



# DAB PLUS Tunnel Solutions

TWO POSSIBLE SOLUTIONS



**CTE Digital Broadcast S.r.l.**  
**Sede Legale - Registered Office:** Viale Piave, 15 - I-20129 Milano (MI) - Italy  
**Sede Operativa - Manufacturing and Components Warehouse:** Via E. Mattei, 7 - I-30039 Stra (Venice) - Italy  
**Tel.:** +39 0499828694 - **FAX:** +39 0499828694 - **PEC:** ctedb@pec.it - **E-mail:** info@ctedb.com - **Web:** www.ctedb.com  
**Cap. Soc.:** € 100.000,00 I.V. - **C.F.:** Registro Imprese Milano 04912770288 - **REA:** MI 2081436 - **P. IVA:** EU VAT IT 04912770288

## SYSTEM DESCRIPTION

The proposed architecture provides the use of a double 'through' bridge combiner over the existing system which introduces a minimum loss and in any case not more than one alternative solution in which the existing combiner would be completely redone. The broadband port would be used as an input to the existing system, leaving unchanged the current characteristics (loss, insulation, connections....). The narrow-band port, whose selectivity depends exclusively on the filters used in the branching, and therefore scaleable according to the requirements, it is used for the input of additional services (DAB) required.

As an example, we attach the simulation calibrated on the frequencies that you provided.

The realization of this branching requires high bandwidth (80/440 MHz) hybrid couplers we have already made at prototype level.

Regardless of the solution chosen, in our view, it would be much more simple, cheap and effective use repeating-same-channel apparatus provided with echo-canceller 'fishing' the signal/s to be repeated off-air from the outside and retransmit it/them in the existing slotted line, repeating the operation N times depending on the length of the tunnel and on the slotted line itself. Starting from a good level of MER this operation can take place several times without affecting the service and remaining in the Guard Interval required for the SFN. The use of such devices avoids the necessity of carrying the feed and GPS signals to the apparatuses themselves along the tunnel to each of the 'substations'.

We planned and proposed two possible solutions which have in common the double bridge combiner but differ in the type of apparatus.

# SYSTEM DESCRIPTION

## 1<sup>st</sup> solution:

It involves the use of an apparatus of new conception which allows to generate or re-transmit the 4 carriers provided by the technique of "common amplification" that can be used thanks to a new algorithm that allows the pre-correction of broadband linearity. The advantages are quite obvious: a single device instead of 4, and the absence of the 4 channels DAB combiner, very cumbersome and expensive (see example below). Besides the inexpensiveness of the system, we highlight the easiness of installation (no need to wire tunnels with dedicated optical fiber and / or cables for the ETI signal and / or cables required to re-synchronization: GPS, 10MHz, 1pps ...) and maintenance, the extremely compact size (1RU for the transmitter +2 or 3RU, depending on the type of filter required, for the double bridge combiner) and extremely low power consumption. The only drawback, in the case of non-adjacent carriers, is the noise in the band between carriers that is expected to grow at around -45 dB, while the out-of-band one would be filtered: in our humble opinion this would not imply any important problem, since it regards diffusion in tunnel.

