DRM – Digital Radio Mondiale

Emergency Warning Functionality (EWF)

An Overview

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1. Overview

Digital Radio Mondiale (DRM) supports and provides a fully integrated disaster and early warning service called Emergency Warning Functionality (EWF).

The functionality described below is part of the DRM system specifications, which is described in recommendation ITU-R BS.1114-7 and is a European Telecommunications Standards Institute standard (ES 201 980). It therefore works with any standard confirming DRM radio set without requiring extra receiver components, specific hardware or transmission networks.

1.1 Task

Inform **general public** (and relevant authorities) about the impending disaster, with **maximum reach** and as **quickly** as possible, giving **all relevant information.**

1.2 Requirements

A typical early warning system has the following requirements:

- Send notification to maximum number of people in the affected areas as promptly as possible
- Must cover large areas with very high reliability
- Must work when common information services and local services fail
- Make warnings available on devices that people use on daily basis
- Reach devices that are still operational, if electricity fails (i.e. radio sets and other devices with independent energy source)
- Be as un-intrusive as possible for daily use
- Must be available and continuously on-air for the duration of the emergency
- Control of emergency notification and immediate access by authorities
- Make emergency message available to widest possible audience, including the visually or hearing impaired

1.3 Summary

- The DRM technology provides an ideal platform for delivering emergency warning services using standard radio sets – no extra hardware or infrastructure required.
- EWF support is mandatory as described in the DRM minimum receiver requirements and second-level receiver profile (pls. see www.drm.org) with no need for special chipsets or extra adaptation for EWF. Everything needed for EWF is already in the receivers built according to the above specifications issued by the DRM Consortium.
- The DRM technology should be the major building block of a national emergency warning policy, providing full and continuous services as a last resort potentially even from a remotely located transmitter site.

2. DRM Building Blocks – How EWF works

2.1 Broadcast functionality

- AFS – Alternative Frequency Signalling is employed by the DRM system: points to emergency broadcast (even if the receiver is tuned to a different service ID or on a different frequency)
- Emergency announcement signalling: receiver is aware of general support for emergency announcement feature and of current activation status on tuned program (can be sent in DRM signalling channel along with any audio or data transmission)
- Receivers may check regularly for announcement activity even if turned off, as announcement information is carried in signalling channel (no need to decode full DRM signal for checking; for battery-operated receivers proper engineering solutions are needed to make this feature available)
- If emergency announcement is active, DRM receivers switch automatically to emergency broadcast
- Emergency content is provided automatically in the form of audio and text information (see below for details)

2.2 Listener experience

Listeners receive emergency broadcast comprising:

- **Audio** programme (provided in one language at a time);

- **DRM text messages** (short text lines appearing on screen, updated automatically every few seconds)

- **Journaline advanced text** service (providing detailed instructions in multiple languages simultaneously; see ETSI standard TS 102 070)

➔ Together these content tools provide a great advantage of the DRM standard.

