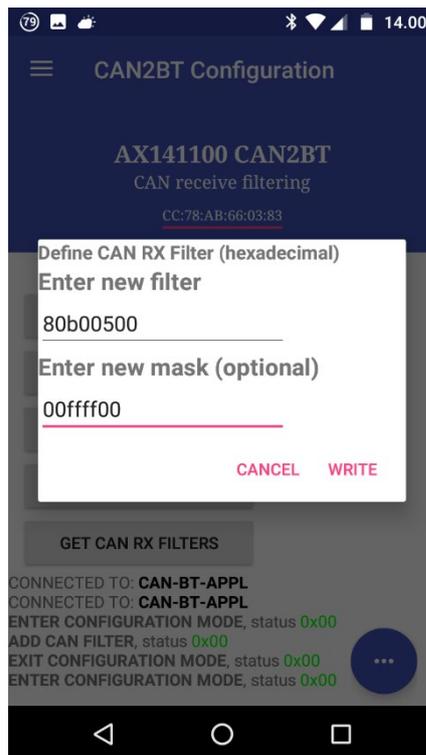
4. The next step is to configure the CAN receive filtering. In case all CAN messages should pass from AX1411xx to the smart device / PC, please select "USE BRIDGE MODE". If all messages should not pass, configure the required CAN RX filtering using the "ADD CAN RX FILTER" function.



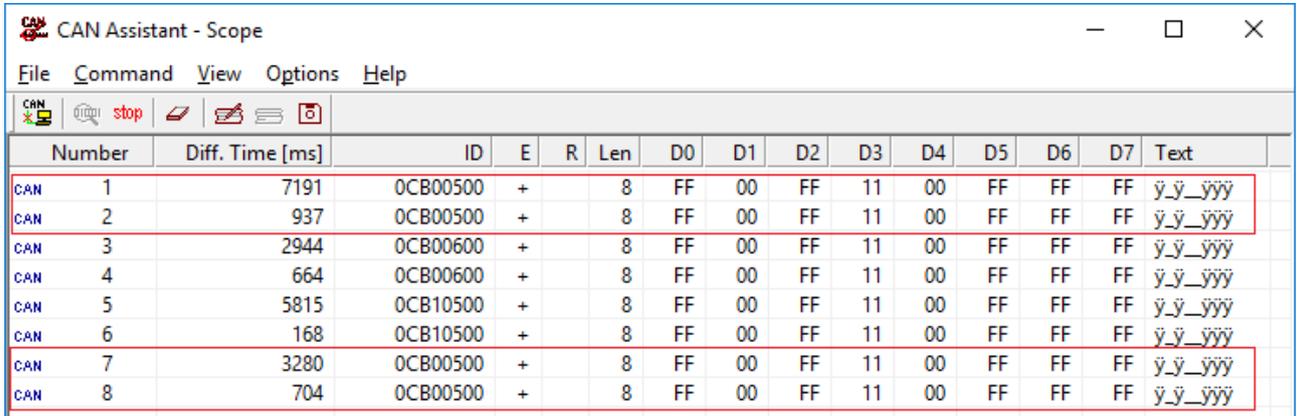
5. **Note**, that in order to enable the AX1411xx to forward any Bluetooth frames containing CAN data, the **Configuration Mode needs to be disabled**. When in Configuration Mode, the AX1411xx won't forward any CAN messages, to save the Bluetooth bandwidth for configuration messaging.

It is also a good idea to cycle the AX1411xx's power after its CAN receive filter configuration. This will make sure that the latest CAN receive filter configuration is set to the CAN filter configuration registers.

- a. Custom CAN receive filtering can be configured using the "ADD CAN RX FILTER" function. The filter ID and, optionally, the mask to use, can be entered to the configuration dialog. The configuration shown in the screenshot below configures filter ID 0x00B00500 with mask 0x00FFFF00. In practice, this makes PGN 0xB005 pass, all priority bits and all source addresses are accepted. **Note that in order to configure an Ext ID filter (29 bit identifier), the bit 31 of the filter definition needs to be set. That is why the filter ID is 0x80B00500.** If the bit 31 is not set, the filter ID is handled as an 11bit identifier.

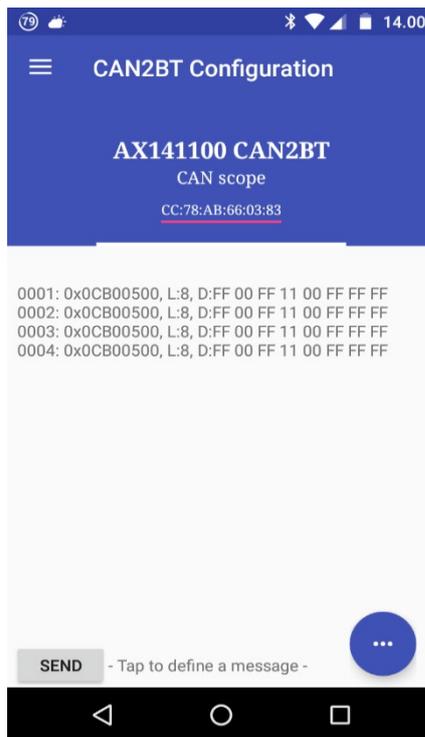


Sending the following frames to the CAN bus:



