www.izt-labs.de

IZT
Innovationszentrum
Telekommunikationstechnik

IZT DAB ContentServer™

Digital Radio Multiplexer System

- Real-time DAB, DAB+ and DMB Audio encoding
- Data service and multimedia management
- Service or ensemble multiplex generation
- Reliable and efficient operation of DAB head-ends
- Developer edition for receiver testing

IZT DAB ContentServer™
Digital Radio Multiplexer System

The IZT DAB ContentServer is a highly reliable professional broadcast system for DAB, DAB+ and DMB. It combines audio encoding, data service management and multiplex generation in one device.

- **Complete Functionality**
  All options offered by the family of DAB standards.
- **Perfect Match**
  Suits your needs and infrastructure environment and adapts flexibly to changing requirements.
- **Green & Efficient**
  Brings valuable savings in terms of rack space, energy cost and maintenance.
- **Keeps You on Air – At all Times**
  Exceptional reliability – permanently proven in numerous installations worldwide.

Overview

The IZT DAB ContentServer is the choice for an efficient and reliable operation of Digital Radio networks. It not only performs multiplexing, but also includes audio encoding, a DMB gateway as well as handling of all DAB/DMB data and audio services.

The system's interfacing capabilities integrate smoothly with broadcast infrastructures. Typically located in DAB head-ends, in playout centers or at the transmitter site, the IZT DAB ContentServer allows full remote control for administration and data provision. The IZT DAB ContentServer supports all content and signaling options DAB offers.

The IZT DAB ContentServer is based on Fraunhofer technology and is operated on highly available standard server hardware. External audio inputs and EDI/ETI converters can optionally be added to the system configuration.

Moreover, the IZT DAB ContentServer can be used as eligible laboratory tool – for example to develop, test and verify DAB receivers.

