



DAB+ for national emergency warnings in Germany

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DAB Market Germany Latest Activities

DAB roll-out in Germany

Digitalradio Deutschland e.V.

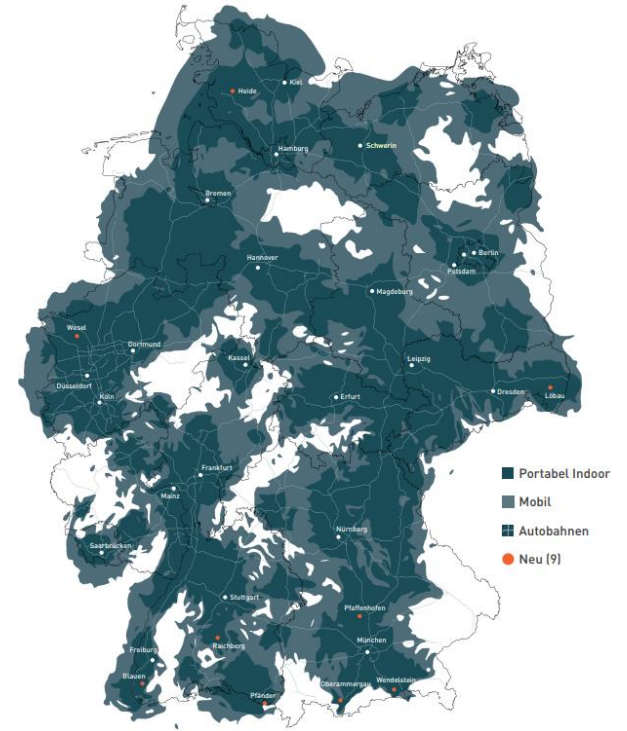
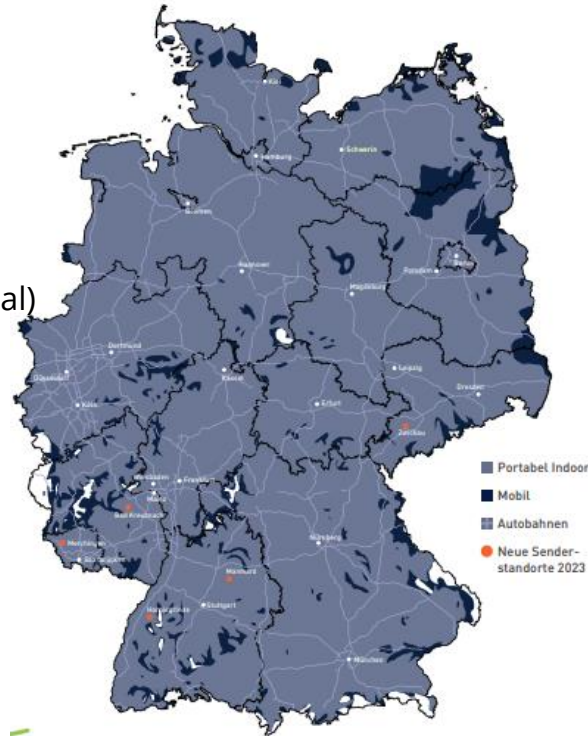


Digitalradio Mitteldeutschland e.V.



National Ensembles

- + 29 nation-wide services
- + Combined over 260 sites
- + Coverage 1. Mux: 98 % (public)
- + Coverage 2. Mux: 90% (commercial)



Regional Ensembles : Sachsen

+ 37 new services

+ 3 new ensembles:

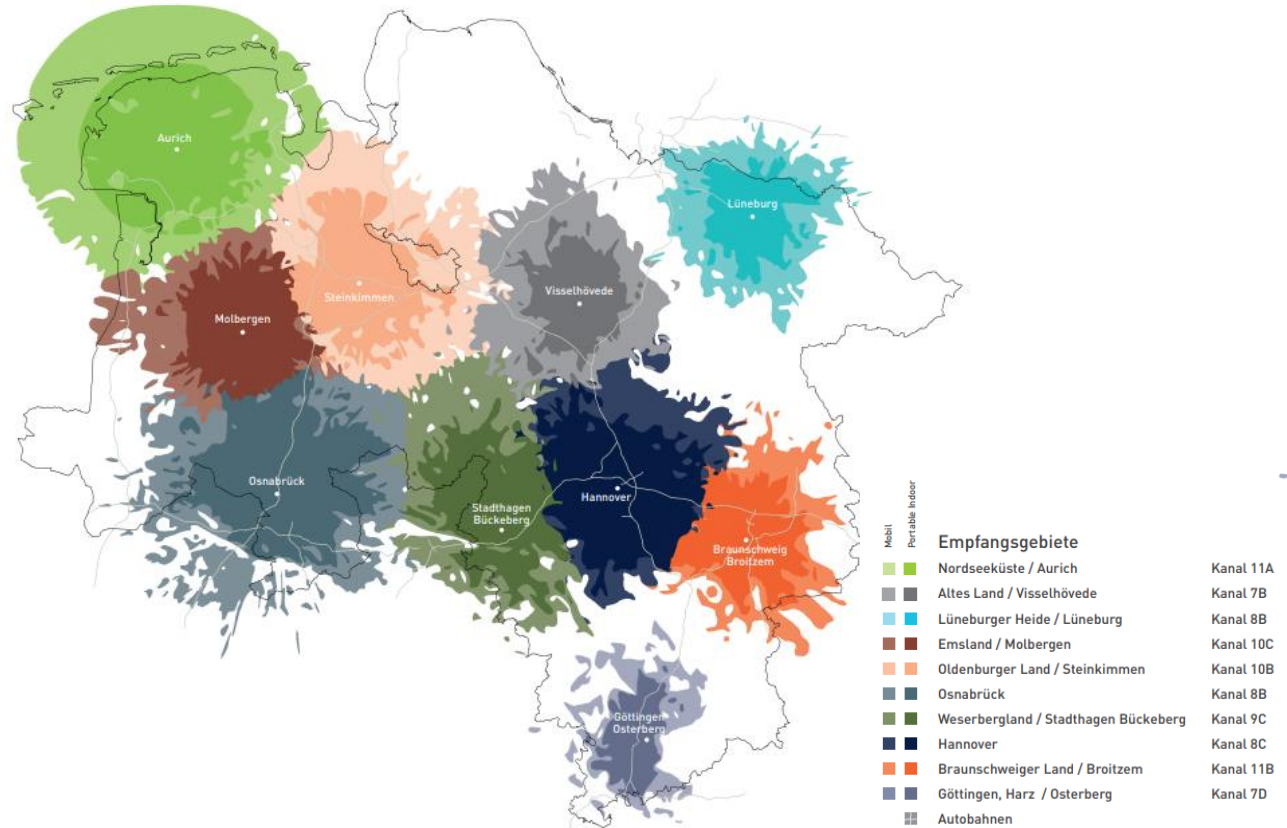
- Chemnitz
- Dresden
- Leipzig

+ Up to 90 services available via DAB+



Regional Ensemble: Niedersachsen

- + 18 new services
- + 10 new ensembles (MFN)
- + In total 117 services on-air





DAB Emergency Alerts How did it all start?

Motivation and Driving Forces

DAB+ for emergency warnings: Why Germany went forward

Times of crisis

- **Floods** in Germany killed over 140 people in 2021
- **Climate change** is everywhere
- Times of **war** in Eastern Europe: Ukraine
- Germany is the **biggest country** regarding population in Western Europe

Big DAB+ market

- Germans listen to about **185 minutes** of radio each day
- **30 per cent of all households** now are able to listen to DAB+ radio
- In recent years, some 2.2m home receivers were sold p.a.
- Some 2.6m new passenger cars are sold p.a., amounting to around **5m new DAB+ radios in Germany per year**

Industry alliance

- Broadcasters wanted a **robust and reliable answer to mobile phone apps** and their warning messages ("Cell broadcast, 3GPP TS 23.041")
- **Strategically secure DAB+ system** with federal and state governments as a backbone of public information
- **Digital Radio Germany Association** and **WorldDAB Technical Committee** are pushing things forward

Why warning messages via DAB+?



