March 2009: RDS is now 25 – 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 exactly now 25 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 RDS technology also interesting for portable devices like music players and mobile phones. Since then annual production increased to over 200 million 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 at least 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, now TomTom) and Simon Parnall (then BBC, now NDS) joined and continued to improve it further in the following years, especially with 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 (Nokia), Matthias Ewert (WDR) and Werner Richter (IRT). 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 set a flag to enable a waiting for news status and when NEWS is signalled via EON, the receiver switches to that signalled news programme and after the finished newscast then back to the initially tuned programme. Several public broadcasters in the UK, Netherlands and Belgium use the EON feature also in that particular way. 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, 25 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, now over 200 million units per year. 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 DSPs, 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 the possible switch-off, much talked about by regulators, 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 re-edited in 2005, 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.643-2 that describes the characteristics of RDS/RBDS.

During 1999 RDS became the worldwide IEC standard 62106, which was updated during 2008 and just officially approved with a 100% support by the IEC. After some smaller editorial work it will be published later this year as IEC 62106 ed.2. The new version contains several compatible changes leading to a number of improvements, including:

- The list of RDS country codes, inclusive the extended ones, has been updated in Annexes D and N.
- Annex D now contains 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.
- Annex E, containing the character code tables to be used in RDS was updated. Initially there were three optional character tables.
- The proposed coding was no longer inline with the relevant ISO character coding standard. *de facto* only character table E.1 was used and this has now been declared to be the basic character table.

- Enhanced RadioText is now proposed in Annex Q for use in those countries, where the basic character table is insufficient and they may instead use the extended RDS character table E.2, designed to support all national languages used in the European Broadcasting Area.
- RadioText Plus has been added as a new feature in Annex P. 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 is already implemented by some public broadcasters in Germany and it was implemented on over 450 Clear Channel Radio stations in 2008 in the United States nationwide, where it is then very likely that RBDS will adopt that same technology.
- Annex R was added to explain briefly what is common and what is different between RDS elsewhere and RBDS in the USA; it is possible and sometimes even desirable to design receivers that work with both systems. The IC chips used are the same anyway.

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, seventh version, will be published by the RDS Forum later this year and it will, of course, support all RDS features now specified in the latest RDS standard version.

The RDS Forum

Currently the RDS Forum, created in 1993, looks after the all RDS technology issues. The RDS Forum is a non-profit international professional 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 2wcom in Germany, Audemat-Aztec in France, Profline in the Netherlands, Autosound Electronic and WiWi Industries in Hong Kong, Best Creative in China, Robert Bosch Car Multimedia in Germany, Cambridge Silicon Radio in the UK, Catena Radio Design in the Netherlands, the Swiss Private Radio Association, Clarion Europe, Clear Channel Broadcasting in the USA, the Denon Brand Company, Pioneer and Sony in Japan, Data FM in the USA, Delphi Grundig in Germany, Digita Oy in Finland, Harman Becker Automotive Systems in Germany, Hyundai Autonet Co. in Korea, Institut für Rundfunktechnik in Germany, ItoM in the Netherlands, JVC Technology Centre Europe, Kenwood Electronics Europe, KRS Electronics Co., LG Electronics, MC&T Electronics in Korea, Media Broadcast in Germany, Mitsubishi Electric Automotive Europe in Sweden, Nokia, OFCOM in the UK, Qbit in Germany, Ruoss AG in Switzerland, Silicon Labs in the UK/USA, Swiss Broadcasting Corp. (SRG/SSR), Swisscom Broadcast AG, TomTom International, and Visteon Engineering Services in the UK.

The internet address for the RDS Forum web site is URL http://www.rds.org.uk/. 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.