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R23/007_1

RDS2 Position Paper 2023/001

**RDS2 development status
- 30 Questions and
Answers from the
RDS Forum Members**



Our aim

With RDS2 FM/RDS has undergone a significant transition to offer state of the art radio features and multimedia functionality in the car dashboard.

The 30 questions and answers compiled by the RDS Forum members give you a good impression of the development status of RDS2.

Frits de Jong, Chairman of the RDS Forum

RDS2 - Frequently Asked Questions

Q 01 – Why discrete carriers are used instead of some spread spectrum like modulation technique?

All carriers are derived from the 19 kHz pilot tone, which allows block and bit synchronisation between the RDS carriers. The existing RDS modulation technology within VHF/FM broadcasting is very robust. RDS2 supports all current applications and existing RDS devices. Equipment designers can now conceive RDS encoders and receivers that can be upgraded to support by new software versions any new applications using the ODA concept with RDS2. Thus, anyone who has an “RDS2 ready” product and who wants to upgrade may do then so very easily.

Q 02 - RDS is also locked to the pilot in phase; so what about RDS2 – can phase locking there be applied as well and if yes, how?

An important requirement for proper RDS2 decoding is phase and bit synchronisation with the groups and blocks in the mainstream. This is achievable with receiver DSP technology. At the encoder all carriers are derived from the 19 kHz pilot tone. RDS2 modulation is using next to 57 kHz three additional subcarriers. They are achieved using frequency shifting.

Q 03 – What are the differences between RDS and RDS2?

RDS2 offers three additional RDS streams. As a number of mandatory elements from the main stream such as AFs, PS and PTY do not need to be present in the upper streams, RDS2 can achieve up to 5 times more net data capacity compared with RDS. RT and ODAs can be tunnelled on one of the upper carriers. Thus the speed of transmission can be increased significantly.

Q 04 – How can RDS2 increase the RDS-TMC capacity?

By using the ODA on the upper carriers with high quality detailed traffic information for urban and specific regional areas. Using only one additional upper subcarrier will permit to broadcast at least 250 additional messages per minute and the existing standardized ODA does not even need to be changed as it can be tunnelled.

NOTE 1: RDS-TMC is an ODA standardized by ISO 14819 (all parts) and maintained by the TISA Forum in Brussels. Up to now this standard does not even mention the possibilities to increase the performance of TMC when using the RDS2 option and all this even without changing the existing standard. The RDS Forum will contact TISA and ask to correct the RDS-TMC standard of ISO in order to bring it in line with the state of RDS development reached to date in the IEC.

Q 05 – How can we achieve that TMC device manufacturers use the RDS-TMC on the additional subcarriers in EXACTLY the same way as on the main subcarrier?

Existing PND devices with a new RDS2 external receiver can receive the enhanced TMC data stream. The original PND software may need an adaptation because of the much increased datastream. Full backwards compatibility with legacy TMC services using only the basic RDS subcarrier can be maintained.

Q 06 – On RDS is no IPR. If there is IPR on RDS2 –what will be the consequences for broadcasters, encoder manufacturers, chip makers and manufacturers of receiving devices?

There is no IPR on RDS2 as well. RDS2 is thus free to use, which was a prerequisite from the RDS Forum.

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Q 07 – What advantages and innovation could RDS2 offer to the car industry?

First, RDS2 can offer a much better TMC service with more detailed urban traffic information. Second, there can be attractive display information like station logos and slideshows with text, images and internet cross-references. The internet address of the same radio programme to be streamed can also be signalled which is useful for mobile reception. Third, there can be local or regional information for special events or emergency warnings. Graphical features can be used for more attractive commercials. RDS2 can also be used to update the car radio with new features and apps over its lifetime. Soon, we shall have connected cars. Thus, "remote update" functionality is important.

Q 08 – Can TPEG be used on RDS2?

Not directly, but indirectly yes and only for the TPEG-TEC app. In practice, for the app TPEG-TEC, messages are generally translated from TMC (not the other way around). However because TMC is much more efficient at transmitting traffic info of local relevance to mobile radio receivers than TPEG-TEC, a similar level of traffic information service is possible using RDS2 as the carrier for TMC messages.

NOTE 2: TPEG-TEC is a TPEG2 application (ISO/TS 21219-15) where TEC means Traffic Event Compact.

