

*NRSC
GUIDELINE*

NATIONAL RADIO SYSTEMS COMMITTEE

**NRSC-G300
Radio Data System (RDS) Usage
Guideline
September 2012**



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FOREWORD

The first Radio Data System (RDS) Standard was developed in Europe in 1984, followed by the NRSC version, the RBDS Standard (known now as NRSC-4), in 1992. Since then, numerous updates to these Standards have been published and RDS technology has proliferated and is now widely supported by both broadcasters and receiver manufacturers.

With the advent of digital radio systems, most notably the FCC's authorization of in-band/on-channel (IBOC) digital radio in the U.S. in 2002, broadcasters have been upgrading their infrastructures to support data broadcasting at an accelerated rate, and one consequence of this has been a dramatic increase in the use of the RDS FM subcarrier. Recognizing this, the NRSC is publishing this Guideline with the goals of helping broadcasters and receiver manufacturers to make the best use of RDS technology and providing a more useful and consistent RDS experience for consumers.

The information contained in this NRSC Guideline is the work of the RDS Usage Working Group (RUWG), a subgroup of the Radio Broadcast Data System (RBDS) Subcommittee of the NRSC. The principal author of the first version of this document was Alan Jurison, Senior Operations Engineer – Engineering and Systems Integration with Clear Channel Media and Entertainment. Some of the material included was originally developed by Mr. Jurison and published in a series of trade journal articles and presentations at the NAB Broadcast Engineering Conference (BEC). At the time of first adoption of this Guideline, the RUWG was chaired by Steve Davis, Clear Channel Media and Entertainment, and the RBDS Subcommittee was chaired by Dan Mansergh, KQED Public Radio. The NRSC chairman at the time of adoption of NRSC-G300 was Milford Smith, Greater Media, Inc.

The NRSC is jointly sponsored by the Consumer Electronics Association and the National Association of Broadcasters. It serves as an industry-wide standards-setting body for technical aspects of terrestrial over-the-air radio broadcasting systems in the U.S.

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RDS USAGE GUIDELINE

1 SCOPE

This is an informative Guideline document which sets forth recommendations on the use of the Radio Data System (RDS) FM data subcarrier in the U.S. for broadcasters, broadcast equipment manufacturers, and receiver manufacturers.

2 REFERENCES

2.1 Normative References

This is an informative specification. There are no normative references.

2.2 Informative References

The following references contain information that may be useful to those implementing this Guideline document. At the time of publication the editions indicated were valid. All standards are subject to revision, and users of this Guideline document are encouraged to investigate the possibility of applying the most recent editions of the standards listed below.

- [1] *NRSC-4-B United States RBDS Standard – Specification of the Radio Broadcast Data System*, National Radio Systems Committee, April 2011
- [2] *IEC 62106, Specification of the Radio Data System (RDS) for VHF/FM sound broadcasting in the frequency range from 87.5 MHz to 108.0 MHz*, International Electrotechnical Commission (IEC), Edition 2.0, 2009-07
- [3] *NRSC-G200 Harmonization of RDS and IBOC Program Service Data (PSD) Guideline*, National Radio Systems Committee, September, 2007
- [4] *Coding of RadioText Plus information (RT+)*, RDS TS – Annex P, RDS Forum TS 2008, R08_008_3
- [5] *IEC 60315-9, Methods of measurement on radio receivers for various classes of emission - Part 9: Measurement of the characteristics relevant to Radio Data System (RDS) reception*, International Electrotechnical Commission (IEC), 1996-05
- [6] *NRSC-R300 Program Associated Data (PAD) Field Length Study*, National Radio Systems Committee, November, 2011
- [7] *Information Technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane*, ISO/IEC 10646-1:2000, International Organization for Standardization (ISO) Web URL:
www.iso.org/iso/catalogue/catalogue_tc/catalogue_detail.htm?csnumber=29819
- [8] *Broadcaster Traffic Consortium web site*, www.radiobtc.com
- [9] *Total Traffic Network web site*, www.totaltraffic.com
- [10] *Alert FM web site*, www.alertfm.com
- [11] *viaRadio Envoy system web site*, www.viaradio.com/services/network.html

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- [12] NRSC-5-C, *IBOC Digital Radio Broadcasting Standard*, Reference Document 1028s rev. D (Program service data), National Radio Systems Committee, September 2011

2.3 Symbols and abbreviations

In this Guideline the following abbreviations are used:

FCC	Federal Communications Commission (U.S.)
FM	Frequency Modulation
IBOC	In-Band/On-Channel
NRSC	National Radio Systems Committee
ODA	Open Data Application
PAD	Program Associated Data
PSD	Program Service Data
PTY	Program Type
PTYN	Program Type Name
RDS	Radio Data System
RBDS	Radio Broadcast Data System
RUWG	RDS Usage Working Group
RT	RadioText
RT+	Name of an industry-standard ODA extension to RT
VHF	Very High Frequency

3 BACKGROUND

The purpose of this Guideline is to provide broadcasters and receiver manufacturers with information that will help them make the best use of BDS technology and to provide a more useful and consistent RDS experience for consumers. The material which follows was discussed at length over many months in meetings of the NRSC's RBDS Usage Working Group (RUWG) and represents the consensus opinion of that group.

RBDS is the US version of a European standard, RDS. In this document, we generally use the term "RDS" unless specifically referring to the U.S. version or history.

While the use of RDS in the U.S. has only become widespread in the last ten years, RDS was developed by the public broadcasters collaborating within the European Broadcasting Union (EBU) from about 1975. The first specification was issued by the EBU in March 1984. 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 (these units were mostly sold outside of the U.S.).

In February 1990, discussion started about standardizing RDS for the U.S. under the auspices of the NRSC. The RBDS Standard was adopted by the NRSC on January 8, 1993, consisting of the major components of the European RDS Standard but also with some important differences, including the following:

- Program Type definitions – due to differing broadcast styles, the program type (PTY) code definitions (i.e. Jazz, Rock, etc.) differ between RDS and RBDS;
- Program Identification coding – North American program identification (PI) codes differ in functionality in three ranges. This affects alternate frequency switching and regionalization;
- "Dynamic" Program Service name – the RBDS Standard allows "nondistracting" changes to the program service (PS) field, while the RDS Standard strictly forbids dynamic changes to the PS;
- ID Logic feature (IDL)/RDS updates to In Receiver Database (IRDS) – a licensed feature which allows the receiver to identify the call sign and format of non-RDS FM and AM broadcast stations via a built in database. This database may be updated via an Open Data Application (ODA);
- AMRDS – the RBDS standard has a reserved section for an AM equivalent to RDS (this section was removed in the NRSC-4-B version);
- Emergency Alert System (EAS) ODA – an ODA has been developed to carry emergency information compatible with the U.S. Federal Communication Commissions (FCC) EAS protocol. This public ODA also offers increased consumer receiver functionality with emergency messaging.

Since the adoption of the original RBDS Standard, the NRSC has adopted modifications in 1998, 2004 (the official designation was changed to NRSC-4 with this version), 2005 (NRSC-4-A), and 2011 (NRSC-4-B, the current version).

Elsewhere in the world, the major RDS-focused group is the RDS Forum (www.rds.org.uk), created in 1993, which is a non-profit international professional industry association that has the objective to promote and maintain RDS technology. The RDS Forum serves its members also acts as an efficient contact network for experience exchange regarding the use and correct implementation of the RDS technology in the many different countries involved. The RDS Forum has been the leader in Europe in advancing the technology and has been successful in gaining ETSI adoption of the RDS specification.

3.1 RDS Installation

3.1.1 Hardware installation

RDS is a component of FM broadcasting that uses an encoder to create a signal which is combined with other components of the FM baseband including the mono (L+R) and stereo multiplex (L-R) audio signals. The RDS signal is a 1,187.5 bits per second (bps) data stream encoded into a 4 kHz-wide suppressed-carrier AM subcarrier centered at 57 kHz.

The hardware that creates the signal, the RDS encoder, is installed in the FM program chain either between the audio processing/stereo generator and the (analog) baseband input of an FM exciter (Figure 1), or, the encoder is connected to a separate input on the FM exciter designed for an RDS encoder or for subcarriers (Figure 1). These installation methods both provide for the feeding of a sample of the 19 kHz pilot to the encoder. The 57 kHz RDS subcarrier frequency is the third harmonic of the 19 kHz pilot and therefore performs in similar fashion as the stereo L-R signal. Receivers should detect the 19 kHz pilot then use multiples of that frequency to demodulate the L-R, and now the RDS subcarriers.

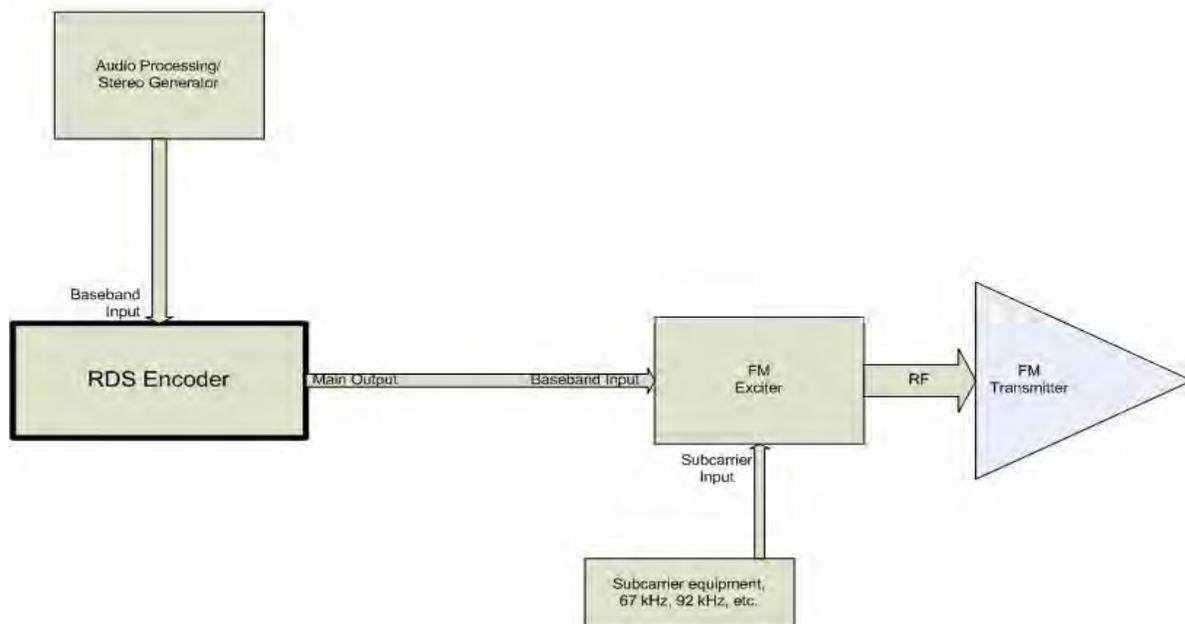


Figure 1. RDS encoder installation – loop-through method

When using the discrete input or “sidechain” method shown in Figure 2, it is important to confirm that the RDS encoder is configured NOT to feed the baseband input signal to its output. It is possible to install an RDS encoder as shown in Figure 2 without connecting the FM baseband to the RDS encoder. Improvements in frequency stability and quality of both transmitting and receiving equipment can allow the RDS encoder to “free run” or use an internal 19 kHz reference but this is not an optimal installation practice.

RDS encoders are typically installed at the transmitter site, however the physical location of the equipment will largely be based on the type of studio-to-transmitter link (STL) that is in use and the data connectivity available between the sites.

