



# SE5000 Integration Guidelines

## TELEMATIC, D8, RDL, TSG 201C

Date 21/09/2023	Initial release	By LAD
Date 21/11/2023	Rev B, Updated CAN Bus Timing paragraph	By LAD
Date 01/10/2024	Rev C, Added Appendix 2 on detailed CAN Bus communication optimization	By LAD

### SE5000 Smart 2 Integration guidelines for Telematic

This guide covers all Telematic interfaces to the SE5000 Smart 2, to help TSP fitters & developers to integrate with the Stoneridge Smart 2 Tachograph.

*In any case, stay legal: if in doubt with one of the actions recommended herein such as power interrupt or wiring change, contact an approved tachograph workshop to carry the work.*

#### Table of Content

1.	Remote Download (RDL) basics .....	3
a.	New TREPs .....	3
b.	CAN Bus available for RDL.....	3
c.	Recommended Tachograph Parameters.....	3
d.	CAN Bus Termination .....	4
e.	Interfering devices .....	4
f.	T=0 Protocol .....	4
g.	CAN Bus timing.....	4
2.	Troubleshooting Remote Download issues.....	5
a.	Truck ECU issues .....	5
b.	DSRC Module .....	5
c.	MERCEDES Fleetboard .....	5
d.	CAN Termination.....	5
e.	Test outside the truck .....	6
f.	RDL only works with KL15 On.....	6
g.	The Remote authentication fails because the remote company card is invalid .....	6
h.	The Remote authentication fails on some trucks despite identical configurations .....	7
i.	RDL is working fine with a Gen1 Company Card, but fails with a Gen2 .....	7
j.	Tachograph RDL is possible but Card RDL fails .....	7
k.	Other issues .....	8
3.	Local download .....	9
a.	Troubleshooting Local Download issues .....	9
4.	D8 Broadcast .....	9
a.	Serial interface versus CAN .....	9



# SE5000 Integration Guidelines

b.	Configuring D8 .....	9
c.	Driver consent.....	9



# SE5000 Integration Guidelines

## 1. Remote Download (RDL) basics

The remote Download functionality is based on Annex 1C Appendix 7, and on the HDEI FMS User Guide version 03.01. It differs from the 1B since it introduces new APDUs for the Generation 2 card authentication. And it differs from the 1C in particular with new Treps being introduced.

### a. New TREPs

New TREPs are x00, x31, x32, x33, x35. Only the *Card Download* TREP is unchanged, x06 and *Detailed Speed* is x24, same as 1C.

### b. CAN Bus available for RDL

The Telematic device used for remote download is generally connected to the CAN-C, pins C5 and C7. But OEMs may recommend using the FMS plug instead, which may be connected to our A-CAN, pins A4 and A8, or to C-CAN as well. Remote download can be enabled on A-CAN or C-CAN via the Optimo<sup>2</sup>, Company card and Tachograph menu, or via the Tacho Link Smart Phone App.

### c. Recommended Tachograph Parameters

There are some specific settings required depending on which truck the tachograph is fitted on. Please refer to our SIL19\_001 for latest information. Current revision F of this SIL indicates:

