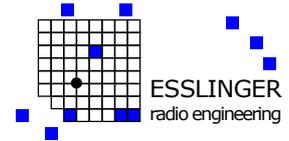


RDS / RBDS Toolkit

ANSI-C decoder library minimizes costs and development time

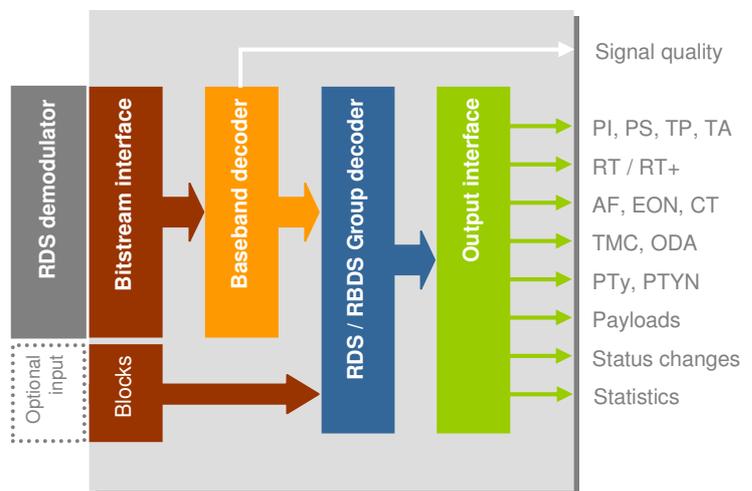


Highlights

- Gives access to almost any RDS / RBDS feature, including signal error rates.
- Proven quality: Contained in thousands of consumer and automotive tuners.
- Cost-attractive software solution for mass production: Makes expensive RDS processors obsolete.
- ANSI-C source code: Suitable for practically any embedded system.
- Small memory footprints, low CPU load.
- Extremely fast bitstream sync and enhanced error correction: Guarantees high data output even under difficult reception conditions.
- RDS features can selectively be included or omitted: Makes the product equally suitable for simple radios and high-end receivers.
- Complies:
 - IEC 62106 (1999 and upcoming 2009 version)
 - NSRC RBDS standard
 - MISRA-C (key rules)
 Fully meets U.S. RBDS certification requirements.

Description

Esslinger's RDS Library is a professional, turnkey, industry-proven software solution to decode Radio Data System (RDS) and U.S. RBDS FM subcarrier transmissions. The Library comprises all middleware layers to transfer a RDS bitstream into useful RDS data for display on a receiver and tuning support.



The basband decoder can directly handle serial bitstreams from simple, inexpensive RDS demodulator chips or from software radios. Its excellent signal acquisition performance is achieved by Esslinger's unique, intelligent bitstream correction technology which increases data output significantly.

The group decoder covers almost any state-of-the-art RDS application and supports customized handling of RDS groups.

The RDS toolkit includes the decoder source codes, a Windows® development and tutorial application, comprehensive manuals, RDS samples, and two hours of personal engineering support.



Esslinger's RDS Library is the outcome of a 15-years expertise in customer support all around RDS. The product empowers numerous state-of-the-art receivers, particularly in automotive applications. It has been licensed by companies all over the world and is many manufacturers' first choice whenever a reliable RDS decoding solution is required. Today, Esslinger is an independent, well-established and well-recognized supplier of RDS / RBDS know-how and radio consultancy services.

Target Applications

- Automotive tuners, car multimedia systems
- FM HiFi tuners, multiroom audio equipment, kitchen radios, portables, settop boxes
- Car navigation systems, receivers for Traffic message channel (TMC and TMCpro)
- Media players
- Mobile phones / smartphones with integrated FM radios
- Any kind of datacasting (RDS Open Data Applications decoding)
- RDS chipset design
- RDS research and development
- Industrial applications, such as:
 - Remote control via broadcast networks,
 - Addressing individual receivers,
 - RDS monitoring, bit error rate measurements, processing in-house data

Please visit our website for customer references.

Contact:

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Germany
Phone: +49-(0)781-990 79 79
rds@esslinger.de
www.esslinger.de

General

- Decoder library is fully scaleable to different application requirements through easy-to-use compiler switches.
- Simultaneous decoding of 1 or 2 independent RDS data streams (configurable by the user).
- Supports any RDS demodulator / processor.
- Minimized RAM consumption (less than 1 kB for fully-featured decoding of 1 RDS data stream). RDS features can often be implemented in the free resources of an existing design.
- Code runs on 8, 16 and 32 bit targets. Normal ANSI-C compiler features are sufficient.

