



PANEDA®

LARS-PEDER LUNDGREN



PANEDA®

## ABOUT US

- Owns and operate its own DVB-T2 network in Norway with over 100 transmitter nationwide.
- Radio break-in systems for road tunnels, over 250 tunnels equipped with a Paneda solution.
- Leading supplier of DAB head-end system with over 200 system in operation world-wide



TV Networks



Tunnel Systems



DAB Head-End



PANEDA®

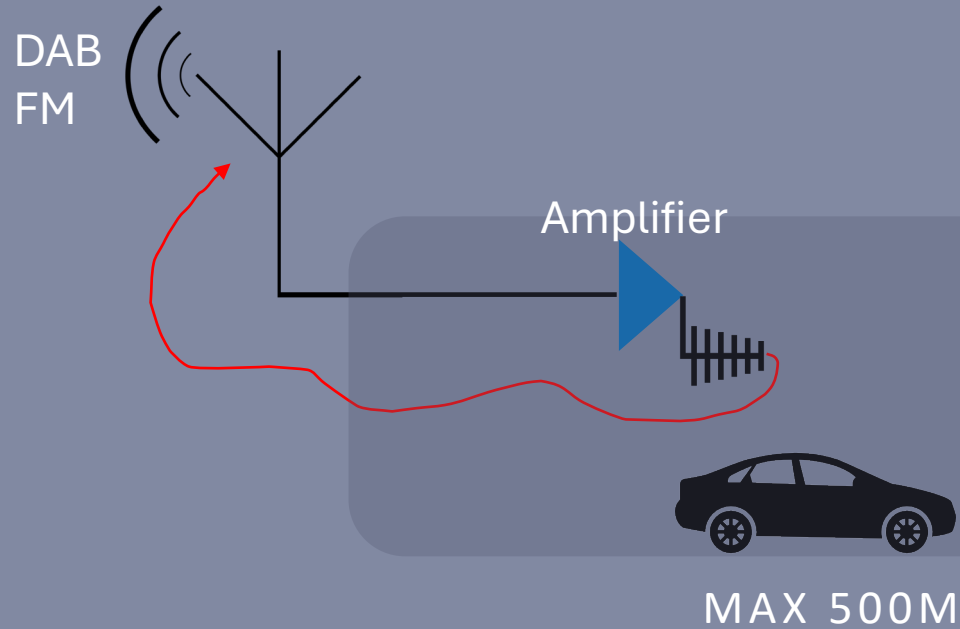
A photograph of a long, illuminated tunnel. The tunnel walls are rough and textured, with a blue and orange color scheme. The road is paved and has white lane markings. Overhead, there is a complex system of cables and lights. The perspective is from the side of the road, looking down the length of the tunnel.

