

## DAB ContentServer™ Product Lines, Editions & Features

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

### Feature List / Functionality Overview

The Fraunhofer DAB ContentServer R7 technology enables highly reliable professional broadcast systems for the DAB Digital Radio platform (Eureka 147 DAB) including DAB+, DAB Classic, and DMB (see [www.worlddab.org](http://www.worlddab.org)).

It supports the content and signalling options DAB 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 testing and development with close to 100% test coverage.

The Fraunhofer DAB ContentServer R7 provides triple functionality:

#### DAB AudioServer

with multi-stream real-time DAB+, DAB Classic, and DMB-Radio audio encoding

#### DAB Multimedia DataServer

supporting all standardized as well as broadcaster specific data services; covering import, processing, encoding and broadcast of data services, along with DMB Gateway functionality

#### DAB Ensemble/Service Multiplex Generator

managing the extensive DAB signalling capabilities, supporting STI-C input or output, generating the full digital DAB (Sub-)Multiplex and providing standard EDI/DCP output streams

#### The One-box DAB 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.

Depending on the selected Product Line, the output signal of the Fraunhofer DAB ContentServer R7 carries the complete DAB Ensemble or Service Multiplex signal (FIC, MSC) in EDI/DCP format according to ETSI TS 102 693 (Encapsulation of DAB Interfaces) and ETSI TS 102 821 (Distribution and Communications Protocol). This DAB Ensemble Multiplex can be fed simultaneously to any number of DAB Modulators/transmitter sites (with timing support for SFN single frequency network operation), and monitoring stations.

The Fraunhofer DAB ContentServer R7 is based on a highly reliable and secure

operating system (Linux based), which remains invisible to the user.

#### Fraunhofer DAB AudioServer

This system component provides real-time encoding of multiple audio streams in parallel:  
Live analog and/or digital input  
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  
DAB Classic encoding: MPEG Audio Layer-II, 24 or 48 kHz, mono, stereo, joint stereo, dual channel  
DAB+ and DMB-Radio encoding: MPEG-4 HE-AAC v2, all sample rates, mono, stereo, parametric stereo, incl. 5.1 surround  
Full PAD support  
MPEG Surround option with optional 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 DAB as well as broadcaster-specific individual data applications.

#### DAB data applications:

DAB Dynamic Labels  
(incl. DL Plus, Intellitext)  
Journaline®  
Journaline® Live Ticker Pages  
Journaline® Recently Played Songs  
automatic listing from DL+ Slideshow  
(incl. categorized/interactive SLS)  
EPG/SPI (Electronic Progr. Guide)  
incl. service logos  
TPEG Traffic Information  
TMC Traffic Message Channel  
MOT Broadcast Website  
Filecasting

#### 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  
MSC Data Groups  
Packet Mode subchannel  
Synchronous / asynchronous stream  
mode subchannel  
(incl. audio subchannel)  
FIC Data Insertion (FIDC, SI, CA)

### **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)

### **DMB Gateway Functionality – import methods comprise:**

live streams via real-time TCP/IP  
interface  
live streams via DMB UDP/IP  
unicast or multicast (Reed-Solomon  
calculated by ContentServer; bitrate  
adjustment)

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

### **DAB Ensemble Multiplex Generator**

DAB signalling features are supported  
according to ETSI EN 300 401 (v 1.4.1  
and v 2.1.1) including the DAB dynamic  
reconfiguration  
feature.

### **General configuration options:**

Standard (FIG1/x) and Extended (FIG2/x)  
DAB labels  
Label character encodings: EBU Latin  
based set, UCS-2, UTF-8  
(i.e. support for all international  
characters);  
general and per-label definition  
Unused MSC-CUs handling rules

PAD Encoder flags for enhanced legacy-  
receiver compatibility  
DAB time signal format (short/long)  
STI-D/ETI subchannel extraction  
STI-C input or output option for  
autonomous and dynamic sub-  
multiplex management  
Extended STI-C: links one (redundant)  
Service multiplexer to multiple  
independent (redundant) Ensemble  
Multiplexers while maintaining full  
STI-C flexibility  
Resource management for Service  
Multiplexer input (CUs, FIC bitrate,  
DAB-IDs)  
Configuration of delay/ flags for  
individual modulators (MNSC)  
External remote audio encoders  
(including redundant setups) with full  
dynamic reconfiguration and PAD  
support