Saving lives, enhancing the DAB+ broadcasting system

1

With its **data services**, DAB+ may save lives. With this added feature, we want to **strengthen** the DAB+ broadcasting system

2

Emergency warnings are **more precise and up-to-date** with DAB+ data services than „only spoken“ FM warning messages

3

Everything will be put in **international standards**: ETSI, TC heavily involved

4

Warning messages will be able to **address big and smaller regions**, cities and parts of cities

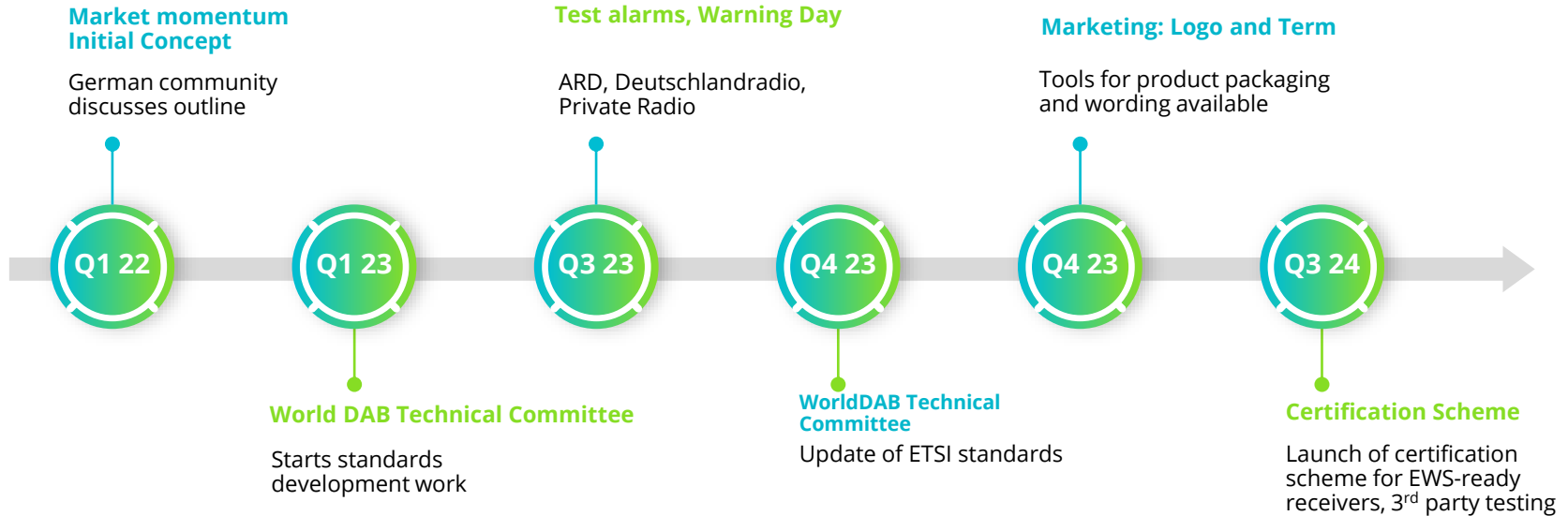
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Future radios will be able to **wake from stand-by**, alarming people at night etc., Chip manufacturers involved in developing process

6

Receivers will have to be **tested against the forthcoming ETSI standards** and rules

DAB+ for emergency warnings: Timeline





DAB Emergency Alerts How does it work?