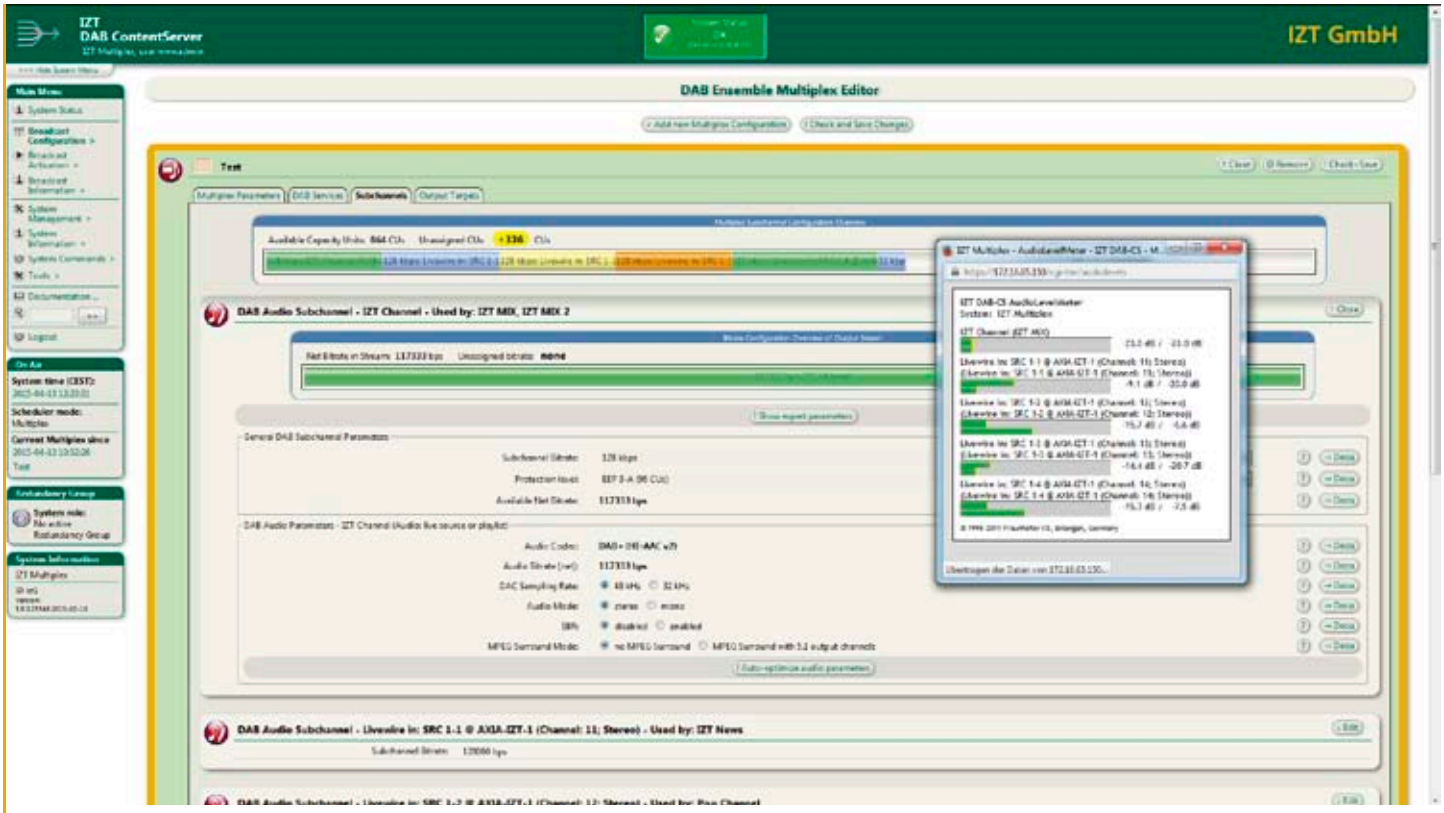

FIGURE 1: THE REMOTE WEB INTERFACE FOR QUICK AND CONVENIENT SYSTEM CONFIGURATION AND MONITORING

Functionality

DAB AUDIO ENCODING

The system embodies encoding of multiple simultaneous audio streams in real-time. It supports MPEG Audio Layer-2 for DAB as well as MPEG-4 HE-AACv2 as used in DAB+ and DMB.

The system supports Audio over IP (AoIP) via the Livewire protocol or according to AES67. Digital audio over AES3 or analog audio can be provided using external AoIP interfaces. Further, file formats such as mp3, wav and playlists can be handled.

Audio level monitoring is available via web browser. Clipping and silence detection, audio amplification and mp3 normalization make for a sophisticated audio management set-up. The audio encoder cross-redundancy allows highly reliable systems for network operators.

The IZT DAB ContentServer audio encoder fully supports insertion of PAD services.

MULTIMEDIA AND DATA SERVICE MANAGEMENT

This system component supports all standardized and broadcaster-specific data applications. It includes collection, import, merging of data as well as conversion, processing and broadcast encoding.

The range of standardized DAB applications includes Dynamic Labels, Journaline®, EPG, Slideshow and TPEG. Open interfaces enable the transmission of any custom-tailored and broadcaster-specific applications.

Versatile data import interfaces and automation features allow for a smooth integration into productive environments. The fully supported VLAN configuration allows enhanced network security and helps to save costs.

The full range of DAB service signaling options is supported. All combinations of DAB audio/data services with secondary service components and audio X-PAD data service components are possible, including shared secondary service components between DAB services.

