March 2017: RDS is now 33 – 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 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 33 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 ICs 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 now much used in car radios and in navigational devices, had a significant impact on the success of 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 a 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 tomark 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 Altran).

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, 33 years after that technology was created, almost all FM radios use RDS. 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 are 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 possible switch-off policies, much talked about, given the fact that FM broadcasting is so widely used.

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 standard are 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.

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 standardised in 1994 the so-called Universal Encoder Communication Protocol (UECP), now very widely used by all broadcasters and transmission operators. This open specification is freely available from the RDS Forum and has since then been updated several times. The latest, eighth version, will become now part of the new RDS/RDS2 standard, expected to be published by the IEC in early 2018. There will be a complete re-structuring of the RDS standard in eight parts that will in the future be maintained separately:

Part 1: RDS system: Modulation characteristics and baseband coding

Part 2: RDS message format, coding and definition of RDS features

Part 3: Coding and registration of Open Data Applications ODAs

Part 4: Registered code tables

Part 5: Marking of RDS and RDS2 devices

Part 6: Compilation of technical specifications for Open Data Applications in the public domain

Part 7: RBDS

Part 8: Universal Encoder Communication Protocol UECP

The original specifications of the RDS system have been 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. For RDS2, both sidebands around the basic RDS 57 kHz subcarrier can be repeated a few times, up to three, centred on additional subcarriers higher up in the FM multiplex still remaining compatible with the ITU Recommendations.

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

The RDS Forum

Currently the RDS Forum, created in 1993 by Johnny Beerling and Dietmar Kopitz, looks after the 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, regarding the use and correct implementation of the RDS technology in the many different countries involved. Maintenance means not only keeping the RDS system correctly going as originally conceived by the EBU, but also upgrading it, *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 that include e-Radio in Canada, Worldcast Systems, Radio France and TDF in France, Axel Technology in Italy, 2wcom, Altran, Robert Bosch Car Multimedia, Delphi, Harman Becker Automotive, JVC Kenwood, Panasonic Automotiove and the Institut für Rundfunktechnik in Germany, Catena Radio Design, ItoM and MacBe in the Netherlands, Pioneer and Sony in Japan, the NAB/NRSC, Silicon Labs and XPERI in the USA, LG Electronics in Korea, Mitsubishi Electric Automotive, Swedish Radio and Teracom in Sweden, Swiss Broadcasting Corp. (SRG/SSR), Swisscom Broadcast in Switzerland, HERE Traffic and Visteon in the UK.

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 (HERE).

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 in June at Glion/Montreux, Switzerland.