Features, Requirements, System Operation

System Outline

Alert Announcements

- Spoken announcement message for essential information: what, where, what to do?
- Proven system known from DAB announcement function
- Works with receiver on any ensemble, full support of Other Ensemble switching
- Alert meta-data provides for user control of alert playback

Sleep and Wake-up

- Receivers support Sleep mode: function to keep listening to DAB signal while in very low-power mode
- Wake-up: when Alert Announcement signal is detected, receiver transitions to full-on mode to play back Alert
- Alert Ensemble: any ensemble that carries an "Alert Flag" identifies as part of the Emergency Warning system

Geofencing

- DAB has native regionalisation feature due to size of broadcast cell
- Strong demand for alert region smaller than broadcast cell has led to development of novel "Location Code" scheme
- DAB signalling includes encoded alert region, receiver performs location matching before Alert playback

Receiver Requirements

Technical Criteria supported by every receiver

1

DAB Signalling

- Alert Status: meta-data with alert id, alert stage, wake-up flag
- Alert Region: set of location codes to define alert region

2

Receiver Behaviour

- FIC monitoring: permanent listening on alert ensemble for alert signal
- Alert Ensemble selection at install and regular intervals
- Test Alerts (User option)

3

Sleep Mode

- Very low-power mode to enable background alert monitoring
- Wake-up transition to full-on when alert is detected
- Fast update function

4

Geofencing

- Location Awareness: receiver has its own position in memory (any method)
- Alert Region: function to region match own position with Alert Region for conditional Alert play-back

5

Presentation Constraints

- Conditional Requirements
- DAB text and slideshow presentation during alert announcement need to conform to presentation rules

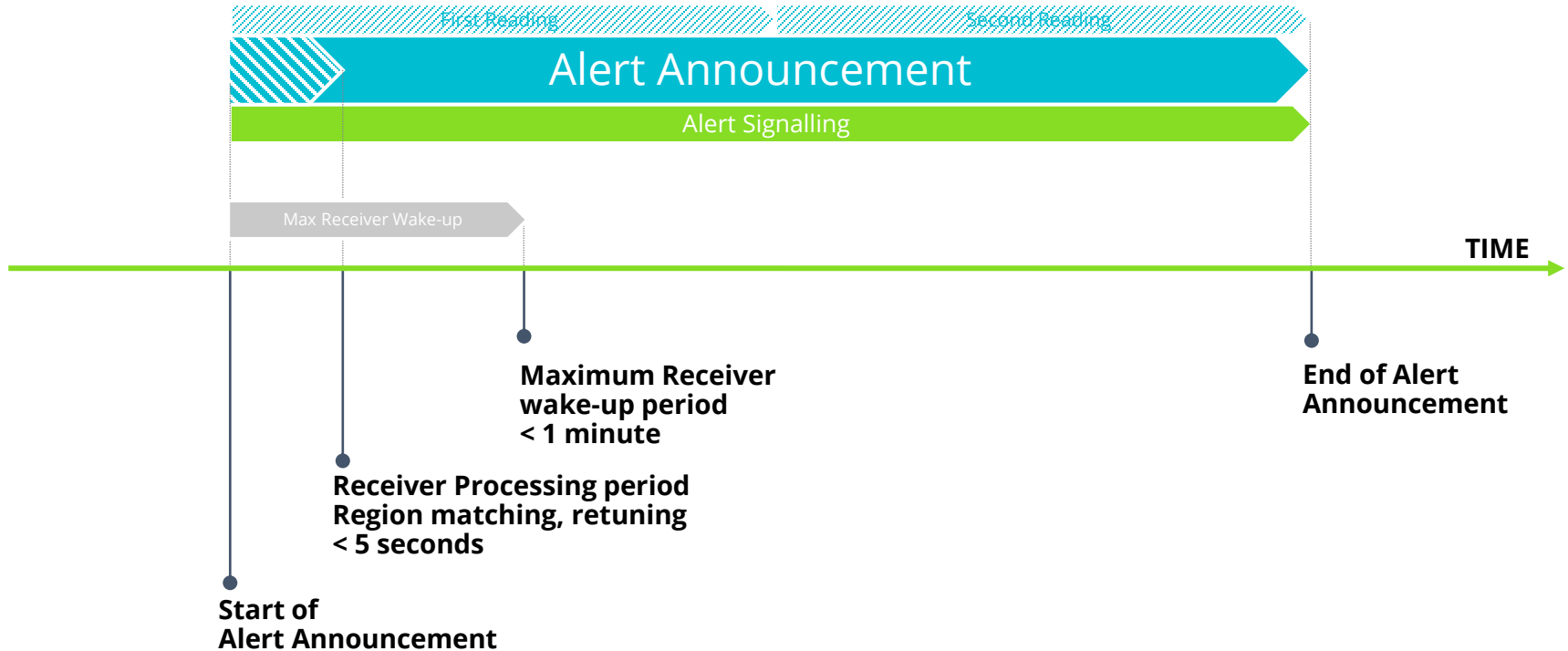
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Certification