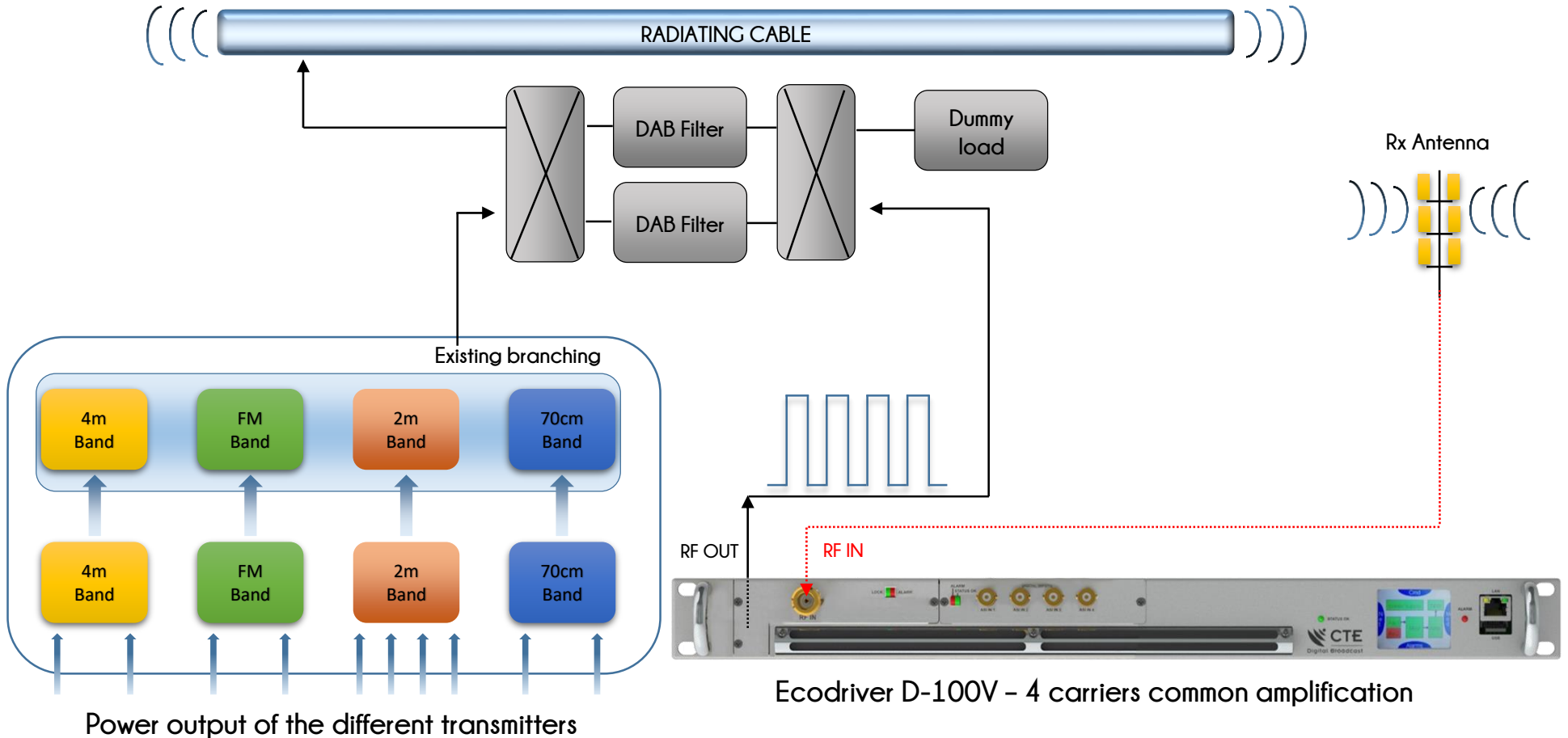
## 2<sup>nd</sup> solution:

"standard" architecture which provides the use of 4 transmitters and relative combiner. In this case, while wanting to use the technique of same-channel repetition, it would be necessary to place the same number of apparatuses and combiners to each 'jump' in the tunnel.

The attached graphics should help to better understand the description. In any case we remain at your disposal for further explanation.