Q 09 – Why would chipset makers be interested in the RDS2 implementation?

It will create significant added value, and quantities may rise extremely fast since RDS2 is basically an extension of RDS, which itself is mature and well established. Through new products new service opportunities are created. Broadcast real time data services are significantly better for a lot of applications. These can boost the entertainment and advertising sectors, and it allows also to use new radio show formats. Investments may be quite moderate in case of RDS2 implementation and can be realized only by software adaptations of some already existing tuner platforms. However, because of the high development cost involved, this can only be achieved if there is a significant demand for using RDS2 by the (car-)receiver industry.

Q 10 – Could RDS2 be used as a means to achieve Service Following with the Internet included?

Yes, it can give direct information via a new ODA protocol, specified in IEC 62106-6 Ed2 directing receivers to find back your favourite station on the Internet. RDS2 may, as a consequence of this, include the treatment of the Internet connection as an alternative frequency.

Q 11 – What are the recommended injection levels for RDS2?

Between 1.5 to 3.5 kHz, for each carrier.

Q 12 – In the USA, HD-Radio and occasionally SCA are used; is RDS2 compatible with them?

No real tests on air have been made so far. Thus, the answer is based on assumptions only. With 92 kHz SCA probably yes and with 67 kHz SCA no. However, with RDS2 individual subcarriers can be also be switched off. Thus, RDS2 maybe be usable with 67 kHz SCA at least with one additional subcarrier on 76 kHz. With HD-Radio in use some simple tests will be required to show if there are major problems. The RDS Forum and the NRSC Data Services and Metadata Subcommittee will keep each other informed on all observations made during over the air tests.

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Q 13 – In RDS2 there will be enhanced Radiotext and in RDS we have also RT. Why twice Radiotext?

Enhanced Radio text goes far beyond the character set which is available for RDS. With UTF-8 coding almost all languages (Arabic, Chinese, Korean etc.) can be covered. UTF-8 needs more data capacity which RDS2 can cope with. The eRT can also be used for longer ASCII text, up to 128 bytes.

Q 14 – Will RT+ work with enhanced Radiotext on RDS2?

Yes, with some restrictions, however. It may be preferable to create a version supporting all possible 128 characters and also using more than two tags. The possibilities to achieve this are being studied within the RDS Forum.

Q 15 – What about the RDS propagation for the upper carriers at dynamic reception conditions?

The reduction in sensitivity for the upper carriers is marginal. The upper carriers are a bit more susceptible to adjacent channel interference at 100kHz. Simulations and measurements in the laboratory looked promising. However only field trials will provide more clarity about this in practice. In case the reliability of RDS reception needs to be improved, additional redundancy, by repeating data more frequently, can be added.

Q 16 – Who will validate the performance of RDS2 on the road?

A team from the RDS Forum with involvement of IC development and production companies and the manufacturers of car radios in association with the car industry has still to accomplish such tests. It is planned to start this work during 2023.

Q 17 – Will RDS2 improve the overall reception in a car?

Yes - for example when 2A groups (RT Radiotext) are repeated also on an upper carrier using the RDS2 tunnelling method, the reliability of correctly received RT messages will increase significantly, particularly at moderate reception conditions.

Q 18 – How will this performance be communicated in objective and measurable terms?

By publishing measuring data and results from field trials. The performance will most probably be expressed in a relative way by comparison with the RDS performance on the main carrier.

Q 19 – How is RDS2 positioned in marketing terms next to DAB+?

RDS2 is an FM radio extension, available on frequencies from 64 to 108 MHz worldwide. As a worldwide available radio application RDS2 offers much added value when compared with RDS. RDS2 is not meant to be a competitor for DAB+. RDS2 is worldwide applicable like RDS, while DAB+ is used only in a few countries.

Q 20 – Would an existing RDS receiver be completely unaffected by an RDS2 transmission?

Yes. All existing RDS features remain available. New features and services will exclusively use ODA. Backwards compatibility with RDS was a major pre-requisite for the RDS Forum.

Q 21 – Would a broadcaster need permission from their regulator to switch from RDS to RDS2?

Yes – but RDS2 complies with existing ITU regulations as far as the injection levels of audio, pilot tone and additional RDS data are concerned. Therefore, permission to use RDS2 on air for experimentation and/or a regular service may be obtained.

