



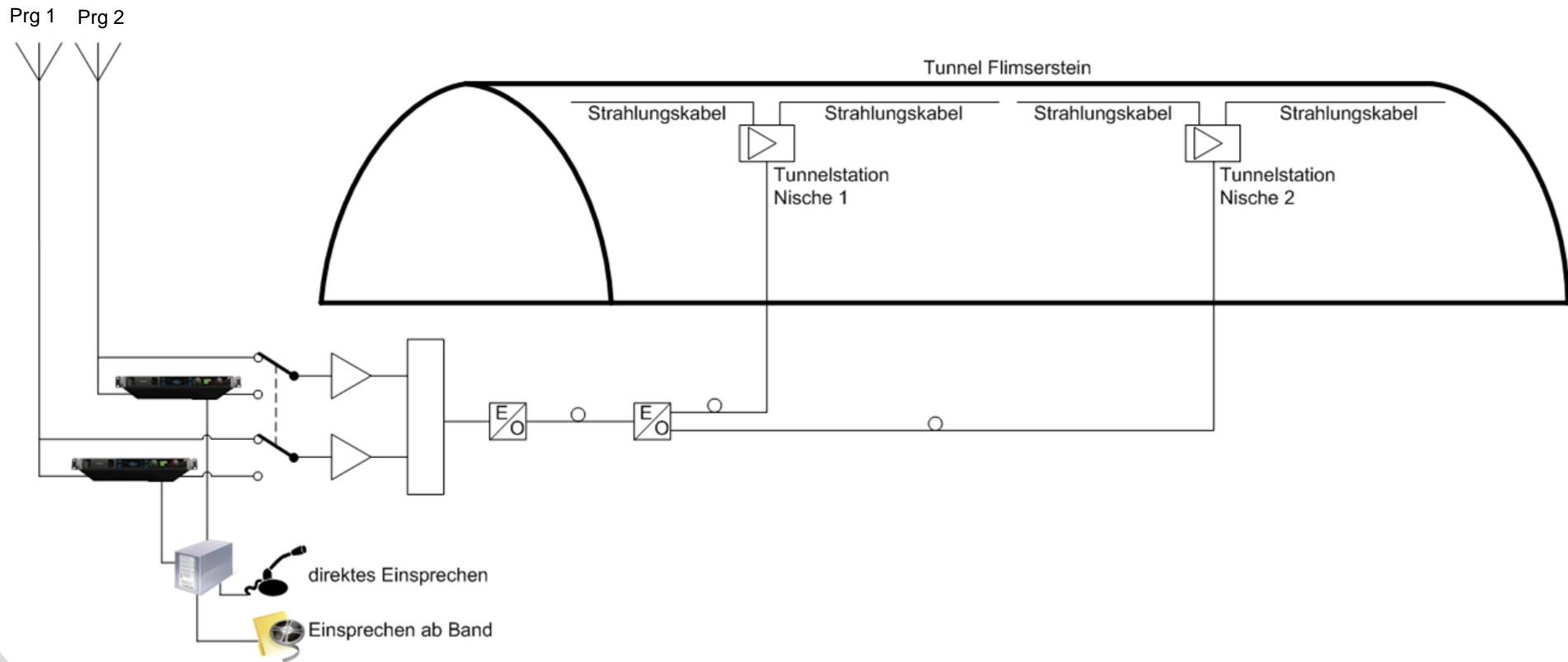
# DAB safety and emergency announcements in tunnels

Thomas Saner

# FM safety and emergency announcements in tunnels

FM safety and emergency announcements in tunnels possible with an in-tunnel transmitter per program on the same frequency.