- Receiver certification with logo mark as system safe-guard
- Manufacturer and 3rd party testing to obtain logo mark licence

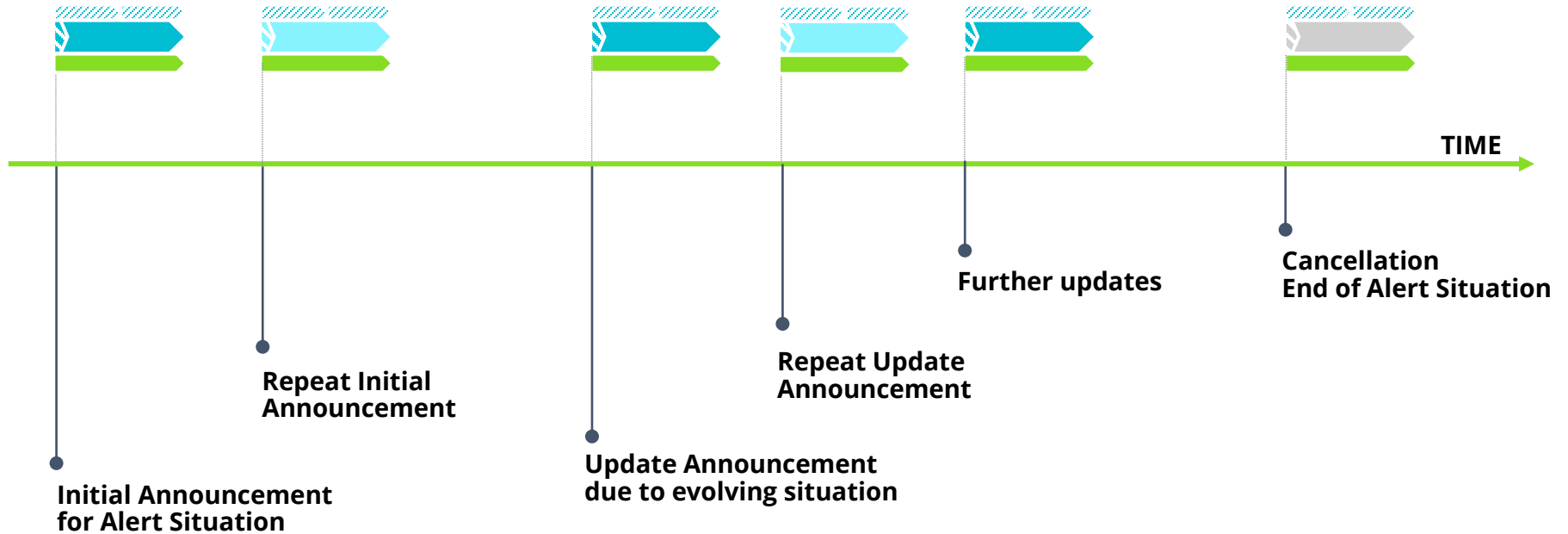
System Operation

Time-line of an Alert Announcement



System Operation

Time-line of an Alert Situation



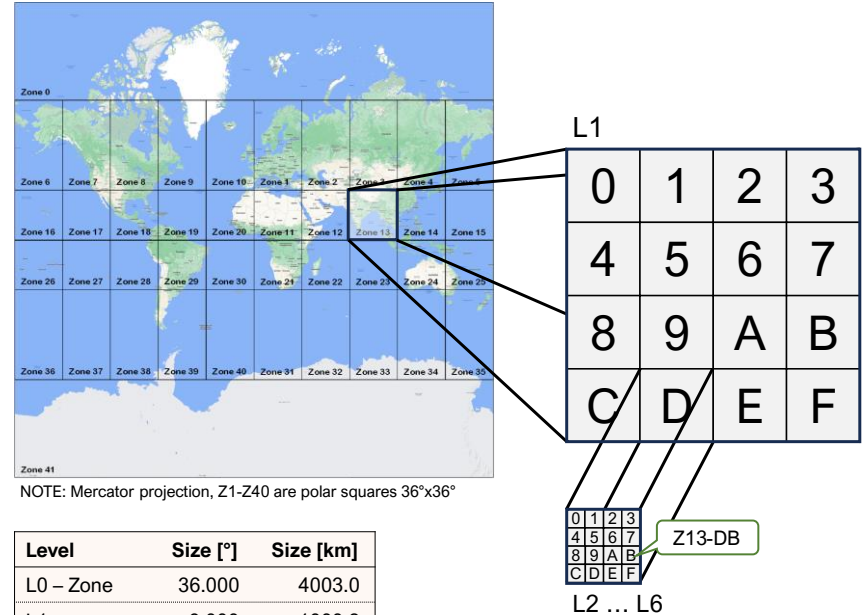
Location Code

Introduction to novel geofencing technique

- + Hierarchical Code scheme of WGS84 Coordinates
 - o Granularity scales with code length
30-bit code (L6) has ~1km resolution (vertical)