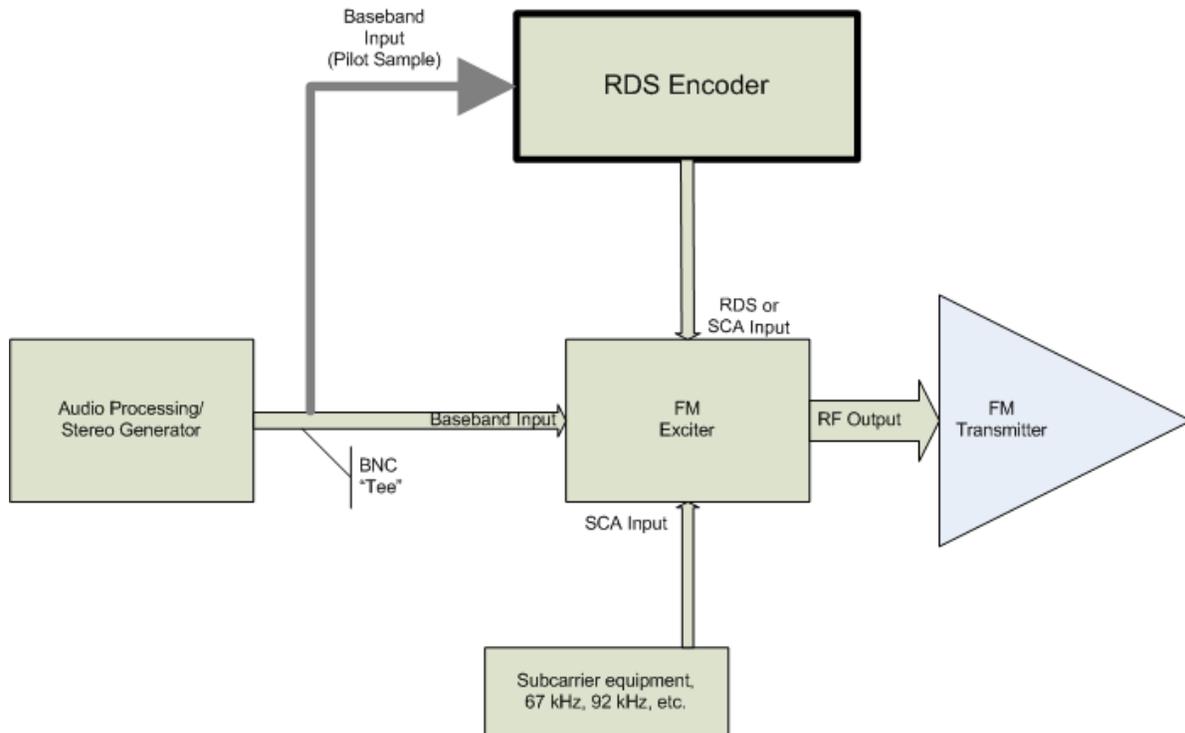


Figure 2. RDS encoder installation – discrete input with sample or “sidechain” method

3.1.2 RDS injection and pilot synchronization

RDS runs as a low power (with respect to the main channel audio), 57 kHz amplitude-modulated data subcarrier on an FM station. When installing an RDS encoder, there are configuration options to control the overall output level. Historically, the RBDS Standard does not have a recommended subcarrier injection level.

This Guideline recommends a nominal RDS injection rate of 6% (4.5 kHz) of the 75 kHz total modulation of an FM signal. Values below this have been found to be acceptable for mobile receivers, however, smaller, portable receivers tend to work with an injection rate closer to 6% or even higher, generally not to exceed 7% for most conditions.

When setting RDS injection levels, it is best done with a calibrated modulation monitor that supports RDS injection. It is important to be precise about setting of modulation and injection levels, so make sure the proper test equipment is used. It is worth the effort to be precise.

It is recommended to follow the instructions for your specific RDS encoder to synchronize and align the RDS signal with the 19 kHz pilot. There are stations where RDS encoders are not synchronized or have become unsynchronized, and this has been known to cause issues with RDS reception. It is recommended that broadcasters observe the RDS encoder’s status regarding the pilot sync over time. If the 19 kHz pilot sample into the encoder is marginal, there have been situations where an encoder was going in and out of sync as a result. When the encoder was going in and out of sync, it would cause RDS reception errors; thus creating a bad end-user experience by delaying the decoding of the RT and skipping of PS frames.

The added benefit of going through the RDS encoder manufacturer's synchronization process is that a properly synced RDS encoder in quadrature will slightly reduce the modulation peaks of the subcarrier without reducing their actual levels, providing for more room for the main channel modulation (see Figure 3).



Figure 3. An example from the Inovonics 730 user manual of a properly synchronized RDS subcarrier in quadrature with the pilot, as shown from an oscilloscope

3.1.3 Initial programming

RDS encoders typically have on-board memory which allows configuration settings, encoder programming and certain other data to be saved on-board. In locations where data connectivity is difficult or impossible, stations would use the on-board memory to take advantage of RDS features and even create a scrolling display of messages.

Certain data, like PI, PTY, TP, AF and M/S are programmed into the encoder during installation, even if the station is using a live data feed. In older encoders this data may need to be factory-encoded using firmware although most encoders now allow changes to be made in the field using a computer and a serial or IP connection to the device.

Many RDS encoders allow RadioText (RT) messages to be loaded into memory, allowing any FM station to send display data to RDS receivers, even if the station is not able to send live now-playing or program associated data. Many encoders even allow such messages to be scheduled so that, for example a different message could be scrolled during each program or could be used to identify the scheduled on-air talent.

3.2 Data Feeds

Most RDS encoders provide a means to send live data to the RDS encoder. This is achieved using either a serial data connection or an IP connection. Since the bandwidth of the entire RDS bit stream is only 1,187.5 bits per second, integrating the data into a station STL or transmitter site data connection will not require significant overhead. Typically stations feed live data using a data source like the radio automation playback system. Many radio automation providers can export live data based on the on-air programming and export them to RDS encoders either as a function of their base system or as an extra option. Automation equipment manufacturers and RDS equipment suppliers should be able to provide guidance on appropriate means to interconnect the equipment.

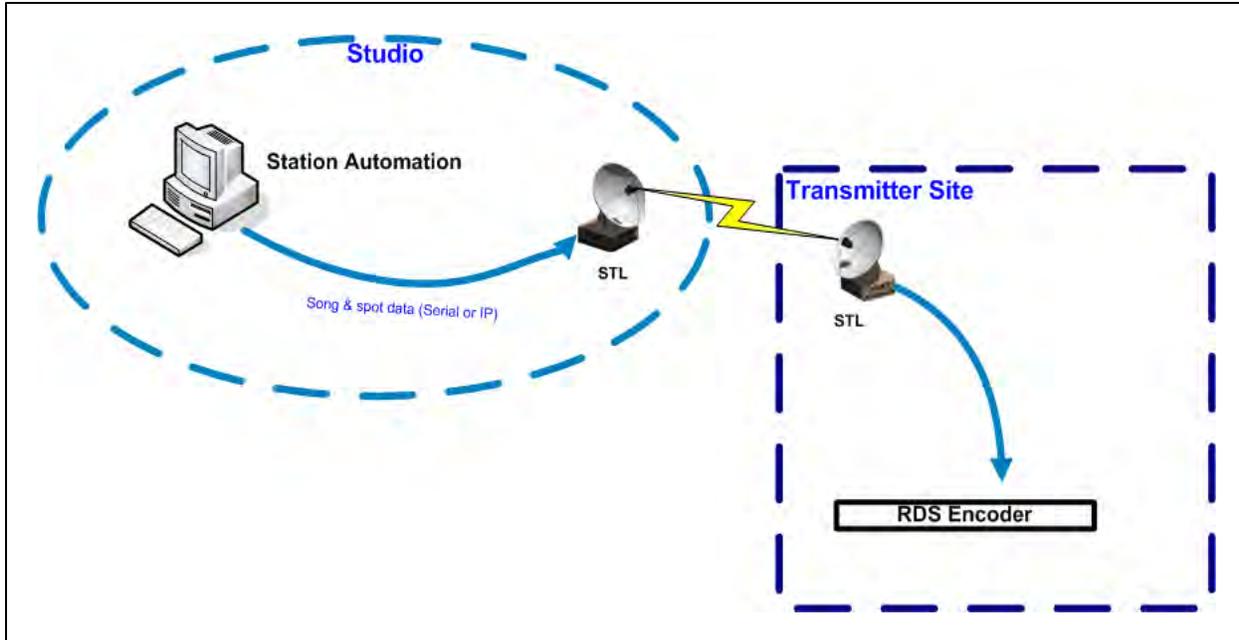


Figure 4. Direct automation – RDS feed

The basic connection is illustrated in Figure 4 which illustrates a data feed from a station automation directly to the RDS Encoder. Most automation systems can provide this using either an RS-232 Serial connection or using TCP/IP. The RDS Encoder will be programmed with static parameters such as PI and repetition rate. Live data will typically appear as RadioText (RT) and/or a scrolling PS display.

The native mode of communication of most RDS encoders is known as the Universal Encoder Communication Protocol (UECP). This is still the most effective means to access RDS features like RT+, song tagging, TMC data, paging, etc. Although most popular RDS encoders also offer access to RT and other more common live data features to be sent using ASCII data. Stations that wish to exploit more RDS features may find it advantageous to employ a device to aggregate data and convert it to UECP. This could be done using a computer on-site (Figure 5) or by establishing a connection to an outside service provider (Figure 6).

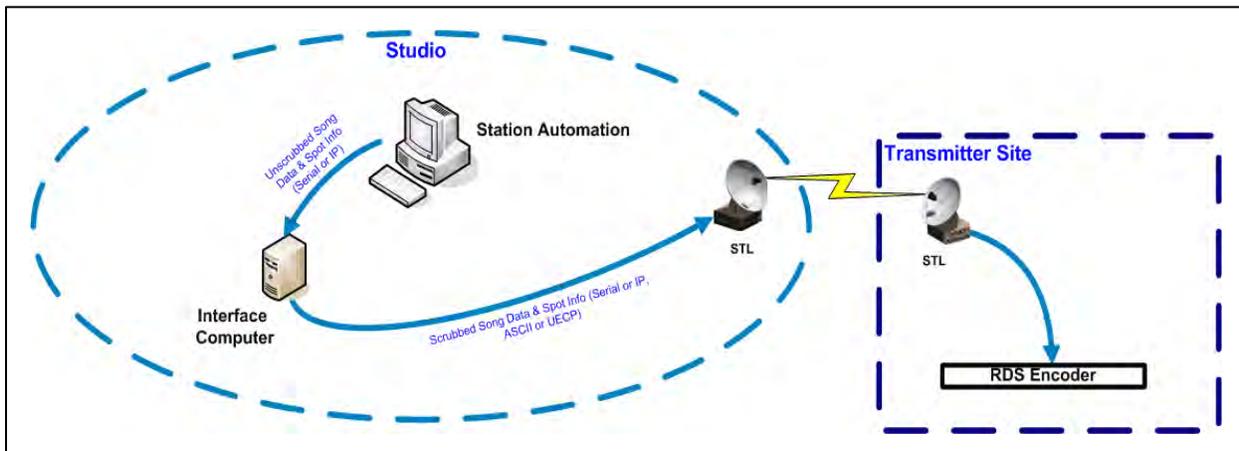


Figure 5. Local data management

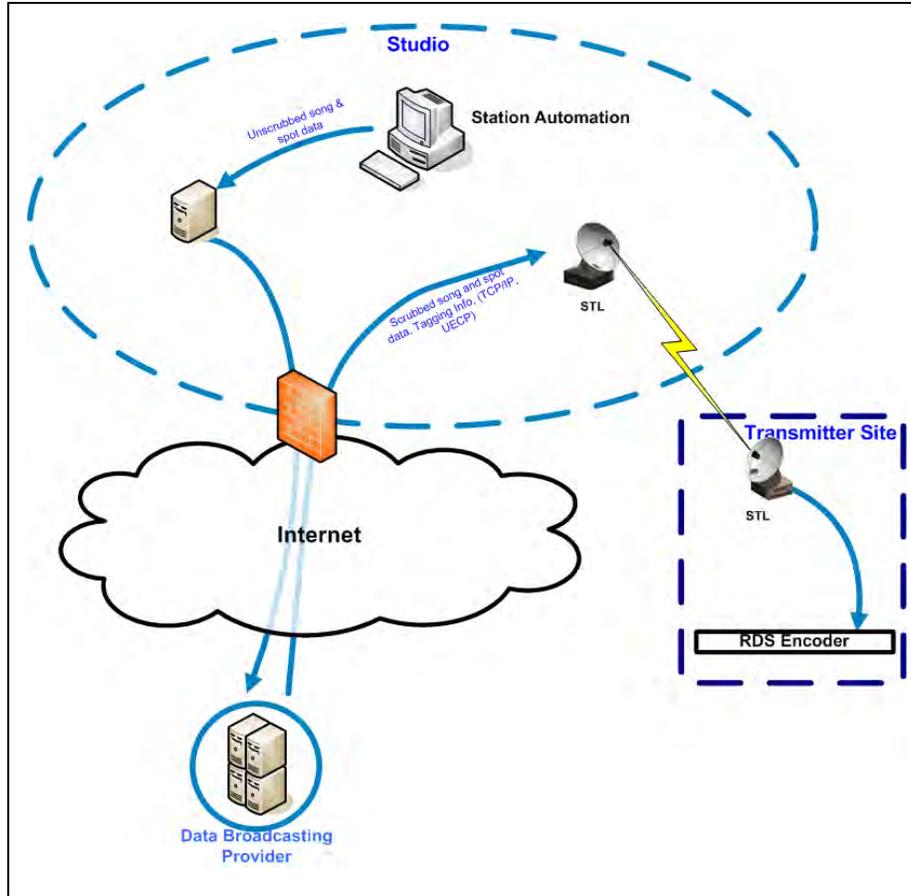


Figure 6. Service provider data management

The data management computer can provide a means to “scrub” or “sanitize” the feed from the automation system and optimize the data for RDS displays. The local computer or offsite data provider can be used to manage message scheduling, dayparting, message repetition rates and provide access to RDS features like RadioText+. Outside data broadcasting providers can also provide a means to incorporate special features such as Apple iTunes Tagging, and news or traffic data.