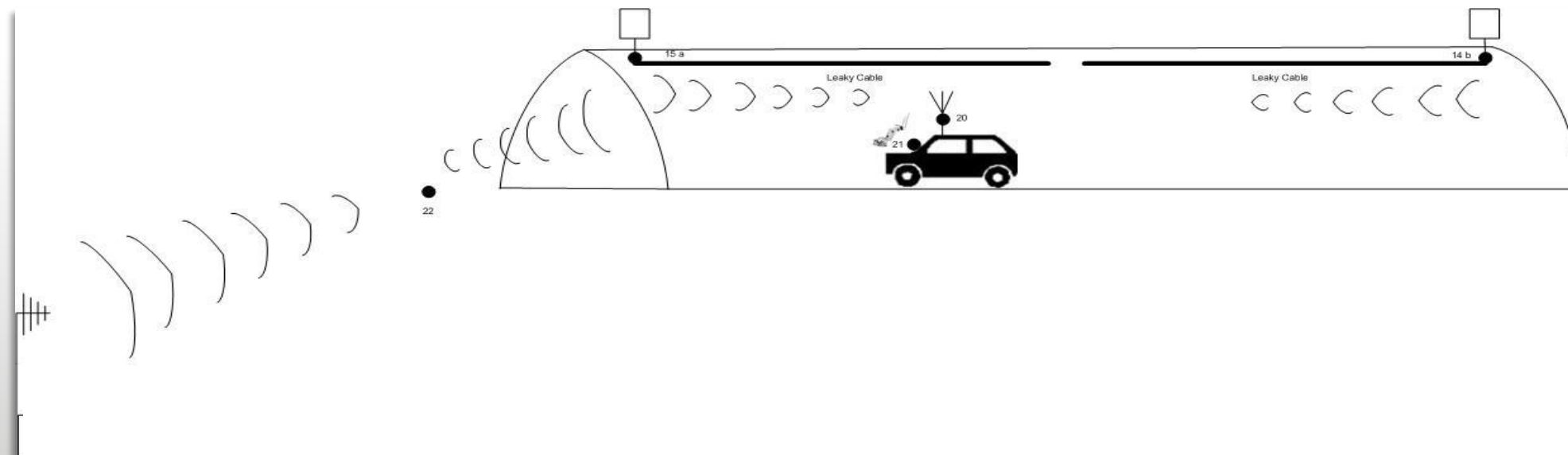
# FM safety and emergency announcements in tunnels



# FM safety and emergency announcements in tunnels

FM safety and emergency announcements in tunnels possible with an in-tunnel transmitter per program on the same frequency.

Switchover at the tunnel entrance and exit quite difficult. Mix of non-synchronized signals. High power needed



# DAB safety and emergency announcements in tunnels

DAB is SFN capable. Seamless transition tunnel entrance and exit no problem.

Since DAB is digital an in-tunnel transmitter on the same frequency alone doesn't work for voice break in.

# DAB safety and emergency announcements in tunnels

Program	Audio [kb/s]	Data [kb/s]	PL	Mode
DRS1	120	8	4	DAB j-stereo
DRS2	152	8	4	DAB stereo
DRS3	120	8	4	DAB j-stereo
DRS Musikwelle	120	8	3	DAB j-stereo
DRS4News	56	0	3	DAB mono
DRS Virus	120	8	3	DAB j-stereo
Radio Rumantsch	56	0	4	DAB mono
Swiss Classic	120	8	4	DAB j-stereo
Swiss Jazz	104	8	4	DAB j-stereo
Swiss Pop	120	8	4	DAB j-stereo
La Première+	32	0	3A	DAB+ mono
Rete uno+	32	0	3A	DAB+ mono
WRS+	32	0	3A	DAB+ mono

Program	Audio [kb/s]	Data [kb/s]	PL	Mode
DRS1+	72	8	3A	DAB+ stereo
DRS2+	88	8	3A	DAB+ stereo
DRS3+	72	8	3A	DAB+ stereo
DRS Musikwelle+	72	8	3A	DAB+ stereo
DRS4News+	56	8	3A	DAB+ stereo
DRS Virus+	72	8	3A	DAB+ stereo
Radio Rumantsch+	64	8	3A	DAB+ stereo
Swiss Classic+	88	8	3A	DAB+ stereo
Swiss Jazz+	64	8	3A	DAB+ stereo
Swiss Pop+	64	8	3A	DAB+ stereo
La Première+	64	8	3A	DAB+ stereo
Rete uno+	64	8	3A	DAB+ stereo
WRS+	56	8	3A	DAB+ stereo
DRS1	56	0	4	DAB mono
DRS Musikwelle	56	0	4	DAB mono
DRS4News	48	0	4	DAB mono

# DAB safety and emergency announcements in tunnels

DAB is SFN capable. Seamless transition tunnel entrance and exit no problem.

Since DAB is digital an in-tunnel transmitter on the same frequency alone doesn't work for voice break in.

During emergency announcements switchover at the tunnel portal is easy. No mix. Hard switchover

Low power broadband signal. Less interference to other systems.

# Service Following Solution

Every DAB-program on air signals service following to an emergency message program in all tunnels

Service following must be implemented according to the standard in every car receiver

Switch to the emergency message program by the car receivers must be very fast



# Spoofting Solution

The solution for emergency message break in is similar to the one in FM

The emergency message must simulate the original multiplex

# Results of Tunnel Tests

Tunnel coverage as expected. Needed RF levels low as predicted.

Voice Break with the spoofing solution works in principle.

It could not yet be proofed that this solution works reliably with all receivers.