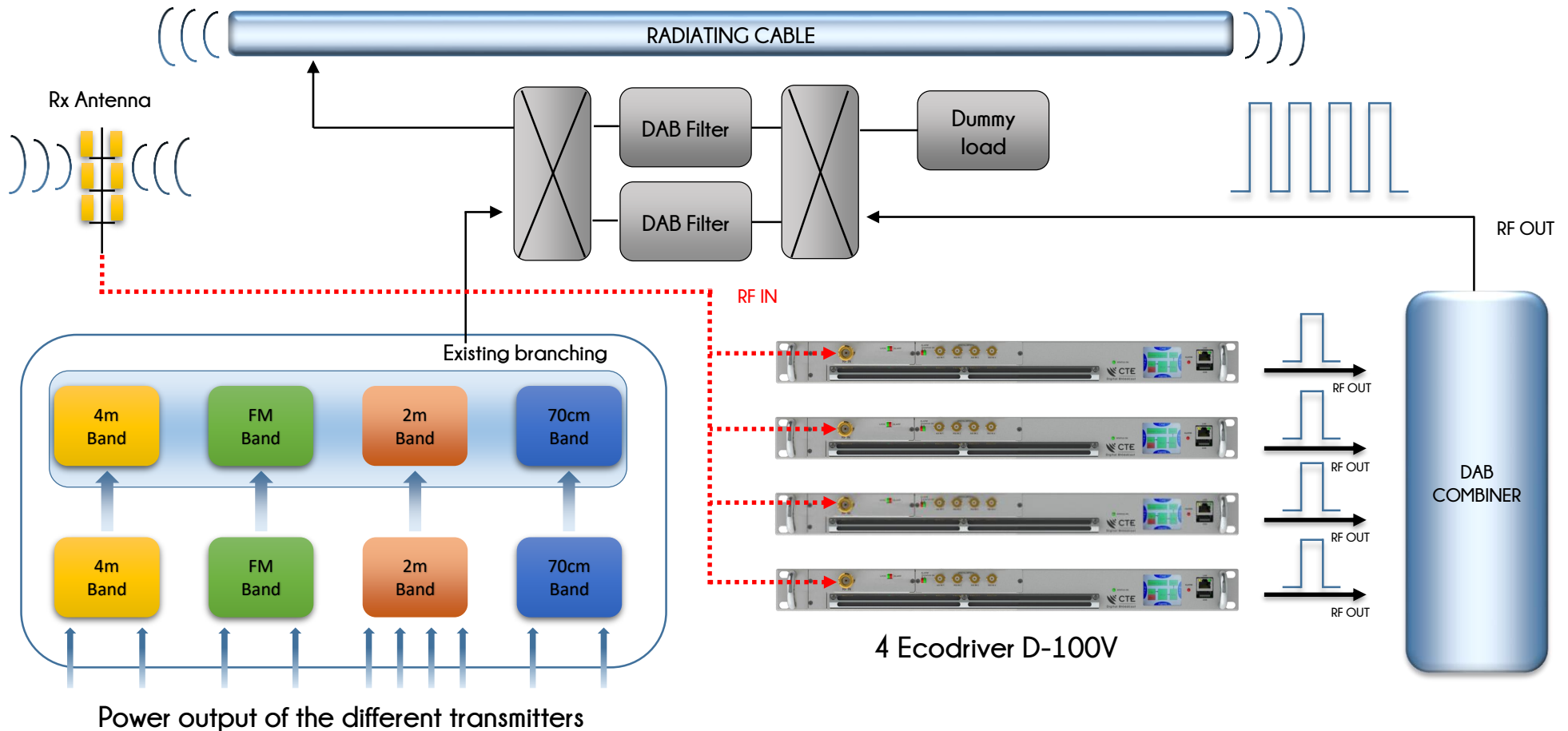
# DAB - TUNNELS

1<sup>st</sup> solution