When stations use a live data feed, special arrangements will be required to accommodate long form programming, live programming, and network feeds. During these periods most station automation systems will not be sending new data to the encoder so an RDS display will show the last live event, (e.g., the last song played before a pre-recorded talk show or network program). During these circumstances the integrated message scheduling features of some RDS encoders can be used or an intermediate device, a service provider, or even a network data feed could be used to provide the relevant messages.

It should be noted that the NRSC is developing a guideline, NRSC-G301 to provide a data standard/framework which would allow live or network programming feeds to communicate to the automation system the relevant program content. For example, a syndicated music show from a network provider could publish the programs content (song title/artist) that the automation playback system could then export to the RDS encoder as if it were playing the music locally.

There are a number of providers that may offer hardware and services to manage RDS data. Each supplier will have individual requirements and capabilities that will have an impact on the data paths as displayed above. A reference list of providers appears in Annex 2.

4 SELECT FEATURES OF RDS

While the RDS Standard provides for a host of features, there are some features that are more widely used than others. Discussed in this section are details about and considerations regarding usage of some of the most frequently used RDS features. Most of those features are included in Table 1 (taken from the NRSC-4-B standard).

Table 1. Main feature repetition rates

Main Features	Group types which contain this information	Appropriate repetition rate per sec.
Program Identification (PI) code	all	11.4 ^a
Program Type (PTY) code	all	11.4 ^a
Traffic Program (TP) identification code	all	11.4 ^a
Program Service (PS) name	0A, 0B	1
Alternative frequency (AF) code pairs	0A	4
Traffic announcement (TA) code	0A, 0B, 14B, 15B	4
Decoder identification (DI) code	0A, 0B, 15B	1
Music/speech (M/S) code	0A, 0B, 15B	4
RadioText (RT) message	2A, 2B	0.2 ^b
Enhanced other networks information (EON)	14A	up to 2 ^c

^a Valid codes for this item will normally be transmitted with at least this repetition rate whenever the transmitter carries a normal broadcast program.

^b A total of 16 type 2A groups are required to transmit a 64 character RadioText message and therefore to transmit this message in 5 seconds, 3.2 type 2A groups will be required per second.

^c The maximum cycle time for the transmission of all data relating to all cross-referenced program services shall be less than 2 minutes.

4.1 Program Identification (PI)

The original purpose of the code was to identify the station in a unique way. The RBDS standard NRSC-4-B stipulates the method for calculating the appropriate PI code, in hex that would be entered into the encoder. There are a few software utilities available that will convert the station call letters to the 4-digit hex code. Most RDS encoder manufacturers should be able to give you that information.

Those interested in implementing PI code translation on the receiver side need to be aware that there are two models used in the US: The RBDS Standard (call letter translation) and the alternate method described in NRSC-4-B section D.7.4 (not direct call letter translation).

As a result, many stations do not send the “correct” call letters through PI codes. We recommend that receiver manufacturers consider decoding RadioText Plus (RT+) StationName.Short in place of back-calculating the call sign of PI codes.

Besides the method described in D7.4, there may be other cases where stations are not able to use the PI code that matches their call letters. In such cases, an appropriate code must be assigned. Original PI code creation may need to follow to station or company agreements, or may need to follow additional technical requirements.

For example, if an FM station used translators and boosters and that station employed the RBDS “AF” or “Alternate Frequency” capabilities of RDS, encoders on the boosters and translators would send the

same PI code. A receiver with the ability to use the AF feature would be able to recognize that the booster or translator was the appropriate alternate signal because of the matching PI codes. This is an RDS capability that is used more commonly in Europe but has not been used widely in the U.S to date.

4.1.1 Designing the Appropriate Program Identification (PI) Code for Boosters, Translators, and Simulcasts

Increasingly, FM translators are used for cross-service stations (AM, IBOC Multicast, etc.). In such cases, PI code selection or creation may not be obvious. The following section provides some guidance for PI code selection.

For stations which follow the following conditions:

- 1) Translator OR Booster carrying primary stations FM Analog/IBOC Main Channel;
- 2) Translator carrying IBOC Multicast of primary station which is simulcast of an AM with unique call letters for market;
- 3) Main FM station or Translator programming of an in-market AM with unique call letters.

The NRSC recommends using the PI code calculated from the call sign of the primary AM or FM station originating programming, as defined in Section D.7.1 of NRSC-4-B.

For stations which follow the following conditions:

- 4) Translator carrying IBOC Multicast of primary station which is simulcast of an in-market AM with non-unique call letters - (Primary is WXXX-FM but AM is WXXX);
- 5) Main FM station or Translator carrying programming of an in-market AM with non-unique call letters - (There is already an WXXX-FM but AM is WXXX);
- 6) Translator carrying IBOC Multicast of primary station which is a unique program non-associated with any existing station.

Under conditions 4) through 6) above, the NRSC recommends carefully selecting another call sign from the RDS PI code space outlined in [1] Table D.7 (page 20 only) using the following guidelines:

- a) Avoid using a PI code based on a call sign assigned by the FCC to another station in the U.S. By exception, if desired, the stations listed in conditions 4) through 6) above may consider swapping the "W" or "K" prefix of the call sign with a "K" or "W" respectively, if such a swap will not cause confusion with a station licensed to that call sign in the market or nearby markets.

For example, a translator of WSEN in Syracuse would consider transmitting a PI code "KSEN" to avoid duplicating the WSEN-FM PI code while retaining the last three characters. The real KSEN AM and FM are some 2000 miles away. This is the only method by which the NRSC recommends choosing a PI code that represents a call sign in use by another station under conditions 4) through 6) above.

- b) If desired, the stations listed in conditions 4) through 6) above may consider using an unassigned call sign by referring to the FCC database. At any given time, there are more four-letter call signs not assigned to AM and FM stations than are assigned. If at some time in the future a station or stations using an unassigned call sign to generate a locally unique PI code learns that the call sign is no longer unassigned, the station or stations should select a new unassigned call sign to generate a new locally unique PI code.

Broadcasters and receiver manufacturers are encouraged to avoid relying on PI codes for station identification to listeners and to rely on other methods outlined in the Standard and discussed in this Guideline to identify stations on user displays (i.e. RT+ StationName.Short). Broadcasters are expected to verify they have not selected a duplicate PI that another broadcaster has selected. This is best done by calling or meeting with other broadcasters in your area.

4.2 Program Type (PTY)

The PTY code should be used as a format description for the station. Receivers that fully support PTY use the code to categorize stations and provide ways for listeners to search for radio programming. It's not unusual for stations to choose a PTY code that doesn't strictly adhere to their format definition. The PTY code will often more closely match a marketing position or public image, as opposed to a strict, industry definition of the station's format.

The Arbitron format list was the basis of RDS PTY codes. Arbitron uses terms of art that may or may not reflect listener's understanding or listening. For example the format "Urban" is not necessarily an accurate description.¹ Likewise, Spanish-formatted stations will likely not want their stations to appear on public radios under the label "Language" or "Foreign Language." With the release of the NRSC-4-B standard, the PTY codes for "Hip Hop", "Spanish Talk", and "Spanish Music" were adopted and receivers are now beginning to appear on the market. Stations using these codes may appear as "Undefined" on older radio displays.

Table 2 is a list of Arbitron formats (from a 1/27/11 listing) with a suggested PTY assignment. Note that some formats are shown with multiple possible PTY codes. It's best to consider these a starting place for discussion with station programming and marketing departments to decide the appropriate PTY classification. It should also be noted that the program types listed are compatible within the HD Radio system, and considerations should be made to synchronize the Program Type settings in the appropriate configuration sections of an HD Radio Importer and Exporter.²

¹ A list of Arbitron formats is available on the Arbitron web site at www.arbitron.com/home/formats.htm.

² See pg. 59 of [12] for a list of genres supported by the NRSC-5-C Standard.

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Table 2. List of Arbitron formats with suggested PTY codes defined in NRSC-4-B

Arbitron Format	PTY Code	PTY Code	Program Type	8 Character	16 Character	Definition
	Binary	Decimal				
80s Hits	00111	7	Adult Hits	Adlt_Hit	Adult_Hits	An up-tempo contemporary hits format with no hard rock and no rap
Active Rock	00101	5	Rock	Rock	Rock	Album cuts
Adult Contemporary (AC)	01000	8	Soft Rock	Soft_Rock	Soft_Rock	Album cuts with a generally soft tempo
Adult Hits	00111	7	Adult Hits	Adlt_Hit	Adult_Hits	An up-tempo contemporary hits format with no hard rock and no rap
Adult Standards/MOR	01101	13	Nostalgia	Nostalgia	Nostalgia	Big-band music
Album Adult Alternative (AAA)	00101	5	Rock	Rock	Rock	Album cuts
Album Oriented Rock (AOR)	00110	6	Classic Rock	Cls_Rock	Classic_Rock	Rock oriented oldies, often mixed with hit oldies, from a decade or more ago
All News	00001	1	News	News	News	News reports, either local or network in origin
All Sports	00011	3	Sports	Sports	Sports	Sports reporting, commentary, and/or live event coverage, either local or network in origin
Alternative	00101	5	Rock	Rock	Rock	Album cuts
Blues	01101	13	Nostalgia	Nostalgia	Nostalgia	Big-band music
Children's Radio	10101	21	Personality	Persnlty	Personality	A radio show where the on-air personality is the main attraction
Christian AC	10011	19	Religious Music	Rel_Musc	Religious_Music	Music programming with religious lyrics
Classic Country	01010	10	Country	Country	Country	Country music, including contemporary and traditional styles
Classic Hits	00110	6	Classic Rock	Cls_Rock	Classic_Rock	Rock oriented oldies, often mixed with hit oldies, from a decade or more ago

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Table 2 (continued). List of Arbitron formats with suggested PTY codes defined in NRSC-4-B