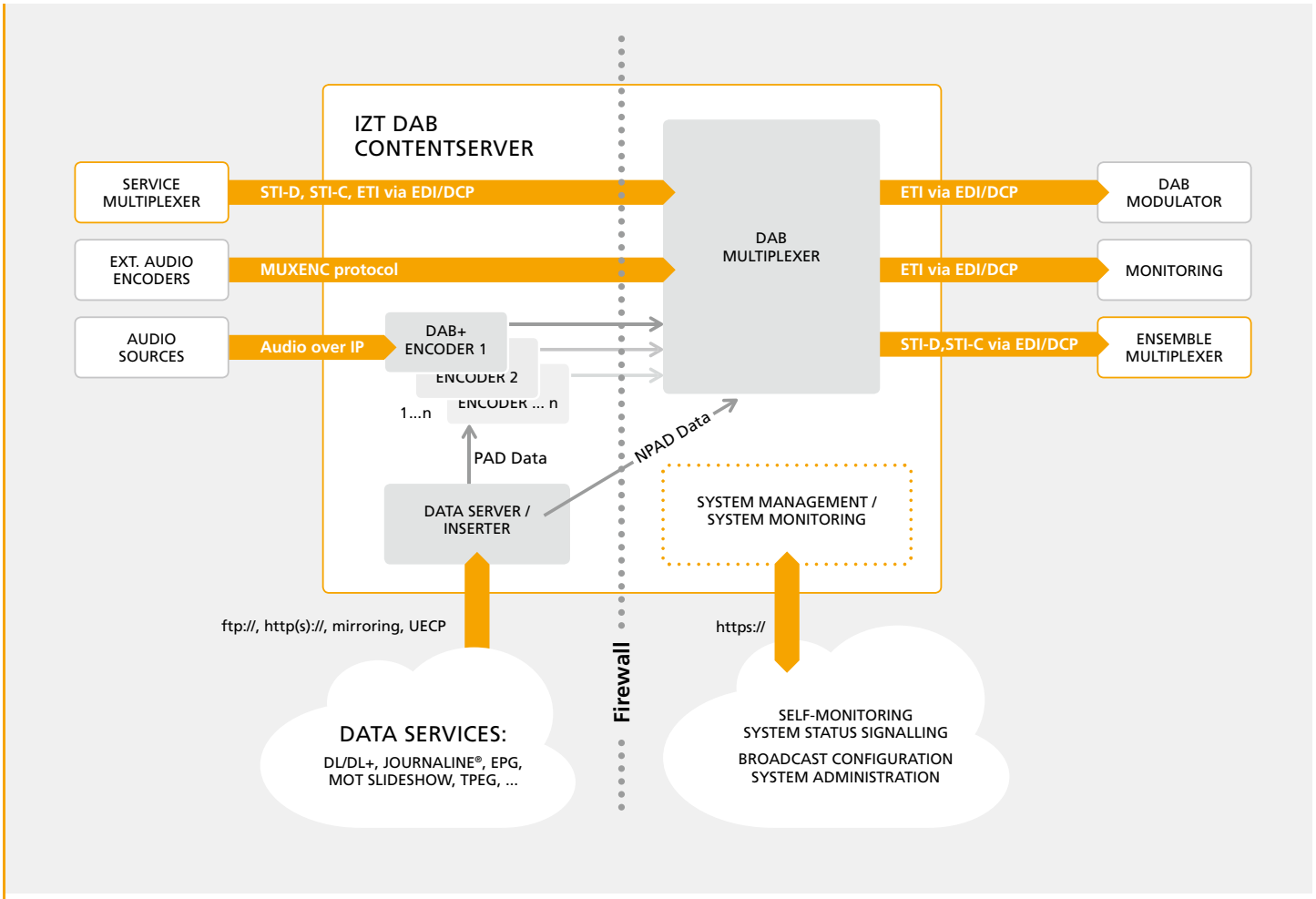

FIGURE 2: VERSATILE FUNCTIONALITY IN ONE BOX: AUDIO ENCODING, DATA SERVICE HANDLING AND MULTIPLEXING

Editions

DAB MULTIPLEX GENERATOR

The Multiplexer component manages the extensive DAB signaling capabilities and generates the complete digital DAB ensemble or service multiplex. The STI or ETI output signal is provided via standard EDI/DCP.

The supported signaling features include ensemble and service labels with all globally used characters, country and time information. In addition, Alternative Frequency signaling, TII and region definitions and all announcement types are supported.

An unlimited number of multiplex configurations can be defined in parallel. The automatic broadcast scheduling feature allows for manual or scheduled activation of multiplex configurations, dynamic reconfigurations based on a global broadcast calendar and weekly schedules.

Reconfigurations are performed seamlessly, i.e. continuous output frames are provided and no bit errors or audible artifacts occur. For services which cannot be seamless according to the standard, any audio glitches are reduced to a minimum.

SYSTEM CONFIGURATION AND USER INTERFACE

A convenient web interface allows easy and efficient handling of all daily configuration work and provides detailed system status information. The system is fully remotely accessible from administration PCs running on any operating system using a modern web browser.

DAB/DRM MULTIMEDIAPLAYER ADD-ON

The complementary MultimediaPlayer software can directly decode audio and data content from EDI streams. Hence, it can be used as a very powerful monitoring solution. At present, the software supports the digital radio standards DAB/DAB+ and Digital Radio Mondiale (DRM30/DRM+).

Along with reproducing radio programs in stereo and 5.1 surround sound, the MultimediaPlayer offers unique features – including the simultaneous presentation of album covers, text messages, weather forecasts and sports results directly in the player.

FIGURE 3: : THE MULTIMEDIAPLAYER ALLOWS LISTENING TO DIGITAL RADIO SERVICES AND DISPLAYING THE FULL SET OF DATA SERVICE FEATURES

The IZT DAB ContentServer is available in three editions – each providing basic DAB features plus a different level of enhanced system functionality matching different use scenarios. All editions can be extended easily with additional features at any time after the initial purchase.

BASIC EDITION

This edition makes fundamental DAB functionality available, for example as a Service Multiplexer for smaller broadcasters. It enables encoding of live audio inputs and handling of essential data services including Dynamic Labels MOT Slideshows and Journaline®. To satisfy additional requirements, options can be extended subsequently.

PROFESSIONAL EDITION

Additional professional features result in a comprehensive system, for example for DAB head-ends of larger broadcast networks. This edition allows thorough multiplex configuration and automation features. Moreover, the full range of broadcaster-specific data transmissions and standardized multimedia applications are supported.

DEVELOPER EDITION

The Developer Edition is a powerful solution for efficient development and testing of DAB devices such as chipsets, receivers or broadcast equipment. Operated as Ensemble Multiplexer, it makes the complete functionality of the DAB system with regards to signalling and transmittable content available for laboratory use (including dynamic reconfigurations).

A full broadcast chain with RF output can be set up easily with an external DAB Modulator. In combination with the **IZT S1000** signal generator, a versatile laboratory setup can be achieved. The DAB realtime modulator option for the IZT S1000 allows for a direct link between the IZT DAB Content Server and the IZT S1000 with the EDI protocol.

System Integration

OPERATION MODES

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

Service Multiplexer

Audio encoding, multimedia/data service management and DMB gateways are combined 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 DAB Ensemble Multiplexers.

In addition, 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 redundancy group and feed their output signal (including STI-C support) to a set of Ensemble Multiplexers (operating as a redundancy group themselves). In case of system failures, redundancy groups allow for a seamless changeover.

Ensemble Multiplexer

The IZT DAB ContentServer brings out a complete full single-server DAB head-end solution, comprising audio encoding, multimedia/data service management and DMB Gateways combined with an Ensemble Multiplex generator.

The ensemble multiplex can be generated in a one-stage process from the audio and data inputs. In addition, sub-multiplexes from specific content providers can be incorporated. 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. The STI-C input option accepts autonomously generated DAB sub-multiplex signals from DAB Service Multiplexers.