 - o Shorter codes are larger square
 - o Serves to define
 - Alert Region in a set of codes
 - Receiver location with single 30-bit code

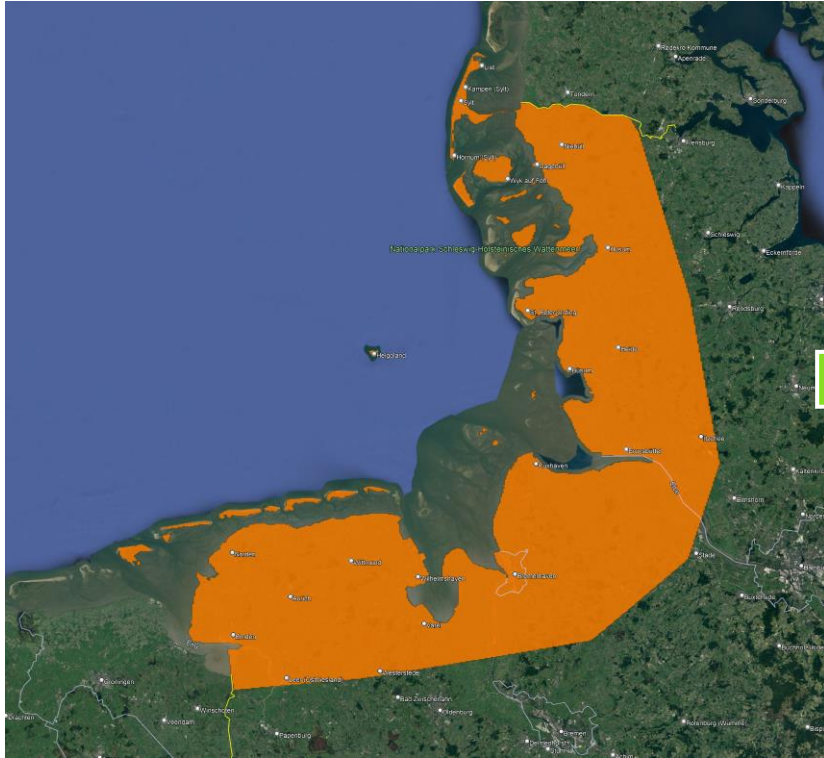
+ Properties

- o Universal
Code scheme provides for any location globally
No region-specific mechanisms involved
- o Light-weight
Receiver support feasible in entry-class model
No special requirement to UI, memory or CPU
- o Efficient
Compact encoding of arbitrary region, low (FIC) data capacity, fast transmission (<1sec) of alert region