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Q 22 – Does RDS2 have any negative effect on current FM/RDS reception?

Not significantly: The balance of where the deviation is taken from is important, since any implementation of RDS2 sub-carriers still have to be maintained within the permitted +/-75kHz, so it would inevitably be taken from the audio channel deviation, since legacy RDS is already engineered to be minimal deviation so as not to take more deviation than necessary from the audio channel. Using RDS2 will thus slightly reduce the service range of the radio programme. However, conventional RDS reception is not affected by adding RDS2 subcarriers. The reduction of audio quality so far observed is negligible when RDS2 data is added to the transmitted channel within the existing FM 75 kHz deviation budget. Using 1/4 phase spaced RDS2 data symbols reduces the peak-deviation.

Q 23 – Is there a commercially available RDS/RDS2 encoder already?

Yes, since February 2019, but still only usable for RDS2 test transmissions. The software needed for a full operational usage, as specified in the RDS standard for the RDS2 option, has still not been included in this product. The device is only “RDS2 ready” as far as the hardware is concerned and the RDS2 commands of the UECF, standardized in IEC 62106-10, have not yet been implemented by the manufacturer. This latter option is for WorldCast Systems (WCS) still subject to customer demand. For more details contact RDS Forum member WCS in Bordeaux, France. See also their web site:

[audemat-rds-encoder \(worldcastsystems.com\)](http://audemat-rds-encoder.worldcastsystems.com)

Q 24 – Can I monitor and decode what I transmit over RDS2?

Yes. There exist several RDS/RDS2 quite inexpensive tools from MacBe. These are ideally suitable for product designers for even remotely monitoring and subsequent validation. Contact RDS Forum member Joop Beunders from MacBe in the Netherlands. See also their web site:

[RX014 RDS Evaluation Tool](#)

Q 25 – How can I design an ODA for RDS2?

Join the RDS Forum and you will be get full support from a number of highly skilled professionals in this area.

Q 26 – Can I transfer files using RDS2?

Yes. There is a special protocol called RFT (RDS2 File Transfer), standardized in IEC 62106-2 Ed.2 (2021). Two ODAs designed for RDS2 and specified in IEC 62106-6 Ed.2 , Station logo and Slideshow, use the RFT which is just a tool that one can use in the design of RDS2 ODAs using file transfers. See also information about the demo from Radio France, WorldCast Systems and Caméon given at the Paris European Radio Show:

[Radio France Displays RDS2 File Transfer - Radio World](#)

Q 27 – Is the RDS2 adaptation development of the RDS standard still ongoing?

No. This development was completed since 2021. Now, in 2023 the respective parts of the RDS standard IEC 62106 have all been updated to fully support RDS 2.

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Q 28 – Is an RDS2 transmission already on air somewhere?

Yes, in Nantes (France) on EURADIO, 101.3 MHz. This is a demo of comparing with DAB+ the RDS2 Slideshow that Caméon had helped to develop for Radio France within a project agreed with the RDS Forum. Caméon had also developed in this project an RDS2 test receiver that can display the slides thus received. For the RDS2 demodulation it uses the RX014 module from MacBe mentioned above. Here is a short video that you can watch

[https://rds.org.uk/2010/videos/RDS2 on air with Euradio - v3.3.mp4](https://rds.org.uk/2010/videos/RDS2%20on%20air%20with%20Euradio%20-v3.3.mp4)

Q 29 – Is RDS2 fully suitable for future multimedia car platforms?

Yes. Applications with station logos and visualization of programme content has already been successfully demonstrated.

Q 30 – Is RDS2 now already fully standardised?

Yes and worldwide in IEC 62106 (all parts). The modulation system is specified in Part 1, the data coding for the baseband and the RDS2 File Transfer protocol RFT are specified in Part 2, the applications Station logo, Slideshow and Internet connection are specified in Part 6 and the data transfer commands needed for the RDS2 encoder using the protocol UECP are defined in Part 10. In addition, the ITU Recommendation for RDS was brought in line with the status achieved now with the IEC standard. In this sense, the RDS Forum has now fully completed the standard development of RDS2.

Any additional questions?

Please contact the RDS Forum. Please address your message to Dietmar Kopitz, CEO of the RDS Forum. You can contact him using e-mail: rdsforum@bluewin.ch.