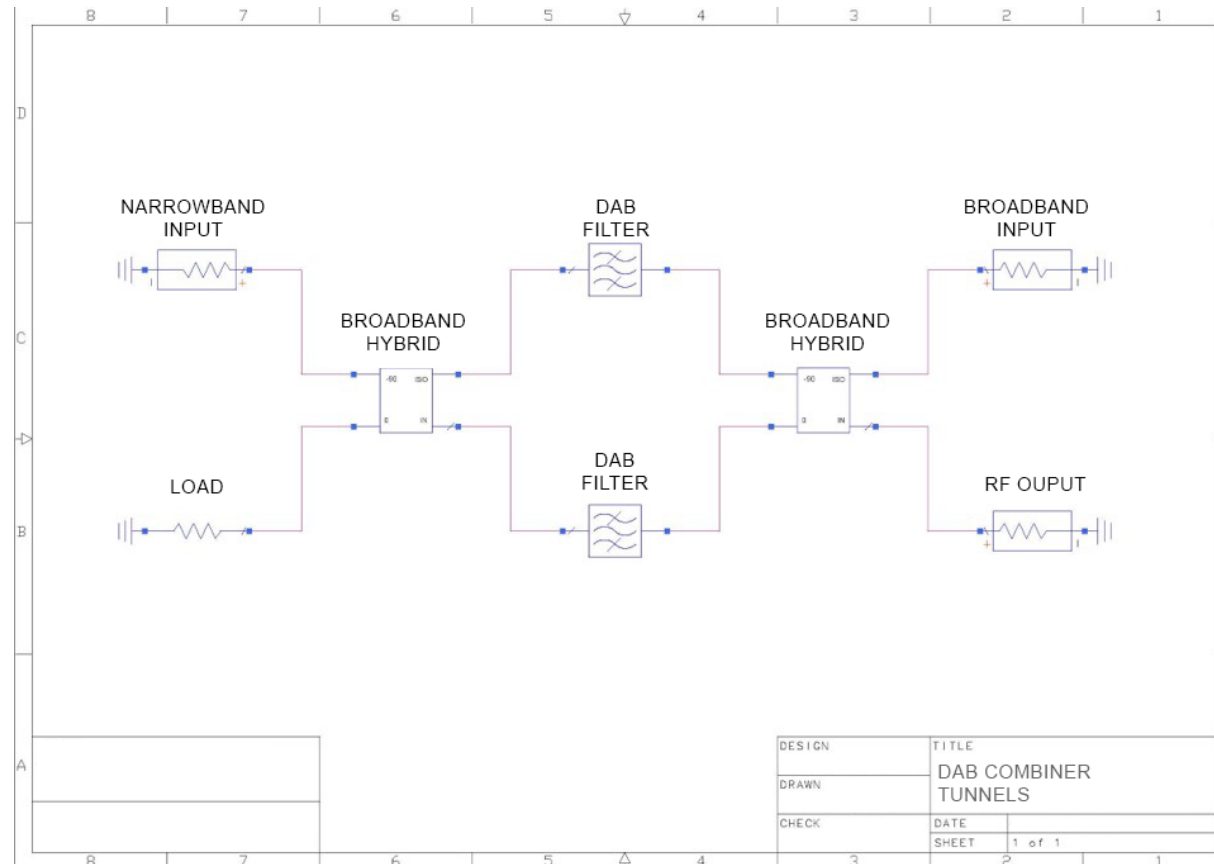
# DAB - TUNNELS

2<sup>nd</sup> solution



