



## October 2022: RDS is now 38.5 – the complete history

### Introduction

RDS is also sometimes called “the silent revolution”. It is only a digital helper signal in FM broadcasting, but it is very important to make an FM radio work well in the mobile reception mode. In addition it is “you see what you hear”. RDS was developed by the public broadcasters collaborating within the European Broadcasting Union (EBU) from about 1975. The first specification was issued 38.5 years ago by the EBU in March 1984. It was then agreed with the European car radio industry that the public broadcasters would rapidly implement the system on all their networks so that the industry could launch on the European market RDS car radios as from mid-1987, and so it happened! RDS technology take-off in radio receivers was relatively slow, as the first RDS car radios were all high-end models that were fairly expensive. However within 10 years, there were already over 50 million RDS car radios sold, and by 2004 the total had reached 200 million. As from 2005 the industrial production of RDS FM receivers literally exploded. The reason was the availability of a new generation of very inexpensive and very small highly integrated FM-RDS chips that made the RDS technology also interesting for portable devices such as music players and mobile phones. Since then annual production increased to over one billion units a year. Also the wide usage of RDS-TMC, heavily promoted by several regional EU development projects, and much used in car radios and in portable navigational devices, had a significant impact on the success of the RDS technology.

### The Origins

The basic idea was launched by the French public broadcaster ORTF, now Radio France. The proposal was inspired by an upcoming traffic broadcast identification system called ARI, jointly developed in Germany by the public broadcasting research centre IRT and the car radio maker Blaupunkt. The precise mandate given to the EBU in 1974 was to come up with a technology more flexible, applicable to all FM broadcasts, and permitting inaudible automatic receiver tuning for best signal reception within an FM broadcast network radiating the same radio programme. The Europe-wide development lasted 10 years with many field trials and five alternative proposed solutions. The modulation system was taken from a previously introduced Swedish paging system and the baseband coding was a new design, mainly developed by the BBC and the IRT. Everything was carefully coordinated through the EBU, and at the final stage of the development, the European car radio industry was invited to join the numerous field trials. Two of the most severe criteria to be met were that the data added to the FM broadcast had to be completely inaudible, even in the most critical listening mode, i.e. on headphones and that only insignificant additional r.f. interference caused by the RDS signal was permitted.

## **The people behind RDS**

Dr. Kari Ilmonen from Yleisradio in Finland and André Keller from TDF in France had the basic development idea. Both were representatives in the EBU Technical Committee, which launched at its 1974 Paris meeting the development task to be carried out within Working Party R, then chaired by Hermann Eden (IRT), who entrusted the job to a Sub-group, chaired by Ernst Schwarz (Swiss PTT) and inside that Sub-group a Specialist group was created, chaired by Dr. Bob Ely (BBC Research). It was this Specialist group, which met during many years until 1992 that created RDS.

Bob Ely created the backbone for the baseband coding, Jürgen Mielke (IRT), Dr. Josef Berger (ORF), Sten Bergman (Swedish Radio), Dr. Mario Cominetti (RAI), Henri van der Heide (NOS), were those engineers that inspired most the first specification version published in 1984 and Theo Kamalski (then Philips) and Simon Parnall (then BBC) joined and continued to improve it further in the following years, especially using their first implementation experiences. In this context it is also important to mention the RDS promotion campaign launched through the EBU, heavily assisted by the BBC and specifically three persons – Johnny Beerling, then Head of BBC Radio 1, Mark Saunders, Head of the BBC's RDS development office and Bev Marks, Project Manager of the BBC's RDS implementation team, who also brought many implementation ideas to the group and who also worked on implementing EON. Johnny Beerling launched the idea of the RDS logo which was then developed by the BBC and later offered to the EBU for integration into the RDS standards and to be used to mark industry products with standardised RDS functionality.

Among the latest additions to the RDS specification RadioText Plus is worth mentioning and the people behind this were Dr. Hans-Christoph Quelle (then Nokia), Matthias Ewert (WDR) and Werner Richter (IRT).

The most recent development is RDS2 using three additional subcarriers modulated like the basic RDS subcarrier. This powerful concept was a contribution from RDS Forum member Attila Ladanyi (now Capgemini).

The coordinator of the RDS project was all this time Dietmar Kopitz, formerly EBU Chief Engineer and nowadays the Chief Executive of the RDS Forum.

## **The wide range of possible RDS implementations**

There still exists a lot of confusion about the possible implementation of RDS. To say it right away, the large majority of broadcasters still nowadays only use the basic features needed for automatic tuning – and these are only those five known as PI, PS, AF, TP and TA (Programme Identification, Programme Service name, Alternative Frequency lists, Traffic Programme and Announcement identification). The next most important features used also quite widely then are EON, CT and RT (Enhanced Other Network information, Clock Time and date and RadioText). Another feature widely used is also PTY (Programme Type Code). This permits RDS receivers to search for one of the 29 pre-defined programme types, like NEWS. Some car radios even use a “news button” to launch the search. This is simple to implement and listeners appreciate the comfort offered.

The Open Data Application ODA made RDS adaptable in a compatible way with existing implementations for newly created open and sometimes encrypted features. As a result open and encrypted RDS-TMC, RT+ and eRT (Traffic Message Channel, RadioText Plus and Enhanced RadioText) could all be added in recent years.

Nowadays, 38.5 years after that technology was created, almost all FM radios in Europe and the USA use RDS, but in other parts of the world as well. ICs have become available that have an FM receiver and an RDS decoder on the same chip and the price for such a component, if bought in quantities, is now extremely low; to give an idea of the magnitude, only one to three Euros. The trend of this price is still falling and the quantity of such chips sold on the world market is still much increasing. A number of RDS features were already seen within mobile phones and portable network devices.