# Tunnel Systems

- Coverage
- Break-In

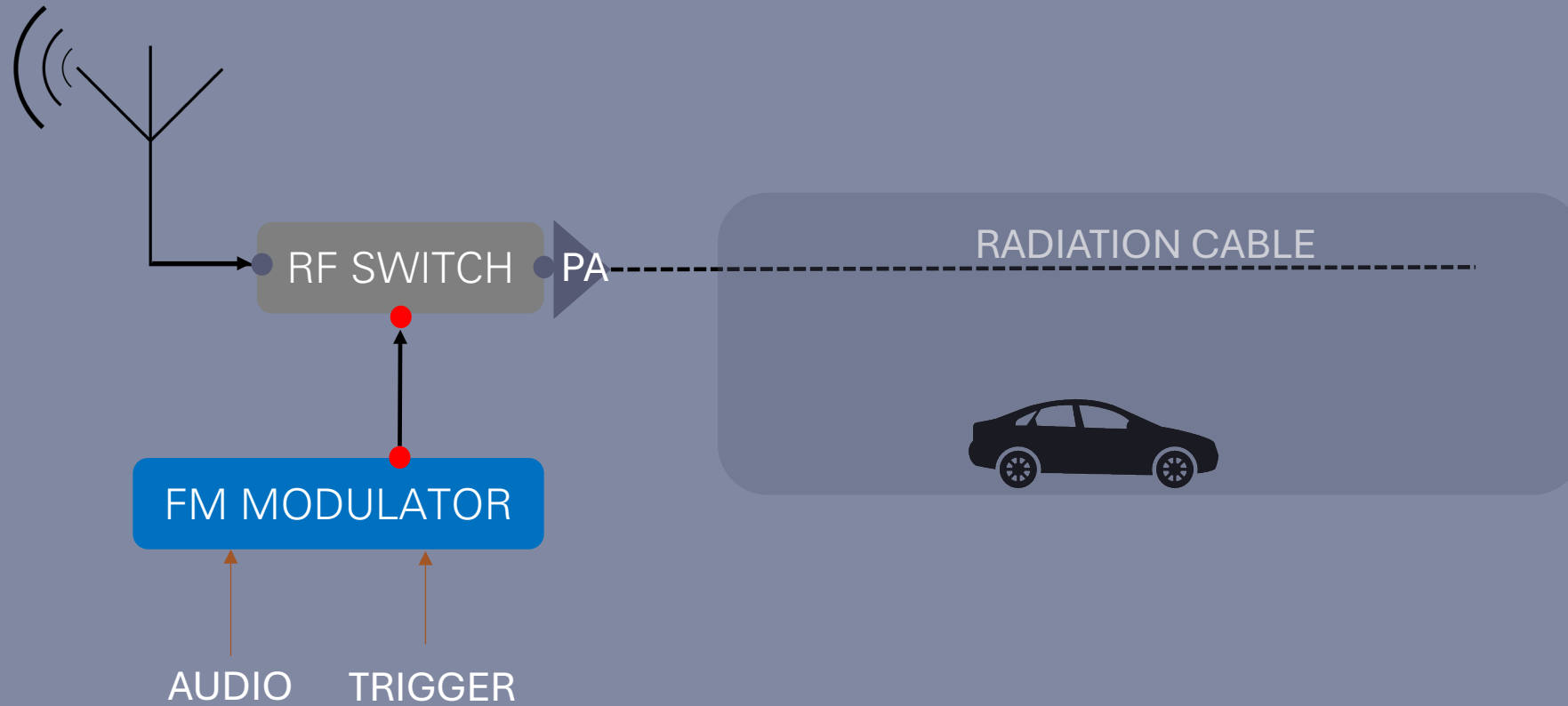
Directive 2004/96/EC for tunnels >500m

# COVERAGE (SHORT TUNNELS)



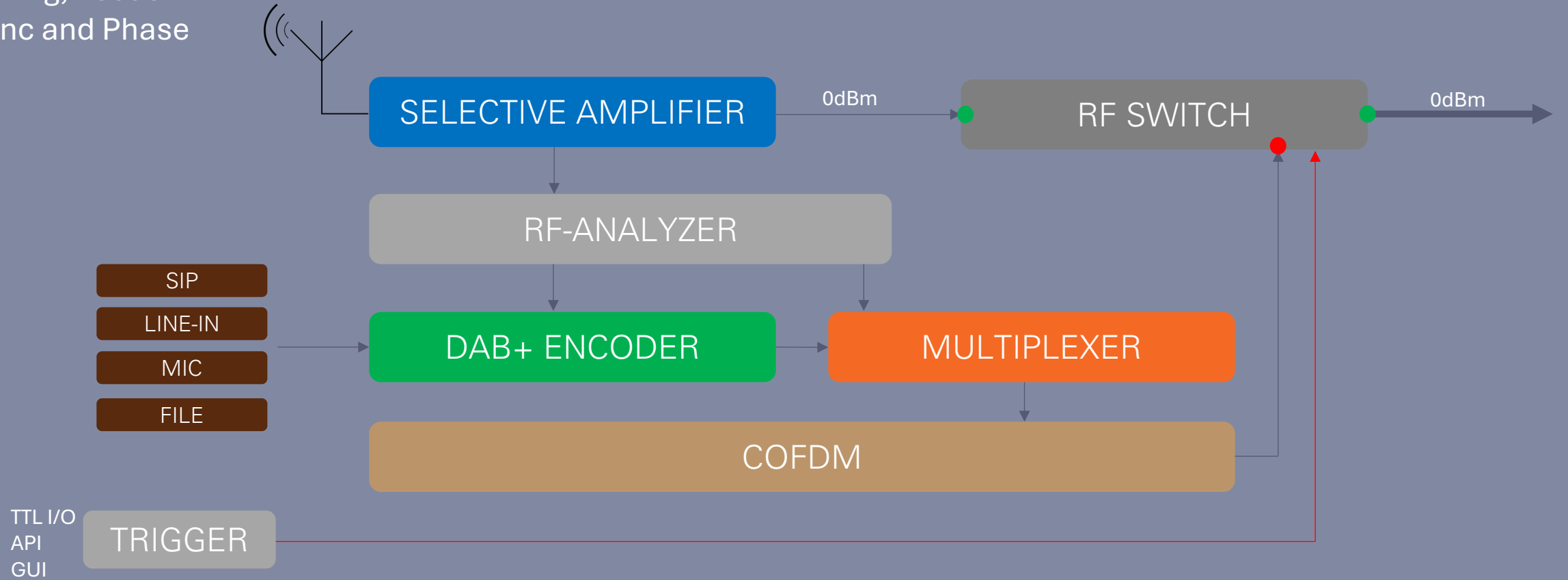