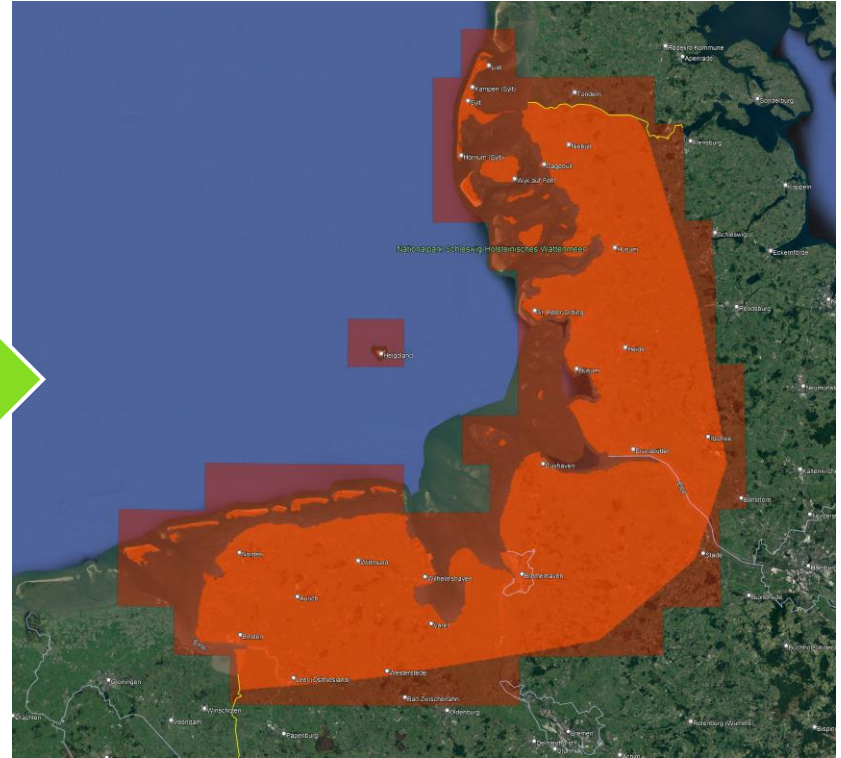


NOTE 1: Polar zones (Z0, Z41) extend 18° from pole
NOTE 2: Length of spherical rectangles is only independent from latitude in N-S direction. Given sizes apply to E-W direction only at equator.