2.3 When the alarm signal is triggered by the authorities

- All running DRM receivers pick up the alarm signal from the currently tuned DRM service and switch to the emergency broadcast
- All DRM receivers present the audio content of the emergency broadcast;
- DRM receivers with at least a text screen, in addition present text headlines (DRM text messages) plus detailed, multilingual information and instructions (Journaline) for instant and interactive look-up by user
- Turned-off receivers may switch on automatically. This is a requirement to be defined by regulators for DRM receivers sold domestically. The ability of receivers to check on emergency warning signals being active should be a general requirement for receiver manufacturers
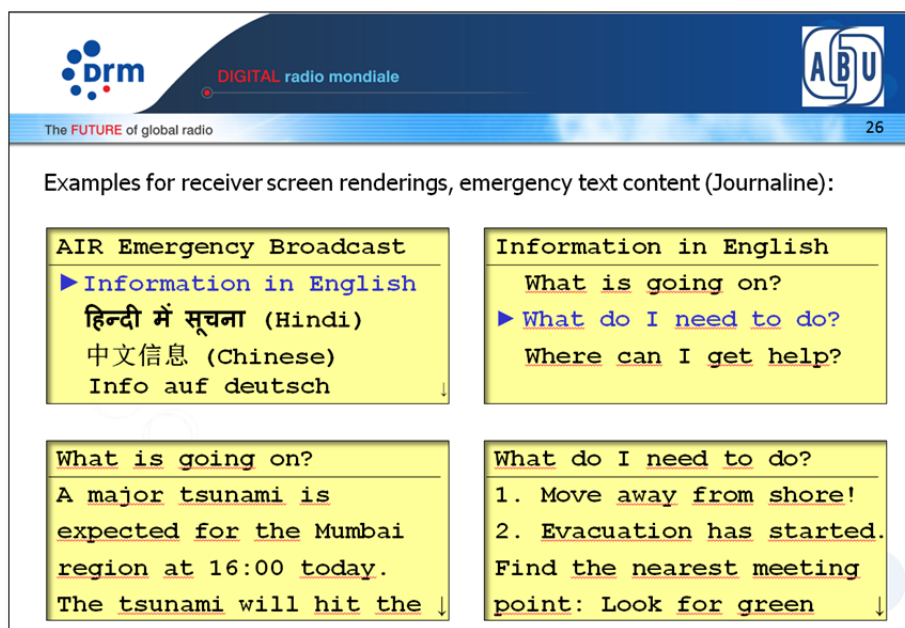
Deploying DRM's multimedia capabilities (text messages, Journaline) allows for more listeners to be addressed, providing additional facilities:

- Addressing the group of audio impaired listeners (see recommendation ITU-R BS.1984)
- Addressing listeners in their own language

As a result, target listeners of the EWF can receive detailed text information through Journaline, supporting multiple languages and scripts simultaneously in one single broadcast (see Figure), such as:

- The reason for emergency warning
- Instructions on what to do
- Contact details for further information
- List of affected areas
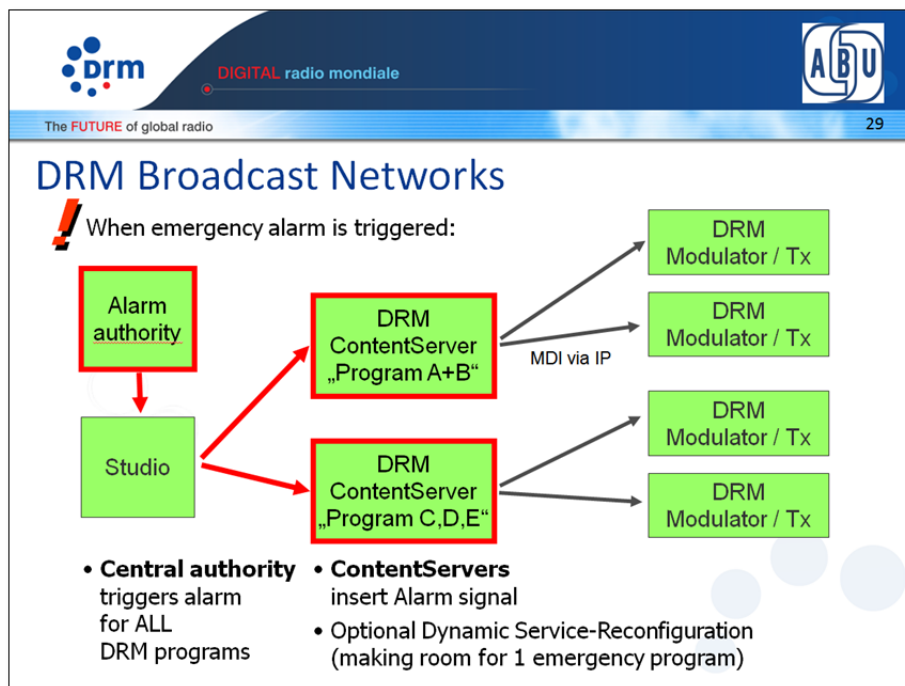- List of affected people/population (search messages etc.)

3. Broadcast Chain Implementation

3.1 A DRM broadcast chain consists of:

Studio (content) → DRM ContentServer(s) → DRM Modulator(s)/Transmitter(s)

- If authorities trigger the emergency signal, it must automatically be provided to the studios, which in turn activate it at the DRM ContentServer(s) (or grant authorities direct access to an appropriate interface).
- The emergency warning signal must be activated for all DRM on-air services (even if they do not carry the emergency program themselves but simply point receivers to e.g. a public broadcast).
- During implementation DRM configuration(s) may need to be dynamically reconfigured to make room for the emergency program and additional content.
- Typical interfaces to trigger/activate the DRM emergency signal on a ContentServer may include web interface access (for manually activating a trigger) or UECP (international standard for automated announcement distribution within studio environments). See figure below.