Directive 2004/96/EC for tunnels >500m

# FM BREAK-IN

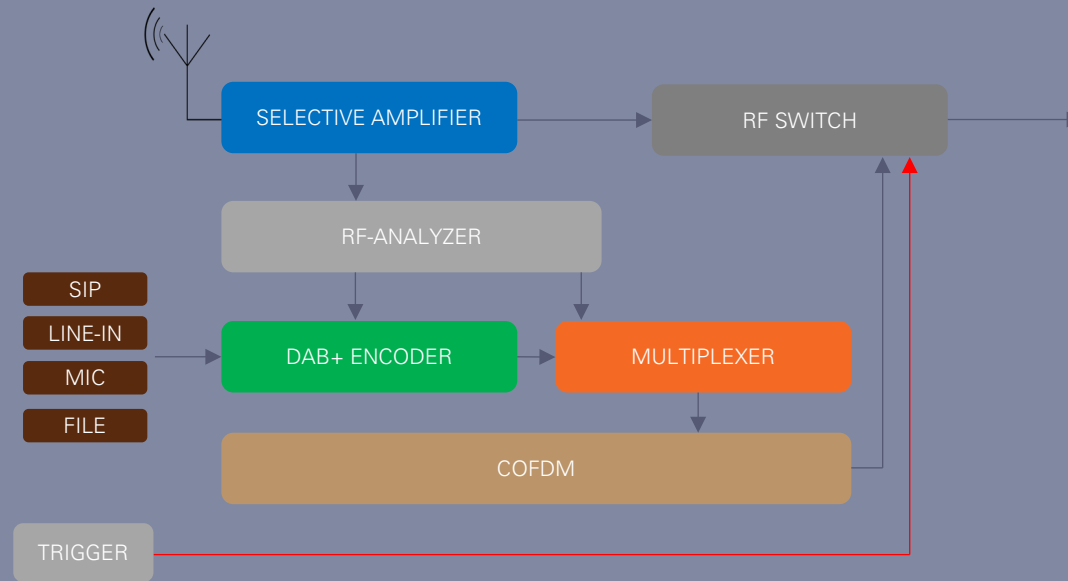


# DAB BREAK-IN

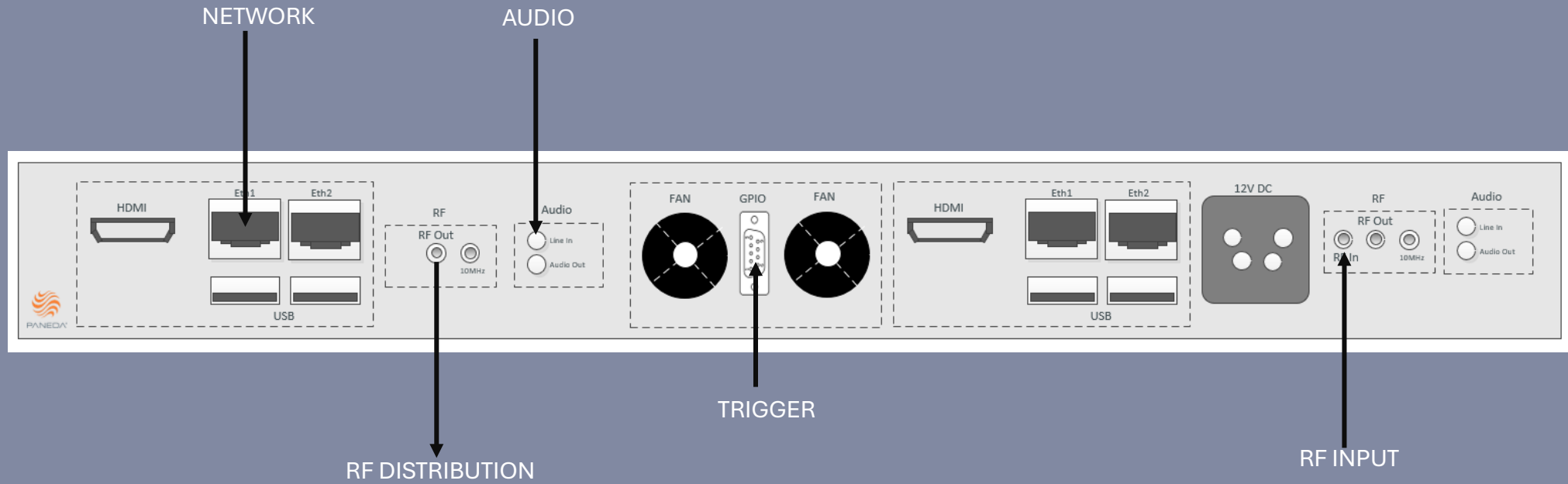
Complicated  
Timing, 180us  
Sync and Phase