Location Code Principle



Encoding



Ecosystem Considerations

Receiver Side

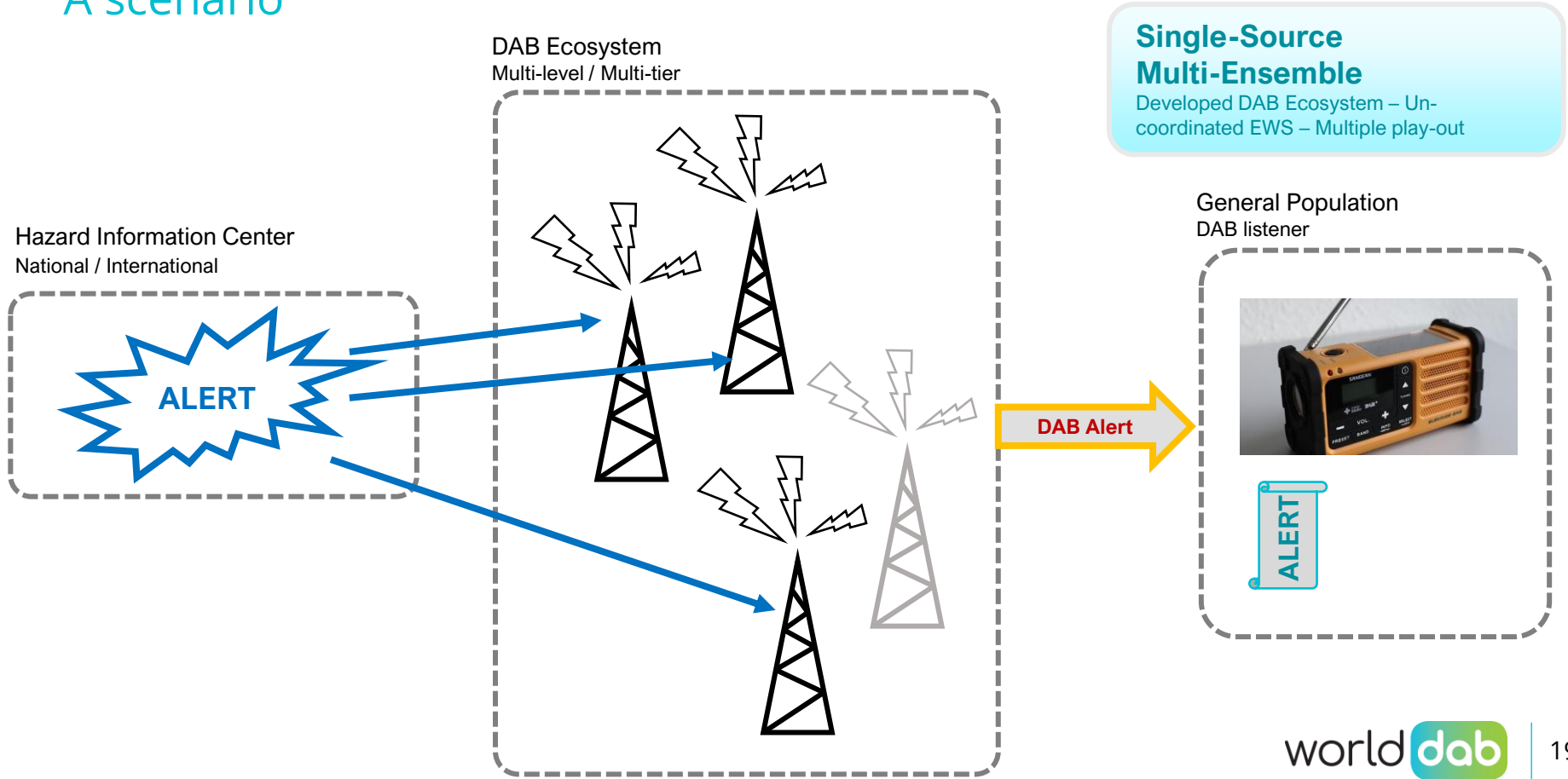
- Receivers are certified
 - Only certified receivers will be able to respond to Emergency Alerts
 - Safe-guarded by licensed logo on product
 - 3rd party testing to verify compliance
- Certified receivers implement full functionality
 - Functional guarantees
 - Performance guarantees

Broadcast Side

- Ensembles opt-in
 - No mandate for ensembles to participate EWS signalling is voluntary for ensembles
 - However: participating ensemble must support all EWS requirements
 - One ensemble sufficient to run EWS
National ensembles can address any alert due to geofencing
- Every EWS Ensemble must
 - Signal ALL alerts within broadcast signal range
 - Alerts running in an own service (Tuned ensemble alert)
 - Alerts running in another ensemble (Other ensemble alert)
- IDEAL : all ensembles are EWS ensembles
 - Receivers tuned to non-EWS ensemble locked-out

DAB as EWS play-out

A scenario



**Single-Source
Multi-Ensemble**

Developed DAB Ecosystem – Un-coordinated EWS – Multiple play-out

General Population
DAB listener



Q & A