GAP FILLER
HIGH COVERAGE

Provides good reception in areas where the main station coverage is blocked

WHAT IS A GAP FILLER?

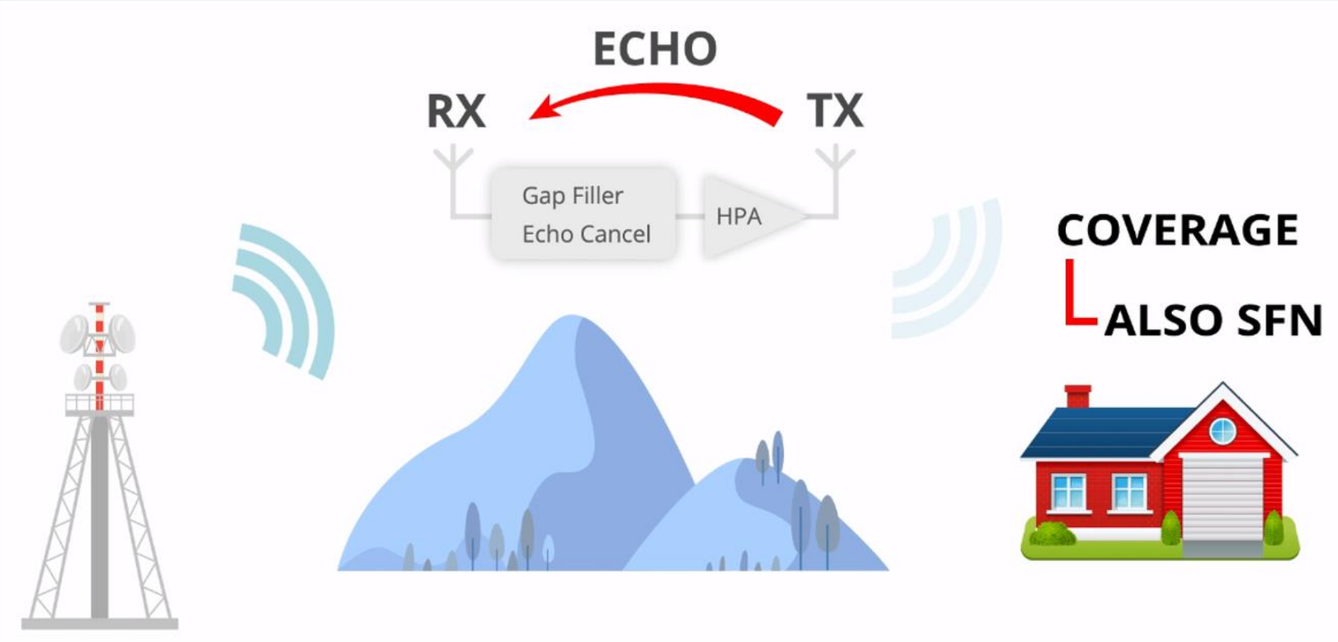
The main transmitter on the left side is transmitting as normal but the mountain in the middle blocks that signal from being received at the home on the right

TV Broadcasting today requires **optimum and continuous coverage**, but often there are holes (or gaps) of coverage created, for example, by mountains or high buildings.

A Gap Filler **receives** the signal from the main transmitter, **amplifies** it and **retransmits** it without changing the frequency.

This system **eliminates holes** and offers **uninterrupted coverage**.

WHY USE ITELCO GAP FILLER?



The Gap Filler is installed on the top of the mountain, with the receive antenna directed towards the main station, and the transmit antenna toward the home
The two antennas must be isolated as much as possible in order to limit the Echo effect

With the Itelco Gap Filler, you'll **save money and time**.

You just receive the main station signal and retransmit it.

No need of separated radio, satellite or fiber links.

It is a standalone unit, lightweight and energy saving. It requires careful antennas installation.

ECHO CANCELLATION AND COMPLEX FIR SYSTEM

EXTREMELY LOW QUALITY DEGRADATION

Since the Gap Filler is transmitting on the same frequency as it is receiving, there is a tendency for the transmitted signal to overwhelm the main station signal.

There is an “Echo” signal from the transmit antenna which can cause deterioration of the received signal.

