

Fraunhofer DRM ContentServer™ R7 Features, Editions & Product Lines

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Subject to change without notice.

For complete systems including hardware and extended customer support please contact our **OEM Partners** (addresses available on request).

Symbols:	✓	Option is included in the package
	–	Option is not included but can be added to the package
	*	Option can not be combined with the package

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Product Lines

To complement individual needs and infrastructure requirements, the Fraunhofer DRM ContentServer is available in the form of two different product lines.

- **Fraunhofer DRM ContentServer R7 – DRM-AM (DRM Modes A—D)**

The DRM-AM product line is suitable for all DRM broadcasts in the AM bands below 30 MHz, including the SW, MW and LW bands.

Note that the following functionality option listed in the Editions table below can only be combined with this DRM-AM product line: DRM-FM (Robustness Mode E) add-on (in the DRM Multiplex Generator section)

- **Fraunhofer DRM ContentServer R7 – DRM-FM (DRM Mode E)**

The DRM-FM product line is suitable for all DRM broadcasts above 30 MHz, including the VHF broadcast bands I, II (FM) and III (based on regional regulatory conditions).

Feature List / Functionality Overview

The Fraunhofer DRM ContentServer R7 technology enables highly reliable professional broadcast systems for Digital Radio Mondiale ("DRM", see www.drm.org). It supports the content and signalling options DRM offers and all interfaces for a smooth integration into the broadcast chain. Due to its flexible configuration options, the ContentServer adjusts perfectly to the needs of small-scale community stations all the way to large-scale and complex national networks, along with dedicated support for receiver development and testing with close to 100% test coverage.

The Fraunhofer DRM ContentServer R7 provides triple functionality:

- **DRM AudioServer**
with multi-stream real-time audio encoding (including the MPEG xHE-AAC audio codec)
- **DRM Multimedia DataServer**
supporting all standardized as well as broadcaster specific data services;
covering import, processing, encoding and broadcast
- **DRM Multiplex Generator**
managing the extensive DRM signalling capabilities, generating the full digital DRM Multiplex,
scheduling among multiplex configurations and providing standard MDI/DCP output streams

The One-box DRM Broadcast Solution

The system is typically located in the studio, at a play-out center or at the transmitter site – with full remote control for administration and data provision, enabling cloud-based operation. The remote web interface featuring Fraunhofer's in-place-editing technology for quick and convenient system configuration can be accessed through any modern web browser, including individual user login via LDAP.

The output signal of the Fraunhofer DRM ContentServer R7 carries the complete DRM Multiplex (FAC, SDC, MSC) in MDI/DCP format according to ETSI TS 102 820 (Multiplex Distribution Interface) and ETSI TS 102 821 (Distribution and Communications Protocol). This DRM Multiplex can be fed simultaneously to any number of DRM Modulators/transmitter sites (with timing support for SFN single frequency network operation), and monitoring stations.

The Fraunhofer DRM ContentServer R7 is based on a highly reliable and secure operating system (Linux based), which remains invisible to the user.

Fraunhofer DRM AudioServer

This system component provides real-time encoding of up to 4 audio streams in parallel:

- Live analog and/or digital input (with dynamic resampling option)
- File sources (mp3, wav, playlist)
- AES67 Audio over IP (AoIP) input: incl. Livewire, Ravenna
- RTP-based audio stream input (e.g. as audio bridge end-point), with powerful packet loss concealment
- Icecast/SHOUTcast stream input
- Audio input stream monitoring, automatic stream config detection and remote listening through HTML5
- Backup Audio Source: auto-switch from missing live input to alternative source: live/uploaded audio content
- xHE-AAC encoding (mono, stereo)
- AAC with SBR (mono, stereo, parametric stereo, 5.1 surround)
- All bitrates, including UEP (unequal error protection)
- All available sampling rates
- MPEG Surround option with automatic real-time stereo-to-5.1 upmix using SX Pro®

Fraunhofer Multimedia DataServer

This component supports the import, collecting, merging, checking, conversion and encoding of data for all standardized DRM and DAB as well as

broadcaster-specific individual data applications.