Arbitron Format	PTY Code		Program Type	8 Character	16 Character	Definition
	Binary	Decimal				
Classic Rock	00110	6	Classic Rock	Cls_Rock	Classic_Rock	Rock oriented oldies, often mixed with hit oldies, from a decade or more ago
Classical	01111	15	Classical	Classicl	Classical	Mostly instrumentals, usually orchestral or
Contemporary Christian	10011	19	Religious Music	Rel_Musc	Religious_Music	Music programming with religious lyrics
Contemporary Inspirational	10011	19	Religious Music	Rel_Musc	Religious_Music	Music programming with religious lyrics
Country	01010	10	Country	Country	Country	Country music, including contemporary and traditional styles
Easy Listening	01100	12	Soft	Soft	Soft	A cross between adult hits and classical, primarily non-current soft-rock originals
Educational	10110	22	Public	Public	Public	Programming that is supported by listeners and/or corporate sponsors instead of advertising
Family Hits	01100	12	Soft	Soft	Soft	A cross between adult hits and classical, primarily non-current soft-rock originals
Gospel	10011	19	Religious Music	Rel_Musc	Religious_Music	Music programming with religious lyrics
Hot AC	01001	9	Top 40	Top_40	Top_40	Hits, often encompassing a variety of rock
Jazz	01110	14	Jazz	Jazz	Jazz	Mostly instrumental, includes both traditional jazz and more modern "smooth jazz"
Latino Urban	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Mexican Regional	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language

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Table 2 (continued). List of Arbitron formats with suggested PTY codes defined in NRSC-4-B

Arbitron Format	PTY Code		Program Type	8 Character	16 Character	Definition
	Binary	Decimal				
Modern AC	00111	7	Adult Hits	Adlt_Hit	Adult_Hits	An up-tempo contemporary hits format with no hard rock and no rap
New AC (NAC)/Smooth Jazz	10001	17	Soft Rhythm and Blues	Soft_R&B	Soft_R_&_B	Rhythm and blues with a generally soft tempo
New Country	01010	10	Country	Country	Country	Country music, including contemporary and traditional styles
News/Talk/Information	00010	2	Information	Inform	Information	Programming that is intended to impart ad
	00100	4	Talk	Talk	Talk	Call-in and/or interview talk shows either local or national in origin
Nostalgia	01101	13	Nostalgia	Nostalgia	Nostalgia	Big-band music
Oldies	01011	11	Oldies	Oldies	Oldies	Popular music, usually rock, with 80% or greater non-current music
Other	00000	0	No program type or Undefined	None	None	
Pop Contemporary Hit Radio	01001	9	Top 40	Top_40	Top_40	Hits, often encompassing a variety of rock
Religious	10100	20	Religious Talk	Rel_Talk	Religious_Talk	Call-in shows, interview programs, etc. with a religious theme
Rhythmic AC	10001	17	Soft Rhythm and Blues	Soft_R&B	Soft_R_&_B	Rhythm and blues with a generally soft tempo
	10000	16	Rhythm and Blues	R_&_B	Rhythm_and_Blues	A wide range of musical styles, often called "urban"
Rhythmic Contemporary Hit Radio	11010	26	Hip-Hop	Hip hop	Hip hop	Popular music incorporating elements of rap, rhythm-and-blues, funk, and soul
	01001	9	Top 40	Top_40	Top_40	its, often encompassing a variety of rock

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Table 2 (continued). List of Arbitron formats with suggested PTY codes defined in NRSC-4-B

Arbitron Format	PTY Code	PTY Code	Program Type	8 Character	16 Character	Definition
	Binary	Decimal				
Rhythmic Oldies	10000	16	Rhythm and Blues	R_&_B	Rhythm_and_Blues	A wide range of musical styles, often called "urban"
Smooth AC	10001	17	Soft Rhythm and Blues	Soft_R&B	Soft_R_&_B	Rhythm and blues with a generally soft tempo
Soft AC	01100	12	Soft	Soft	Soft	A cross between adult hits and classical, primarily non-current soft-rock originals
Southern Gospel	10011	19	Religious Music	Rel_Musc	Religious_Music	Music programming with religious lyrics
Spanish Adult Hits	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish Contemporary	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish Contemporary Christian	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish Hot AC	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish News/Talk	11000	24	Spanish Talk	Habl_Esp	Hablar_Espanol	Call-in shows, interview programs, etc. in the Spanish language
Spanish Oldies	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish Religious	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish Sports	11000	24	Spanish Talk	Habl_Esp	Hablar_Espanol	Call-in shows, interview programs, etc. in the Spanish language
Spanish Tropical	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Spanish Variety	11000	24	Spanish Talk	Habl_Esp	Hablar_Espanol	Call-in shows, interview programs, etc. in the Spanish language

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Table 2 (continued). List of Arbitron formats with suggested PTY codes defined in NRSC-4-B

Arbitron Format	PTY Code		Program Type	8 Character	16 Character	Definition
	Binary	Decimal				
Talk/Personality	00100	4	Talk	Talk	Talk	Call-in and/or interview talk shows either local or national in origin
	10101	21	Personality	Persnlty	Personality	A radio show where the on-air personality is the main attraction
Tejano	11001	25	Spanish Music	Musc_Esp	Musica_Espanol	Music programming in the Spanish language
Urban AC	10001	17	Soft Rhythm and Blues	Soft_R&B	Soft_R_&_B	Rhythm and blues with a generally soft tempo
Urban Contemporary	11010	26	Hip-Hop	Hip hop	Hip hop	Popular music incorporating elements of rap, rhythm-and-blues, funk, and soul
Urban Oldies	10000	16	Rhythm and Blues	R_&_B	Rhythm_and_Blues	A wide range of musical styles, often called "urban"
Variety	00000	0	No program type or Undefined	None	None	
World Ethnic	10010	18	Foreign Language	Language	Foreign_Language	Any programming format in a language other than English
	10110	22	Public	Public	Public	Programming that is supported by listeners and/or corporate sponsors instead of advertising
	10111	23	College	College	College	Programming produced by a college or university radio station
	11101	29	Weather	Weather	Weather	Weather forecasts or bulletins that are non-emergency in nature

4.3 Program Type Name (PTYN) codes

While PTYN is part of the RDS standard, the NRSC believes it is not commonly used in receivers designed for the U.S. Given the finite bandwidth available for RDS applications, it is recommended to not encode PTYN and instead use the available bandwidth for features that benefit newly introduced features like RT+ tagging, and increased RT transmission rates which benefits all receivers.

4.4 Traffic programming (TP)/Traffic Announcement (TA) flags

While stations are encouraged to encode the Traffic Programming (TP) flag if they provide traffic reports, and to have receiver manufacturers display that information, should they select to, automatic receiver switching using the Traffic Announcement (TA) flag is discouraged. There have been complaints and confusion from listeners when the TA flag has been used to automatically switch a receiver.

Since the development of the TP/TA feature set in RDS, more efficient and advanced traffic reporting features have been made available to the general public. Instances of these include Global Position Systems (GPS) navigation devices with embedded FM or HD Radio receivers in them to decode traffic incident data and display it on the map and provide re-routing assistance. Also, out-of-band data provided on the Internet and viewed on smartphones provides another way in which to convey this information to the public.

4.5 Music/Speech (MS)

Stations are encouraged set this switch appropriately according to the programming.

4.6 Decoder Identification (DI)

These bits indicate audio modes that are appropriate for use with the broadcast and to indicate if PTY codes are switched dynamically. Typically in the U.S. a value of 0 is used if the audio on the station is monaural, and a value of 1 is used if the station's audio is in stereo.

4.7 Alternative Frequency (AF)

This is a frequent component of implementation in Europe but AF has not been a widely used feature in the U.S. to date. AF is intended primarily to enable receivers to find simulcast stations more quickly. The PI code still controls whether a receiver will automatically switch. RDS encoders are programmed to transmit a list of frequencies directing a compatible receiver where to receive the same programming. Its intended application in the U.S. would be to associate fill-in translators and boosters, or full service FM stations that fully simulcast another station in the area. Compatible receivers should verify that the station on the alternate frequency is transmitting the identical PI code as the current station and should not switch if the code is not the same.

It is important to stipulate that the purpose of the AF feature is not to control receivers in such a way that the equipment will switch between co-owned full-service FM stations, or to link stations airing similar programming. Stations should consider carefully the listener experience when employing AF and ensure that the associated signals are transmitting the identical programming and to limit the time offset of simultaneous programming to under 1-2 seconds.

Stations that implement AF to link full-service, booster, or translator stations, must not only set the AF Flag and a list of alternative frequencies into the primary station's encoder but should also program complimentary values into encoders feeding all associated stations. Stations that choose to implement AF to link stations that air common programming only during certain times should not publish on any of the stations' encoders any AF channel numbers that refer to stations whose programming is not currently

identical. If there are no stations whose programming is currently identical, then the AF feature should be deactivated until such time as another station is again transmitting identical programming.

The RDS Standard specifies an alternate use of the AF Feature described as “Method B” which is designed to link stations with non-identical programming, such as stations carrying the same national network programming. Information about this method is contained in the RDS Standard (IEC 62106) beginning in section 6.2.1.6.4.

If a station is not explicitly using the alternative frequency feature it is recommended that the AF flag not be set. Sending the flag and a list of unnecessary frequencies, (such as a list that only includes the transmitting station’s original frequency) robs bandwidth from other useful applications.

4.8 Clock Time (CT) flag

This flag is sometimes set if a station is sending a clock reference. If a station is not explicitly using this feature it is recommended that the flag not be set. Sending the flag and a time value, especially if the time is not explicitly synchronized robs data from other useful features.

5 USING RDS FOR PROGRAM ASSOCIATED DATA

5.1 Overview

Program Associated Data (PAD) is a term used to describe data (usually textual) that is associated with an audio program on the radio. PAD can vary depending on the type of material being aired on the radio station. The most common use of PAD currently via RDS is the current song title and artist data. However, there are many other types of PAD that can be encoded via RDS and displayed such as the song's album data, or in the case of non-music related programs, more information about the program. For example, a radio station running a live talk show may include the show's name, topic being discussed, the name of the guests and, perhaps the phone number to call in and participate in the show. The examples above are just some of the current and potential uses of PAD for RDS.

The importance of transmitting PAD data via RDS is increasing. Increasingly, more radios are being sold that include RDS. As these radios continue to be adopted by consumers; it is only natural to provide information to the listener about the current programming on the air. The ability to address the display keeps terrestrial radio relevant with other forms of technology, such as portable music MP3 players, satellite radios, and Internet streaming audio applications via a computer, portable device or phone. For those stations also employing IBOC transmissions, many of the concepts here also apply to Program Service Data (PSD) and can result in an overall improvement of PAD/PSD implementation across multiple platforms.

As outlined below, it is recommended that stations encode PAD in the RadioText (RT) field, and optionally in the Program Service (PS) field, as described in Sections 5.8 and 5.9 below.

5.2 Receiver display length considerations

For guidance on display length, and data on how long artist and title information is in a typical over-the-air broadcast RDS data stream, receiver manufacturers are encouraged to consult the companion document to this Guideline, NRSC-R300. NRSC-R300 is entitled Program Associated Data (PAD) Field Length Study. [6] This report provides valuable information on song title, artist and album usage to help guide decisions when designing receiver displays.

5.3 Confusion between PS and RT

PS and RT are different fields in the RDS Standard and they are treated differently by each receiver. While the general listening public does not necessarily need to know what they are looking at (PS or RT), radio stations encoding RDS should understand how both fields relate to the end-user experience.

It is important to know that there are newer radios that support RT equally, if not better than they do PS. These new receivers display the RT in a more prominent manner. While so much of the emphasis in the past within the U.S. has been on the dynamic PS and its scrolling/framing effects, broadcasters need to be equally as aware of the RT. Ignoring the RT is ignoring the end-user experience that listeners on the newer devices now have, and this is important to the future of RDS-enabled radio displays.

Given that many feature-rich hand-held units and advanced automotive radios are already on the market, the future should bring more receivers that display the RT in a prominent way, and the broadcast industry need to make sure as much value is being placed on the RT as on PS.

The NRSC has noted some stations that are doing dynamic PS scrolling/framing for PAD data, but are not transmitting PAD data in the RT field. Stations in this situation should consider transmitting PAD data in the RT field as well.

5.4 Album name data

All stations encoding RDS and supporting song title and artist are encouraged to transmit the album name (if applicable) using RT. Satellite radio, digital cable radio and Internet streaming stations often include the album name of the song they are currently playing. Many of the radio industry's web-sites and streaming initiatives show album name data. With RDS, broadcasters have the ability to provide the same information about the songs playing and achieve parity with other competing mediums.