# PANEDA BREAK IN SYSTEM PBS

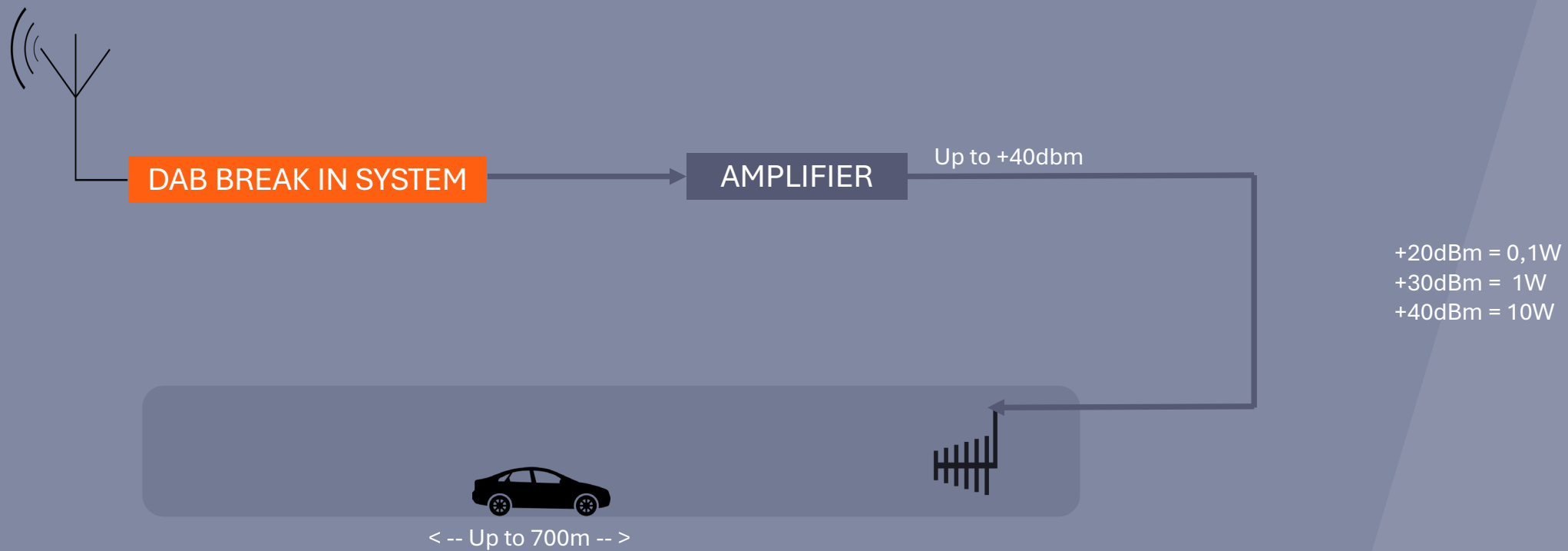


# PBS

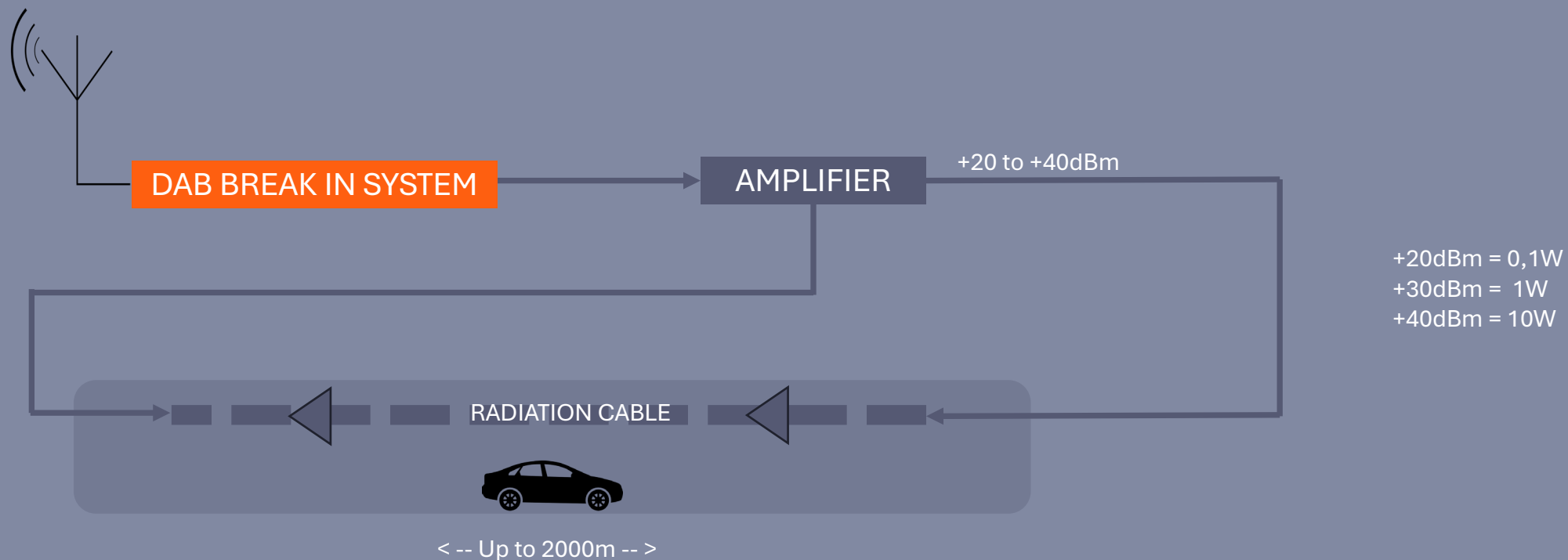




