

PANEDA GROUP · NORWAY &amp; SWEDEN

# Complete solutions for digital radio. DAB technology experts.

Paneda develops and provides innovative, state-of-the-art solutions for digital radio — from DAB head-end systems for broadcasters to emergency break-in systems for road tunnels.

 **ISO 9001:2015 CERTIFIED**
**200+**

DAB head-end  
systems

**250+**

tunnels with Paneda  
break-in

**2001**

Founded in Selje, Norway

**200+**

DAB head-end systems in operation worldwide

**250+**

Tunnels equipped with Paneda systems

**50+**

Transmitter sites in our own TV  
network

## About us WHO WE ARE

### — DAB technology experts SINCE 2001

Paneda is active in the area of digital radio (DAB+) and, with some of the most experienced staff in the industry, develops DAB products for professional applications. Through targeted research and development, Paneda helps take DAB technology to new standards — and has made it **significantly easier and more cost-effective** to start with DAB today.



#### Selje, Norway

Head office — sales, support  
and tunnel installations.


#### Linköping, Sweden

Development centre —  
hardware and software.


#### Paneda 24/7 NOC

Monitoring and supervision of  
customer systems.

### — World-leading in tunnels and head-end

Paneda is the **world-leading provider of DAB break-in systems for tunnels** and a major supplier of DAB head-end systems, with hundreds of installed systems around the world. Our customers range from public broadcasters and national network operators to road authorities.

### — Turnkey solutions

Paneda often acts as system integrator. With our own technician team we handle both project management and installation, and with an extensive network of partners we deliver **complete turnkey solutions**. New products are developed continuously — often customer-driven, with our customers as a natural part of the development.

#### BUSINESS IDEA

*“Developing and providing innovative, state-of-the-art solutions for digital radio.”*

#### OUR VISION

*“The preferred long-term DAB partner.”*

## Highlights

PANEDA GROUP


**AWARDS**

### Awarded for innovation RECOGNITION

Paneda has been awarded a number of times for its innovative technology and fast growth — and is certified according to ISO 9001:2015.



### Management

PANEDA GROUP

Experienced leadership in digital radio and broadcasting.



#### Lena Flølo

CEO, Paneda Norway



#### Geir Gjøsrovik

Chairman of the Board-Paneda Group



#### Oddvar Flølo

Senior Advisor &amp; Founder



#### Lars-Peder Lundgren

CEO Paneda Sweden & Marketing  
Director, Paneda Group

## FOUR BUSINESS AREAS

## One DAB partner. Four areas.

Paneda delivers digital radio from the studio to on-air, to tunnels, warns people and infrastructure in an emergency — and operates its own TV network in Norway.

## HEAD-END

**200+ systems**

## TUNNELS

**250+ tunnels**

## WARNING

**1 s action**

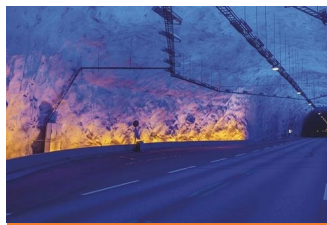
## TV NETWORK

**50+ sites**


### DAB Head-End

## BROADCASTERS

Complete DAB multiplexing — audio encoders, data insertion and management.

**200+** systems


### Tunnel systems

## ROAD AUTHORITIES

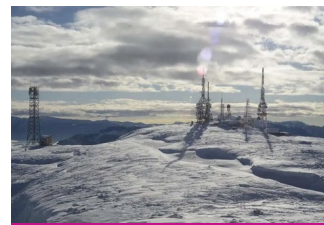
DAB, FM and VHF systems for tunnels, with emergency break-in since 2008.

**250+** tunnels


### Emergency warning

## NEW CONCEPT

PWS and ASA — warnings to people and infrastructure over existing DAB+ networks.