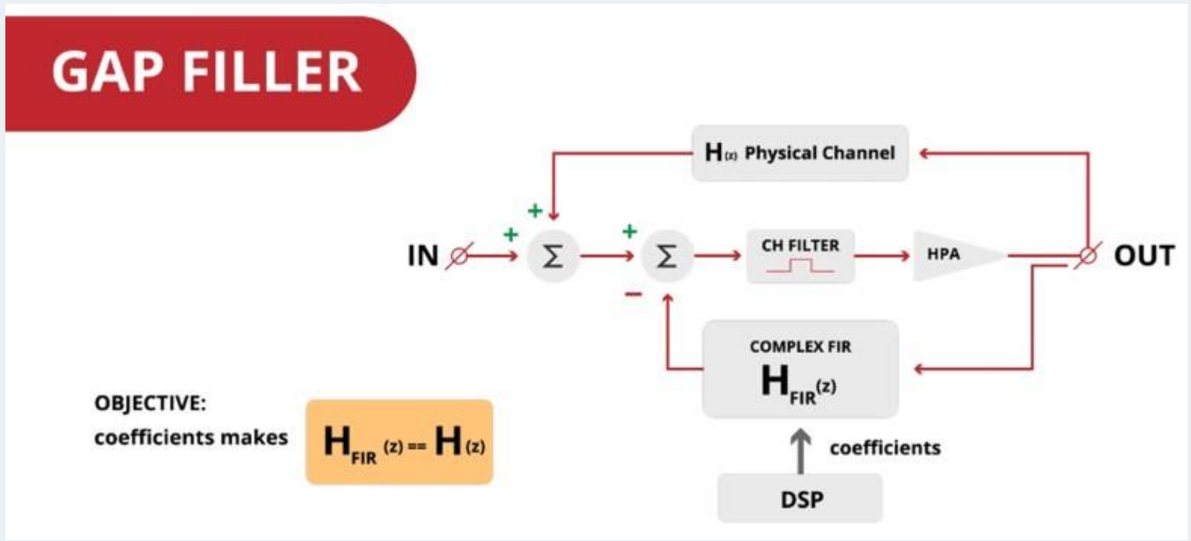
The Elenos Group (ProTelevision and Itelco) engineers cooperated with **Nokia** and five full time university professors at the **Institute of Applied Mathematics** in St. Petersburg, Russia.

We patented a complex FIR system which senses what the Gap Filler transmits, it derives an error correction term and applies it in real-time to the received signal.

This extremely reduce the negative echo effect, for a high quality transmission.

HOW DOES IT WORK?

In this scheme, the signal represented in the “Physical Channel” is the **superposition of the wanted off air input signal** for amplification/re transmission and an **unwanted contribution** from the Gap Filler’s own transmission antenna. This causes an "***echo***" because the unnecessary signal arrives at the receiving antenna a little later. So another (digital) feedback signal path is established into the **FIR system**.



This path is fed by a signal identical to that of the transmitting antenna and brought to a summing node in **opposite phase** to the real, physical feedback signal. The two opposite phased signals **cancel one-another** and **eliminate the negative effects** of the unwanted echo feedback.

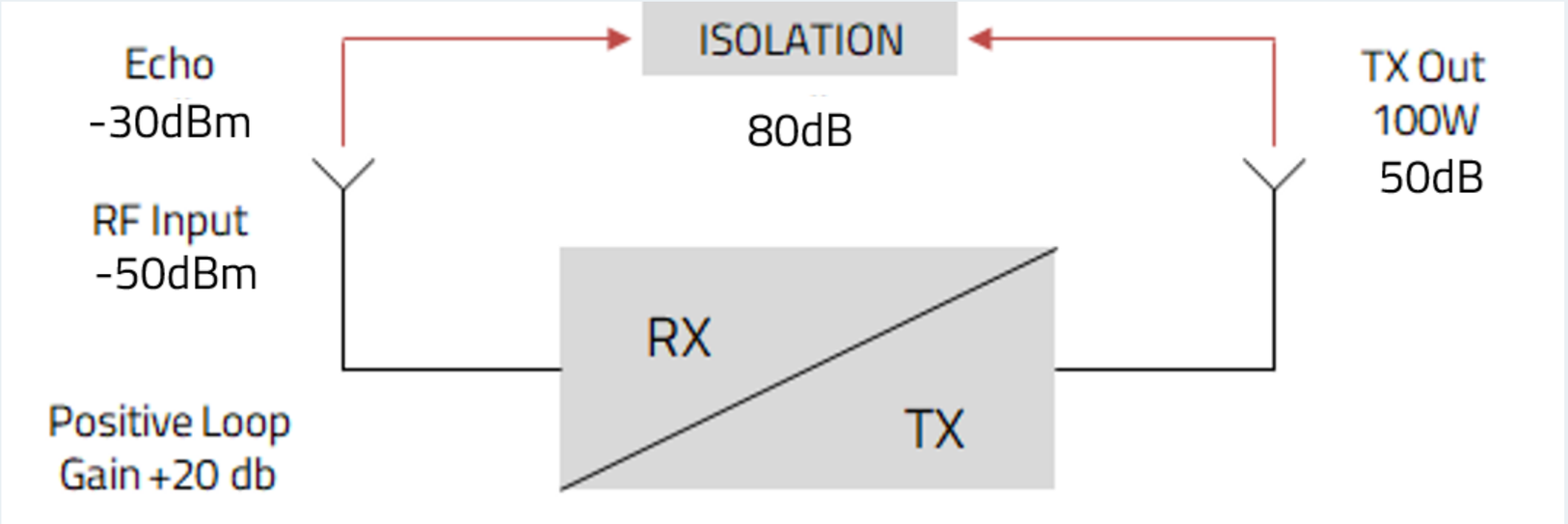
The coefficients of this filter are continuously calculated and updated so that the transfer characteristics assemble those of the real physical channel from the transmitting to the receiving antenna.