# DISTRIBUTION EXAMPLE



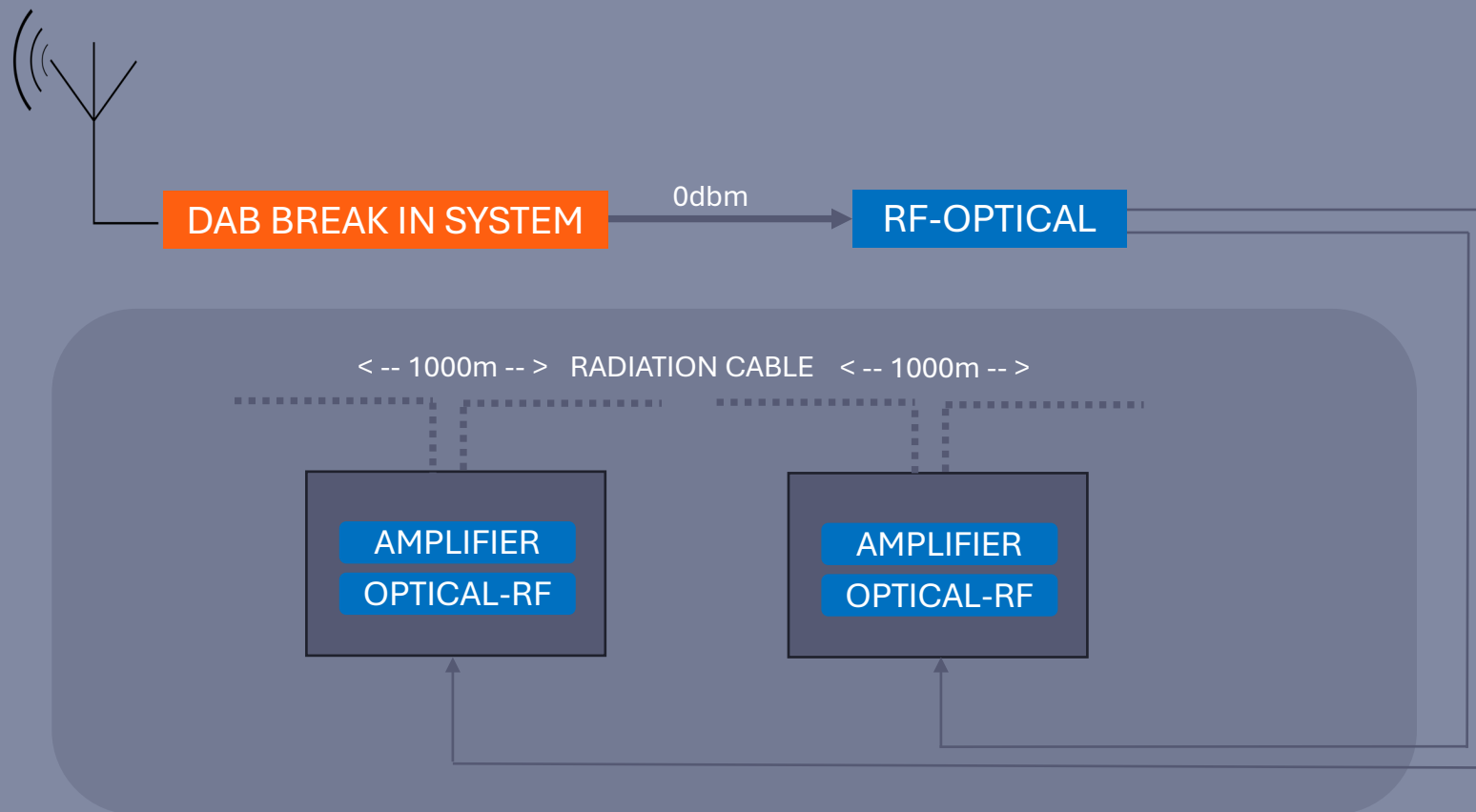
# DISTRIBUTION EXAMPLE



+20dBm = 0,1W  