3.2 Implementation considerations for the DRM broadcast chain

The following are implementation considerations for the DRM broadcast chain:

- Enable emergency alarm signalling for **all** DRM broadcasts (+ AFS links to emergency programme)
- Establish **alarm trigger signal path** from central authorities to all stations
- The content to be put on-air (audio + text) must be **prepared in advance** for each possible emergency scenario to be available and placed on-air immediately when required, and easily accessible by broadcasters.
- If required, **prepare DRM broadcast configurations** for emergency program scenario to quickly switch configurations in case of emergency. For example to add the emergency service with audio and text content into a regular DRM broadcast (optionally replacing existing content and programmes in the broadcast).

3.3 Activation of emergency alert:

When the emergency alert is required to be activated, the following steps should be taken:

- Activate switch trigger chain from authorities through studios to DRM ContentServers and eventually the DRM receivers, to switch all receivers automatically to the emergency programme (see figure below).
- Broadcast (at least) one emergency programme covering at least the region of the emergency with audio + text information.

4. Implementation Consideration on Receiver Side

The following are implementation considerations for DRM receiver manufacturers to make full use of the DRM Emergency Warning Functionality.

Functional requirements:

- At least the following DRM core functionalities need to be supported:
  audio, text messages, Journaline, AFS, announcements (including type 'warning/alert')

Activation:

- In case the announcement type 'warning/alert' is triggered for the current DRM Service, the receiver shall switch automatically to and start presenting the target DRM Service, i.e. the emergency programme.
  (Whereas for announcement types other than 'warning/alert', the user should be allowed to configure whether or not automatic switching to target service shall be carried out automatically.)
- While the receiver is turned off (e.g. in deep standby mode), the currently tuned DRM transmission should still be monitored on a regular interval. The receiver should switch on automatically once the announcement status of any of the DRM Services on the currently tuned DRM frequency is activated.

Content presentation:

- When presenting the emergency programme, the receiver should indicate this emergency condition visually (e.g. by flashing the screen) and increase the audio volume to catch the user's attention even if for example located in another room.
- If the emergency programme contains associated Journaline information, the Journaline start page shall be presented automatically on screen, allowing the user to immediately start interacting and accessing the provided textual detailed information and instructions.

Deactivation:

- While presenting the emergency programme, the receiver should switch back to normal audio level and stop flashing the screen with the first user interaction (such as pressing any button). The user should be allowed to manually change the volume or switch away from the emergency programme at any time (even if the 'emergency/alert' condition continues to be triggered).
- While presenting the emergency programme, the receiver shall automatically restore the normal presentation conditions (audio volume, screen rendering) and return to the previously tuned DRM Service in case the 'warning/alert' announcement trigger is discontinued for this previously tuned DRM Service.

5. Conclusion

The DRM audio broadcasting system has all required tools built-in – and supported - by available chipsets for a quick and complete mass notification (including impaired listeners) when disasters/catastrophes occur:

- Providing DRM receivers with switch signals and alternative frequencies to get emergency programmes
- Providing listeners (including impaired users) with complete and detailed information by audio and multilingual on-demand text (Journaline)

Preparation in advance is key on three major areas:

- Alarm trigger routing (from central authority to DRM receivers)
- Content preparation for immediate availability (text information, audio loops/feeds)
- Full receiver functionality to be implemented (including EWF and automatic receiver wake-up)

6. List of references

- DRM system specification   ETSI ES 201 980   www.etsi.org
(includes DRM text messages)

- Journaline specification   ETSI TS 102 979   www.etsi.org

- ITU Recommendation
"Digital radio broadcast service, captioned radio"   ITU-R BS.1894   www.itu.int

- DRM Introduction & Implementation Guide   www.drm.org

- DRM Minimum Receiver Requirements   www.drm.org

- DRM Global Receiver Profiles   www.drm.org