Multiple Ensemble Multiplexers can operate as 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.

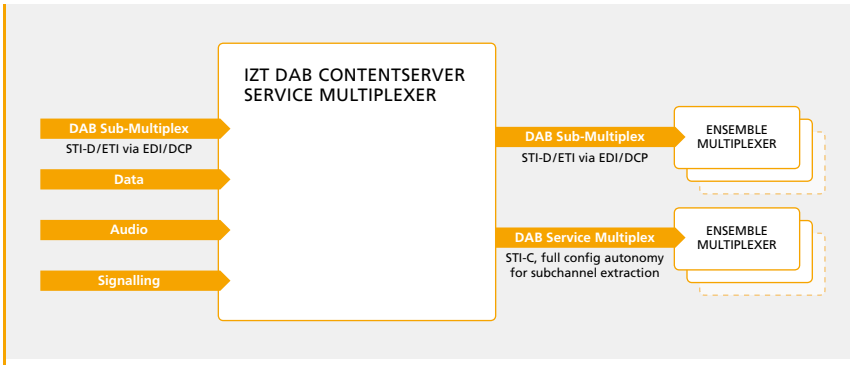

FIGURE 4: SERVICE MULTIPLEXER

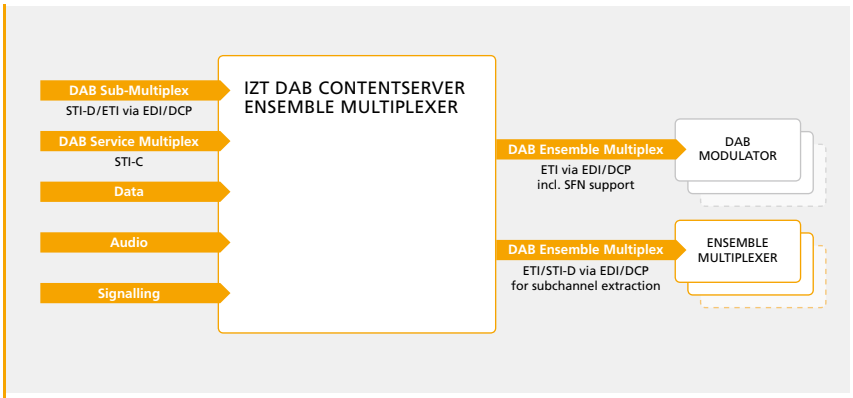

FIGURE 5: ENSEMBLE MULTIPLEXER

SYSTEM MANAGEMENT INTERFACES

The IZT DAB ContentServer provides APIs for convenient integration of the system into infrastructures. An SNMP interface permits querying system parameters as well as starting system commands or activating multiplex configurations and schedules.

Using the ContentServer's JSON/XML RPC interface, URL calls can be used for data provision, activation of multiplex configurations and setting multiplex parameters (e.g. Programme Type and Announcements). In addition, broadcast and system information can be queried.

REDUNDANCY

A redundancy group combines two or more ContentServer systems that are treated as one single unit. One of these systems is the "Redundancy Authority", all other systems are "Redundancy Shadows". If the "Redundancy Authority" should fail (or if the user explicitly chooses to transfer the Authority), one of the Shadows seamlessly takes over the role as "Redundancy Authority".

All configuration and data upload is made at the "Redundancy Authority", which then forwards all changes to all "Redundancy Shadows". The members of a redundancy group are linked by IP multicast, each generating a frame-synchronous and co-timed output signal. Reconfigurations are synchronized among all group members whether triggered manually, through API or automatically according to the scheduler.

FIGURE 6: EXCEPTIONAL RELIABILITY AND FLEXIBILITY FOR DAB HEAD-ENDS

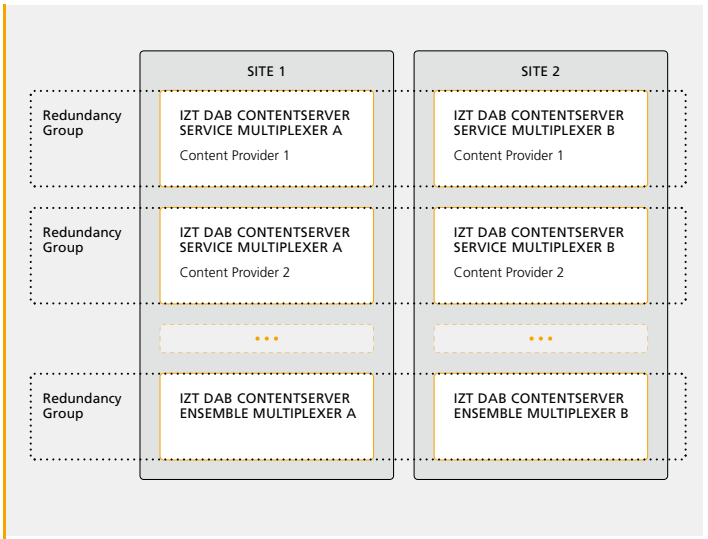

FIGURE 7: REDUNDANCY GROUPS IN A DAB HEADEND

SETUP AND INFRASTRUCTURE

The IZT DAB ContentServer is typically assembled as a highly available and redundant 24/7 server hardware system. Administration, system configuration and data provision are based on Ethernet network or modem dial-in connections for a completely remote operation.