DRM / DAB data applications:

- DRM TextMessages incl. TM+
- Journaline®
- Journaline® Live Ticker Pages
- Journaline® Recently Played Songs automatic listing from TM+
- Slideshow (incl. categorized/interactive SLS)
- EPG/SPI (Electronic Progr. Guide) incl. service logos
- TPEG Traffic Information
- TMC Traffic Message Channel
- MOT Broadcast Website
- Filecasting
- PRBS with internally generated synchronous or asynchronous (standard or user-defined) test patterns

Open interfaces allow the transmission of any custom-tailored individual application at various protocol levels:

- Transparent File Transmission via MOT (with optional MOT Directory compression)
- IP Insertion (Internet Protocol tunnelling)
- TDC Transparent Data Channel
- DRM Data Units
- MSC Data Groups
- Synchronous / asynchronous data streams

Versatile data import interfaces and automation features allow for a smooth integration into production environments:

- RSS/Atom import
- Customer-specific XML formats (option)
- Ftp, ftp-mirroring and http-mirroring (automatically scheduled or manually triggered)
- JSON-RPC and XML-RPC
- Web-interface for quick data editing using a standard web browser
- UECP, Funkhaustelegramm, Leitungsprotokoll and ZENON studio interfaces
- Socket interface for real-time data insertion (API + Win/Linux command line tools for data provision by clients)
- Protected connections for secure data import restricted to the predefined data sources: ftps, ftps-mirroring, https-mirroring
- Service logo import incl. RadioDNS
- Axia GPIO nodes (announcements)

Incl. support for DRM Enhanced Packet Mode (FEC protection) and protocol standard MOT 2.1.1 (Multimedia Object Transfer) for enhanced file and directory structure transmissions.

Fraunhofer DRM Multiplex Generator

DRM signalling features are supported according to ETSI ES 201 980 (v.4.1.1) including the DRM dynamic reconfiguration feature.

Up to 4 PAD (programme associated data) data Service Components can be linked to each DRM Audio Service.

Transmission channel options for DRM-AM:

- Robustness modes A, B, C, D
- Spectrum occupancy 4.5, 5, 9, 10, 18, 20 kHz
- MSC modes 16 QAM, 64 QAM, and hierarchical (HMmix, HMsym)
- SDC modes 4 QAM and 16 QAM
- Interleaver length 0.4s and 2s
- EEP (equal error protection) and UEP (unequal error protection) with all possible combinations of protection ratios / code rates

Transmission channel options for DRM-FM:

- Robustness mode E

- Spectrum occupancy 96 kHz (100 kHz nominal)
- MSC modes 4 and 16 QAM
- SDC modes 4 QAM with code rates 0.5 and 0.25
- Interleaver length 0.6s
- EEP and UEP with all possible combinations of protection ratios / code rates

DRM signalling options:

- Service ID
- Service language (short list for scanning and detailed list covering all worldwide languages)
- Service programme type
- Country of origin
- Emergency warnings/alerts
- Current time and date, incl. local time offset and automatic daylight saving time adjustment
- Alternative frequency signalling (AFS) for the whole DRM Multiplex and for individual DRM services (linking to DRM, AM, AMSS, FM, FM-RDS, DAB services)
- Announcements (traffic, news, weather, alarm, test alarm, user-defined)
- Full Unicode / UTF-8 support (all international characters, ISO 10646) for DRM TextMessages and DRM service labels

Multiplex Signal Management

- Extended broadcast info (Multiplex configuration, SDC layout)
- Live monitoring of the DRM Multiplex Generator output signal through the web interface, as a receiver would decode and present the data (DRM Text Messages, Journaline, Slideshow); incl. transmission statistics
- Recording of the DRM Multiplex Generator output signal (as MDI) and file-download through the web interface; the duration can be pre-defined
- Powerful in-depth analysis of any MDI file

Advanced System Features

Redundancy Group Feature

- Connects two or more Content-Servers to one Redundancy Group
- Full failover – each group member independently generates frame-synchronous and co-timed MDI