Baseband Decoder

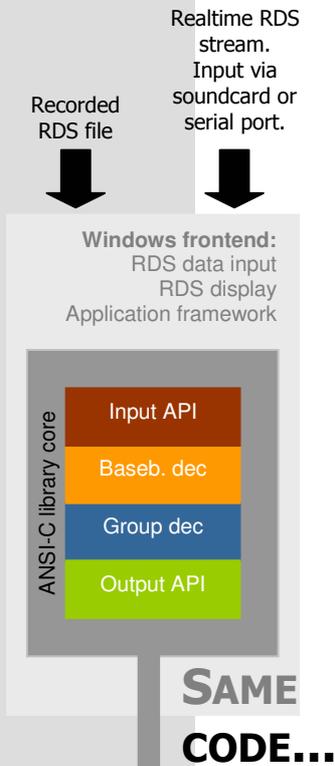
- Robust highspeed block synchronisation and error checking, intelligent correction of bitstream errors. Detailed reception statistics, such as: bit error rate BER, present and average signal quality, acquired and missed groups, error correction.
- Baseband decoder can be configured by the developer for minimized memory footprint or minimized CPU load.

Group Decoder

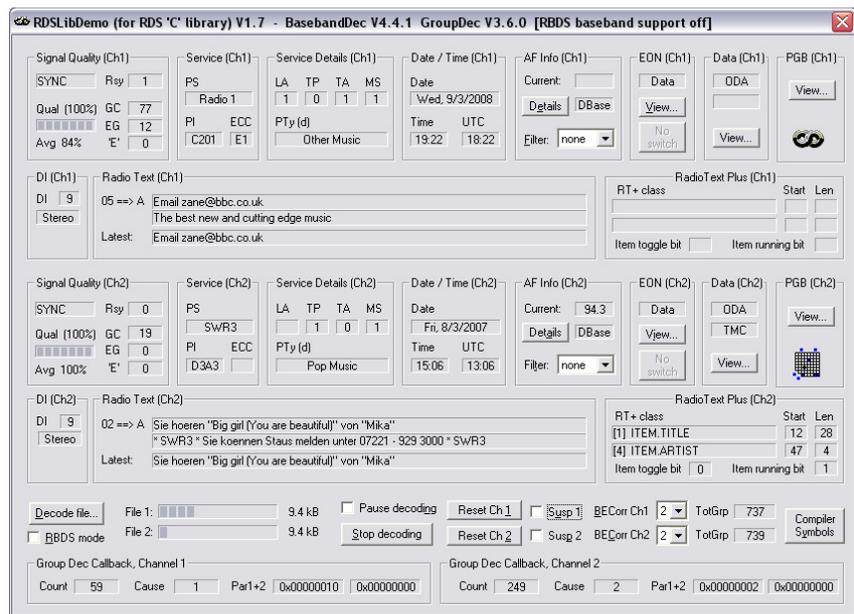
- **Basic RDS data:** Programme Identification (PI) code, Extended Country Code (ECC), Programme Service (PS) name, Programme Type (PTY) code, Programme Type Name (PTYN), Traffic Programme (TP) identification code, Traffic Announcement (TA) code, Decoder Identification (DI) code, Music/Speech (M/S) code, service country, service coverage, character set information, RDS signal quality.
- **RDS Applications:** RadioText (RT), Alternative Frequency (AF) information, Enhanced Other Networks (EON) information and switching, Clock Time and Date (CT), Traffic Message Channel (TMC), Open Data Applications (ODA), Transparent Data Channels (TDC). Full support for RadioText Plus (RT+).
- **Security:** Crosschecks plus statistical methods improve data integrity and reliability under poor reception conditions. Protects crucial RDS data, like Programme Service Name, TA / TP flags and PTy.
- **Bypass input:** The group decoder can be detached from the baseband decoder. Allows to decode RDS groups that are obtained from third party baseband decoders.
- **Customized processing:** The group decoder allows programmable access to any desired RDS group type's raw data. Allows application-specific processing of individual RDS groups.