It should be noted, due to space limitations, that the inclusion of album name information in the shorter, scrolling/framing/dynamic implementations of PS is not recommended.

5.5 Data formatting, truncation, and capitalization

Similarly, broadcasters are encouraged to review the quality of the data they are transmitting via RDS. Look for music libraries that have truncated, incomplete or inaccurate title/artist/album data. Stations may need to "groom" the music libraries to make sure the data is accurate.

When RDS was first implemented, it was the general consensus to capitalize everything sent because some radios did not support lower case characters. The majority of receivers in use today do not have this problem, so the use of proper capitalization is encouraged. If capitalization must be used, the recommendation is to use it sparingly (and appropriately).

5.6 Extra text ("Now playing...by...on")

Some stations add the phrases "Now playing", then insert the title of the song, then "by" followed by the artist name, and then "on" and the station name. This practice is discouraged as discussed in NRSC-R300 (reference [6], pages 18-19). This extra text will lengthen the time it takes for a driver to observe the real information being conveyed on the display (*i.e.*, Title, Artist, Album). "Now playing" adds 12 characters to the required text length, and removes the key information (*i.e.* the Title) from the prime location (the beginning of the text string on the display).

5.7 Data and song timing

For stations that are running an audio delay, whether it be for IBOC and/or for profanity, it is strongly recommended that adjustments be made in the RDS display delay so that the audio and PAD are properly aligned at the receiver. Some hardware and software products on the market have this ability, and it is best to research this and spend some time "fine tuning" it. If this is ignored, it is possible that a song's PAD could show up before the song is on the air. When transitioning into another song, the new song's data can be displayed for a period of time while the old song is still playing, which is also an issue. For stations running in real-time (no delay) this alignment process does not apply, as the data is likely being sent to the RDS encoder at the same time the song is changed.

5.8 Using RadioText (RT) for PAD

RadioText (RT) is a 64 character field which can be transmitted via an RDS encoder to receivers. As mentioned above, the PAD content of the RT field can vary depending on the program that is currently airing on the radio station.

5.8.1 RT formatting

In the case of music, it is suggested to have the radio station's name, along with the song's title, artist and album information (if applicable) sent via RT. A separator between each of the fields is recommended, to give better readability to the listener. In the example below, a single hyphen character is used, - (ASCII

Decimal 45, Hex 2D), although other delimiters could be used, such as a foreword slash, / (ASCII Decimal 47, Hex 2F).

Uses may vary, but here are some suggested combinations:

Station Name – Song Title – Song Artist – Song Album

or

Song Title – Song Artist – Song Album – Station Name

or

Station Name Song Title/Song Artist/Song Album

or

Song Title/Song Artist/Song Album Station Name

In some cases the song's album information is not available. This can be omitted, it is optional. However, if the means to provide this information are available, it is recommended that it should be listed.

National Public Radio (NPR) has conducted studies that indicate for informational/topical/spoken word formats, the suggested text might be:

Station Name – Program Name – Topic

Using a "live" example:

WZZZ – All Things Considered – Deficit Reduction

5.8.2 **RadioText (RT) send rate**

As discussed earlier, many newer receivers are displaying the RT in a more prominent manner. Almost every RDS encoder has an adjustment of how frequently the RT is sent compared to other data fields. The default settings of existing units are not necessarily set the best for a good end-user experience and require attention.

When an RDS receiver first tunes to a station with RDS and RT, it locates the RDS data signal and starts decoding. Many receivers are designed to wait until the RT has been sent twice to make sure it was received without any errors. If RT is not being sent frequently, this can take some time. RDS encoders default settings typically have a very slow RT send rate setting. Many encoders dedicate 75% of the bandwidth to the PS and 25% to the RadioText. These default settings could take up to 15 seconds for the receiver to decode the RT under optimal conditions. If there are any impairments such as multipath or a weak signal during those 15 seconds the process of displaying the RT can take longer. This, in turn, creates a bad end user experience. Couple this with the addition of the new RadioText+ (RT+) tagging standards (to be discussed later in Section 5.10) the RT transmission rate is an important component to check and consider adjusting.

It is recommended that the RT transmission rate be increased from the default values. The more frequently the RT is sent, the faster a receiver can decode and display it to listeners. This is even more important when it comes to the new portable RDS receivers on the market, because they prominently display the RT. These receivers are also more likely to be operating at lower signal levels due to antenna design (*i.e.*, just a headphone cable instead of a better antenna found in mobile receivers). These

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portable receivers are also more likely to be used in areas where there is multipath or other signal impairments (*i.e.*, inside buildings).

Before adjusting the RT send rate on the RDS encoder, the consequences of this should be considered. By increasing the send rate, a trade-off is being made on other RDS functions. The RDS signal operates at a low bit rate, with a useful capacity of approximately 670 bits per second. When the RT rate is increased, other data types may suffer as fewer bits will be available for these functions. For instance, the PS will be sent less frequently, and, accordingly, adjustments should be made to that field to maintain a good user experience. For stations that use other RDS “specialized” features, contained in the Open Data Application (ODA) groups, such as Traffic Message Channel (TMC), make sure the settings being changed do not impact these services. Stations in this situation may need to reduce their RT sending rates down as a compromise between a better RT experiences for the listener and making sure the station is meeting its ODA obligations.

A recommended RT sending rate has been developed based on field testing with various RDS receivers on the market. The benchmark for developing these recommended settings was to get the RT to display in optimal reception conditions 3-4 seconds after tuning to the station, or after the RT has been changed (*i.e.*, a new song or program element has come on). See the encoder-specific recommendations in Table 3.

A display of the RT in 3-4 seconds is the optimal experience. Under bad signal conditions, this will take longer. Even with the recommended settings, under poor reception conditions, it can take 10 or more seconds for the RT to display. If the RDS encoder has factory default RT send rates a receiver may take 30 (or more) seconds and/or perhaps never resolve the RT in these environments. The NRSC encourages RDS encoder manufacturers to consider using these recommendations below as the default settings for new units.

If making adjustments to your encoder, be sure to read Section 5.9.1 about Program Service (PS) scrolling delay adjustments that should also be considered when making this change.

Table 3. Recommended RadioText (RT) send rates for stations with no significant ODA use (RT+ Only)

Note: these settings may interfere with any special ODA groups being transmitting such as leased traffic or other data. When transmitting this type of ODA data, it is best to consult with the station's corporate engineering staff or the company that is leasing the data to ensure there is no interference with these services.

Encoder Type(s)	Recommended Setting	RDS group type / feature			
		0A PS (%)	2A RT (%)	3A (%)	RT+ ODA (%)
Inovonics 711 Audemat FMB1, FMB10i [†]	RT_RATE=1	45	50	1	4
Inovonics 712, 713 [†]	DRTS=9	63	32	1	4
Inovonics 720, 730 [*]	DRTS=9	24	71	1	4
Audemat (Worldcast) FMB-50, FMB-80 ^{††} Burk RDS Master [†] BW Broadcast RDS3 ^{††} Kvarta RDS1000 ^{††}	GS=0A,2A,2A,2A	24	71	1	4
Pira32 ^{††}	GRPSEQ=0222	24	71	1	4

[†] Many legacy encoders do not support integrated RT+ from the manufacturer, but 3rd party hardware or software solutions may exist to enable these features.

^{*} Requires firmware upgrade of 2.6 or higher to achieve desired group sequence.

^{††} May require firmware or software upgrade to enable integrated RT+ features.

Table 4. Recommended group sequence percentages for stations with TMC Traffic ODA use

Note: These group sequencing benchmarks are suggested for stations running Traffic Messaging Channel (TMC). Generally, TMC requires 25% of RDS bandwidth to be allocated to its specific ODA. Your provider will likely have a customized group sequence setting specific to their service and encoders. The NRSC encourages TMC providers to provide optimized group sequencing for RT 2A transmission.

RDS group type / feature				
0A PS (%)	2A RT (%)	8A TMC (%)	3A (%)	RT+ ODA (%)
24	45	25	2	4

5.8.3 RT length padding

To combat display problems on legacy receivers, some RDS encoders give the option to always send 64 characters in the RT. If enabled, when the encoder sends something under 64 characters, it adds spaces to the RT so as to always transmit 64 characters. It is believed that few, if any, receivers still need this option. For encoders with this ability, it is recommended that it be turned off.

The longer the RT is, the longer it takes to transmit. By always transmitting 64 characters, there will always be the maximum delay. Most receivers do not display the RT data until it has been fully received without errors twice. The process of displaying RT data to the receiver is being slowed down unnecessarily in many cases. Look for settings related to short RT versus long RT. Unfortunately, with some legacy encoders, this option cannot be turned off.

5.9 Using scrolling Program Service (PS) for PAD

The NRSC-4-B Standard does not support using the Program Service (PS) field for PAD, as it is a single, static 8 character field. However, use of a “dynamic,” “framing,” or “scrolling” PS is a common practice within the U.S. Provided here is some best practice information for those stations that elect to provide PAD data via dynamic PS.

The PS is an 8 character field that was designed to describe the radio station and remain static (*i.e.*, never change or change only intermittently). Many of the early RDS receivers displayed only this field prominently on the display. Over time, the use of the PS has evolved into a dynamic (*i.e.*, changing) “scrolling” or “framed” display. Many stations in the U.S. frequently change what is in this PS field to interleave (or scroll) not only the station name but song artist, title, advertisements, promotional and other messages.

Because there is a limitation of 8 characters in this field, many of the messages stations want to display do not fit. RDS hardware and software vendors have developed solutions to take a long string of characters and put it into the PS field 8 characters at a time, with a delay in between, creating a “scrolling” or “framing” effect. The interval between these frames is the PS scroll delay. This delay is an adjustable setting in most RDS hardware and/or software products. It should be clear, in this specific section, that this delay is the time a particular 8 character PS field remains unchanged, and not the number of individual 0A PS packets that are sent out during this time. This could also be described as the PS field change rate.

Stations with low PS field change rates may have found the radio receiver dropping the 8 character PS frames periodically. It has been found that many stations have this scrolling delay set too low (*i.e.*, not enough delay) and when the receiver has impairments (such as multipath) the PS frames drop. With RDS encoder defaults, stations running a delay on their PS at under 2.0 (two) seconds were already prone to this.

When the recommendations above in Table 3 for an aggressive RT send rate are followed, then the receivers that prominently display the PS may start dropping frames, even under optimal conditions. Again, this is due to the data rate limitations of the RDS signal. Given this, a minimum delay of 4.0 seconds between PS frames is recommended. For more multipath-prone stations, or for stations that have chosen to have their RDS subcarrier injection rate below 6% (4.5 kHz), this could be set closer to 5.0 seconds to improve PS performance.

5.9.1 PS formatting

In the case of music, it is suggested to have the radio station's name, along with the song's title, and artist information. Because of the limited amount of characters in the PS field, sending the song's album information via the PS field is not recommended.

Uses may vary, but here are some suggested combinations:

Station Name Song Title Song Artist

Using a "live" example:

WZZZ Fireflies Owl City

This would be broken up into several PS frames, which will be changed after the PS delay:

WZZZ
Fireflie
ireflies
Owl
City

Note, in the example above, the song title "Fireflies" has a length of 9 characters. The PS only supports 8 characters, so a framing technique has been employed.

National Public Radio (NPR) has conducted studies that indicate for informational/topical/spoken word formats, a suggested text might be:

Station Name Program Name Topic

Using a "live" example:

WZZZ All Things Considered Deficit Reduction

This would be broken up into several PS frames, which will be changed after the PS delay:

WZZZ
All
Things
Consider
nsidered
Deficit
Reduction
eduction

Note, in the example above the word "Considered" has a length of 10 characters, and "Reduction" has a length of 9 characters. The PS only supports 8 characters, so a framing technique has been employed.