- Group-wide synchronized dynamic reconfigurations
- Single user interface – automatic internal replication of broadcast configurations, schedules, and uploaded broadcast content
- Mutual system health and availability checks among members
- Audio Cross-Redundancy: the encoded audio stream from another Redundancy Group member replaces a failing/missing audio source including Smart Silence Detection

EFW – Emergency Warning Functionality:

- Full support of EFW for immediate mass-notification of listeners via DRM in cases of pending disasters: emergency audio programme audio, Journaline for detailed multilingual text instructions and geo-region definition, alarm announcement, AFS signalling, dynamic reconfigurations
- Import interface for standardized CAP/MoWaS conforming notifications, triggering the automatic generation and broadcast of Journaline (incl. affected region definition), TM and audio content, required multiplex reconfigurations and (test) alarm announcements

Automatic broadcast configuration scheduling:

- Global broadcast calendar
- Multiple weekly calendars
- Manual, SNMP triggered, URL triggered, JSON/XML-RPC triggered or pre-scheduled broadcast activation / reconfiguration

Sound system configuration:

- Live audio source peak level and loudness (LUFS) monitoring
- Live audio playback via web browser
- Audio source amplification setup
- Audio loudness normalization (to configured target LUFS level) within and across audio services, based on Fraunhofer Sonamic technology
- Continuous and configurable clipping and silence detection for all audio input signals
- Audio level limiter
- Opt'l mp3 normalization on import

Powerful security features:

- Professional firewall to separate the potentially public content contribution from the protected system administration and DRM Multiplex distribution to DRM transmitters

- Secured connections for system administration and data contribution access

Continuous system self-monitoring & status reports

- System status signalling via e-mail report system, local console and SNMP (for all system components, and for dynamic broadcast content)
- Detailed system status information via HTML web interface
- Web interface access to detailed log files for inspection and download
- Interactive Graphic System Status visualizes the status of all system components with direct links to relevant documentation, logging and editor pages; with multi-system option to monitor multiple ContentServers
- System configuration backup and restore mechanism (remote / local)
- Monitoring of attached uninterruptible power supplies (UPS)

Contribution Network Monitoring:

- Short- and long-term statistics of incoming and outgoing data

streams; covering MDI output & external audio encoders

- Validity checks and comparisons for redundant input/output streams
- MDI reports allow MDI targets to inform MDI sources about quality of contribution network