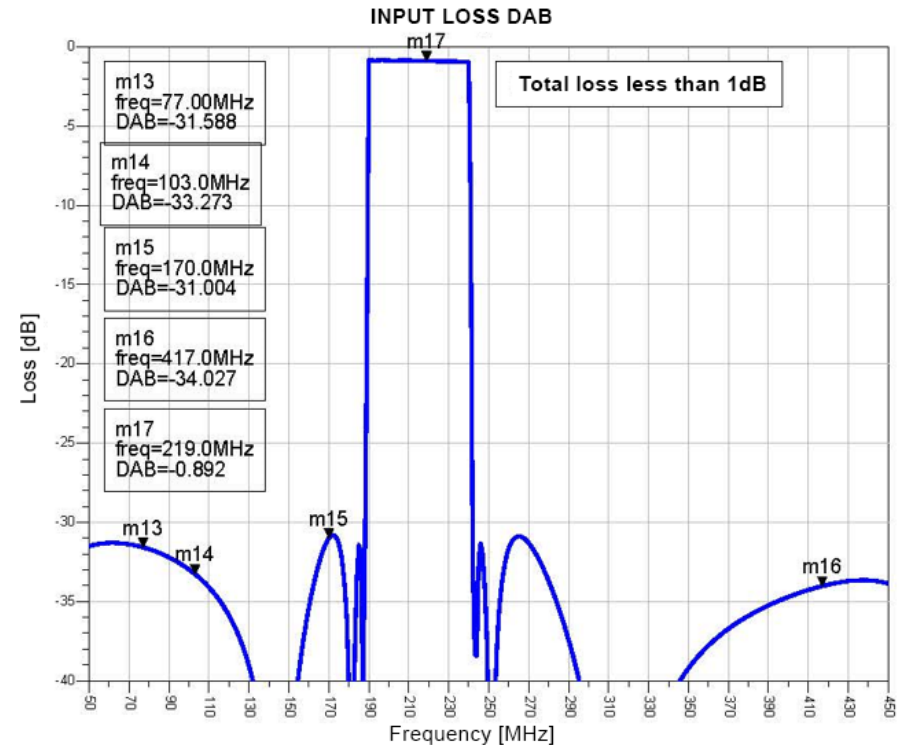
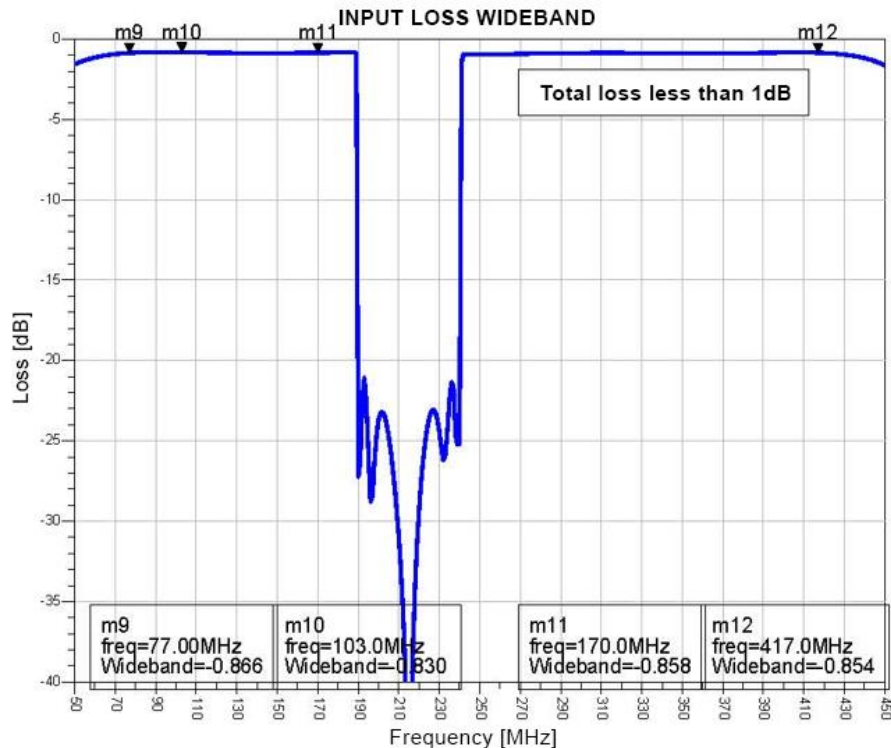
# DOUBLE BRIDGE COMBINER