5.10 Using RadioText+ (RT+) for PAD

In Section 5.3 above, the importance of implementing PAD data within the RT field was stressed. Broadcasters are also encouraged to adopt the RadioText+ (RT+) tagging standard for PAD data in the RT field. [4]

RT+ is an additional ODA data stream defined in IEC 62106 Annex P that can be added to an RDS encoding which identifies the text being encoded in the RT field. Until the RT+ Standard was developed, there was no way to know what specific parts of the RT data were from a hardware or software standpoint, and this is important for song tagging. RT+ offers the ability to classify different types of information (such as title) and their location within the RT field.

Because the RT field is so flexible, the receiver cannot make any assumptions as to what information is contained within, but RT+ bridges the gap and essentially allows for definition of what each part of the RT actually is. It also gives radio stations an “MP3 player feel” by consistently showing title, artist, and album on separate, defined areas of the display, which makes for better readability for the listener.

RT+ is not new. In 2005, IRT, Nokia and WDR joined forces in Europe and developed the RT+ Standard. Unlike other tagging standards, it is an open standard, free of charge for use and implementation. This standard has been improved since 2005, it is now adopted by the RDS Forum, and, in the past few years several RT+ receivers have come to market in the U.S., including the Apple iPod Nano 5th, 6th, and 7th generation units which support this standard. In addition, Kenwood has supported RT+ in many models including 18 models for the 2012 model year. Microsoft also included RT+ support in its Zune line of products (which was discontinued).

The iPod offers the ability to “tag” the song for later download by pressing and holding the center button. The next time the listener connects the Nano to a computer and launches iTunes, the tagged songs may be viewed and purchased. The Zune HD has an icon at the bottom, right hand side of the screen with a shopping cart; click on that and it is added to the listener’s cart. Because the Zune HD has built-in WiFi (IEEE 802.11) support, the song can be purchased and downloaded to the Zune HD immediately (if a WiFi connection is available).

It is recommended that all broadcasters deploy RT+ tagging for Item.Title, Item.Artist, Item.Album, as well as StationName.Short and StationName.Long. These are the most commonly used RT+ fields in receivers today.

While most of today’s available receivers in the U.S. support just artist/title/album tagging, there are some other promising things that can be tagged. There are over 60 content types available for use. Looking at the list available, RT+ gives broadcasters the ability to tag phone numbers, websites, SMS text messaging campaigns, addresses and times and dates. As more smart receivers with RDS/RT+ support come to market, it is not hard to conceive a time when receivers will be able to act on other RT+ fields.

5.11 RT+ implementation for broadcasters

To add RT+ to an existing RDS stream, two Open Data Application (ODA) packets need to be broadcast in the RDS stream from the RDS encoder. The first type of packet is the 3A packet which identifies to an RT+ capable receiver that the station is encoding the RT+ standard. These packets shall be broadcast at least once every 10 seconds by the station as per IEC 62106 Annex P.6. By encoding with Application ID (AID) 4BD7, receivers that support RT+ know this station supports the RT+ standard. The contents of this 3A packet have what ODA group the actual RT+ tagging packets are located in.

The second ODA packet is where the RT+ tagging data is located. ODA is part of the regular RDS Standard and is a way to add additional functionality. These packets shall be broadcast at least once

every 2 seconds as per IEC 62106 Annex P.6. Multiple ODA's can be running on a single RDS stream, but they must each be in a different "logical" numbered location. In the U.S., the NRSC-4-B Standard specifies valid ODA group locations of 5A, 6A, 7A, 8A, 9A, 11A, 12A, 13A.

It is important to note, if a station is broadcasting any traffic or other leased data applications using RDS, the ODA group(s) these services are using should be confirmed with the station's corporate engineering staff, or the vendor who is leasing the data. RT+ must be put on a different ODA, or there will be a conflict.

In the RT+ ODA packet, there are three important fields:

- **Item Toggle bit** is an important concept to understand in the RT+ Standard. In brief, every time a new "Item" changes, this bit should be toggled. It is a single bit, meaning there are only two values for it, 0 and 1. Essentially, this bit should only change when a programming element is changing. The best way to relate to this is a song. When a song comes on, this bit should be set to 0 for the entire duration of the song. When the song is over, and the next song is aired, the bit should be set to 1. By changing the toggle bit, the receiver purges anything in memory related to ITEM. This clears content types 1-11 which includes title, artist, album, and other song data from the receiver. The next song played will have newer content types and start/length markers that it would then apply.
- **Item Running bit** essentially states that the current Item being displayed in the RT+ and RadioText is actually running, or "on the air." In most cases, this is always set to 1.
- **Content Types and Markers** – each RT+ ODA tag allows for two "tags." Each tag consists of a Content Type, Start Marker and Length Marker. The Content type is a number from 0-63 that identifies what type of tag the text is. The Start and Length markers define where in the RadioText (RT) that field begins and where it ends. These are both 0 based numbers, so the counting has to start from zero. Alternatively, these can just be counted and then from the result, subtract one.

5.11.1 Tag 2 length logic inversion

Note that in the RT+ Standard the Length on Tag 2 is 5 bits instead of 6 (like Tag 1) which limits Tag 2 to 32 characters. It is recommended that when developing RT+ solutions to keep this in mind and dynamically flip the tags if the second one exceeds 32 characters but the first is under 32. Given that the RadioText is only 64 characters in length, if Tag 2 had 33 or more characters, then the length of Tag 1 must be 32 or smaller and could easily fit in the second tag. The RT+ standard in Annex P of NRSC-4-B calls for this action in Section P.5.2, however this point can be easily overlooked.

5.11.2 RT+ interleaving – having multiple RT+ tags per single RT

By understanding the Item.Toggle bit, it can be seen that a receiver will cumulatively store to memory any supported RT+ field. This can occur on multiple RT+ tags on a single RT line, and even across multiple RadioText transmissions, so long as the Item Toggle bit is held constant.

The interleaving feature of the RT+ Standard allows for tagging of more than just two fields at once.

In fact, having only 2 RT+ tags per a single RT is very limiting, especially when encoding information in all of the 60+ RT+ tags is considered.

For example:

WZZZ – Fireflies – OWL CITY – CD: Ocean Eyes

In the case above, 4 RT+ tags could be used: StationName.Short, Item.Title, Item.Arist, Item.Album:

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WZZZ
Fireflies
OWL CITY
Ocean Eyes

All RDS encoder manufacturers and software solution providers are encouraged to support RT+ Interleaving in their products. This will encourage broadcasters to encode more than just standard Item.Title, Item.Artist, and Item.Album – and use the other 60+ RT+ content types. As broadcasters tag additional RT+ fields, this will also encourage receiver manufacturers to support the additional content types as well.

6 USING RDS FOR TRAFFIC INFORMATION

6.1 Overview

Broadcasters in the U.S. (and much of the world) use TMC for providing traffic information. In the U.S., TMC services are offered on a commercial basis by two service providers - Broadcaster Traffic Consortium (BTC) and Total Traffic Network (TTN). Most of the top 100 U.S. markets are covered by both services. For additional information go to www.radiobtc.com and www.totaltraffic.com.

6.2 Traffic using RDS-TMC

NAVTEQ's TMC uses Service Identifier (SID) = 7 for its TMC services which are transmitted in accordance with the latest version of the RDS-TMC Standard (14819 parts 1,2,3,& 6). The data is encrypted according to the conditional access specification. Single and multi-group messaging are supported, and the service includes Incident data (e.g., accidents, road closures, road construction etc.), real-time flow data derived by road sensors and GPS probe sources, and basic road-related weather conditions.

The maximum rate of data transmission is used, with type 8A groups being sent out every fourth RDS group using 25% of the available bandwidth, and tuning variants are used to reference other transmitters in the same and adjacent market areas. The data is sent to the RDS encoders using the Universal Encoder Communications Protocol (UECP).

6.2.1 Location Table Country Code (LTCC) definitions – old and new

In RDS-TMC, each Location table is identified by a Location Table Number (LTN) together with a Location Table Country Code (LTCC).

In Europe, when RDS-TMC started, it was erroneously believed that it was not necessary to transmit the LTCC as in all cases would be the same value as the first element of the PI code, which in Europe indicates the country of origin of the program audio (Program Identification Country Code, PICC). This error was not appreciated for some time, but when it was the RDS-TMC standard was corrected and since 2009, LTCC should be explicitly transmitted, independently of PICC. All new RDS-TMC receivers must use LTCC and not derive the LTCC from PICC, unless LTCC is not broadcast by the RDS-TMC Service Provider.

7 USING RDS FOR EMERGENCY ALERTING

7.1 Overview

Emergency management agencies are aggregators of Federal, State and Local emergency information with multiple contact paths for mass notification. One of the emergency information paths is via the RDS data subcarrier of existing FM radio stations. The Broadcast EAS public service is extended to include digital alerts for the benefit of the emergency managers and the citizenry in the local FM broadcast service area.

This personal alert and messaging system allows emergency management officials to create and send digital alerts and messages to recipients such as first responders, school officials, businesses, and citizens based on geographic or organizational groupings. Such alerts and messages might include NOAA weather warnings, evacuation instructions, homeland security notices, Amber Alerts, or school closings.

7.2 Alert FM system

Providers of emergency alert information use the RDS protocol via FM radio subcarriers to send out basic alarm information but also advanced information to targeted devices with additional information such as network identification, geographical addressing, control/management commands, encryption of data, and other added service information. An important attribute of using the RDS protocol also includes the ability to use battery saving features for handheld devices.

To be able to include additional RDS enabled devices, the providers of RDS emergency alert information retransmit a subset of the addressable emergency information in accordance with the RadioText+ (RT+) standard groupings. One example of this is the Alert FM system, which sends out emergency information based on RDS RT messages and is completely backward RDS compatible to the RT. All additional information necessary for implementing the RT+ service is carried in the RDS group 3A and in an RDS ODA group (see Table 5).

Table 5. Alert FM RT+ information elements

Alert FM RT+ Information Elements		
Alert FM RT Messages	Alert FM RT+ Identification	Alert FM RT+ Tags
RDS group 2A	RDS group 3A	RDS RT+ ODA group

7.2.1 Alert FM RT+ messages

Alert FM RT+ messages are being transmitted using RDS group 2A (RadioText). This means that any RT compatible device will be able to receive Alert FM messages. In addition, the RT+ information gives the receiver the possibility to identify that the information received is indeed ALARM information intended for a specific group (addressing) and can act accordingly.

7.2.2 Coding of RT+ in RDS groups

To transmit the RT+ tags the Open Data Application feature of RDS is used.

7.2.2.1 RT+ Identification (RDS group 3A)

The coding of the message bits of group 3A (Application Identification for the ODA RT+) is explained below.

Application group type code: the group type for transmitting the RT+ application data is RDS group 12A. The group type code is signaled in block 2 of the 3A group.

The meaning of the rest of the message bits of group 3A is according to [4], Section P.5.1.

7.2.2.2 RT+ Tags (RDS ODA Group)

In the message, bits of the RT+ application group (RDS ODA group) two RT+ tags are conveyed. The two RT+ tags used are INFO.ALARM and INFO.OTHER.

INFO.ALARM: Holds the actual alarm message.

INFO.OTHER: Holds numeric addressing information for the alarm message.

If the alarm message is not addressed to any specific group/area the INFO.OTHER tag should be left out and be replaced with RT+ tag DUMMY_CLASS which indicates that only INFO.ALARM is being used for the current alarm message.

See [4], Section P.5.2 for details of coding the message bits of the application group.

Example:

```
This is an Alert FM message. 90326
0----0----1----1----2----2----3----3----4----4----5----5----6----
0----5----0----5----0----5----0----5----0----5----0----5----0----
```

RT Content Type	INFO.ALARM
Start marker	0
Length marker	28

RT Content Type	INFO.OTHER
Start marker	30
Length marker	5

The first tag information will tell the receiver where to find the alarm message. The second tag information will tell the receiver that this alarm message is only intended for address 90326 (e.g. zip code).

7.3 The ViaRadio ENVOY system

The viaRadio ENVOY system is used across the U.S. and around the world, linking State, Local and College Emergency Operations Centers (EOC’s) with broadcaster’s RDS so that the EOC’s can send targeted text alerts to specialized FM receivers and to car radios using RadioText/RT+ where appropriate.