### **Multiplex configuration options:**

Ensemble ID, label (full/short), country,  
time zone  
Ensemble time zone (automatic daylight  
saving time adjustment)  
Transmission Modes I—IV  
Alternative frequency signalling (AFS) for  
the Ensemble  
Alarm announcement and test alarm  
announcement signalling, same and  
other ensemble (OE)

### **Service signalling options:**

Primary / Secondary service components  
Multiple audio PAD components  
Service ID, country (audio/data)  
Service Label, Primary and Secondary  
Service Component DAB Label  
(full/short)  
Program type (standard/  
complementary, static/ dynamic)  
Dynamic PTy signalling (e.g. UECP)  
Dynamic Active Linkage Set (LSN)  
signalling  
Signalling of (in-)active Linkage Sets  
Service Component ID  
Service Component Information SCI  
(mandatory for DAB v2)  
Service Component language  
(primary/secondary static/dynamic)  
Announcement Signalling (road traffic,  
transport, warning/service, news,  
area weather, event, special event,  
programme, sport, financial,  
proprietary IDs), same and other  
ensemble (OE)  
Dynamic Announcement support  
signalling (no reconfiguration is  
needed if some announcements are  
temporarily not supported)  
Service AFS (alternative frequencies  
individual DAB service, service linking  
to DAB, DRM, AM, AMSS, FM, FM-RDS  
services)

### **Output Signal Management:**

Extended broadcast info (Ensemble  
configuration, FIG layout)  
Live monitoring of the DAB Ensemble  
Multiplex Generator output signal  
through the web interface, as a  
receiver would decode and present  
the data (Dynamic Labels (incl. DL  
Plus, Intellitext), Journaline, Slideshow  
decoding incl. transmission statistics;  
audio streams via HTTP)  
Recording of the DAB Ensemble  
Multiplex Generator output signal  
(ETI/STI) and file-download through  
the web interface;  
the duration can be pre-defined  
Powerful and complete in-depth analysis  
of any EDI, RDI, STI, ETI file, including  
format conversion and subchannel  
extraction

### **Efficient Small-Scale DAB:**

Localized EDI Multiplex Output allows a  
single DAB ContentServer to generate  
multiple small-scale DAB multiplexes  
Each EDI output represents a fully valid  
EDI ensemble multiplex, while  
carrying an individual sub-set of DAB  
Services.

### **Advanced System Features**

#### **Redundancy Group Feature:**

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

#### **EDI (DCP) Switch:**

Ensures that the best available EDI  
output stream (i.e. with fewest errors  
such as audio silence) from the  
members of a Redundancy Group is  
forwarded to downstream devices  
Multi-EDI mode: each member of a  
Redundancy Group independently  
sends the identical (best available) EDI  
version to downstream devices  
Single-EDI mode: only one member of  
the Redundancy Group sends the best  
available EDI stream to all  
downstream devices

---

## **EWF – Emergency Warning**

### **Functionality:**

Full support of EWF for immediate mass-notification of listeners via DAB in cases of pending disasters:

emergency audio programme via DAB+/DAB Classic, Journaline for detailed multilingual text instructions and geo-region definition, (test) alarm announcement (incl. OE) and AFS signalling, dynamic reconfigurations  
Import interface for standardized CAP/MoWaS conforming notifications, triggering the automatic generation and broadcast of Journaline (incl. affected region definition), DL 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  
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 DAB

Ensemble Multiplex distribution to DAB Modulators/transmitters  
Secure 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 EDI based in- and output (STI, ETI) & external audio encoders  
Validity checks and comparisons for redundant input/output streams  
EDI reports allow EDI targets to inform EDI sources (ensemble or service multiplexer) about quality of contribution network

### **Infrastructure and Setup**

---

The Fraunhofer DAB 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.