MAX LOOP GAIN WITH STABLE OPERATION

Gap filler performance depends on three main factors:

1) **Input signal level**
2) **Isolation between antennas**
3) **Gap filler output power**

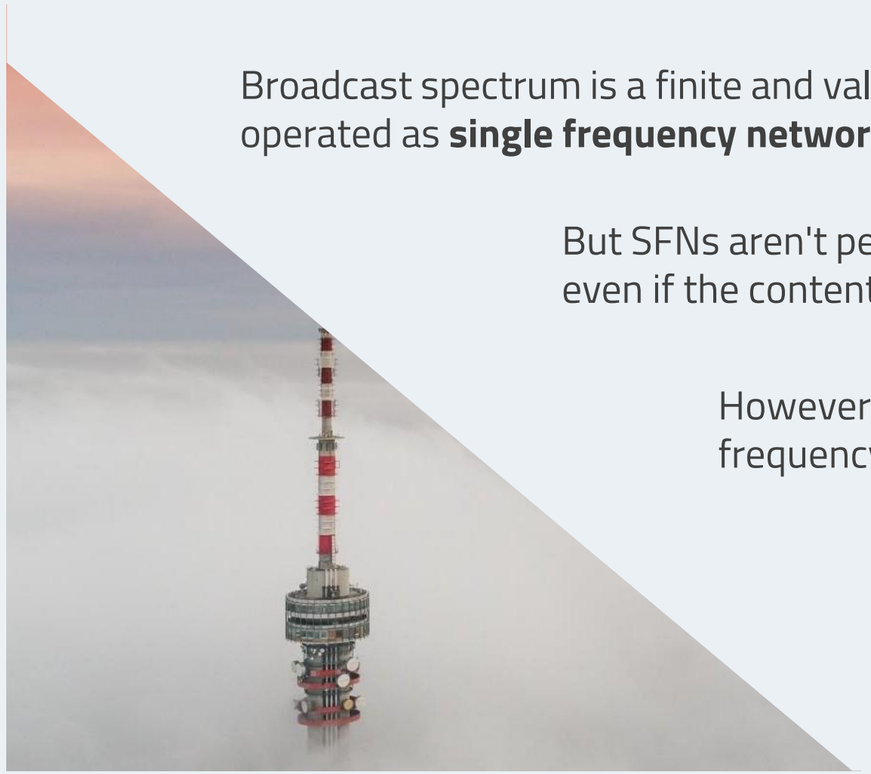
The operational principle is shown in the figure. Our echo canceller is able to transmit a clean signal even when the echo signal is up to 20dB higher than the received signal.



The loop gain is the difference between the RF input wanted signal and the "residual part of the echoes".

Example: If the RF input wanted received signal -50 dBm, in order to transmit 100W (50dBm) it is necessary to have an antenna isolation of 80dB. This value is 30dB higher that the received signal. In order to transmit higher power (ERP) it is necessary to increase the antenna isolation (IS).

USE IN SINGLE FREQUENCY NETWORKS



Broadcast spectrum is a finite and valuable resource and, for this reason, digital networks are often operated as **single frequency networks (SFNs)**.