The ENVOY protocol is an encrypted ODA application that is transparent to the broadcaster. viaRadio decided to build its own protocol rather than using the existing EAS ODA as described in Annex Q of the standard. The ENVOY EWS protocol supports over 16 million customer/group addresses, 8 message priority levels and has the ability to command specialized dual tuner receivers to retune to the originating radio station or NOAA weather audio while also scrolling long text messages or triggering external devices like strobes or sirens. Individual device reprogramming over the air is also possible.

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ENVOY consumes very little RDS bandwidth (about 2% of available data) since data is only sent during an emergency and the ODA beacon is sent every 5 seconds. Warning message data is sent via Universal Encoder Protocol (UECP) and some stations allow viaRadio to also temporarily overwrite their RadioText/RT+ and scrolling PS so the warning message can be visible to any RDS radio.

ENVOY interfaces with other systems using Common Alerting Protocol 1.1 (CAP) so that externally generated alerts from NOAA etc. can be automatically forwarded over the RDS.

8 RDS AND CHARACTER/FONT SETS

8.1 Overview

The RBDS and RDS Standards share a common font or character set, which is defined in a table in the RDS Standard. That is, radios compliant to either standard display the same character image (or glyph) for a given character code value.

However, this RDS character set is not the same as any character set used in the computer world, such as ASCII, ISO-8859-1 (Latin 1), Unicode, Arial font, etc. RDS was being designed approximately during the birth of the PC age, and at that time there was no clear need to use exactly identical font sets.

The RDS character set has many characters in common with ISO-8859-1, especially in the first 128 positions (lower 7 bit characters). The differences can be a problem, unfortunately.

Automation data is entered and stored in computer formats, so typically this is done in the character font set used in that country. Obviously, these data must be translated to RDS character set data for transmission, and the RDS receiver must be designed using the RDS character set as well.

8.2 Dollar sign display problems

The most common character translation problem is that some radios display the wrong character for the dollar sign (“\$”).

Table 6 shows the character maps for various standards. Two values are involved in the dollar sign: 0x24, which is where computer character sets locate the “\$”, and 0xAB, where RDS has this character located.

Table 6. Character set translations for common dollar sign characters

Character Set	0x24	0xAB
RBDS/RDS (IEC 62106 Table E.1)	¤	\$
ASCII / ISO 646 1994 / ECMA 6 7-bit Char Set	\$	n/a
ISO-8859-1 Latin 1	\$	«
Arial font set (or various other font sets)	\$	«

The two most common faulty behaviors are due to the following:

- 1) Receivers sometimes are displaying the ISO-8859-1 or Arial font equivalent graphic for 0xAB (which is ‘«’) rather than the RDS Standard graphic at 0xAB (the U.S. dollar sign, “\$”). However, other character sets have also been observed on radios;
- 2) Broadcasters sometimes are using the ISO-8859-1 value of 0x24 for transmission of ‘\$’, leading to RDS-compliant radios displaying the international currency symbol, “¤”. Broadcasters should be transmitting 0xAB for the U.S. dollar sign ‘\$’ in the RDS character map.

Note that the dollar sign is not the only character that is not the same in RDS vs. computer fonts; see the later sections for more examples.

U.S. broadcasters are using PS and RT text transmission for advertising, which sometimes include information about price. Prices in the U.S. are, of course, most commonly presented in U.S. dollars. The singer Ke\$ha spells her name with a dollar sign, and her popularity has also helped highlight this issue.

8.2.1 Recommended actions for equipment vendors

The majority of receivers tested show correct RDS behavior. Best results for broadcasters in the current installed base can be obtained by using the RDS character tables in transmission. This is best achieved by:

- RDS equipment manufactures providing the feature (via original design, or if necessary by firmware upgrades) to have an option in their encoders to translate 0x24 to 0xAB. It is recommended that this setting be enabled by default on RDS encoders destined for use in the U.S.
- RDS software vendors providing the feature (via original design, or if necessary by software upgrades) to have an option in their encoders to translate 0x24 to 0xAB. It is recommended that this setting be enabled by default on all software destined for the United States.

Broadcasters encoding with RDS should be advised to upgrade their encoder firmware (option 1). If their encoder is no longer supported with firmware upgrades, broadcasters should seek software upgrades (option 2).

8.2.2 Recommended actions for broadcasters

First, determine whether the automation system or the RDS encoder is responsible for changing ISO-8859-1 characters to RDS characters. Check with the equipment or software makers to determine this.

It is also a good idea to verify what the transmission system is actually sending. Note that the fifth, sixth, and seventh generations of the iPod Nano from Apple exhibit the correct behavior.

Some test cases will also need to be constructed to verify both PS behavior and RT behavior. The strings in Table 7 may be inserted at the automation text interface to send text over PS and RT.

Table 7. Test strings for testing dollar sign behavior
Text is inserted at the automation system user interface.

Desired string (as displayed in Arial font)	As encoded on computers	Intended transport	Correct result on RDS receiver
"\$«"	0x24, 0xAB	PS	The automation system or encoder should change the computer's 0x24 "\$" character to 0xAB for RDS, and the receiver should display it correctly as a dollar sign; the automation system or encoder may keep the second character as 0xAB, or substitute another character (the "«" character is not defined in RDS/RBDS)
"\$«"	0x24, 0xAB	RT	

For equipment that is not correctly following the specification, the equipment provider should be contacted. It may be necessary to work with both the automation system and the RDS encoder manufacturers to determine where the fault lies and whether a fix is possible, but this will of course depend on the specific equipment and software being used.

8.2.3 Recommended actions for receiver manufacturers

Receiver makers are also encouraged to follow the RDS standard (IEC 62106 Table E.1) for decoding RBDS/RDS and getting the correct results onto receivers in the marketplace.

8.3 Other character map differences

Table 8 shows some important seven-bit characters which will show up incorrectly if encoded or decoded with a computer font set instead of the RDS standard.

Table 8. Important seven-bit characters that may show up incorrectly on receivers

Hex	Dec	Arial	Courier New	ISO-646	RBDS / RDS [†]
24	136	\$	ℂ	\$	ⱪ
5E	129	^	^	^	—
60	130	`	`	`	
7E	131	~	~	~	-

†Closest Times New Roman equivalent

Table 9 shows some of the eight-bit characters which might be used, and their RDS equivalents.

Table 9. Important eight-bit characters and their RDS equivalents

Hex	Dec	Arial	Courier New	RBDS / RDS [†]
80	128	€	€	á
85	133	ì
8B	139	<	<	Ç
91	145	‘	`	ä
92	146	’	’	ê
93	147	“	“	ë
94	148	”	”	î
95	149	•	•	ï
96	150	—	—	ô
97	151	—	—	ö
98	152	~	~	û
99	153	™	™	ü
9B	155	>	>	ç

†Closest Times New Roman equivalent

This is not intended to be an exhaustive list; these tables are intended to show that there are reasonably likely characters which cannot be transliterated directly from computer fonts to RDS radio fonts.

8.4 RDS character set and HD Radio character set

It should be noted that while the character sets above are for radios doing RBDS/RDS decoding, a separate character set (ISO-8859-1 Latin 1) is needed for radios processing iBiquity Digital HD Radio™ PSD/PAD messages (see [7]). RBDS/RDS uses the character set defined in IEC 62106 Table E.1. These character sets should not be confused between the two mediums.

ANNEX 1 – Broadcaster Information on RDS Usage – RDS Use Cases

Information in this subsection was either obtained from the Internet or provided by individual broadcasters. The NRSC is looking to expand this subsection and encourages broadcasters interested in sharing information about how they are using RDS to contact the NRSC by email at nrsc@nab.org.

Broadcasters Traffic Consortium

The Broadcaster Traffic Consortium LLC (BTC), is a coalition of sixteen radio organizations across the U.S. and Canada. Working together, these organizations have formed a coast-to-coast terrestrial broadcasting network to distribute local traffic, weather and other map-related data, via radio technology. Seven of the top ten U.S. radio organizations are BTC members.

BTC provides a single point of contact focused on building a North American HD Data and RDS-TMC network that offers a standardized, data distribution channel. From member obligations to implementation and operations, BTC can add or subtract the best broadcasters and their station signals as needed to meet the needs of our customers.

BTC has partnered with NAVTEQ, the leading provider of in-vehicle navigation and real-time digital map data, to serve end users with up-to-the-minute traffic, weather, fuel prices and more. BTC strives to drive HD Radio data content development, spurring the investment of broadcasters in HD Radio technology and increasing the value of HD Radio for the radio industry by complimenting HD Radio with utilitarian HD Radio data services.

BTC continues to research and test additional uses for HD Radio data services with partners other than NAVTEQ. For additional information visit the BTC web site at www.radiobtc.com.

Clear Channel Media and Entertainment

Clear Channel Media and Entertainment is using RDS for a large variety of functions.

In 2002, Clear Channel began to dynamically update the Program Service (PS) field to allow for display of Title and Artist to receivers which did not support the display of RadioText. This was in response to research showing that satellite radio subscribers (whose satellite radio receivers always display this information) found this function to be highly desirable. Subsequently, Clear Channel purchased hundreds of RDS encoders and worked to custom-develop firmware that would allow for enhanced service. Clear Channel also connected all of these devices to a centralized portal so that the consumer experience would be identical across all Clear Channel stations.

In 2004, Clear Channel launched RDS-TMC (Real Time Traffic) in cooperation with Siemens. Garmin, BMW and others soon followed. When Clear Channel looked to bring RDS-TMC to the U.S., it had never been done before in North America. Unfortunately there was a conflict between the RBDS Standard at that time and the RDS-TMC standard that was primarily European.³ The RDS-TMC standard required that when a device was tuning to find an RDS-TMC station, it would first look to find a station with a PI code whose country code matched the country code of the map data being used.

In the case of the U.S., TeleAtlas and Navteq had agreed that the U.S. would have a country code of “1,” and therefore any RDS-TMC receiver which was to follow the standard would ONLY look for stations which start with a PI code of “1.” Under the RDS Standard, the PI code is calculated from the call letters of the station, so no station east of the Mississippi could possibly have a 1xxx PI code.

³ Note that with the adoption of NRSC-4-B in 2011, this conflict was resolved. See Section D.7.4 of the Standard [1].

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Clear Channel clearly could not operate under both standards, so after verifying with the NRSC that the RBDS Standard was voluntary and after some investigation of a variety of stations that did not have their PI code set to the calculated value (many were set to the factory default of FFFF), Clear Channel chose to follow the RDS-TMC standard and carefully break our compliance with the RBDS Standard in this one regard.

About 2 years after Clear Channel's launch of RDS-TMC service, a few radios began to implement backward calculation of call letters from PI code. This created a problem since stations transmitting the RDS-TMC data with the "1" in the PI code (as just described) would likely not have their call letters calculated correctly. Primarily, these initial devices were test equipment like the Audemat Golden Eagle and not mainstream devices that were consumer focused. Then Microsoft launched ZUNE which also used back calculation to display call letters.

Clear Channel had worked with Apple on implementing song tagging over the HD Radio system, but the lack of receivers made this feature less than mainstream. Later, Clear Channel worked with Jump2Go, Zune and Apple to develop song tagging over RDS using a combination of RadioText+ and another ODA for sending specific song IDs over the air in an encrypted format. While this song tagging ODA was being developed, Clear Channel inserted the ability to transmit the correctly calculated PI code data over the air. While a "1" is still transmitted over the air as the first digit of the PI code, the extended country code and the calculated first two nibbles of the PI code are also transmitted in the ODA packet. This allows new devices to correctly decode and display the call sign for Clear Channel stations using the modified PI code calculation method. Clear Channel also employs RT+ tagging of StationName.Short, and in this document, the NRSC encourages receivers to use this field to display the station name instead of back calculating PI codes.

Currently, Clear Channel operates about 450 stations with RDS. Of those stations, the vast majority are broadcasting RadioText+, Apple song tagging, MediaBase tagging (Zune and others), RDS-TMC, dynamic PS and RadioText with up-to-date Title and Artist data. Clear Channel also has a few experimental applications running.