More traditional car radios sometimes have a separate RDS decoder IC, but RDS decoding is very often an integral part of dedicated multi-purpose Digital Signal Processing (DSP) necessary for products even without RDS. In these products the RDS function price is thus almost zero, as it is done in software only. It was actually RDS that made FM broadcasting very successful and extremely widespread.

RDS technology will most probably live as long as FM broadcasting. It is impossible to predict when they will end as the last analogue broadcasting technology, despite of the many possible switch-off policies, much talked about and given the fact that FM broadcasting is so much widely used worldwide.

## **The RDS standards**

After the EBU had issued the first specification in 1984, it was quickly enhanced, specifically with AF method B and EON and the RDS logo. These became all part of the first Cenelec RDS standard issued then in 1990. This was further enhanced in the 1992 Cenelec RDS standard edition with TMC. Another upgraded Cenelec RDS standard followed in 1998 with ODA and TMC becoming the first ODA implementation, however separately standardised by ISO (ISO TS 14819-Series).

In 1992 and updated twice in 2005 and 2011, the US National Radio Systems Committee issued the North American version of the RDS standard, called there RBDS. The differences with the IEC RDS standard were only minor, and the same RDS logo is also used there to identify RDS enabled products.

Within the ITU there is recommendation ITU-R Rec. BS.643-3 (2011) that describes the characteristics of RDS/RBDS. An update of this Recommendation is expected for early 2023.

During 1999 RDS became the worldwide IEC standard 62106, which was updated in 2008 and 2015. These two versions contained several compatible changes leading to a number of improvements, including:

- The list of RDS country codes, inclusive the ECCs, were updated.
- Provisions to enable the use of RDS technology in short-range transmission devices, e.g. to connect a music player to a car radio via FM and to show the music titles and artist names on the PS or RT display.
- Updating of the character code tables to be used in RDS.
- Enhanced RadioText was specified for use in those countries, where the basic character table is insufficient and they may instead use the extended RDS character table, designed to support all national languages used in the European Broadcasting Area.

- RadioText Plus has been added as a new feature. This was jointly developed by Nokia, the WDR and the IRT in Germany. It permits among other possibilities tagging of 'music titles' and 'artist names' in the RadioText feature to create play lists. This feature was implemented by some public broadcasters in Germany and in the USA it was implemented on over 450 Clear Channel Radio stations in 2008 nationwide.

The implementation of RDS requires on the transmission side an RDS encoder. As in broadcast networks there can be easily a mix of such devices from different manufacturers, the EBU already specified in 1994 the so-called Universal Encoder Communication Protocol (UECP), now very widely used by all broadcasters and transmission operators. This open specification was freely available from the RDS Forum and has since then been updated by the RDS Forum several times. The latest, eighth version became Part 10 of the new RDS/RDS2 standard, published by the IEC in 2021. Since 2018 the RDS Forum completely re-structured the RDS standard into eight parts that will in the future be maintained separately:

- Part 1: RDS system: Modulation characteristics and baseband coding (2018)
- Part 2: RDS message format, coding and definition of RDS features (Ed.2 of 2021)
- Part 3: Coding 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: Compilation of technical specifications for Open Data Applications in the public domain (Ed.2 expected for early 2023)
- Part 9: RBDS (2021)
- Part 10: Universal Encoder Communication Protocol UECP (2021)

The original specifications of the RDS system were of course maintained and the extra functionalities of RDS2 have been added. Obsolete or unused functions from the original RDS standard have been deleted.

## **RDS2**

The only disadvantage of RDS so far was the limited data capacity. A solution has been investigated by the RDS Forum since 2014. For RDS2, in addition to the basic RDS 57 kHz subcarrier up to three optional subcarriers higher up in the FM multiplex can be added, still remaining compatible with the ITU Recommendations.

The core elements of RDS2 are these additional three subcarriers which will enable a significant increase of RDS data capacity to be achieved and then new additional data applications will have to be created, using the RDS-ODA feature, which has been part of the RDS standard for so many years already.

New ODAs for RDS2 will be Station logo, Slideshow, Linkage to Internet. There will also be a NFM protocol to transmit RDS data over other bearers such as digital radio and Internet streams.

## **The RDS Forum**

Currently the RDS Forum, created in 1993 by Johnny Beerling and Dietmar Kopitz, looks after all RDS technology issues. The RDS Forum is a not-for-profit international industry association that has the objective to promote and maintain the RDS technology.

The RDS Forum serves its members also as an efficient contact network for experience exchange and for creating new business opportunities. The use and correct implementation of the RDS technology in the many different countries is monitored. Maintenance of the RDS specifications means not only keeping the RDS system correctly going as originally conceived by the EBU, but also upgrading it and *maintaining full compatibility with the very large number of existing RDS receivers*, to enable new functionalities that have only recently become available for implementation in the latest RDS receiver generations.

RDS Forum members are many world-wide known companies.

The RDS Forum was chaired since its beginning and until 2015 by Johnny Beerling. Since then the Chairman is Frits de Jong (formerly with Philips, then with VDO and then with TomTom). The Vice-Chairman is Mark Saunders (formerly with the BBC and now since many years with HERE Technology).

The internet address for the RDS Forum web site is URL <http://www.RDS-forum.org/>. The RDS Forum Office is in Geneva, Switzerland. It publishes openly all new developments relating to RDS and holds annual meetings each year. The RDS Forum Office is also in charge of maintaining the IEC RDS standard 62106.