Setting	Value	Description
C-CAN	Enable or Disable	This controls DDS over C-CAN and does not impact Remote Download
C-CAN Type	Standard or Fast Extended	Most current FMS systems will accept <b>Standard</b> . For vehicles equipped with a <b>Fleetboard</b> , this must be set to <b>Fast Extended</b> .
C-CAN Diagnostics (or A-CAN Diagnostics if the RDL device is connected on A-CAN)	ISO	Most current FMS systems will require <b>ISO</b> . Even the Mercedes Fleetboard. Alternatively, older Fleetboard may require the settings <b>MERCEDES</b> .
Remote download activation status	Enable	Remote Download function activation – <b>ENABLE</b> by default
Remote Download C CAN configuration	Enable	Make sure <b>Remote Download A CAN configuration</b> is set to <b>Disable</b> , or vice-versa : activate <b>Remote Download</b> on only <b>one</b> CANBus at a time. Can also be set via VU Menu while in company mode.
Remote download card writing	Disable	Must be set to <b>Disable</b>
Show remote download	No	Can be <b>Yes</b> or <b>No</b> . This will determine whether the driver is aware that a remote download is taking place or not.
Wake-up on CAN	Both	Options: <b>Off</b> , <b>A CAN</b> , <b>C CAN</b> or <b>Both</b> . If this is <b>OFF</b> , Remote Download will require Ignition ON.
CAN Answer Request	Both	Options: <b>Off</b> , <b>A CAN</b> , <b>C CAN</b> or <b>Both</b> . If this is <b>OFF</b> , Remote Download will require Ignition ON.
C CAN TCO States	Enabled IGN On & Off	This will send CAN message PGN <b>FFDE</b> when the driver request a Card Download. The FMS ECU can use this to launch the remote card download.
Enable Driver Card Download Question	Enable or Disable	If set to <b>Enable</b> , at Card Eject the driver will be asked “do you want to download card?” Can also be set via VU Menu while in company mode.
Enable Driver Card Download Menu	Enable	If set to <b>Enable</b> , the driver can go to the <b>PRINT</b> Menu to request a Card download. Can also be set via VU Menu while in company mode.



# SE5000 Integration Guidelines

## d. CAN Bus Termination

If the CAN line is not physically terminated - 120 ohms resistor between CAN high and CAN low wires at both ends of the CAN network, you will need to shunt C7 to C8 at the Tachograph C-plug. This will terminate the CAN-C line. The target, when all units are plugged in, is to measure 60 Ohm between C5 and C7 - equivalent resistor value when two 120 ohms resistor are wired in parallel, at ignition Off. However, some Telematic units control this termination by SW, and you may read only 120 Ohms with Ignition OFF.

## e. Interfering devices

Some OEM installations have other Remote Download SW/HW installed by default. If the third-party Telematic device does not work, it may be necessary to disconnect/deactivate those. Even if the Telematic device is wired to C-CAN and the OEM system on A-CAN. In any case, one should not enable remote download on both CAN buses at the same time; chose either A-CAN or C-CAN only.

## f. T=0 Protocol

The industry details the interface between the 2 units in the *FMS User Guide* document from the HTEI Working Group. This document highlights that for Remote Download the ISO Card reader must adapt its T=0/T=1 protocol to what the VU is using. The SE5000 Smart 2 only handles the T=0 protocol.

## g. CAN Bus timing

RDL CAN Messages are sent using multi-frames transport protocol. SE5000 Connekt used to request the Remote Card to transfer Consecutive Frames (CF) every 10 ms. SE5000 Smart 2 advertises 0ms on the network. If this causes problem to some specific TSP HW, the Telematic must be reprogrammed to disregard this 0ms timing request and to keep using 10 ms between each CF, or whatever the TSP HW Buffer is supporting.



# SE5000 Integration Guidelines

## 2. Troubleshooting Remote Download issues

### a. Truck ECUs impact

Remote Download must be authorized on one CAN only. Some STONERIDGE OEM variants have RDL enabled on both CAN Buses. If both CAN have a Telematic device installed, you will need to deactivate RDL on one of the CAN Bus. Some other Truck systems such as the FMS Gateway or RIO Box may require deactivated RDL as well, please refer to the OEM Dealer.

The RDL SDI/CAN Address is supposed to be xFB per the HTEI standard recommendation. Verify this is the case, and ensure that no other units use this address on CAN A or CAN C. Alternatively, set your Telematic hardware to another address, such as xFC. In which case, make sure this is not impacting other systems.