Infrastructure and Setup

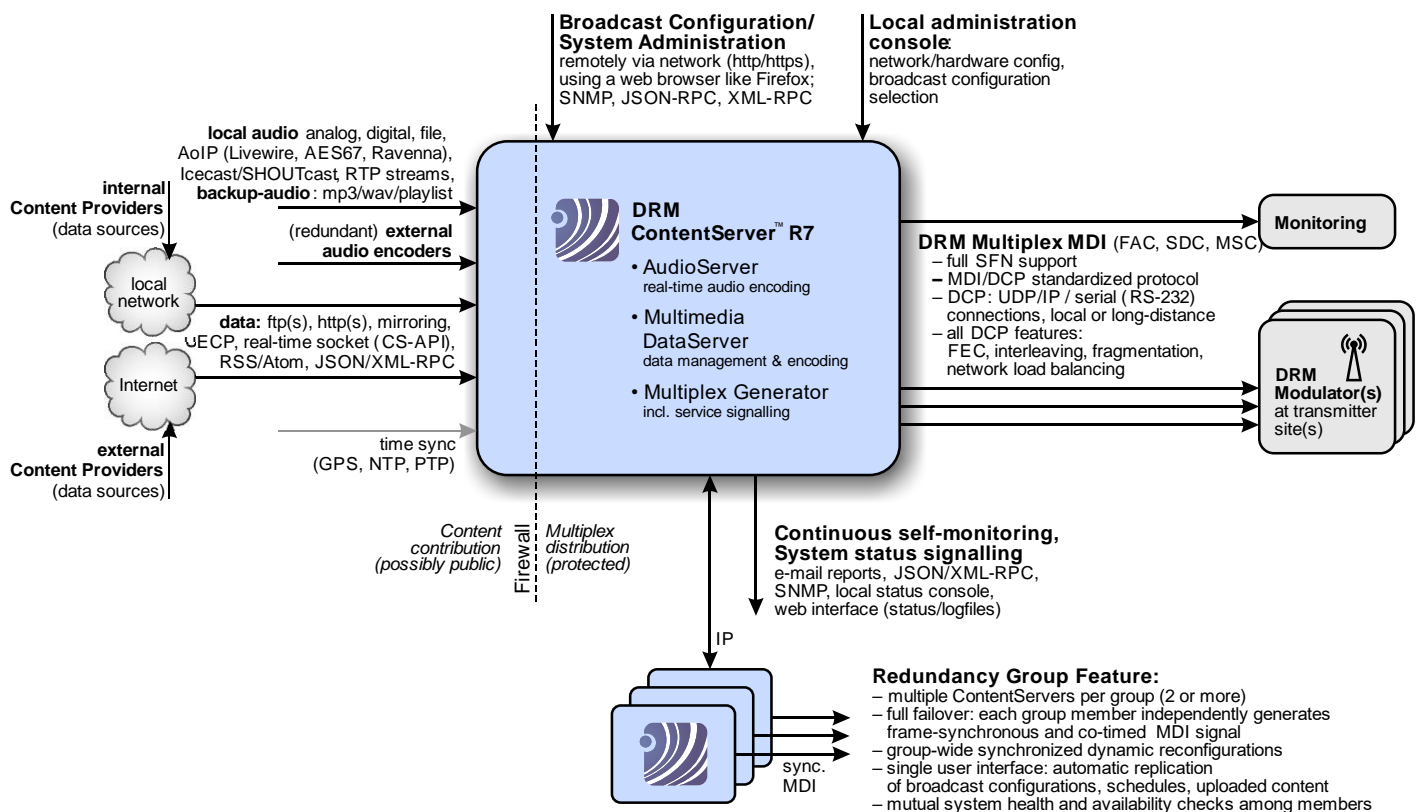
The Fraunhofer DRM ContentServer is typically deployed as a highly reliable and redundant 24/7 server hardware system, or in virtualized/cloud-based environments.

Administration, system configuration and data provision are based on Ethernet network connections for a **completely remote operation**. A detailed user management (incl. LDAP integration) is provided to control system access and data contribution sources. System software updates can be triggered remotely through the web interface.

The strong firewall functionality guards access to the system. The Professional Firewall option enables the configuration of multiple network cards, VLAN, multi-homing, and port bonding.

In addition, a local console display is supported to locally activate configurations, to monitor the system status and to setup the basic hardware parameters (such as network settings).

If the MDI/DCP output signal of the DRM ContentServer shall be fed simultaneously to a virtually unlimited number of DRM Modulators/transmitters operating in SFN mode (single frequency networking), the system must be time-synchronized. Supported synchronization methods are direct GPS receiver input via serial line (see list of supported models), or NTP access (network time protocol) and PTP (precision time protocol) via IP network.



Editions

Each product line of the Fraunhofer DRM ContentServer R7 is available in 4 Editions for regular broadcasting: Compact, Basic, Standard and Professional.

The Developer Edition enables receiver and broadcast equipment development and testing.

All Editions share all basic DRM functionalities, but each Edition provides a different level of enhanced system functionality as a starting point to accomplish typical user scenarios.

All Editions can easily be extended with additional features at any time after the initial purchase.