RDS / RBDS Toolkit: Same Code for All Your Platforms

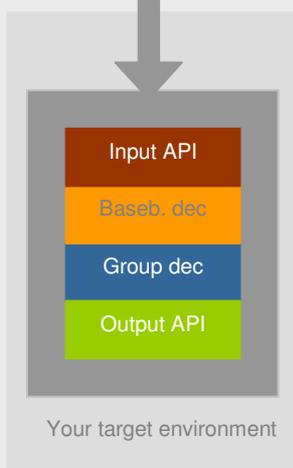
The supplied Windows framework around the C decoder modules lets you do the first development steps conveniently on your PC: Configure the library, inspect the RDS data coming from your hardware, watch the decoding results. Later, you just move the C files to your target system.



The PC application comes as a project for Microsoft Visual C++® (V6.0 and higher), includes all source codes, and equally serves as a tutorial application for RDS library usage. It guides you comprehensively through the library's API functions.



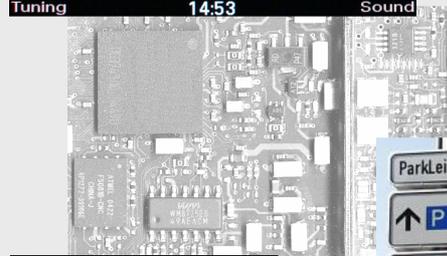
...DIFFERENT PLATFORMS



Application example: Car infotainment system



Application example: Multiroom entertainment system



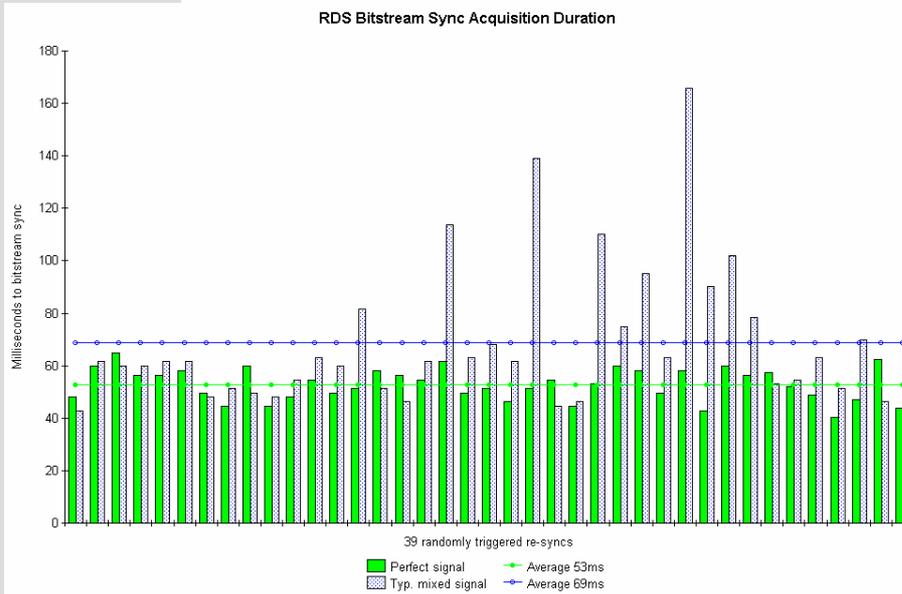
Application example: Low-cost home tuner

Industrial RDS application example: Deploying parking space information to electronic roadsigns (using a RDS ODA on a local radio station).



Rapid synchronization on the bitstream is one of a RDS decoder's key requirements. In particular this applies to mobile applications with their frequent signal dropouts and alternative frequency hops.

Esslinger's RDS baseband decoder performs ultrafast, though highly reliable bitstream sync, even with weak signals.