### b. DSRC Module

DAF LF and MAN TG3 trucks have the DSRC Module wired to C-CAN. This must be considered when fitting a Telematic device:

- Do not disconnect the module when installing the telematic
- Do not use a long CAN cable
- Do not activate the Telematic CAN Termination
- Do not alter the Tachograph C-CAN termination – leave C7/C8 in or out as you find it

Likewise, MERCEDES trucks fitted with an OEM STONERIDGE tachograph, or any STONERIDGE Retrofit installation, will have the DSRC Module on CAN C2, pins C1 and C4:

- Do not disconnect the module when installing the telematic
- Do not use C1/C4 for the Telematic, this CAN Bus does not support RDL
- Make sure C5/C7 CAN Termination is correct

### c. MERCEDES Fleetboard

“C-CAN Diagnostic” may need to be set to MERCEDES if the Telematic device is a MB Fleetboard.

- Try using C-CAN Diagnostic = MERCEDES or ISO.

Also, please note that since 2020 MERCEDES have the option to connect their Fleetboard to A-CAN.

### d. CAN Termination

The resistance value measured between C5 and C7 must be 60 Ohms when all devices are connected, and ignition is OFF:



# SE5000 Integration Guidelines

- If less <60 Ohms, remove a terminator which may be installed on the CAN line. You must carefully select the terminator you remove, so as to keep the 2 terminators at the CAN Bus extremities.
- If more >60 Ohms, add a terminator on the line, for instance by shunting C7 and C8 at the tachograph C-plug, or adding a resistor at one end of the CAN line.
- **Note:** the Telematic device may have a SW-driven 120 Ohms termination, only active when ignition is ON. In which case C5/C7 resistance with ignition OFF must be 120 Ohms.

## e. Test outside the truck

If RDL fails despite above, please test with no truck interfaces connected:

- Disconnect all A-CAN and C-CAN from truck,
- Leave only power and the Telematic C5/C7 connection,
- Wire C7 to C8 and activate the Telematic internal CAN Termination,
- Test, if the issue is still present, it is not related to the truck installation.

## f. RDL only works with KL15 On

Use Optimo<sup>2</sup> to make sure *Wake-up on CAN* and *CAN Answer request* are set to BOTH.

## g. The Remote authentication fails because the remote company card is invalid

1. Test the company card locally: if it is seen as invalid when inserted in the VU drawer, this is not a RDL issue, but a card issue. Test with another card supplier, the card customization may not match the IOT/Annex 1C.
  - A company card can be invalid because of index 15 or 16: check the card history for more recent cards. Indeed, the Annex 1C calls for the Tachograph to check cards validity based on index 15 and 16. Since in the past index 15 was used for delivering more cards to the same company, this now causes issues for local and remote downloads.
2. The remote card reader may be using ISO Protocol T=1, see next paragraph for more details.



# SE5000 Integration Guidelines

## h. The Remote authentication fails on some trucks despite identical configurations

If a Telematic device communicates with the SE5000 Smart 2, but fails to authenticate cards, while it successfully authenticates the card on a competition unit, it can be either:

- A company card was previously used with the tachograph with index 15 or 16 higher than on the card used for this authentication (ref previous paragraph).
- Or the T=1 to T=0 protocol conversion is not programmed correctly:
  - For instance with a Gen2 card if a General Authenticate CAN message 86 00 is answered with a “wrong length” **67 00** message. The Telematic SW does not correctly handle the card reader T=1 protocol translation into the T=0 protocol.
  - The same back-end SW may work with some Tacho/Gen2 card, inserted in a remote card reader using the T=0 protocol, and not in some others, inserted in a remote card reader using T=1 protocol. A Gen2 CAN log of a working RDL compared to a Gen2 CAN log of a non-working case would give some hints as to what must be modified in the Telematic SW.
  - The Telematic Service Provider must test the various cases: Gen1 or Gen2 card, Card reader using the T=0 or T=1 ISO-protocol and compare how their SW behaves in each 4 cases.
  - If the Telematic SW already translates the protocol based on Gen1 / FMS Spec annex 3, this is not sufficient. Indeed, the new Gen2 APDUs are not covered by the FMS Spec annex 3.
  - **Note:** there is no differences between Smart 1 and Smart 2 in this respect.

## i. RDL is working fine with a Gen1 Company Card, but fails with a Gen2

See the delta Gen2/Gen1 in Annex 1C appendix 7 and the HTEI FMS User Guide. Card protocol is described in ISO 7816-3 and -4. Refer to previous paragraph for T=1/T=0 protocol translation information.