To ensure safe and reliable operation, the IZT DAB ContentServer includes a sophisticated redundancy management, a professional system firewall and continuous self-monitoring. The system status is signaled through email report system, console output, web interface, relay card and SNMP.

The strong firewall functionality guards the access to the system. A detailed user management is provided to control system access and data contribution sources.

The generated output signal can be delivered to any number of DAB modulators at various transmitter sites in parallel with full Single Frequency Network (SFN) support. To synchronize the system, the IZT ContentServer supports GPS receiver input via serial interface or NTP access via network.

The web interface allows for live monitoring of the output signal. Providing an overview of the services/sub-channels of a broadcast multiplex, this includes details about each service component including parameters of service provision. Moreover, it is possible to record the ETI multiplex signal and each individual sub-channel for further analysis and trouble-shooting.

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

SERVICE AND SUPPORT

IZT offers the full range of support in the field of building systems for DAB multiplexing. This includes expert consultation, systems dimensioning, configuration and integration as well as commissioning and system support.

The experienced IZT support team provides system engineering consultancy and assistance in designing system architectures and in integrating the IZT DAB ContentServer into broadcast infrastructures. Every customer's specific requirements are taken into account to provide tailored solutions that can include audio interfacing, EDI/ETI converters, redundancy switches, synchronization equipment and more.