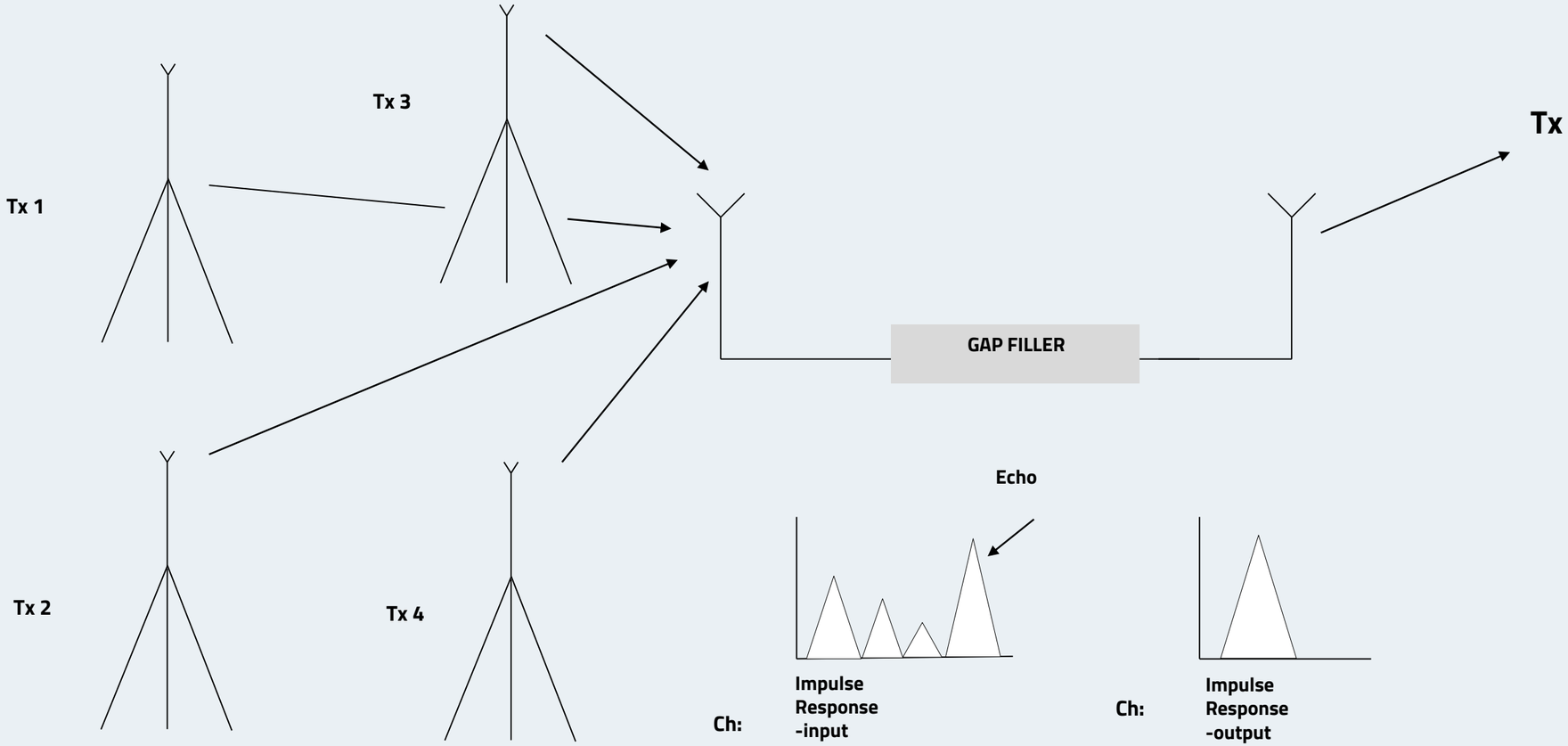
But SFNs aren't perfect in analog systems because analog signals interfere with each other, even if the content is identical and the frequencies are synchronized.

However, in digital systems, overlapping transmitters can share the same frequency, without need to use two frequencies.

The Elenos Group Gap Filler has a very **short internal delay** which allows you to easily manage Single Frequency Networks.