## j. Tachograph RDL is possible but Card RDL fails

Some Telematic are using the D8 DriverID to pre-assign Card download to a specific driver from the back-end database. Make sure D8 is wired and set properly (see next section).



# SE5000 Integration Guidelines

## k. Other issues

If you still need further advice, please contact your official Stoneridge Distributor with all relevant details, using the **Appendix 1 - checklist** at the end of this document.



# SE5000 Integration Guidelines

## 3. Local download

The Smart 2 Tachograph download is only possible with a Smart 2 capable tool.

### a. Troubleshooting Local Download issues

If the Local Download fails, verify:

- The download tool cable
- After a tachograph power cycle – removing plug A
- Using another tool such as Optimo<sup>2</sup>, DigifobPro or updated OPTAC DLT

## 4. D8 Broadcast

### a. Serial interface versus CAN

D8 is a serial interface doing broadcast only. Note: it is not part of the 1Cv2 specification; CAN interfaces are offering many more parameters. Yet 1B real-time monitoring traditionally was done over the D8 Serial Output. OEM systems now offer CAN-only interfaces.

The Stoneridge D8 specification for our Smart 2 tachograph is unchanged compared to our 1B/1C specification, with the exception of a Sync Frame delay of up to 45ms, instead of 27.5ms.

### b. Configuring D8

“Serial Data Output” parameter on Optimo must be set to “SRE”. This can also be changed with a Company card, without using a Workshop Tool. Please refer to the Driver & Company manual on [www.se5000.com/product-support](http://www.se5000.com/product-support)

### c. Driver consent

The Driver Consent is not impacting the D8 behavior: we keep transmitting the D8 frames when the driver answers NO to the Consent question, in line with Annex 1C requirements (200) & (201).

## Annexes

---

[Annex 1C](#) Appendix 7

HTEI [FMS User Guide](#) 03.01

Card index 15 and 16 Stoneridge Knowledge Article

Stoneridge “Remote Download” **SIL19\_001** and Smart 2 Company Lock **SIL24\_008**