Number	Diff. Time [ms]	ID	E	R	Len	D0	D1	D2	D3	D4	D5	D6	D7	Text
CAN 1	7191	0CB00500	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 2	937	0CB00500	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 3	2944	0CB00600	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 4	664	0CB00600	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 5	5815	0CB10500	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 6	168	0CB10500	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 7	3280	0CB00500	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy
CAN 8	704	0CB00500	+		8	FF	00	FF	11	00	FF	FF	FF	y_y_yyy

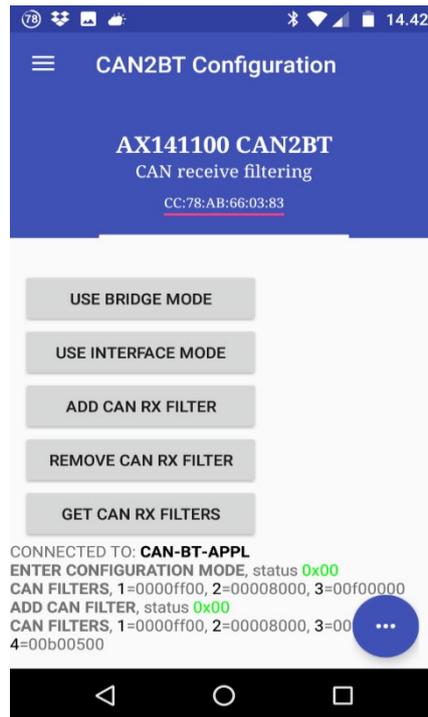
Will result in only the frames having PGN bytes equivalent to 0xB005 pass over the Bluetooth link to the smart device, as shown below:



- After configuring the slave device's CAN RX filtering, its power can be cycled. Cycling the power will make sure that the proper CAN receive filtering is applied to the CAN interface's filter configuration registers.

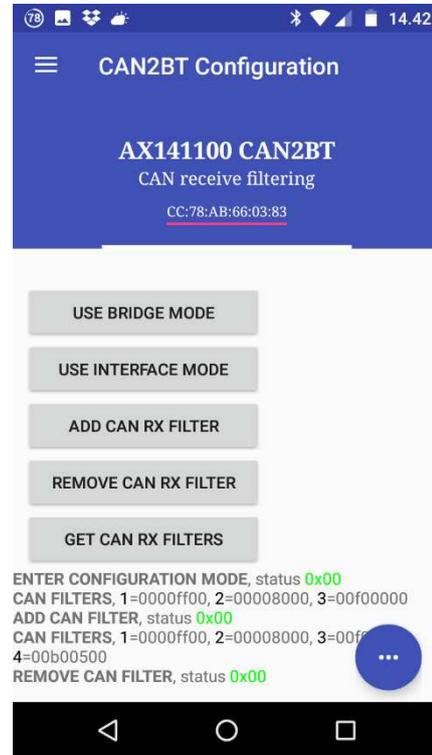
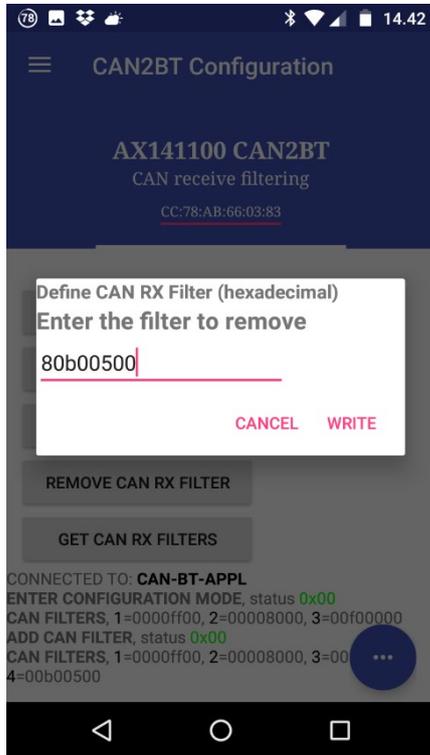
Testing

- Optional step:** In case the list of currently configured filters is needed, the "GET CAN RX FILTERS" function can be used. This function will return a list of currently configured filter IDs. Please note, that the first three filters are built in filters that are required for the Interface Mode to work. These three filters will make sure that the standard J1939 messages (frames sent to Global Address, frames targeted to AX1411xx itself and all PDU2 frames) will be received by the AX1411xx. Filter #4 in the list is the one that was configured in this example.



Optional step: In order to remove a filter definition from the list, the "REMOVE CAN RX FILTER" function can be used. To properly remove a filter, its full ID needs to be defined.

After successful removal, the CAN2BT app will report "REMOVE CAN FILTER, status 0x00"



Removing the Filter

Enable the configuration mode before removing the filters.

Below are the steps used to remove a filter:

1. In configuration mode, select the "Get CAN Rx Filters" command to get the current filters. "1=0000ff00, 2=00008000, 3=00f00000" is received in the example above.
2. To remove a filter, the filter ID needs to be specified in hex in the "Remove CAN Rx Filter" dialog.
3. To remove the first filter, the ID 8000ff00 needs to be specified. Though this is not clearly stated in the User Manual, bit 31 needs to be set for specifying an ext.ID filter. If 0000ff00 is specified instead in the dialog, the filter removal function searches for an std.ID filter and the removal fails.
4. After specifying filter 8000ff00 to be removed, the "Get CAN Rx Filters" returns: "1=00008000, 2=00f00000"

Version	Date	Authors	Comments
1.00	December 21, 2018	Antti Keränen	Initial Release
1.01	May 6, 2021	Antti Keränen	
1.02	July 6, 2023	Kiril Mojsov	Legacy Updates & Marketing Review