## Block Diagram



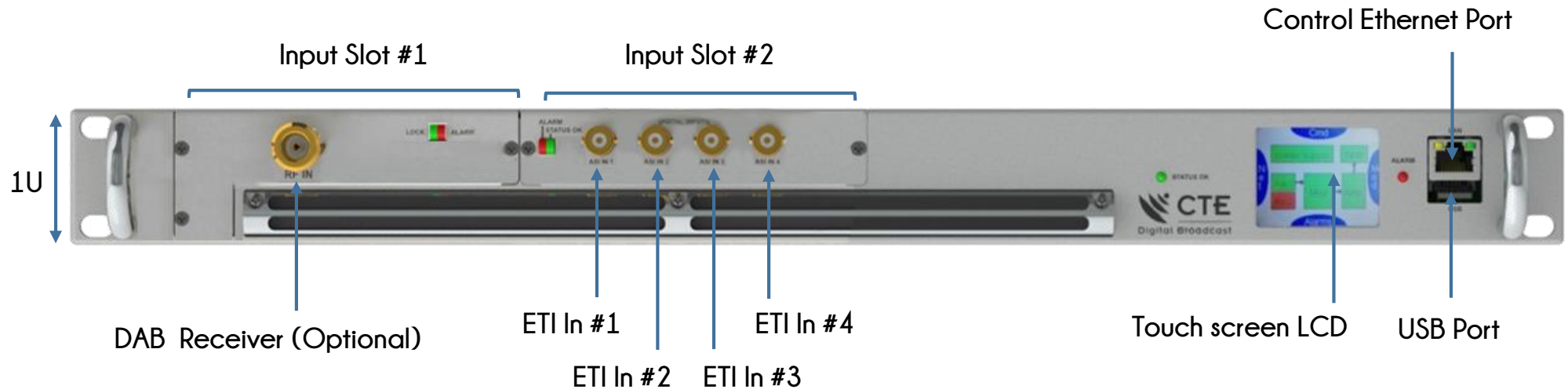
# DOUBLE BRIDGE COMBINER

## Input Leakage



# ECODRIVER D-100V

## Front Panel





# ECODRIVER D-100V

further available configurations



4 x ETI + Analog



1 x DVB-S/S2 Rx



1 x DVB-S/S2 Rx + 4 x ETI



1 x RF



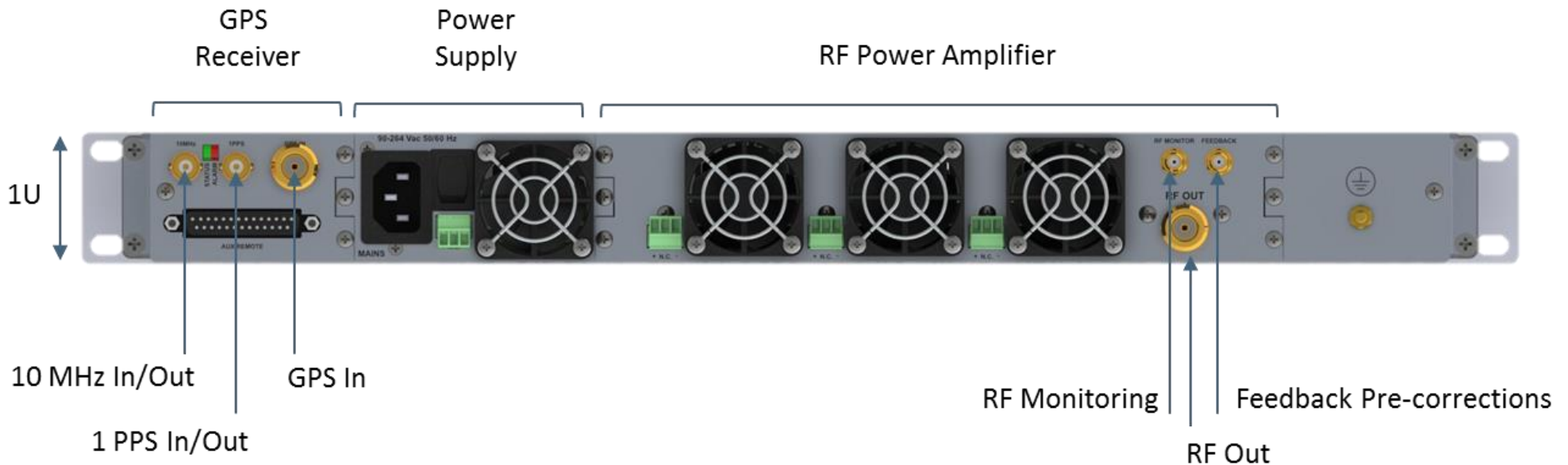
2 x EDI + 2 x ETI



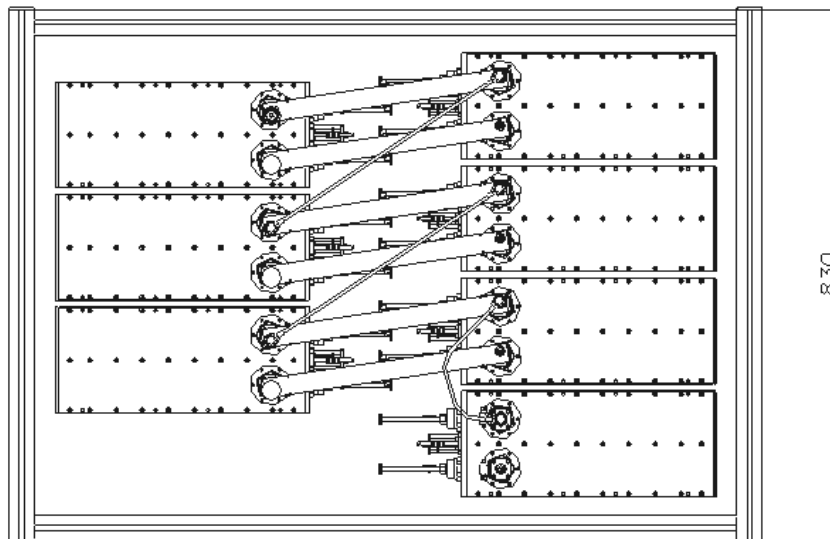
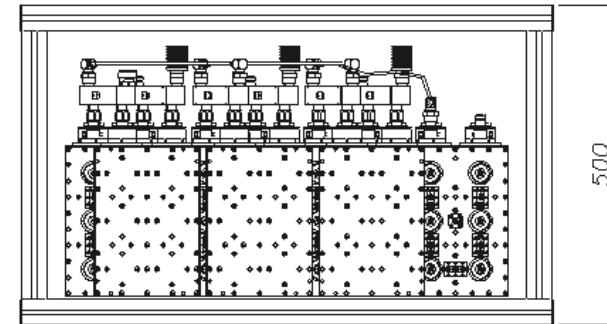
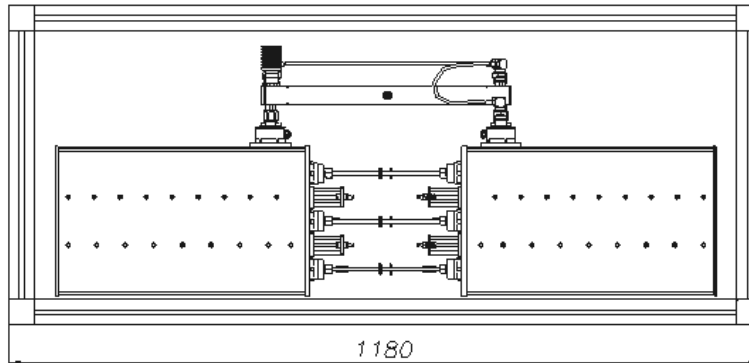
1 + DVB-S/S2 Rx + 2 x ETI + 2 x EDI

# ECODRIVER D-100V

## Rear Panel



# Combiner RF DAB example



# Main features TX

## 1<sup>st</sup> SOLUTION

- 4 ETI Input (EDI optional).
- 4 DAB modulated carriers in the same TX.
- Common amplifier VHF BIII.
- Power output: 10 Wrms/channel (higher powers available).
- Removable power supply and amplifier.
- Broadcasting: DAB, DAB + T-DMB.

# Main features TX

## 2<sup>nd</sup> SOLUTION


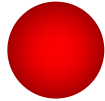



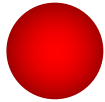




- 4 ETI Input (EDI optional).
- 4 DAB Transmitters separated.
- RF DAB Filter Combiner.
- Power output: 10 Wrms/channel (higher powers available).
- Removable power supply and amplifier.
- Broadcasting: DAB, DAB + T-DMB.

# SYSTEMS COMPARISON

## Main Features

1<sup>st</sup> solution

2<sup>nd</sup> solution

	1 <sup>st</sup> solution			2 <sup>nd</sup> solution
Dimensions TX	1U			4 X 1U
Independent management of single MUX	YES			YES
RF DAB Combiner	NO			YES
Filter Combiner DAB + Services	YES			YES
Power output W/CH*	10W rms			10W rms

\*higher powers available