Application Scenarios

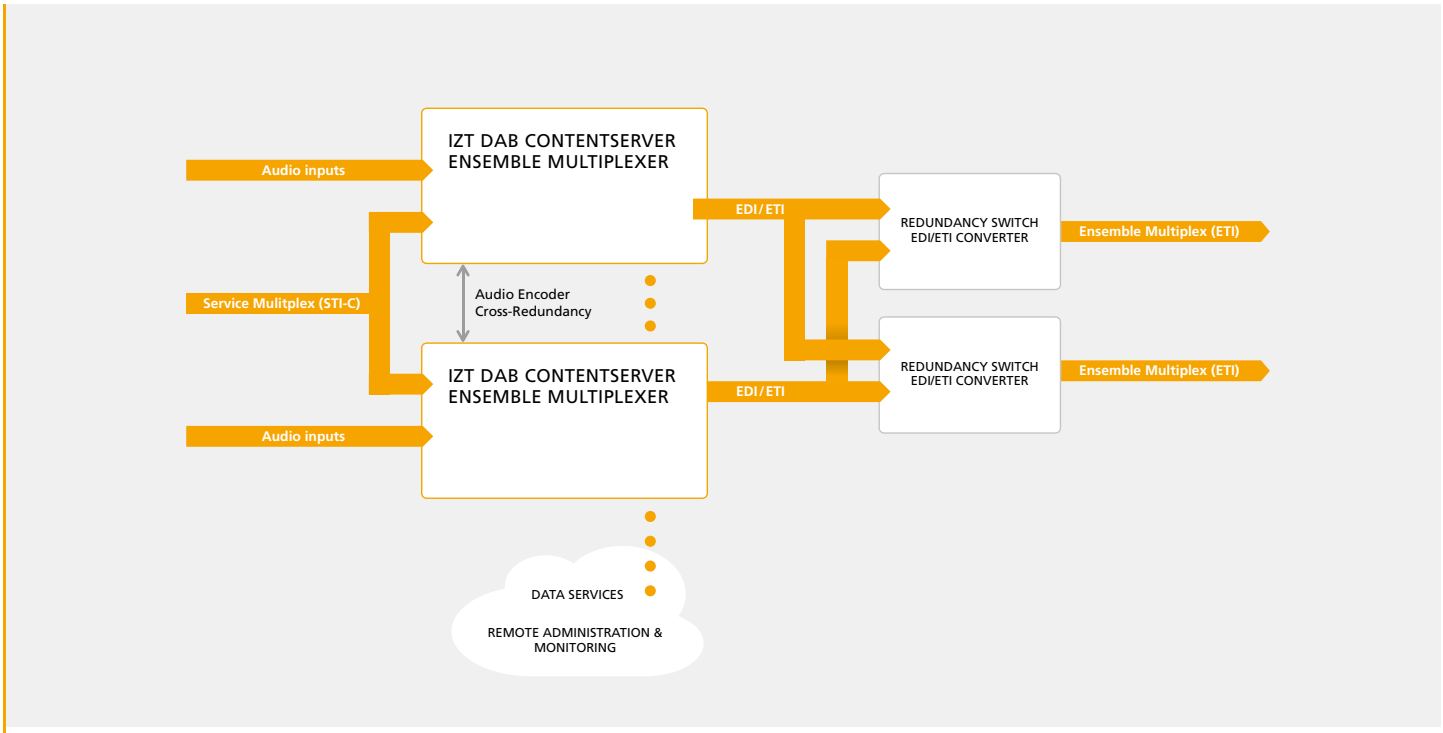

FIGURE 8: REDUNDANT DAB HEAD-END – TWO ENSEMBLE MULTIPLEXERS FORM A REDUNDANCY GROUP

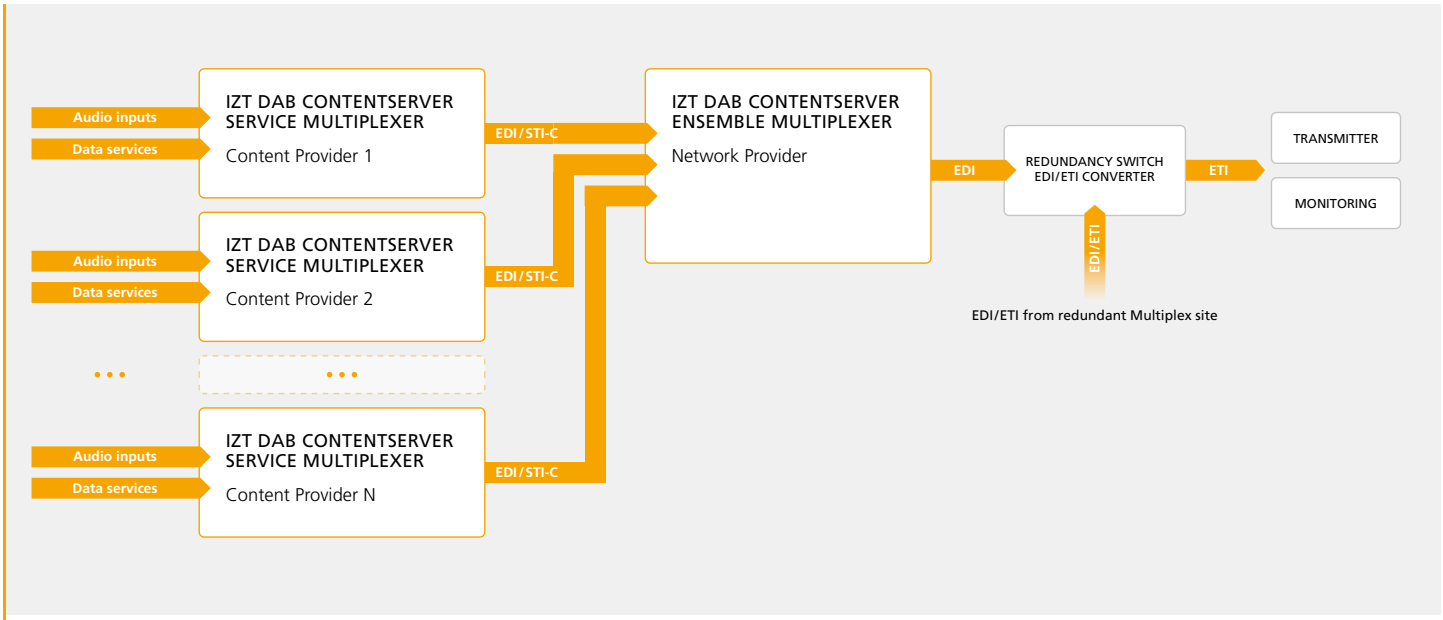

FIGURE 9: SERVICE/ENSEMBLE MULTIPLEX ARCHITECTURE – CLEAR INTERFACES BETWEEN SERVICE PROVIDERS AND NETWORK

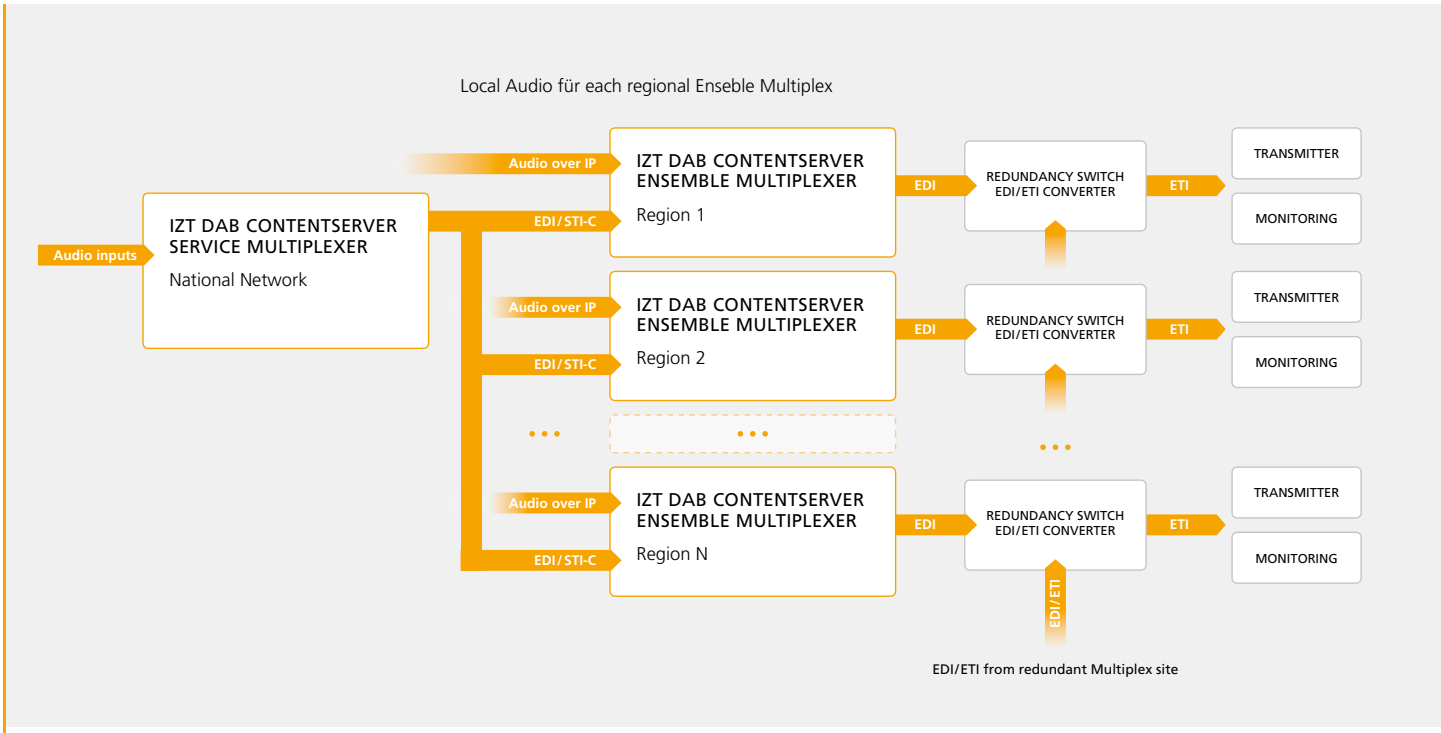

FIGURE 10: REGIONALIZATION IN A NATION-WIDE NETWORK

The IZT DAB ContentServer is the right choice for a variety of broadcast infrastructure setups. Be it a conventional Service/Ensemble Multiplexer architecture or the deployment of regional ensembles – the IZT DAB ContentServer integrates smoothly and reliably.

Redundant head-end installations protect against failure and disaster scenarios. In figure 7, two Ensemble Multiplexers form a redundancy group. If the main multiplexer fails, the redundancy switch immediately falls back to the spare multiplexer. Enhanced redundancy features such as the audio encoder cross-redundancy further improve system reliability.

Figure 8 shows a typical service/ensemble Multiplex architecture with clear interfaces between service providers and network. This setup is common if an ensemble comprises services from different content providers.

The system architecture outlined in figure 9 enables regional deployment of a national DAB network. A Service Multiplexer generates a multiplex with nation-wide services. Regional services can be added by the respective regional Ensemble Mulitplexers.

Specifications / Available options
IZT DAB ContentServer™

General System Features	Basic	Professional	Developer