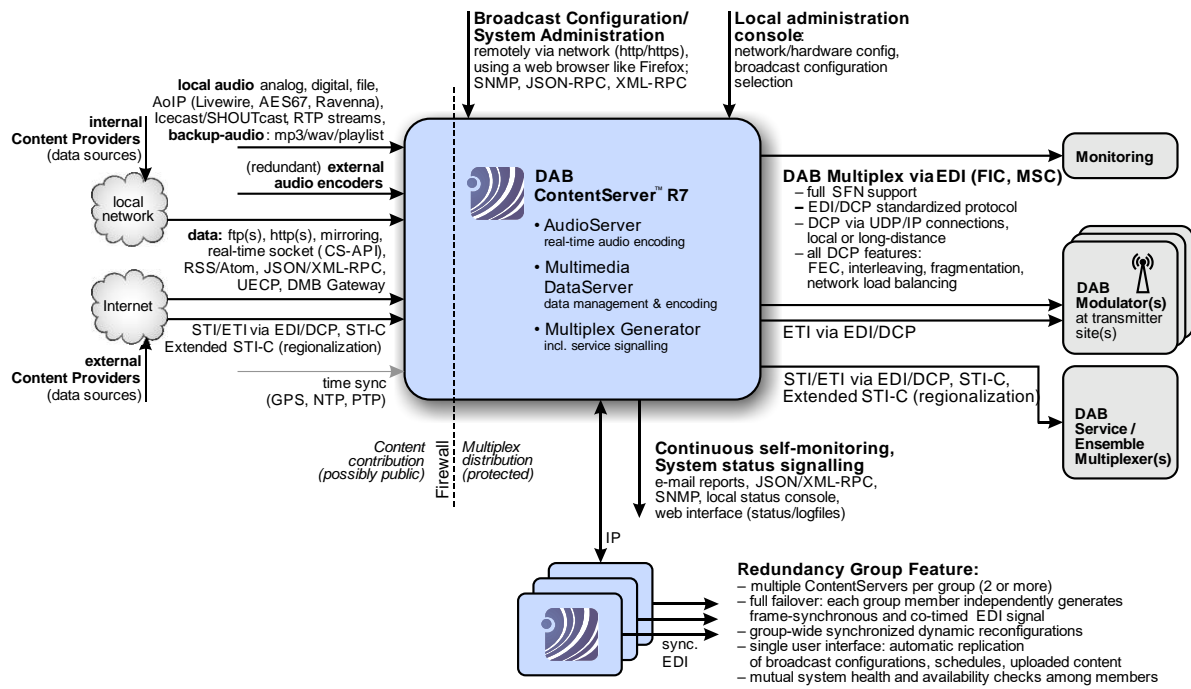
The strong firewall functionality guards access to the system. The Professional Firewall option enables the configuration of multiple network cards, VLAN, multi-homing, and port bonding.

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).

Link redundancy: each EDI or MuxEnc based input stream can be received through multiple network ports simultaneously to enable contribution over independent network connections.

If the EDI/DCP output signal of the DAB ContentServer shall be fed simultaneously to a virtually unlimited number of DAB 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), NTP access (network time protocol) and PTP (precision time protocol) via IP network.

---



## Product Lines

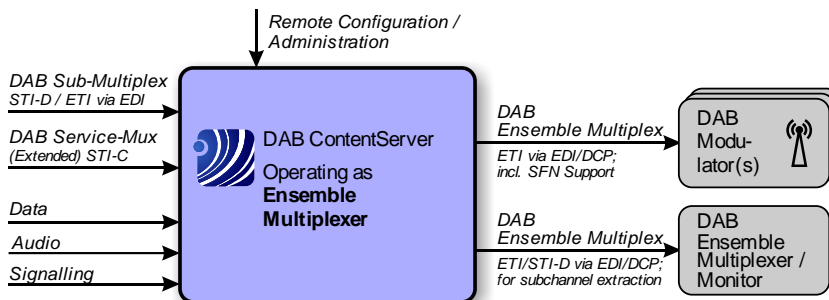
To complement individual needs and infrastructure requirements, the Fraunhofer DAB ContentServer is available in various configurations to allow for a most flexible combination and individual setup of the broadcast chain.

A DAB ContentServer can either be operated as a **DAB Ensemble Multiplexer** or as a **DAB Service Multiplexer** (each option with or without integrated audio and data encoders).

- ### Fraunhofer DAB ContentServer R7 – Ensemble Multiplexer

Combines audio encoding, multimedia and data service management, and DMB gateways with a DAB Ensemble Multiplex generator to a **full single-server DAB head-end solution**. The output format is a complete DAB ensemble multiplex signal (ETI) via standard EDI/DCP interface for direct delivery to DAB modulators. Optionally DAB subchannels can be extracted from ETI or STI-D input streams provided via EDI. Optionally STI-C is available as an input option to accept autonomously generated DAB sub-multiplex signals from DAB Service Multiplexers.