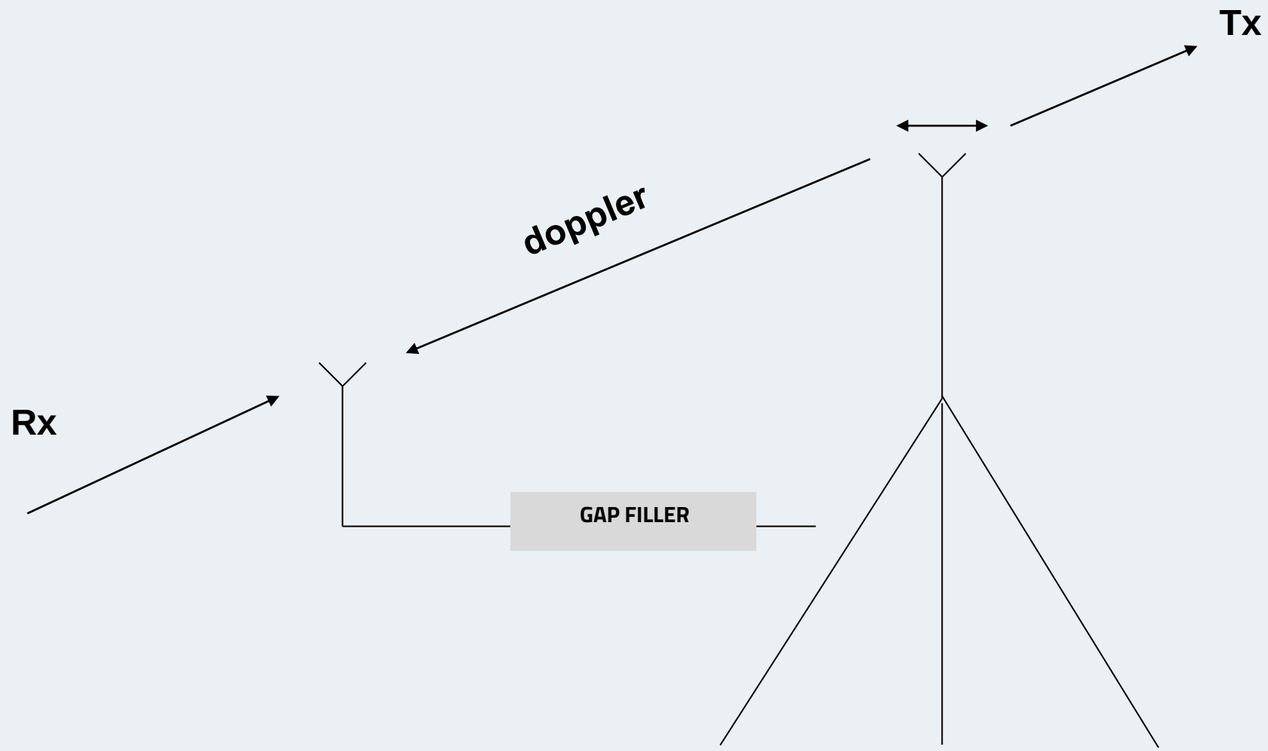
REAL SFN NETWORK CONDITION

The Gap Filler can clean and obtain a pure output spectrum from multiple Single SFNs (Single Frequency Networks)



SOPHISTICATED ALGORITHMS

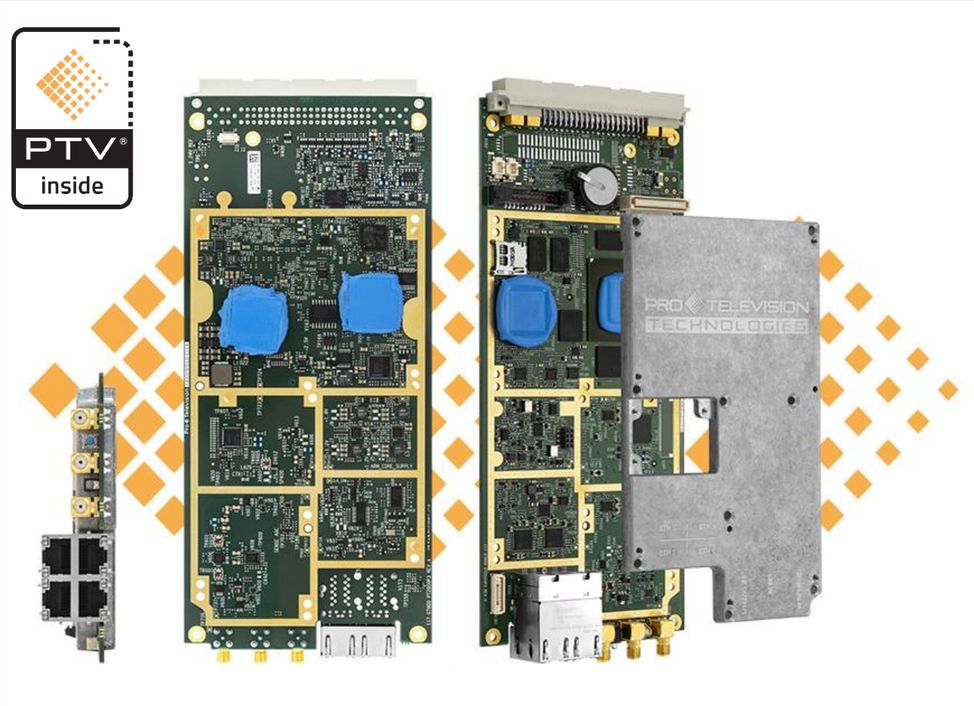
The Itelco gap filler uses sophisticated internal algorithms for the predictions of the antenna movement / vibrations, due to winds, to reduce the unwanted Doppler effect.



