

Market Requirements Document (MRD): Digital Radio Modiale

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Agenda

- **Market Focus**
- **Product description**
- **Cost Metrics**
- **Product Features**
- **References**

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- What is in a MRD
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Market Focus

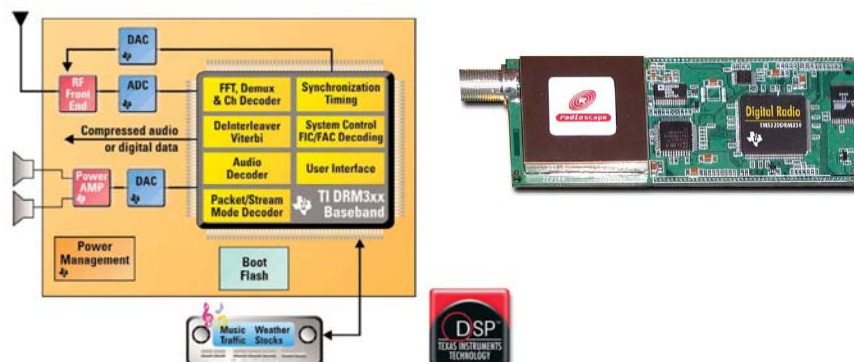
- **The primary target market for the DRM solution that will developed is for MP3 players that want to receive digital radio transmissions.**
 - ◆ Estimated market size is approximately 5-7 million units per year.
- **It is anticipated that the next generation cell phones may be configured to receive FM and DRM/DAB transmissions. If so...**
 - ◆ The potential market size is approximately 35 million units per year.

What problem are we trying to solve?

- There is a need to transmit and receive digital music and data using existing long-, medium- and short-wave transmission systems. Transmitters in these wavelengths are accessible world wide.
- Need to provide near-FM quality sound and the capacity to integrate data and text.

Competition

- Texas Instruments currently offers the TMS320DRM300/350 component:



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Product description

- **You will generate a PRD for a DRM IP sub-system that can be integrated into a MP3 player or a 4G cell phone.**
 - ◆ The hardware intellectual property will be delivered in the SystemC tools environment. This will include all components which are not available in the standard library, such as accelerators, special I/O devices, etc.

Product Benefits

- **A DRM system provides the following benefits:**
 - ◆ Ability to receive digital music and data using existing long-, medium- and short-wave transmission systems providing near-FM quality sound available to markets worldwide.
 - ◆ DRM has a small bandwidth of less than 20 kHz – easy to handle with current generation of embedded computing devices.
 - ◆ The quality of DRM audio is excellent, and the improvement upon analog AM is immediately noticeable. DRM can be used for a range of audio content, including multi-lingual speech and music.

Product Benefits (cont'd)

- **A DRM system provides the following benefits:**
 - ◆ Besides providing near-FM quality audio, the DRM system has the capacity to integrate data and text. This additional content can be displayed on DRM receivers to enhance the listening experience.
 - ◆ Unlike digital systems that require a new frequency allocation, DRM uses existing AM broadcast frequency bands. The DRM signal is designed to fit in with the existing AM broadcast band plan, based on signals of 9 kHz or 10kHz bandwidth. It has modes requiring as little as 4.5kHz or 5kHz bandwidth, plus modes that can take advantage of wider bandwidths, such as 18 or 20kHz.

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Cost Metrics

- **Performance**
 - ◆ Utilize no more than 75 MHz of an ARM 926-EJS running at 256 MHz
- **Additional die size cost**
 - ◆ Accelerators .5 mm²
 - ◆ On board Memory - TBD
- **Advanced System and Power Management**
 - ◆ Additional system power for accelerators: < 8 mW

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Product Features

- **Flexible and scalable platform based architecture.**
- **Standard architecture for a wide range of devices supporting a wide range of information services**
- **Flexibility – To be able to dynamically re-program different waveforms tailored to particular scenarios**
- **Portability – To be able to host third party designs on multiple independent platforms**
- **Potential for significant life-cycle cost reduction**
- **Over the air downloads of software patches, and new features and services**
- **Offers significant improvement in flexibility, portability and interoperability between different users**

Product Features (cont)

- Frequency coverage 0-32 MHz
- Mode reception: USB, LSB, CW, AM, synchronous AM, NFM, DATA
- Advanced IP3 greater than +35 dBm
- Very high dynamic range
- >100 dB in AM mode with 7 kHz filter
- >105 dB in SSB mode with 2.2 kHz filter >110 dB in CW mode with 500 Hz filter
- Passband tuning +/-5 kHz
- Audio pitch tune in CW & DATA

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References

- DRM Consortium
 - ◆ <http://www.drmrx.org/>
 - ◆ <http://www.drm.org/>
- PC based software for DRM reception user manual
 - ◆ http://www.drmrx.org/downloads/docs/drm_sw_radio_manual_V1_3.pdf
- WINRADIo info
 - ◆ <http://www.winradio.com/>