**1 s** action time


### TV networks

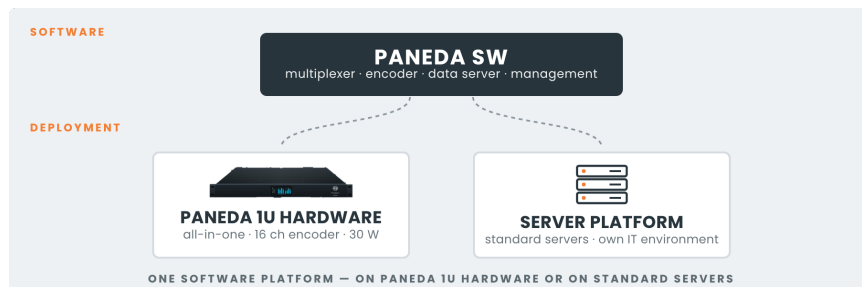
## NORWAY · DVB-T2

Paneda has built, owns and operates a national DVB-T2 TV network, used by NRK among others.

**50+** sites

## DAB Head-End BUSINESS AREA

Paneda offers a complete range of products for **DAB multiplexing**, including audio encoders, data insertion and management, compliant with ETSI EN 300 401. Unique **virtual provider handling** lets each radio station operate, manage and monitor its own services, while **SMART content switching** provides seamless redundancy.



One Paneda software platform — on Paneda 1U hardware or on standard servers.

### — DAB as a service

Paneda offers several different business models. With what we call **Pay-As-You-Go**, Paneda takes responsibility for the entire platform for a monthly fee — with **no investment costs** required from our customers.



### 16 channels in 1U

## ALL-IN-ONE HARDWARE

The unique Paneda 1U hardware holds a complete system — multiplexer and a 16-channel encoder — in one rack unit, at about 30 W.

**UNIQUE**


### Container-based platform

## DOCKER ARCHITECTURE

Our latest Docker-based platform is being rolled out to major broadcasters — robust, simple to update and flexible to deploy.



### Built to scale

## ONE SERVER, MANY MUXES

A single server can host 10 independent multiplexers and 300 encoders, with unlimited cluster members for redundancy.

## Tunnel systems BUSINESS AREA

### — Safety in every tunnel SINCE 2008

In tunnel systems, Paneda offers a complete range of products for **DAB, FM and VHF**. Paneda has provided emergency systems for tunnels since 2008, has delivered complete systems to a great number of tunnels, and is today the world-leading company in the tunnel area.

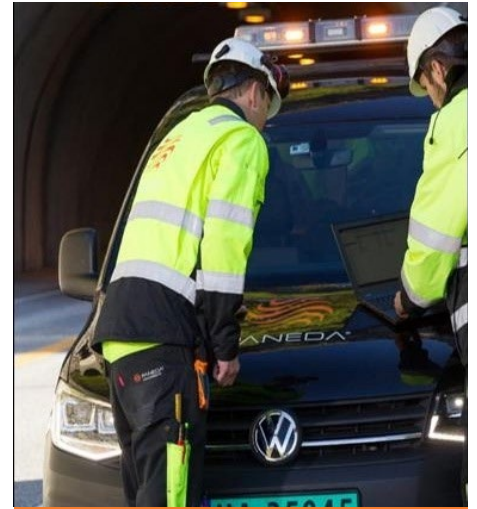
### — Paneda Break-In System

The PBS contains **two complete break-in systems in one 1U unit**. Unlike other systems, it uses the original off-air signal in all normal situations and switches only in an emergency — with no GPS required and seamless switching for every car radio.



### — Customers and recent installations

|           |                                  |           |           |        |               |     |     |
|-----------|----------------------------------|-----------|-----------|--------|---------------|-----|-----|
| CUSTOMERS | Statens vegvesen                 | Nye Veier | ABB       | Aventi | OneCo         | NLI | BMO |
| 2024-2025 | Tanem                            | Mettevoll | Indreeids | Myrmel | Kvænangsfjell |     |     |
| ABROAD    | Eysturoyar Tunnel, Faroe Islands |           |           |        |               |     |     |



### Turnkey delivery

OWN SERVICE TEAM

From project management to installation and maintenance, with supervision and monitoring by the Paneda 24/7 NOC.

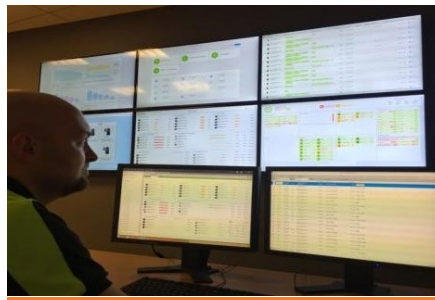
## Services SUPPORT & OPERATIONS



### Service team

INSTALLATION & MAINTENANCE

Experienced technicians handle installations, service and maintenance.