8 REASONS TO CHOOSE OUR GAP FILLER

1. Works in real-field conditions with excellent, proven ProTelevision technology inside.
2. Input tracking filter: you set the band and signal frequency, our Gap Filler does the rest.
3. You can choose the selectivity of the curve, in case of adjacent channel interference.
4. The echo canceller system responds in as little as 100ms.
5. Echo cancellation can exceed 50dB.
6. Extremely low process delay and group delay values (critical for SFN networks).
7. Works with every standard: DVB-T/T2, ISDBT and ATSC1 or 3.
8. Can be set in Gap Filler or Transposer mode (with different input/output frequencies).

INNOVATION AND EXPERIENCE



Elenos Group's Gap Filler is the result of a **massive engineering and testing program**.

We tested a transmission site with TerraCom in Sweden where we installed the Gap Filler and run it for over a year.

We controlled the behavior of the antennas in the wind so that we could physically model and optimize the system under real-world conditions.

Then the system was written into firmware on the embedded **ProTelevision hardware platform** (an RF SuperComputer built on 16 layer printed circuit board with 2,200 electronic components), integrated in each gap filler.

Since long time, a lot of our gapfiller(s) are in service in several government and private networks, domestic or foreign, including Rai Way (Italy) and all our customer are extremely satisfied.

WOULD YOU LIKE TO LEARN MORE ?

The product is used to make signal coverage uniform, so it is perfect for networks that have minimum coverage percentage obligations or small shady areas such as valleys or cities with tall buildings.

MEX, and IEC Gap-filler with echo cancelling (option) completes Itelco transmitter lines,.

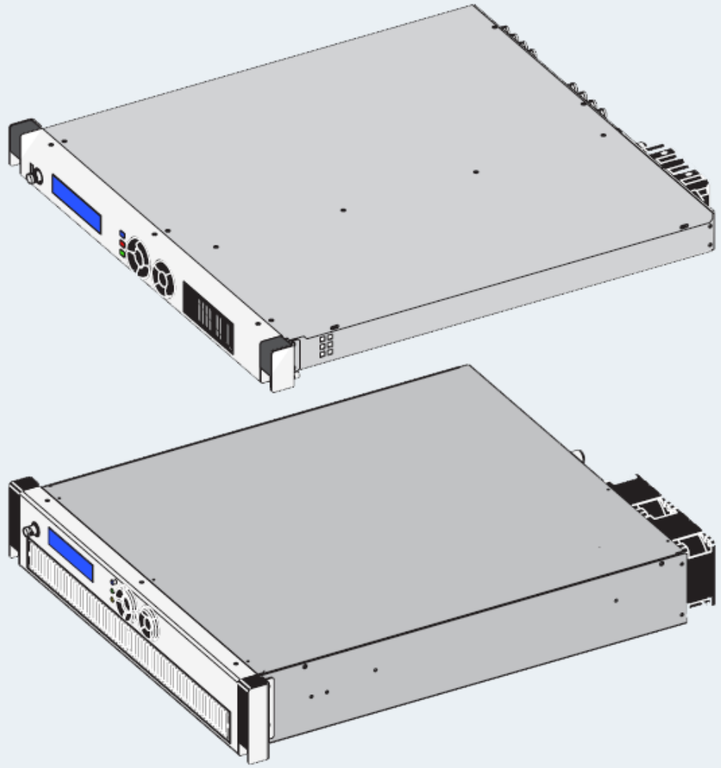
Models available:

ITELCO MEX II	Gap Filler / Repeater	10 / 25 W
ITELCO IEC	Gap Filler / Repeater	50 / 100 / 200 W

Contact us

Connect to our sales team and get Gap Filler solution custom offer:
www.elenosgroup.com

MEX-II
IEC LINE



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