Firewall Basic	●		
Firewall Professional	○	●	
Support for serial devices (GPS receiver, modem, etc.)	●	●	○
Automatic leap second handling	●	●	●
System checks (continuous self-monitoring)	●	●	
System configuration backup (at console)	●	●	●
System configuration remote up-/download	●	●	
E-mail reports	●	●	
SNMP interface	●	●	
Security summary (network config overview)	○	●	
Remote system update	○	●	○
Redundancy group feature	●	●	
Audio cross-redundancy	○	●	
ETI/STI/EDI/RDI analyzer/converter	○	○	●

Data Input / Output	Basic	Professional	Developer
STI-C output (if operated as Service Multiplexer)	●	●	
STI-C input (if operated as Ensemble Multiplexer)	○	●	
Extended STI-C (requires STI-C)	○	●	
Number of EDI (ETI or STI-D) **inputs** (subchannel extraction)	○	2 included	○
DCP input/output Monitoring (network analyzer)	○	○	○

Multiplex Configuration & Management	Basic	Professional	Developer
Unlimited simultaneous multiplex output configuration definitions	●	●	●
Broadcast scheduler (weekly/calendar)	○	●	○
Announcement support via UECP, Funkhaustelegramm, Leitungsprotokoll, HTML interface	○	●	●
AFS – Alternative Frequency editor	○	●	●
TII & Region Definitions editor	○	●	●
Extended broadcast info (Ensemble configuration, FIG Layout)	○	●	●
Multiplexer output live monitoring (audio/subchannel HTTP streaming; Slideshow, Dynamic Label decoding, Journaline®)	○	●	●
Multiplexer output EDI/ETI/subchannel recording	○	●	●

DMB Gateway	Basic	Professional	Developer
DMB audio/video stream inputs (1, 3, or unlimited)	○	○	○

ALL EDITIONS CAN BE EXTENDED WITH ADDITIONAL FEATURES.