- **Compact Edition**
A carefully-devised selection of essential DRM functionalities to support an initial exploration of the DRM broadcasting world.
- **Basic Edition**
The perfect starter kit for smaller broadcasters or for installation as a backup-encoder at the transmitter site (accompanying a DRM Modulator), with the option of future extension to satisfy new requirements.
- **Standard Edition**
Combines the most important DRM features (such as AFS) and functionality (like broadcast scheduling) for easy integration into a studio or playout center environment.
- **Professional Edition**
Extends the Standard Edition by adding professional automation features, and provides the full range of broadcaster-specific data transmissions as well as standardized multimedia applications.
- **Developer Edition**
The Developer Edition is available to support the quick and efficient development and testing of DRM receivers and broadcast equipment. It makes the complete functionality of the DRM system with regards to signalling and transmittable content available for laboratory use (including dynamic reconfigurations), enabling a close to 100% test coverage. A full broadcast chain with RF output can be set up quickly and easily in combination with a DRM Modulator. In particular, the DRM-FM product line of the Fraunhofer DRM ContentServer R7 can be combined with the Fraunhofer DRM Test Equipment DT 230, which provides DRM Modulator and channel simulation options.

Available options	Edition (option package)				
	Compact	Basic	Standard	Professional	Developer
General System Features					
Firewall Basic	–	✓	✗	✗	✗
Firewall Professional (config. of multiple network cards, VLAN, multi-homing, network port bonding)	–	–	✓	✓	✗
Support for serial devices (GPS, ...)	–	✓	✓	✓	–
Automatic leap second handling	✓	✓	✓	✓	✓
Graphical system status overview	–	–	✓	✓	✗
Multi-system graphical status overview	–	–	–	✓	✗
System checks (continuous self-monitoring)	–	✓	✓	✓	✗
System config backup (at console)	✓	✓	✓	✓	✓
System configuration remote up-/download	–	–	–	✓	✗
E-mail reports (admin & Content Providers)	–	✓	✓	✓	✗
SNMP interface	–	–	✓	✓	✗
Security Summary (network conf. overview)	–	–	–	✓	✗
Remote System Update (via web GUI)	–	–	✓	✓	✗
Redundancy Group Feature	–	–	–	✓	✗
Audio Cross-Redundancy (req. Red. Grp.)	–	–	–	✓	✗
MDI Analyzer	–	–	–	–	✓
DCP in/out monitoring (network analyzer)	–	–	–	✓	–
DRM Multiplex Generator & Management					
Unlimited simultaneous DRM Multiplex configuration definitions	–	✓	✓	✓	✓
SFN Timing Support (Single Frequency Network)	–	–	✓	✓	✓
CAP (Common Alerting Protocol) import for EWF	–	✓	✓	✓	✓
AFS – Alternative Frequency Editor	–	–	✓	✓	✓
Broadcast Scheduler (weekly/calendar)	–	–	✓	✓	–
Announcement support (via UECP, Funkhaustelegramm, Leitungsprotokoll, HTML interface, JSON/XML-RPC)	–	✓	✓	✓	✓
Multiplexer output live monitoring (Text Messages, Journaline, Slideshow decoding)	–	–	–	✓	✓
Multiplex MDI recording	–	–	–	✓	✓
EDI reports (quality of contrib. network)	–	–	–	✓	✗
Extended broadcast info (detailed SDC structure and layout)	–	–	–	✓	✓
Support for external audio encoders	–	–	–	✓	✗
Upload of AFS information from external sources	–	–	–	✓	✗
Support for 4x PAD with Audio Services	–	–	✓	✓	✓
DRM-FM (Robustness Mode E) option (for DRM-AM product line only)	✗	✗	–	–	✓