Multiple Ensemble Multiplexers can operate as a Redundancy Group, i.e. offering a single configuration and data upload interface, while generating frame-synchronous EDI output signals with enhanced status signaling for instant switching by the EDI/ETI converter or DAB Modulator – keeping a continuously modulated signal on-air.

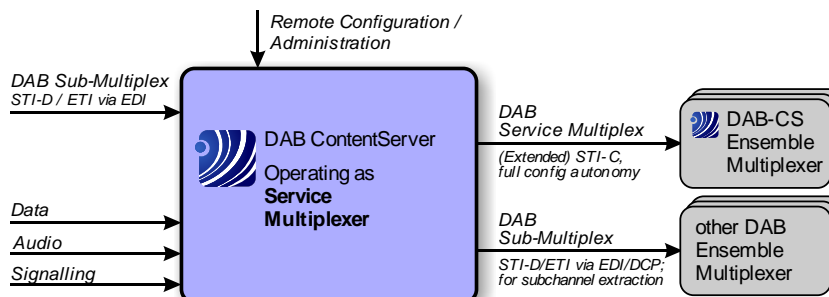


- ### Fraunhofer DAB ContentServer R7 – Service Multiplexer

Combines audio encoding, multimedia and data service management, and DMB gateways with a DAB Service Multiplex generator. The output format is a DAB sub-multiplex signal (ETI or STI-D) via standard EDI/DCP interface for direct delivery to a DAB Ensemble Multiplexers.

STI-C output allows for autonomous configuration and dynamic reconfiguration of the full service multiplex signal within the limits defined by the Ensemble Multiplexer.

Multiple Service Multiplexers can operate as a Redundancy Group and feed their output signal (including STI-C support) to a set of Ensemble Multiplexers (operating as a Redundancy Group themselves).



---

## Editions

---

The Fraunhofer DAB ContentServer R7 in the form of multiple Editions:  
Basic and Professional for regular broadcasting,  
and Developer for receiver and broadcast equipment development and testing.

All Editions share all basic DAB 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.

- **Basic Edition**  
A starter kit for smaller broadcasters with the option of future extension to satisfy new requirements.
- **Professional Edition**  
Extends the Basic Edition by adding professional automation features, and provides the full range of broadcaster-specific data transmissions as well as standardized multimedia applications.
- **Developer Edition**  
In addition, the Developer Edition provides support for the quick and efficient development and testing of DAB receivers and broadcast equipment. Based on the **Ensemble Multiplexer product line**, it makes the complete functionality of the DAB 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 setup easily in combination with a DAB Modulator.

Product Line	Edition (option package)		
	Ensemble Multiplexer or Service Multiplexer		
Available options	Basic	Professional	Developer
<b>General System Features</b>			
Firewall Basic	✓	✗	✗
Firewall Professional (configuration of multiple network cards, VLAN, multi-homing, network port bonding)	–	✓	✗
Support for serial devices (GPS receiver, etc.)	✓	✓	–
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 config overview)	–	✓	✗
Remote System Update (via web GUI)	–	✓	–
Redundancy Group Feature	✓	✓	✗
Audio Cross-Redundancy (requires Redundancy Group)	–	✓	✗
EDI/RDI/ETI/STI Analyzer/Converter	–	–	✓
<b>Data Input / Output Options</b>			
STI-C output option [Service Multiplexer only]	✓	✓	✗
STI-C input option [Ensemble Multiplexer only]	–	✓	✗
Extended STI-C (requires STI-C)	–	✓	✗
Number of EDI (ETI or STI-D) inputs (subch. extraction)	–	2	✗
DCP input/output monitoring (network analyzer)	–	✓	✗
EDI reports (quality of contribution network)	–	✓	✗
EDI Switch (requires Redundancy Group)	–	✓	✗
Localized EDI Multiplex Output	–	✓	✗
<b>Multiplex Configuration &amp; Management</b>			
Unlimited simultaneous DAB Multiplex configuration definitions	✓	✓	✓
CAP (Common Alerting Protocol) import for EWF	✓	✓	✓
Broadcast Scheduler (weekly/calendar)	–	✓	–
Announcement support (via UECP, Funkhaustelegramm, Leitungsprotokoll, HTML interface, opt. JSON/XML-RPC)	–	✓	✓
OE Announcement support (Other Ensemble)	–	✓	✓
Dynamic Announcement support signalling (via realtime interface, opt. JSON/XML-RPC)	–	✓	✓
AFS – Alternative Frequency Editor	–	✓	✓
Dynamic Active Linkage Set (LSN) signalling (via realtime interface, opt. JSON/XML-RPC)	–	✓	✓
Dynamic PTy signalling (via UECP, realtime interface, opt. JSON/XML-RPC)	–	✓	✓
Service Component Information (SCI) signalling	–	✓	✓
TII & Region Definitions Editor	–	✓	✓
Extended broadcast info (Ensemble configuration, FIG Layout)	–	✓	✓
Multiplexer output live monitoring (audio/subchannel HTTP streaming; Dynamic Label, Journaline, Slideshow decoding)	–	✓	✓
Multiplexer output ETI / STI recording	–	✓	✓
Support for external audio encoders (MuxEnc)	–	✓	–
<b>DMB Gateway</b>			
DMB audio/video stream inputs (1, 3, or unlimited)	–	–	–