In 2001, RDS in the U.S. was not gaining in popularity. Car companies were starting to take the feature out of their vehicles as it was a function that was not consistently used across broadcast stations. Now, RDS is the strongest it has ever been in the U.S. Clear Channel, through its development and implementation of services over RDS, believes it has helped to keep radio relevant for U.S. consumers and consumer electronics companies.

Cox Media Group

- Some of the Cox Media Group markets began broadcasting an RDS signal as early as 1993, mostly just displaying the call letters.
- In June 2006 Cox began to support broadcast of Title and Artist information using RDS, and within the year had at least one station in each market operating
- In 2006 Cox began to work with and roll out the BTC project in many markets. The last-contracted Cox stations went on the air with BTC in August 2009.
- In December 2008 – 1st quarter 2009, Cox rolled out the "Jumpgate" devices for song tagging. All Cox stations with active RDS are song tagging.
- Cox is sending Title and Artist and Station Name, scrolling this information using the PS field at a 2 second interval.
- Cox is also sending information for Featured Advertisers, scrolling on the PS during the spots.

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- Cox is running the Station positioning statement, station web address, and featured advertiser additional information using the RT field.

Hawaii Public Radio

(Submitted by Mr. Don Mussell, Consulting Engineer) Hawaii Public Radio (HPR) installed RDBS in the 2006 timeframe. It has really helped listeners identify HPR stations, and tourists know quickly where public radio can be found because most of the rental fleet in Hawaii has RDS equipped radios in their vehicles.

On Kaua'i, KKCR has had RDS since 1997, providing ID, scrolling slogans and announcements, AF for repeaters and translators. Other HPR uses of RDS include the following:

- KHPR: Station ID, scrolling slogans and announcements, AF for translator, and using the RDBS for activation of selected receivers by the local civil defense for various emergency notifications.
- KIPO: Station ID, scrolling slogans and announcements
- KKUA: Station ID, scrolling slogans and announcements, AF for translator
- KANO: Station ID, slogan

ANNEX 2 – RDS Providers List

ANNEX 2

NRSC-G300, RDS Usage Guideline RDS Providers List

UPDATED October 11, 2012

The providers listed in this Annex are known service providers or they have been self-notified as providing hardware and/or services to manage data for RDS applications. The suppliers listed herein have completed the form included in Annex 3 of the Guideline and submitted it to the NRSC, requesting inclusion in this list. An updated list is published as new items are added.

IMPORTANT ADVISORY FOR USERS OF THIS LIST

Neither the NRSC nor its members, participants or co-sponsors make any claim as to the suitability of this services or equipment for use in managing or transmitting RDS data. Parties interested in managing RDS data need to verify for themselves that the provider, service and/or equipment is in fact suitable for their needs.

Providers that are NOT on this list may very well be suitable for use managing RDS data.

Suppliers that have submitted valid self-notifications are included here. The NRSC acknowledges that other providers may also be suitable, and encourages all service providers and manufacturers who offer suitable products or services to self-notify with the NRSC.

Anyone wishing to provide information to the NRSC as to the suitability or unsuitability of these suppliers should send an email to nrsc@nab.org. Please include in this email the supplier's name and product or service(s) being discussed.

(continued on next page)

ANNEX 2 - NRSC-G300, RDS Usage Guideline
RDS Providers List – UPDATED October 11, 2012

Company	Website / Contact Information	Nature of business	Description of services or product(s) provided	Date of Notification
Arctic Palm Technology, Inc.	www.arcticpalm.com csbuck@arcticpalm.com	Software developments specializing in solutions for Broadcasters	Specializing in software for the broadcasting industry, Arctic Palm Technology, Inc. was founded in 1997 and based in London, Ontario, Canada. Combining our knowledge of the business of broadcasting with the technical skills to meet the needs of broadcasters and a strong commitment to service, there are over 1,200 stations in Canada, USA and around the world using one or more of our products. In addition to our award winning Center Stage Live and it's Date Casting features for RDS/RBDS, web sites, HD Radio, streaming services, Tunin.com, etc. we also have a line of "Paperless Studio" products for contest management, script management and work flow, call screening for Telos systems and an automated file transfer solution. With the popularity of social media, our new CSSocial add-on for our Data Casting Contesting and Call Screening updates Twitter and Facebook pages automatically or from talent postings.	8/31/12
Audessence Ltd.	www.audessence.com tech@audessence.com	Equipment manufacturer	RDS encoders, audio processors, etc.	9/5/12
Deva Broadcast Ltd.	www.devabroadcast.com office@devabroadcast.com	Broadcast equipment manufacturer	Deva Broadcast develops and manufactures a wide range of RDS/RBDS encoders and decoders, modulation monitors, remote controls, off-air monitoring receivers and other systems for the broadcasting industry. The company was established in 1997 and is nowadays well known as a market leader and international provider of user friendly, cost effective and innovative broadcast products. All RDS/RBDS encoders developed and manufactured by Deva Broadcast are in compliance with the latest EBU (IEC) and NRSC Standards.	9/3/12

ANNEX 2 - NRSC-G300, RDS Usage Guideline
RDS Providers List – UPDATED October 11, 2012

Company	Website / Contact Information	Nature of business	Description of services or product(s) provided	Date of Notification
Global Security Systems, LLC	www.alertfm.com mstraeb@gssnet.us	Broadcast-based emergency alerts using RDS	<p>Global Security Systems, LLC (GSS) is the systems integrator and service provider of GSSNet (satellite CAP-based EAS data delivery), ALERT FM (FM RBDS broadcast-based text emergency message system) and Alert Studio (web-based CAP-compatible audio/text/image alert origination portal). ALERT FM is a personal alert and messaging system that enables company emergency management officials to create and send digital alerts and messages, including NOAA weather warnings, workplace evacuation instructions, and other company emergency information to employees, board members, and other company officials based on geographic or organizational groupings. GSS has participated in the development of IPAWS-based systems, is a member of the Commercial Mobile Alert Service systems committee, and is actively involved with several EAS and CAP committees. The GSS nationwide GSSNet satellite delivery system for emergency alerts currently is in operation at over 300 locations in 16 states and growing daily, and includes the ability to generate and deliver CAP messages.</p>	9/11/12
Inovonics, Inc.	www.inovonicsbroadcast.com ben@inovonicsbroadcast.com	Broadcast equipment manufacturer	<ul style="list-style-type: none"> ● Model 730 RDS/RBDS Encoder: full featured RDS encoder with LCD front panel display for setup and verification of information. Accessible via USB, RS232, TCP/IP, and UDP for remote updating of dynamic song title, artist information, ODAs, RT+, clock time and all RDS data functions. ● Model 720 RDS/RBDS Encoder: RDS encoder with LCD front panel display for verification of information. Accessible via USB and RS232. Can be remotely updated to display song title, artist information and many other RDS data functions. ● Model 703 RDS/RBDS Encoder: Basic functions of RDS supported. Programmed via USB, the Model 703 is meant to give stations an RDS presence with station identification and promotional text. 	8/30/12

ANNEX 2 - NRSC-G300, RDS Usage Guideline
RDS Providers List – UPDATED October 11, 2012

Company	Website / Contact Information	Nature of business	Description of services or product(s) provided	Date of Notification
Kvarta	www.kvarta.net tmanev@kvarta.net	Radio & TV equipment	<p>Kvarta is widely considered as a reliable producer of radio and TV equipment. Our RDS/RBDS encoders are growing in popularity due to their reputation of reliability, quality and functionality at exceptional prices. All our RDS/RBDS encoders have been designed for professional broadcast use and are fully compliant with the standards.</p> <p>We are supplying the following RDS/RBDS encoder models: RDS300, RDS500 and RDS1000.</p> <p>All our encoders support UECP protocol. Besides the dynamic PS and RT text display features that you can get from RDS300 and the RT+ and SNMP capabilities of RDS500, the RDS1000 our top class RDS/RBDS Encoder supplies all the other ODA applications (TMC, EWS, paging, etc.). RDS1000 also supports configuration and monitoring of the RDS/RBDS encoder from multiple points.</p>	8/31/12
Pira	www.pira.cz mail@pira.cz	Production of complementary FM broadcast equipment	<ul style="list-style-type: none"> • RDS/RBDS encoders • FM analysis equipment • RDS/RBDS analysis and consultancy 	9/3/12
2wcom Systems GmbH	www.2wcom.com wdrews@2wcom.com	Development and production of broadcast products	<p>Basic and full-featured RDS/RBDS encoders with more than 15 years of experience in the market, fulfilling specifications like IEC 62106 und UECP 7.05.</p> <p>Additional features like automation system support, RDS/RBDS decoder (incl. full text TMC) inside the encoder and multi IP access available.</p> <p>Excellent references worldwide.</p> <p>Highly sophisticated RDS/RBDS decoders for measurement and control of all FM and RDS/RBDS parameters (incl. full text TMC decoding).</p> <p>Alarm support via email (SMS), SNMP and relay.</p> <p>Streaming of FM and RDS/RBDS data.</p> <p>Server Software to control large RDS/RBDS networks.</p> <p>Satellite receivers for distributing dynamic RDS/RBDS data to the transmission sites as embedded data or in separate PID.</p> <p>New: FM-MPX over IP or E1 (2 Mbit-line), incl. RDS/RBDS distribution.</p>	9/5/12
Worldcast Systems Inc./ Audemat	www.worldcastsystems.com peterle@worldcastsystems.com	Broadcast equipment mfg. / RBDS generation, analysis and monitoring	<p>RBDS encoders including the world class FMB50 and the affordable RDS Silver. RBDS analysis equipment including the industry standard FM-MC4 and versatile Navigator 100. 24/7 RBDS performance monitors Goldeneagle HD, Goldeneagle FM and FM Silver monitor. Expert assistance for all types of RBDS deployment including TMC, RT+, and other ODA's. Member of the RDS Forum since its inception.</p>	9/3/12

ANNEX 2 - NRSC-G300, RDS Usage Guideline
RDS Providers List - UPDATED October 11, 2012

Company	Website / Contact Information	Nature of business	Description of services or product(s) provided	Date of Notification

NRSC-G300

ANNEX 3 – RDS Providers List Self-Notification Form

NATIONAL RADIO SYSTEMS COMMITTEE

NRSC-G300, RDS Usage Guideline RDS Providers List Self-Notification Form

*Please submit completed
form to:*

National Association of Broadcasters
1771 N Street, N.W.
Washington, DC 20036
Attn: Science & Technology Department

Email: nrsc@nab.org
Fax: 202-775-4981

This form is for suppliers of services and equipment managing and delivering RDS and/or HD Radio Program Associated Data (PAD) in accordance with the techniques discussed in the NRSC-G300 Guideline. Please complete this form and submit it to NAB by mail, fax, or email, using the contact information above.

Completed forms will be reviewed by the NRSC and if found complete, the equipment described therein will be added to Annex 2 of the NRSC-300 Guideline, which lists providers of RDS data management services or equipment.

Company information:

COMPANY			
NATURE OF YOUR BUSINESS			
ADDRESS			
CITY		STATE	ZIP CODE
PHONE (MAIN NUMBER)	FAX	WEBSITE	

Contact information:

NAME			
TITLE			
ADDRESS			
CITY		STATE	ZIP CODE
PHONE	FAX	EMAIL ADDRESS	

NRSC-G300

NRSC Document Improvement Proposal

If in the review or use of this document a potential change appears needed for safety, health or technical reasons, please fill in the appropriate information below and email, mail or fax to:

National Radio Systems Committee
c/o Consumer Electronics Association
Technology & Standards Department
1919 S. Eads St.
Arlington, VA 22202
FAX: 703-907-4190
Email: standards@ce.org

DOCUMENT NO.	DOCUMENT TITLE:	
SUBMITTER'S NAME:	TEL:	
COMPANY:	FAX:	
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URGENCY OF CHANGE: _____ Immediate _____ At next revision		
PROBLEM AREA (ATTACH ADDITIONAL SHEETS IF NECESSARY): a. Clause Number and/or Drawing: b. Recommended Changes: c. Reason/Rationale for Recommendation:		
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