### 24/7 monitoring

PANEDA NOC

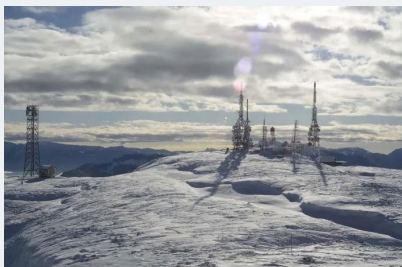
Connect your system to the Paneda monitoring centre — our technicians monitor remotely and often act before problems arise.



### Development centre

HARDWARE & SOFTWARE

Long experience of developing both hardware and software, providing state-of-the-art technology.



BUSINESS AREA

## TV networks

Paneda operates its own national digital TV network (DVB-T2) in Norway, with **more than 50 transmitter sites**. The network was built by Paneda and is fully owned by Paneda. It is used by the Norwegian public broadcaster **NRK** as well as commercial TV operators, and is monitored and supervised by the Paneda 24/7 NOC.

## EMERGENCY WARNING SYSTEMS

## Works when the internet and mobile networks are down.

Paneda has developed a completely new concept for emergency warning over the existing DAB+ networks. Its biggest advantage: the warning chain does not depend on the internet or the mobile networks — so it keeps working exactly when they fail.

|                   |                  |                   |
|-------------------|------------------|-------------------|
| INTERNET / MOBILE | ACTION TIME      | UPTIME            |
| Not required      | 1 second         | Above 99.99 %     |
| NEW TRANSMITTERS  | ADDRESSING       | RECEIVER          |
| None needed       | One · zone · all | IP67 · OEM module |

### ASA

#### REACHES PEOPLE

Radios in the zone wake up and deliver the warning in audio, text and images.



### PWS

#### ACTIVATES INFRASTRUCTURE

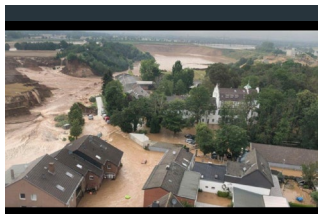
Sirens, loudspeakers, signs and barriers act within one second.



### EWS

#### EMERGENCY WARNING STRATEGY

One robust national warning chain on the existing DAB+ network — working when the internet and mobile networks do not.



#### CASE · GERMANY, JULY 2021

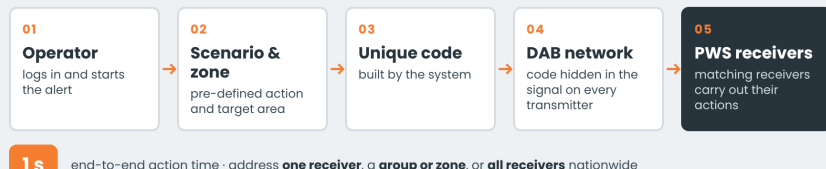
### When the flood came, only broadcast was left.

- ✗ Mobile networks down
- ✗ Internet down
- ✗ No early warning system
- ✓ **Broadcast stayed on air.** 243 lives were lost in the floods — this is the scenario PWS is designed for.

## PWS · Paneda Warning System INFRASTRUCTURE

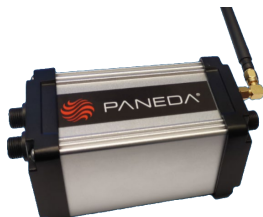
A hidden digital code is inserted into the DAB signal. It activates PWS receivers, which carry out pre-defined actions on **sirens, loudspeakers, screens, barriers** and other critical infrastructure. Because the trigger travels over the broadcast network, **no internet or mobile connection is needed** — sirens and signs are activated even when everything else is down.

#### HOW PWS WORKS — FROM OPERATOR TO ACTION IN ONE SECOND



### — ASA · Automatic Safety Alert

With ASA, radios inside a defined alert zone **wake up automatically** — even from standby — and deliver the warning in audio, text and images, while radios outside keep playing. ASA will be used as the national warning system over radio in Europe, and receivers with ASA are already on sale.