Card protocol: ref. ISO 7816-3 and -4

# SE5000 Integration Guidelines

**Appendix 1 - Checklist - Please complete and return with CAN log to your local Stoneridge distributor**

Your reference:	Stoneridge Tracking 2025S2#																																																																																																														
Truck Brand:	Truck Model:		Truck Year:																																																																																																												
Tachograph HW:	900773 ____ R0 __		Tachograph SWID																																																																																																												
Telematic HW:		Telematic SW:		CAN Termination at Telematic HW:	YES / NO																																																																																																										
Wiring from Telematic...	... to FMS Plug:	Plug and pins, including termination:																																																																																																													
	... to Tacho:	D8?	C5/C7?	C7/C8?	A4/A8?																																																																																																										
How is the VU configured? Ref SIL19_001	Remote download activation status:																																																																																																														
	Remote Download C CAN configuration:																																																																																																														
	Remote Download A CAN configuration:																																																																																																														
	Remote download card writing:																																																																																																														
	Show Remote Download:																																																																																																														
	Wake up on CAN:																																																																																																														
	CAN Answer request :																																																																																																														
Show Driver Card Download:																																																																																																															
Company Card Numbers:	Remote:		Company Lock:			1C Card History:																																																																																																									
						Provide printout																																																																																																									
Is the remote company card accepted when inserted in the VU drawers? YES / NO / UNKNOWN																																																																																																															
Is KL15 status or KL15 transitions impacting the RDL?																																																																																																															
Is the Truck / Telematic combination working fine on another Generation or Manufacturer tachograph?		Which one ?																																																																																																													
Provide a raw CAN log from a working configuration, versus one from the failing configuration.	<table border="1"> <thead> <tr> <th>Identif</th> <th>Flg</th> <th>DLC</th> <th>D0...1..</th> <th>Time</th> <th>Dir</th> <th></th> </tr> </thead> <tbody> <tr> <td>0 18DAEE11 X</td> <td></td> <td>8</td> <td>3</td> <td>22 F9</td> <td></td> <td>80 FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>2994.4171</td> </tr> <tr> <td>0 18DAEE11 X</td> <td></td> <td>8</td> <td>3</td> <td>22 F9</td> <td></td> <td>23 FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>2995.5172</td> </tr> <tr> <td>0 18DAEE11 X</td> <td></td> <td>8</td> <td>3</td> <td>22 F9</td> <td></td> <td>23 FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>2996.6173</td> </tr> <tr> <td>0 18DAEE11 X</td> <td></td> <td>8</td> <td>3</td> <td>22 F9</td> <td></td> <td>80 FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>2997.7174</td> </tr> <tr> <td>0 18DAEE11 X</td> <td></td> <td>8</td> <td>3</td> <td>22 F9</td> <td></td> <td>22 FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>FF</td> <td>2998.7374</td> </tr> </tbody> </table>														Identif	Flg	DLC	D0...1..	Time	Dir												0 18DAEE11 X		8	3	22 F9		80 FF	2994.4171	0 18DAEE11 X		8	3	22 F9		23 FF	2995.5172	0 18DAEE11 X		8	3	22 F9		23 FF	2996.6173	0 18DAEE11 X		8	3	22 F9		80 FF	2997.7174	0 18DAEE11 X		8	3	22 F9		22 FF	2998.7374																																								
	Identif	Flg	DLC	D0...1..	Time	Dir																																																																																																									
	0 18DAEE11 X		8	3	22 F9		80 FF	FF	2994.4171																																																																																																						
	0 18DAEE11 X		8	3	22 F9		23 FF	FF	2995.5172																																																																																																						
	0 18DAEE11 X		8	3	22 F9		23 FF	FF	2996.6173																																																																																																						
	0 18DAEE11 X		8	3	22 F9		80 FF	FF	2997.7174																																																																																																						
0 18DAEE11 X		8	3	22 F9		22 FF	FF	FF	FF	FF	FF	FF	FF	FF	2998.7374																																																																																																



# SE5000 Integration Guidelines

## Appendix 2 – CAN communication considerations

This Appendix lists various CAN communication optimization we can suggest from field feedback. Goal is to optimize communication and reduce traffic/download time during normal processing or when unexpected interruptions occur.

1. Recommended Flow Control (FC) from Telematic to Tachograph is x30 00 00.
2. Consecutive Frames (CF) missing: when the telematic does not receive a CF, the protocol calls for the last x36 download command to be repeated. Instead, some telematic send x37 TransferExit and restart everything. This is not necessary and not optimal. The Telematic must resent the last request whenever they miss a CF.
3. We received some report of an x36 download command timing out with no answer from the Tachograph. The telematic should not wait for the time out but repeat the last command 1 second (maximum 5 seconds) after the initial request.
4. If the tachograph responds with a General reject x7F 36 10, the Telematic shall reopen the remote session with a command x02 10 7E, resend a RequestUpload x35 command then resend the last x36 download command. It is not required to re-authenticate.
5. We received some report of an x31 authentication message timing out with no answer from the Tachograph. The telematic should not wait for the time out but repeat the last command 1 second (maximum 5 seconds) after the initial request.
6. If the tachograph responds with a General reject x7F 31 10, the Telematic shall reopen the remote session with a command x02 10 7E, then restart Authentication.
7. If Remote authentication fails after receiving a x80 07 message from the Tachograph, this is likely caused by the Remote Card writing feature being enable. Some Telematic logfiles show T=0 / T=1 conversion issue when this optional feature is turned ON. Simplest solution is to turn this option off, by using Optimo<sup>2</sup> or any other tool to set FD63 = x00
8. If an x18DAEEFB request is answered with both an x18DAFBEE and a x1CDAFBEE CAN message, this indicates interferences between both A-CAN and C-CAN. This was reported on FMS-plug installation for some early Smart 2 trucks and fixed via an updated truck set-up.