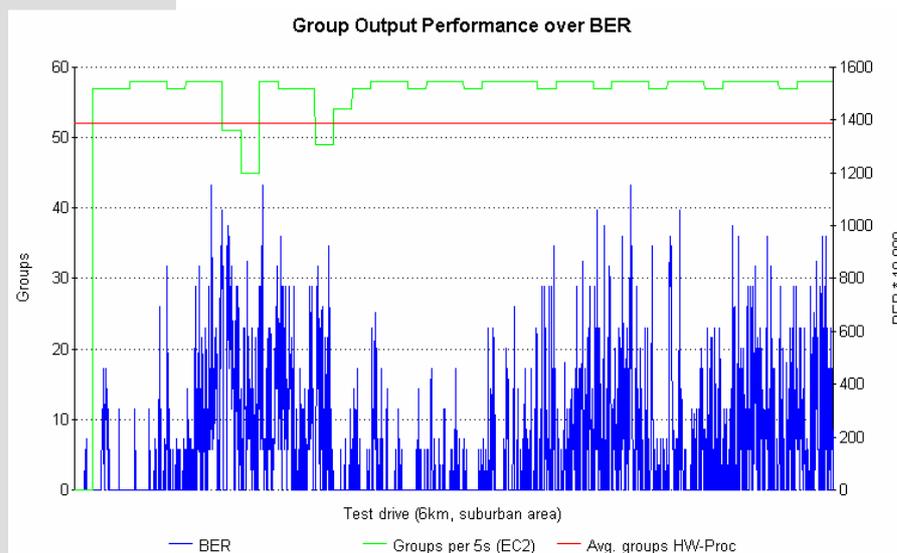
Investigation showing the sync-up time of Esslinger's baseband decoder.

The bars denote the time in milliseconds until the RDS bitstream is synchronized (taken from 39 randomly triggered re-syncs).

Testcase 1 (green) represents reception at best possible signal quality. Testcase 2 (blue) represents a typical mixed-signal reception situation ¹⁾.

↑ **Upper graph:** Comparative tests show that the Esslinger baseband decoder acquires RDS sync typically between two and three times faster than state-of-the-art RDS processors ⁴⁾.

↓ **Lower graph:** The Esslinger decoder applies a selection of intelligent error correction techniques on the incoming bitstream. This results in an unsurpassed group output performance, even if the signal is strongly fading.



Investigation showing the number of RDS groups, output by the baseband decoder. Originating from a typical mixed-signal reception test drive ¹⁾²⁾.

Green graph identifies the number of RDS groups output by the Esslinger RDS baseband decoder within 5-seconds intervals ³⁾.

Red graph shows the measured average group output of a state-of-the-art RDS processor ⁴⁾ during the same test.

Blue = bit error rate

- 1) Suburban test drive over a 6km distance, consumer receiver, wire antenna located inside car. Transmitter power 80kW, air distance to transmitter approx. 37km.
- 2) Error correction settings = maximum 2 bits per RDS block.
- 3) The fact that the nominal RDS group-rate per 5s is not an integer value (57.1) causes a ±1 ripple to the green graph.
- 4) Contact Esslinger for details.

FM/RDS Consulting

Esslinger stands for sophisticated know-how at affordable prices.

Since 1996, the Esslinger company has been supporting professionals all around the world in designing their tuners and RDS applications.

Our expertise comprises:

- General consulting on RDS usage
- Adding RDS features to products
- Help if something doesn't work as expected
- Test drives
- Performance optimization
- System analysis, signal analysis, RDS measurements
- U.S. RBDS certification support
- Independent expert opinions
- Tuner design, recommendations, chipset configuration
- Designing and implementing Open Data Applications (ODA)
- Case studies, proofs of concept
- RDS business consulting (feasibility, return of investment)

We look forward to discussing your requirements with you.