#### PWS receiver

IP67 · OEM MODULE

Rugged IP67 outdoor enclosure, also available as an OEM module. Each receiver has its own unique address and is triggered over DAB — **no internet connection required.**



NEW

### One signal, many actions

#### APPLICATIONS

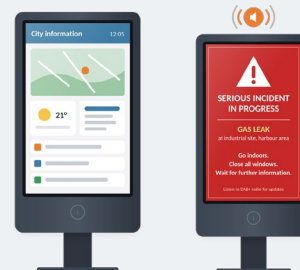
Sirens · loudspeakers · fire alarms · LED signs, screens and info kiosks · barriers and gates · relay outputs for pumps, valves and lights.



### Screens become warning signs

#### INFO KIOSKS & SIGNAGE

A PWS receiver connected to an info kiosk or signage player replaces the regular content with the warning within one second — no internet needed — and returns to normal on all-clear.



Normal content → alert triggered over DAB

Ideal for city kiosks, bus stops, stations, schools and shopping centres.

**WHY DAB+**

## The core platform for radio in Europe.

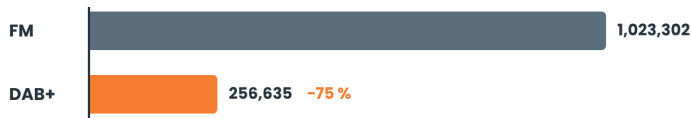
DAB+ carries more stations with less energy — and as a broadcast network it is built to stay on air when other networks fail.

|                                    |                                    |                                           |
|------------------------------------|------------------------------------|-------------------------------------------|
| RECEIVERS<br><b>145M+ sold</b>     | NEW CARS<br><b>10M a year</b>      | PER FREQUENCY<br><b>Up to 24 stations</b> |
| ENERGY<br><b>-75 % per service</b> | NETWORK<br><b>Single frequency</b> | UPTIME<br><b>Above 99.99 %</b>            |

## Lower energy, more stations **EFFICIENCY**

A DAB+ service uses about **a quarter of the energy** of an FM service, and one frequency carries up to 24 radio stations. In a single frequency network (SFN) every transmitter sends the same signal on the same frequency. More than 145 million DAB receivers have been sold (Feb 2025), and around 10 million new cars a year in Europe come with DAB.

ANNUAL ENERGY PER RADIO SERVICE · KWH



Source: Bayerischer Rundfunk, energy consumption of BR radio services (2021).

### — Built for emergencies



#### No internet dependency

A self-contained broadcast chain, from studio to receiver.



#### Protected against hacking

A closed, one-way system with built-in protection.



#### No congestion

One-to-many: load does not grow with the number of listeners.



#### More than audio

Text and images reach DAB+ screens with the spoken message.



#### Software, not boxes

PANEDA HEAD-END

A software head-end is generic, continuously developed and runs on any hardware platform — with no vendor lock-in.

|            |                                          |
|------------|------------------------------------------|
| HARDWARE   | ✓ Any standard server or VM              |
| LOCK-IN    | ✓ None — hardware and OS independent     |
| NEW MUX    | ✓ Start a container on existing hardware |
| UPGRADES   | ✓ Software updates, remote support       |
| MANAGEMENT | ✓ 100 % web-based                        |



#### SMART content switch

REDUNDANCY 2.0

Replaces only the faulty subchannel with data from the other multiplexer — error-free output even with different faults in each mux. Fully SFN compatible, with no master and no slave.



## Why Paneda **SIX REASONS**



#### Future-proof software

Any standard server or VM — add multiplexers without new hardware.



#### Unique redundancy

SMART content switch, PFT sync, time-shift and source addressing.



#### Security by design

A+ graded, TLS 1.2+, two-factor authentication, role-based access.



#### Emergency ready

EWB+ break-in on all services with one click or API call.



#### Open integration

OpenAPI v3 REST API, SNMP and DataMiner.



#### Proven partner

200+ head-ends worldwide, ISO 9001:2015, 24/7 operations centre.