Available options	Edition (option package)				
	Compact	Basic	Standard	Professional	Developer
DRM AudioServer⁽¹⁾					
Audio input live analog and/or digital	– ⁽²⁾	– ⁽²⁾	✓	✓	✗
Audio-over-IP in: AES67, Livewire, Ravenna	– ⁽²⁾	– ⁽²⁾	✓	✓	✗
RTP input (AAC, uncompr.); RTP monitoring	– ⁽²⁾	– ⁽²⁾	✓	✓	✗
Icecast/SHOUTcast input (mp2, mp3, AAC)	– ⁽²⁾	– ⁽²⁾	✓	✓	✗
Audio file source: mp3, wav, playlist	–	✓	✓	✓	✓
Backup/Standby Audio Source	–	–	✓	✓	✗
Silence/clipping detection and configuration	–	–	✓	✓	–
Audio level limiter	–	–	–	✓	–
Audio Loudn. Normalization (target LUFS)	–	–	–	✓	–
Audio input signal amplification/ mp3 normalization	–	–	✓	✓	–
xHE-AAC / AAC encoders [max. 4]	1	1	1	2	1
MPEG Surround option incl. SX Pro	–	✓	✓	✓	✓
DRM Multimedia DataServer					
Data Application Types					
DRM TextMessages incl. TM+	✓	✓	✓	✓	✓
Journaline® (incl. live ticker pages)	✓	✓	✓	✓	✓
Journaline® recently played song listing (from TM+)	✓	✓	✓	✓	✓
SPI / EPG – Electronic Programme Guide	–	–	–	✓	✓
MOT Slideshow	–	–	–	✓	✓
MOT Broadcast Website/ Transparent File Transmission	–	–	–	✓	✓
TPEG Traffic Information	–	–	–	✓	✓
TMC – Traffic Message Channel	–	–	–	✓	✓
PRBS Generator (sync/async)	–	–	–	✓	✓
IP Insertion	–	–	–	✓	✓
TDC – raw data on various protocol levels	–	–	–	✓	✓
Support for multiple transmission priority classes	–	–	–	✓	✓
Data Import Methods					
Import via HTML interface (web GUI)	✓	✓	✓	✓	✓
Import via file FTP upload	–	✓	✓	✓	✓
Import from existing RSS/Atom sources (Journaline®)	–	✓	✓	✓	✓
Import from existing RSS/Atom sources (TextMessages)	–	–	✓	✓	–
Import via JSON-RPC, XML-RPC	–	–	✓	✓	–
Import via live socket connection (API)	–	–	✓	✓	✓
Import via HTTP/FTP mirroring	–	–	✓	✓	–
Import from Funkhaustelegramm, UECP, Zenon, Leitungsprotokoll (TextMessages + Journaline®)	–	–	✓	✓	–
Axia GPIO node (announcement triggers)	–	–	–	✓	–
Automatic Scheduled Mirroring option	–	–	✓	✓	–
Secure data import connections	–	–	–	✓	✗

⁽¹⁾ DRM AudioServer options are available when at least one (internal) audio encoder license is activated for the system

⁽²⁾ The Compact and Basic Editions includes a single live audio input type according to customer choice

Remarks

Software Maintenance Options

Every ContentServer license listed above **includes 24 months of free SUS – Software Update Support**. After this period, the software maintenance can easily be continued on an annual basis.

If Software Update Support shall be enabled for a system that is not currently covered, please contact your OEM Partner for an individual quotation.

Spare System License (Redundancy)

A spare system is a fully functional Fraunhofer DRM ContentServer standby system for backup purposes, typically operated as part of a Redundancy Group with a regular system. The spare system may be used to replace any standard system licensed to the same company. Depending on the backup philosophy of the company, one spare system may be sufficient to cover multiple standard systems.

The following license restrictions apply:

- Spare system licenses are not supported for the Developer Edition.
- The spare system must not be operated except as a replacement for a regularly licensed standard system. It must not be operated by another company than the one owning the standard system's license.
- The replaced standard system must be non-functional during the time of the replacement (e.g. hardware failure). It is not sufficient to just manually or temporarily switch off a standard system.
- The spare system must not be sold or lent to any third party.

General Remarks

- The 'Editions' table only mentions those features that are different among the available Editions. The standard features shared between all Editions of the Fraunhofer DRM ContentServer are contained in the general product description above ('Feature List').
- All Editions can be installed on suitable server system.
A list of required and recommended hardware components is available upon request.
- **All Editions can easily be extended by additional options (features).**
- **Special license restrictions apply to the Developer Edition:**
 - The system is licensed for development purposes only.
 - The system must not be used for regular or commercial broadcasts on air.
 - The system must not be sold or lent to any third party.
- **Customer training on the Fraunhofer DRM ContentServer,**
on Digital Radio Mondiale and Multimedia Services is available upon request.