REFERENCES

RDS standard IEC 62106 (all parts):

- Part 1: Modulation characteristics and baseband coding (2018)
- Part 2 (ed.2): RDS message format, coding and definition of RDS features (2021)
- Part 3: Usage and registration of Open Data Applications ODAs (2018)
- Part 4: Registered code tables (2018)
- Part 5: Marking of RDS and RDS2 devices (2018)
- Part 6 (ed.2): Compilation of technical specifications for Open Data Applications in the public domain (2023)
- Part 9: RBDS – RDS variant used in North America (2021)
- Part 10: Universal Encoder Communication Protocol UECP (2021)

NOTE 3: The Part numbers 7 and 8 will not be used.

ITU-R Recommendation BS.643-4 (2022) on RDS

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About the RDS Forum

For 30 years already the RDS Forum (a non-profit worldwide industry association) offers to the industry, broadcasters, transmission providers and regulators a superb professional contact network. The Forum studied how to link national, regional, sub-regional and local radio programmes best in a hybrid (analogue and digital) radio landscape. Today the RDS technology is in the process of being adapted to what mobile FM/RDS radio receivers need (e.g. linkage to Internet). Thanks to the high level of expertise of its members and cooperation with other Fora, a huge experience has been acquired. As a result, guidelines have been issued and will continue to be developed, specifically for RDS2, as a valuable support in design and implementation for the benefit of all Forum members involved.

In 2022, the RDS technical specifications already existed for 38 years. There has been success all over and billions of FM radios with RDS have been built so far. In quantities on top were car radios of which the features of RDS auto-tuning (AF), the pan-European traffic info system using the traffic announcement feature TA/TP and the TMC concept have had worldwide support from the automotive industry, since at least 20 years.

Worldwide, FM radio will remain the most popular radio technology and it will continue to co-exist next to digital radio still for long time.

In 2015, the RDS Forum entered the years for an adaption of the RDS technology to RDS2, using the full experience gained in the past. Full backwards compatibility is for the Forum a very important objective to be met. Since 2018 with the IEC the worldwide RDS standard IEC 62106 has been re-structured and adapted in line with the progress made in the RDS Forum on the ongoing RDS2 development.

For RDS2, it was necessary to completely re-structure the worldwide RDS standard IEC 62106 into Parts 1 to 6, available from the IEC since October 2018, an objective being fully achieved by the RDS Forum already by the end of 2016. In 2019 this standard adaptation has been enlarged to include RBDS (Part 9), used in North America. On this issue the RDS Forum continues to closely collaborate with the NAB and the US NRSC. Part 10 with the Universal Encoder Communication Protocol for RDS, fully adapted to RDS2 was achieved at the end of 2021. Part 2 was also updated in 2021 to include the RDS2 file transfer protocol RFT, first submitted by the RDS Forum for standardization by the IEC in 2019.

The whole RDS2 concept and the process for its adaptation had been agreed by the RDS Forum in 2015. This opened the door for a large number of innovations that can now be included into RDS using the Open Data Applications (ODA) feature on the three upper subcarriers and the new RFT specification for RDS2 file transfers, developed by the RDS Forum in 2018. All these new developments from the RDS Forum will play a pre-dominant role for RDS2 in the future. RDS2 is not only data over the air, but a complete platform that shall connect FM broadcasting with IP radio streaming of the same audio content.

The ODA (Open Data Application) concept will be fundamental for RDS2 and form a solid foundation on which one will be able to create quickly very innovative added value service applications. This may include FM radio apps for smart phones and support for the connected car concept.

The RDS Forum 2022 agreed a partnership with the DRM Consortium to harmonise data applications used for both, analogue and digital radio. Journaline is an application used in digital radio. An ODA will be created to use it also for FM radio with RDS2.

During 2021 the RDS Forum completed the development on the following RDS2 applications:

- Station logo,
- Slideshow with or without text elements and
- Service following via the internet (including the same audio stream)
- NFM – Protocol to transmit RDS data over other bearers, and not any longer only on FM.

Most important: RDS2 is IPR free as it was jointly developed by the RDS Forum members to be an open technology, just like RDS has always been.

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Our evolution will create new opportunities

**The RDS Forum is a non-profit industry association
based in Geneva (Switzerland)**

Our commitment: Keep the very popular FM radio RDS technology alive

The members of the RDS Forum are:





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