Toolkit Documentation and Tutorial Application

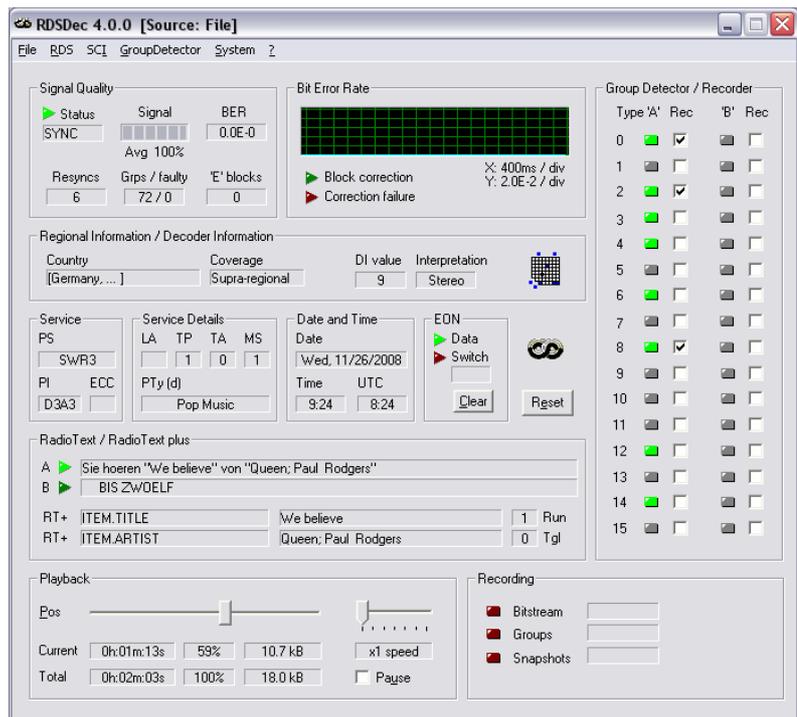
The RDS library's manual (115 pages) and the tutorial application are available to business customers on request - just drop us an eMail with your business co-ordinates. Due to the confidential nature of the material please also return the completed NDA of page 6 along with your request.

The evaluation package is provided free of charge ¹⁾.

Try the RDS Library!

On www.esslinger.de/download you will find our free RDS decoder for Windows®. RDSDec is based upon the very ANSI-C decoder library described in this document.

Of course you can feed real RDS signals from your own receivers into the software. So enjoy thoroughly testing everything.



1) Please note the following:

- We are sorry for being unable to send the evaluation package to private customers nor RDS hobbyists.
- Esslinger Broadcast Engineering reserves the right to request further information from the applicant prior to sending him the evaluation package, or to reject applications for the evaluation package.

UNILATERAL NON DISCLOSURE AGREEMENT

between _____ and (please provide full company name and address) _____
Esslinger Broadcast Engineering
Eспенstrasse 20A
D-77656 Offenburg
Germany
Fax: +49 - (0)781 - 990 79 85

herein referred to as "**Discloser**" herein referred to as "**Recipient**"

concerning the secrecy and restriction in uses of reciprocally disclosed data and information in the field of:

RDS/RBDS Decoder Library and RDS/RBDS Toolkit.

The parties to this Agreement have a mutual interest that **Recipient** receives confidential information of the **Discloser**, in order to evaluate the RDS/RBDS Library's and/or Toolkit's suitability for certain RDS/RBDS applications the **Recipient** is considering.

To protect the justified interests of the **Discloser** the parties agree as follows:

1. **Recipient** undertakes not to disclose any data and information which it has (in whatsoever form) received from the **Discloser** to any third party and not to use such data and information in any way other than for the above mentioned purpose of the disclosure.
2. **Recipient** and **Discloser** agree that the above stated obligations under this Agreement shall not apply to any data and information which, shown by documented proof,
 - a) now are or later become state of the art or belong to the public domain,
 - b) **Recipient** receives from a third party without breach of a confidential obligation,
 - c) were at the time of disclosure already in the possession of **Recipient** or will be generated by **Recipient** without using the received data and information.
3. In respect of the disclosed data and information **Discloser** reserves for himself right and title to apply for juridical protection. The disclosure for the **Recipient** does not imply any right or title to apply for a protection on his side. The disclosure does not include the granting of any licence.
4. **Recipient** is responsible that his employees - as far as they are getting knowledge of the received data and information or having the possibility to get to know them - are or shall be committed according to this Agreement respectively. The obligations of **Recipient** under this Agreement remain, however, untouched therefrom.
5. Companies affiliated to the **Recipient** within the same Concern, shall not be considered as third parties in the sense of this Agreement, provided that these companies fulfil the same obligations of this Agreement.
6. **Recipient** agrees to promptly return to **Discloser** on demand any data and information which were furnished under this Agreement in written or any other material form, without retaining any copies.
7. This Agreement shall continue for a three years' period, beginning with the date on which the **Discloser** receives the correctly signed Agreement. Thereafter it shall automatically continue for a further year's period unless terminated by either Party in writing 6 months before the end of the original or any extended period. The obligation of secrecy and restriction in use for data and information received under this Agreement shall survive the aforementioned termination.

Date _____ Signature _____ Print Name of Authorized Signatory _____