● OPTION IS INCLUDED IN THE PACKAGE
○ OPTION IS NOT INCLUDED BUT CAN BE ADDED TO THE PACKAGE

DAB AudioServer *)	Basic	Professional	Developer
Audio input live analog/digital/Audio over IP	●	●	○
Audio input as mp3/wav, playlist	○	●	●
Backup audio source	○	●	○
Silence/clipping detection and configuration	●	●	○
Audio input signal amplification/mp3 normalization	○	●	○
DAB Classic encoders (Layer II – max. 64)	○	○	○
DAB+ encoders (max. 64)	○	○	1 included
DMB-Audio/Radio encoders (max. 64)	○	○	○
DAB Surround option incl. SX Pro (stereo to 5.1 upmix)	●	●	●
Support for external audio encoders (MuxEnc protocol)	○	●	○

Multimedia DataServer – Data Application Types	Basic	Professional	Developer
Dynamic Labels	●	●	●
Dynamic Labels Plus (DL Plus), **Intellitext**	○	●	●
Journaline®	●	●	●
MOT Slideshow (incl. categorized/interactive SLS)	●	●	●
Electronic Programme Guide (EPG)	○	●	●
MOT Broadcast website/transparent file transmission	○	●	●
Filecasting	○	●	●
TPEG Traffic Information	○	●	●
Traffic Message Channel (TMC)	○	●	●
IP insertion	○	●	●
TDC – raw data (broadcaster-specific data on various protocol levels; incl. FIC signaling)	○	●	●
FIC Data Insertion (FIDC, SI, CA)	○	●	●
Support for multiple transmission priority classes	●	●	●

Multimedia DataServer – Data Import Methods	Basic	Professional	Developer
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 live socket connection (API)	○	●	●
Import from Funkhaustelegramm, UECP, Zenon, Leitungsprotokoll (Dynamic Labels + Journaline®)	○	●	○
Automatic scheduled mirroring option	○	●	○
Secure data import connections	○	●	

*) DAB AUDIOSERVER OPTIONS ARE AVAILABLE IF AT LEAST ONE AUDIO ENCODER LICENSE IS ACTIVATED FOR THE SYSTEM

IZT DAB ContentServer™
Digital Radio Multiplexer System

Ordering Guide			
Editions for Professional Broadcasting	**IZT DABCS-010**	DAB ContentServer Basic Edition	Essential DAB Functionality. Option package according to feature table
	IZT DABCS-030	DAB ContentServer Professional Edition	Full range of professional broadcast functionality. Option package according to feature table
Editions for Receiver Development and Testing	**IZT S1000-407**	DAB ContentServer Embedded Edition	Basic development and testing of DAB equipment (includes one DAB+ Encoder license) Only available as IZT S1000 option
	IZT DABCS-060	DAB ContentServer Developer Edition	Full-featured development and testing of DAB equipment (includes one DAB+ Encoder license) Option Package according to feature table
Typical Options	**IZT DABCS-201**	DAB Audio Encoder	Additional MPEG Audio Layer-II audio encoder license*
	IZT DABCS-202	DAB+ Audio Encoder	Additional MPEG-4 HE-AAC v2 audio encoder license*
	IZT DABCS-203	DMB Audio Encoder	Additional MPEG-4 HE-AAC v2 audio encoder license*
	IZT DABCS-211	DCP (EDI/MDI) Monitor license	Monitoring of input/output DCP streams (network analyzer). E.g. output monitoring of a redundant pair of multiplexers
	IZT DABCS-212	ETI/EDI/RDI Splitter/ Converter/Analyzer license	Format conversion, subchannel/FIC extraction, analysis of DAB ensembles
	IZT DABCS-213	DMB Gateway license	DMB data insertion (unlimited audio/video input streams)
	IZT DABCS-301	Upgrade EPG	Adds Electronic Program Guide (EPG) license to Basic Edition or Embedded Edition
	IZT DABCS-302	Live Audio Input Upgrade	Adds live audio input to Developer Edition
	IZT DABCS-303	First EDI Input	Adds first EDI input to Basic Edition
	IZT DABCS-304	Additional EDI Input License	Adds one EDI input
Hardware platforms	HPE ProLiant or Dell PowerEdge servers depending on customer needs and performance requirements		
	Installation on virtual machines is possible		
Peripheral Equipment	IZT provides Livewire nodes from Axia and EDI/ETI converters/switches to complete setups		

* MAX. 64 IN TOTAL PER SYSTEM; HARDWARE RESTRICTIONS MAY APPLY
INDIVIDUAL FEATURE UPGRADES AND MODIFICATIONS MAY BE AVAILABLE ON REQUEST.

We provide your complete DAB head-end starting from small-scale setups up to complex, redundant DAB networks. Please contact us for more information and an individual proposal.

WORLD DAB
IZT is member of WorldDAB.

About IZT The Innovationszentrum fuer Telekommunikationstechnik GmbH IZT specializes in the most advanced digital signal processing and field programmable gate array (FPGA) designs in combination with high frequency and microwave technology.

The product portfolio includes equipment for signal generation, receivers for signal monitoring and recording, transmitters for digital broadcast, digital radio systems, and channel simulators. IZT offers powerful platforms and customized solutions for high signal bandwidth and real-time signal processing applications. The product and project business is managed from the principal office located in Erlangen/Germany. IZT distributes its products worldwide together with its international strategic partners.The IZT quality management system is ISO 9001:2000 certified.

DEKRA

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Telekommunikationstechnik

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