+30dBm = 1W  
+40dBm = 10W

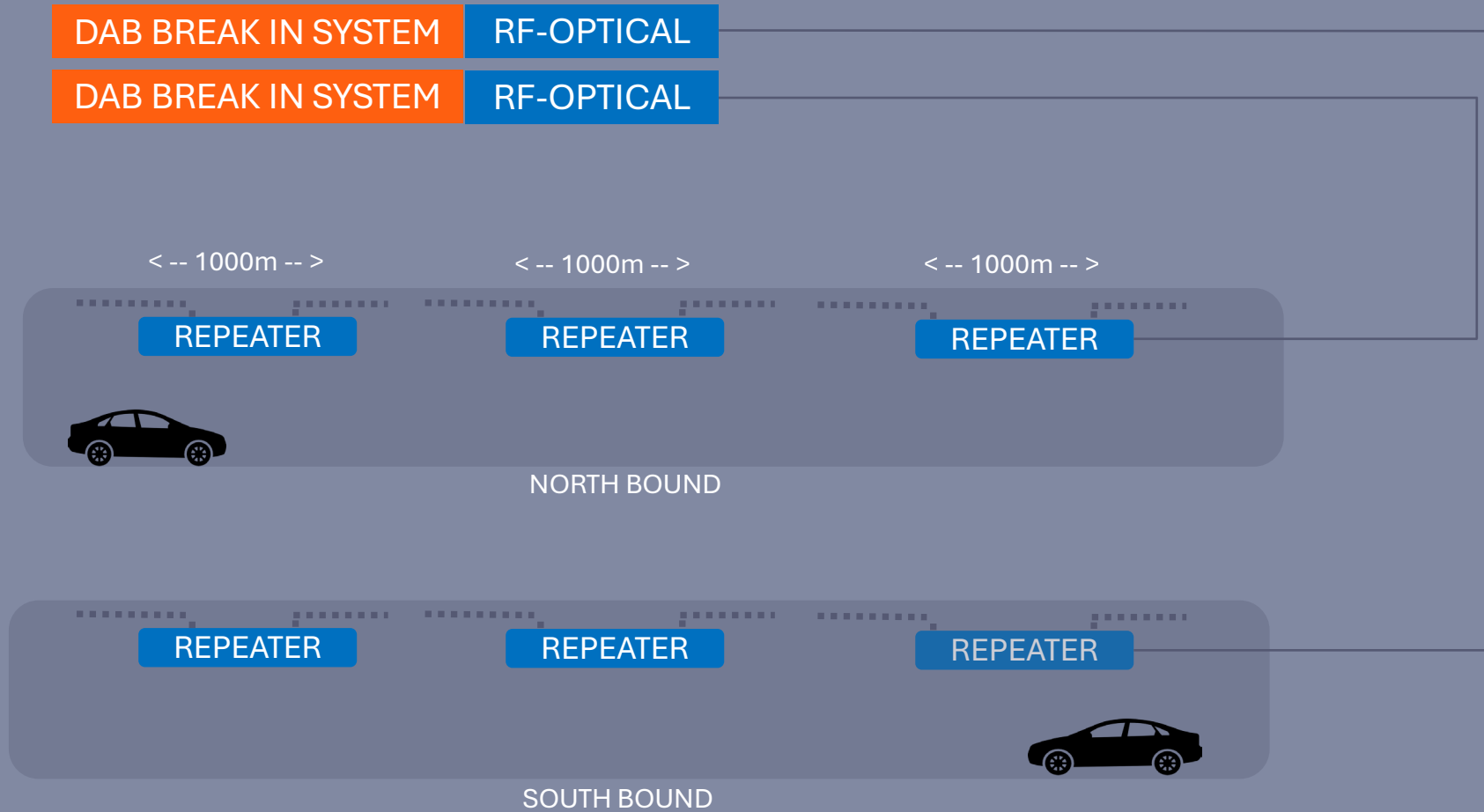
Reception:  
Min -82dBm  
Recommended -76dBm