Sources: energy per service — Bayerischer Rundfunk (2021); receivers sold — figure as of February 2025.

## REFERENCES

## Trusted by broadcasters worldwide.

Paneda is the world-leading supplier of DAB head-end systems, with more than 200 multiplexers in operation in over 26 countries.

|                                            |                                       |                                     |
|--------------------------------------------|---------------------------------------|-------------------------------------|
| UNITED KINGDOM<br><b>Arqiva · 62 muxes</b> | FRANCE<br><b>towerCast · 35 muxes</b> | SWEDEN<br><b>Viaplay · 20 muxes</b> |
| BELGIUM<br><b>RTBF · 8 muxes</b>           | AUSTRALIA<br><b>ABC/SBS · 8 muxes</b> | COUNTRIES<br><b>26+</b>             |

## Milestones SINCE 2001



## Selected customer references DAB HEAD-END

### NORTHERN EUROPE · SCANDINAVIA · BALTICS

|         |                                    |                                                                                  |
|---------|------------------------------------|----------------------------------------------------------------------------------|
| Sweden  | <b>Swedish Radio (SR)</b>          | Public service — 5 regional multiplexers for national coverage                   |
| Sweden  | <b>Viaplay Group</b>               | Commercial radio — 20 regional multiplexers for national coverage                |
| Sweden  | <b>Bauer Media</b>                 | Commercial radio — 4 regional multiplexers for national coverage                 |
| Norway  | <b>Viaplay Group · Bauer Media</b> | National commercial multiplexer — the world's largest SFN, with 400 transmitters |
| Norway  | <b>Local Radio Group</b>           | Local radio community operating 20 multiplexers                                  |
| Denmark | <b>Bauer Media</b>                 | Commercial radio — 5 multiplexers                                                |
| Denmark | <b>Cibicom</b>                     | National commercial DAB — 1 multiplexer                                          |
| Estonia | <b>Levira</b>                      | National and regional multiplexers, public and commercial                        |

### MAIN EUROPE

|                |                                   |                                                                                                         |
|----------------|-----------------------------------|---------------------------------------------------------------------------------------------------------|
| United Kingdom | <b>Arqiva</b>                     | <b>Our largest customer — 62 multiplexers carrying more than 400 radio stations</b>                     |
| France         | <b>towerCast</b>                  | 35 multiplexers — national multiplexers for Radio France and regional multiplexers for commercial radio |
| Belgium        | <b>RTBF</b>                       | Public broadcaster — 8 multiplexers                                                                     |
| Belgium        | <b>Norkring</b>                   | National commercial multiplexer                                                                         |
| Switzerland    | <b>SRG</b>                        | Public broadcaster — national DAB with 4 multiplexers                                                   |
| Spain          | <b>Itelazpi</b>                   | Public broadcaster in the Basque Country — 4 regional multiplexers                                      |
| Italy          | <b>EuroDAB / RTL · DAB Italia</b> | National commercial DAB networks                                                                        |
| Croatia        | <b>OIV</b>                        | National DAB — 2 multiplexer systems                                                                    |
| Czech Republic | <b>Teleko</b>                     | National DAB network — commercial and public radio                                                      |
| Czech Republic | <b>RTI</b>                        | 8 commercial regional multiplexers                                                                      |

### ASIA · MIDDLE EAST · SOUTH PACIFIC · AFRICA

|              |                         |                                                 |
|--------------|-------------------------|-------------------------------------------------|
| Australia    | <b>ABC / SBS</b>        | Public service radio — 8 multiplexer systems    |
| Qatar        | <b>QMC</b>              | National multiplexer for public broadcaster QMC |
| Myanmar      | <b>MRTV</b>             | Public service radio — 1 national multiplexer   |
| Vietnam      | <b>Voice of Vietnam</b> | Public broadcaster — 1 multiplexer              |
| Thailand     | <b>MCOT</b>             | 2 multiplexers for DAB trials                   |
| Ghana        | <b>KNET</b>             | Public service radio — 1 national multiplexer   |
| South Africa | <b>Telemedia</b>        | Commercial radio trial — 1 multiplexer          |

## Get in touch CONTACT

### HEAD OFFICE

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### DEVELOPMENT CENTRE

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### SUPPORT

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