Product Line	Edition (option package)		
	Ensemble Multiplexer or Service Multiplexer		
Available options	Basic	Professional	Developer
<b>DAB AudioServer<sup>(1)</sup></b>			
Audio input live analog and/or digital	– <sup>(2)</sup>	✓	✗
Audio-over-IP (AoIP) input: AES67, Livewire, Ravenna	– <sup>(2)</sup>	✓	✗
RTP based input (AAC, uncompressed); RTP monitoring	– <sup>(2)</sup>	✓	✗
Icecast/SHOUTcast audio input (mp2, mp3, AAC)	– <sup>(2)</sup>	✓	✗
Audio file source: mp3, wav, playlist	–	✓	✓
Backup/Standby Audio Source	–	✓	✗
Silence/clipping detection and configuration	✓	✓	–
Audio level limiter	–	✓	–
Audio Loudness Normalization (target LUFS level)	–	✓	–
Audio input signal amplification/ mp3 normalization	–	✓	–
DAB Classic encoders (Layer II) [max. 64]	–	–	–
DAB+ encoders [max. 64]	–	–	1
DMB-Audio/Radio encoders [max. 64]	–	–	–
DAB+ Surround option incl. SX Pro (SX Pro enhances stereo signals on-the-fly to 5.1 surround)	✓	✓	✓
<b>Multimedia DataServer</b>			
Data Application Types			
Dynamic Labels	✓	✓	✓
Dynamic Labels Plus (DL Plus), Intellitext	–	✓	✓
Journaline® (incl. live ticker pages)	✓	✓	✓
Journaline® recently played song listing (from DL Plus)	✓	✓	✓
MOT Slideshow (incl. categorized/interactive SLS)	✓	✓	✓
SPI / EPG – Electronic Programme Guide	–	✓	✓
MOT Broadcast Website/ Transparent File Transmission	–	✓	✓
Filecasting	–	✓	✓
TPEG Traffic Information	–	✓	✓
TMC – Traffic Message Channel	–	✓	✓
IP Insertion	–	✓	✓
TDC – raw data (broadcaster-specific data on various protocol level; incl. FIC signaling)	–	✓	✓
FIC Data Insertion (FIDC, SI, CA)	–	✓	✓
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 (Dynamic Labels)	–	✓	–
Import via HTTP/FTP mirroring	–	✓	–
Import via JSON-RPC, XML-RPC	–	✓	–
Import via live socket connection (API)	–	✓	✓
Import from Funkhaustelegramm, UECP, Zenon, Leitungsprotokoll (Dynamic Labels + Journaline®)	–	✓	–
Axia GPIO node (for announcement triggers)	–	✓	–
Automatic Scheduled Mirroring option	–	✓	–
Secure data import connections	–	✓	✗

<sup>(1)</sup> DAB AudioServer options are available when at least one (internal) audio encoder license is activated for the system

<sup>(2)</sup> The Basic Edition includes a single 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 DAB 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 DAB ContentServer are contained in the general product description above ('Feature List').
- All Editions can be installed on suitable server hardware. 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 DAB ContentServer**, on Eureka 147 DAB and Multimedia Services is available upon request.