# DISTRIBUTION EXAMPLE

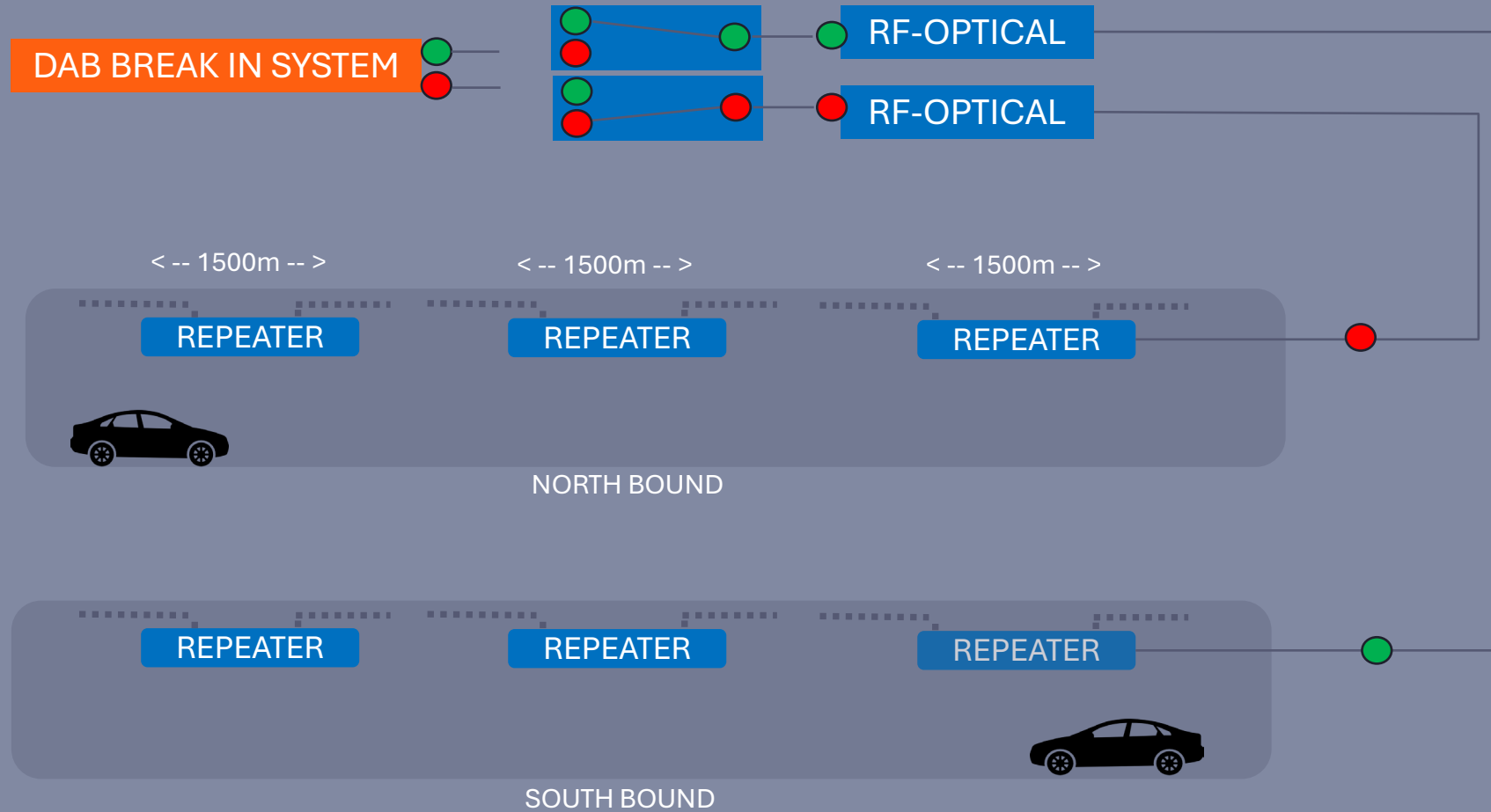


+20dBm = 0,1W  
+30dBm = 1W  
+40dBm = 10W

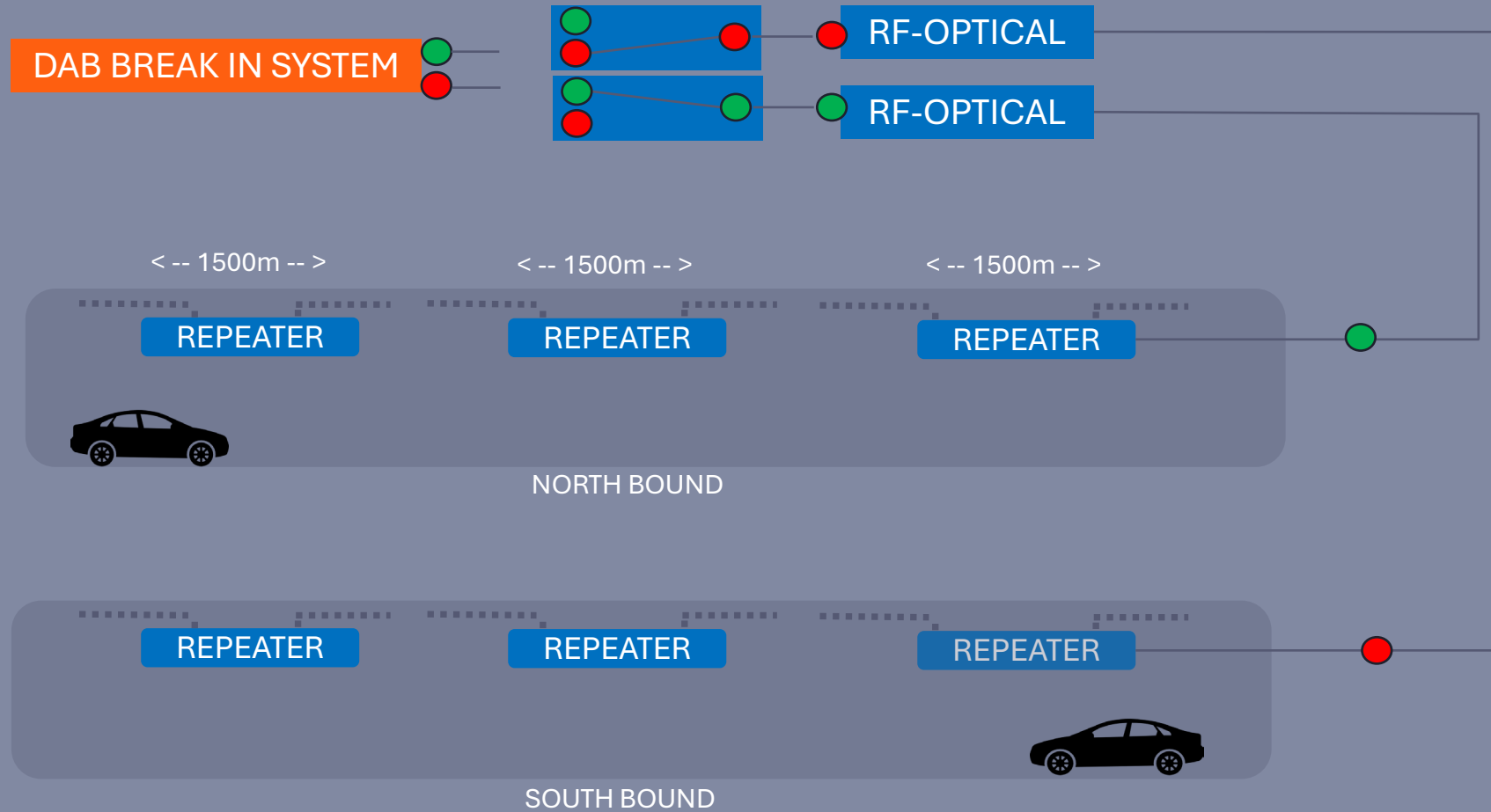
# DISTRIBUTION EXAMPLE



# DIFFERENTIAL BREAK-IN



# DIFFERENTIAL BREAK-IN



# NORWAY



**Statens vegvesen**  
NATIONAL ROAD AUTHORITIES

Traffic Control Center

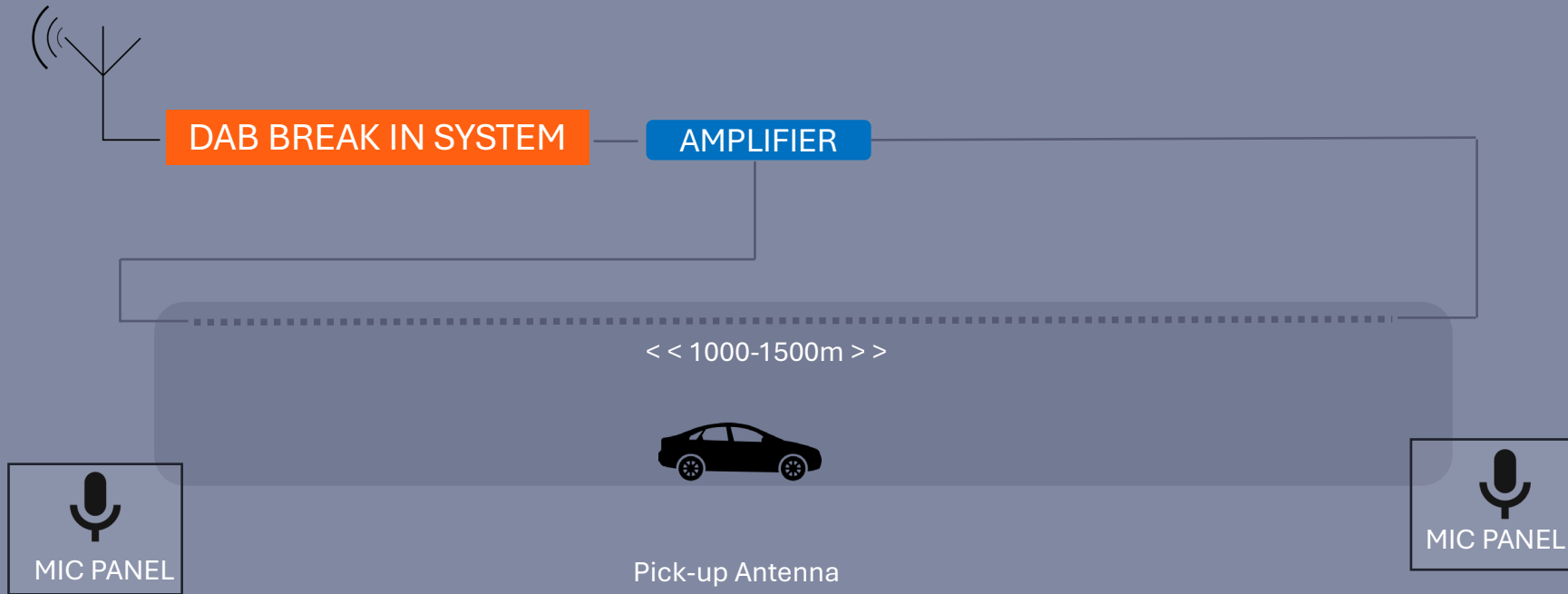


REGIONAL TCC

- SIP
- LINE-IN
- MIC
- FILE



# TYPICAL COSTS

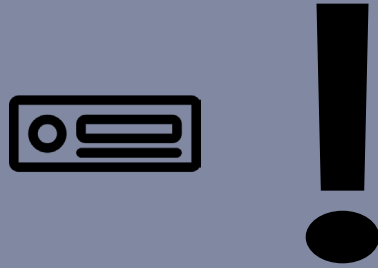


- Pick-up Antenna
- DAB Break-In system
- Amplifier
- Microphone Panel
- Installation work

**50 000€**



# ALARM ANNOUNCEMENT



USED IN COMBINATION WITH BREAK-IN  
FORCING RECEIVERS TO DAB

ETSI TS 103 176 CLAUSE 7.6.1 SAYS  
"RECEIVER SUPPORT FOR TUNED ENSEMBLE ALARM ANNOUNCEMENTS  
IS MANDATORY AND RECEIVERS SHALL MEET ALL REQUIREMENTS OF  
CLAUSE 7.6"



# METADATA



# ISSUE!



## 7.3.9 Audio codec and user application handling

FIG 0/19 only signals the sub-channel that carries the announcement. To determine whether the audio is coded as DAB audio or DAB+ audio it is necessary to find the **SubChId** in the FIG 0/2 MCI. If the announcement audio carries PAD applications (for example, dynamic label or SlideShow), or the service includes data service components, these should be presented according to the capabilities of the receiver.

It is recommended that receivers present non-audio service components contained in the announcement service in the same way as on the source service. Receivers shall not present such non-audio service components from the source service during the announcement.



# CONTACT

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