

**TREDESS:**

**3**

# **THE BEST TECHNICAL SOLUTION FOR GAP FILLER SITES**

## Gap Fillers VS Transmitters

- **A Transmittter is a device the works the same today and tomorrow:** ,  
The environment of a Transmitter does not change, so easy to work: IP input / ASI input,..., output MER stable, ...no problems.
- **GAP FILLERS are clearly the cheapest way to extend a network**  
The site only needs a Yagi antenna, a Gap Filler, and a Transmitting antenna  
No microwave link, no satellite receiver, no GPS → Site is simpler, less points of failure, and consequently, cheaper to acquire and maintain
- **BUT a GAP FILLER SITE HAS ITS COMPLIATIONS AND VARIATIONS IN THE SCENARIO WITH THE TIME**  
Example:
  - Input signal is affected by weather conditions
  - Input level and MER can be varying depending on problems on main TX
  - The scenario of echos will vary during the life of a Gap Filler (example just a new building constructed next to a Gap Filler site creates a new echo today that was no there yesterday)
- **SO, YOU NEED A GAP FILLER SOLUTION THAT WORKS TODAY, BUT ALSO TOMORROW**
- **A MISTAKE IN THE SELECTION OF A GAP FILLER CAN BE A NIGHTMARE**

## Gap Fillers and transposer

- **TRedess counts with the best GAP FILLER solutions available in the market**, covering both DVB-T/T2, ISDB-T, ATSC 3.0 and DTMB standards, and with same very high performance operating in any of the standards.
- TRedess “repeaters” can work as **TRANSPOSER** (with different input and output frequencies - MFN), or as **GAP FILLER / OCR** (ON-Channel repeater with same input and output frequencies-SFN).
- The operation as a Transposer is normally simpler, but the Gap Filler scenarios working in SFN have some specific particularities and problematics. **TRedess solutions including the Doppler Enhanced Echo Canceller (DEEC) are the best solutions available in the market to solve those problematics, providing an optimum output signal quality, higher stability in the operation, easier operation and maintenance of the Gap Filler site, and also a very compact and cost competitive solution.**
- TRedess portfolio also counts with **REGENERATIVE** solutions, what implies receiving in RF, demodulating and modulating again the signal, providing the output quality of a Transmitter

# Particularities & complexity of the Gap Filler scenarios in SFN

- Normally sites with limited infrastructure → Small tower → Poor isolation between receiving and transmitting antenna
- Space restrictions → **Need of very compact low power solutions.**
- Difficult access to the sites → **Need of reliable solutions and with an easy way to do remote operation and maintenance procedures.**
- Signal received is complex & variable → **Need of a solution able to deal with those complex scenarios and to work in today's conditions but also in the new and changing tomorrow's conditions:**

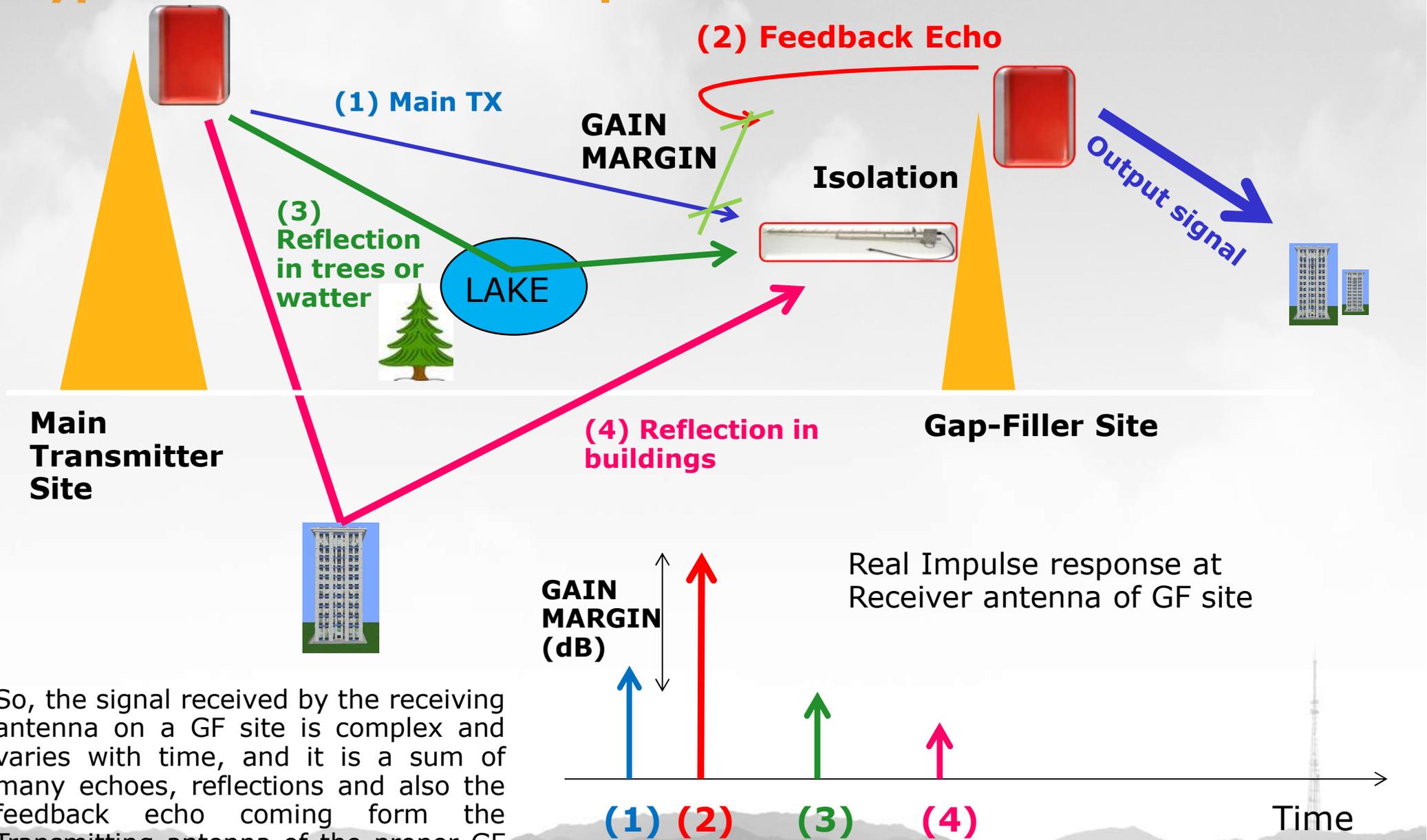
**(1) FEEDBACK ECHO:** Created by the Gap-filler itself due to the parasit feedback of the transmitted signal of teh Gap Fille site taht is also received by RX antenna:

- It is the most relevant echo because it usually has the highest level.
- Its level increases with the Gap-filler site Output Power

**(2) MULTI-PATH ECHOES:** Coming from other transmitters or reflections of the main transmitter signal, due to the SFN scenario.

- Static
- Variable:
  - **Dopper:** Variation in frequency (caused by sea, trees)
  - **Rayleigh:** Variation in amplitude (weather conditions change)
  - **Temporary** echoes: They go On and Off (due to moving obstacles)

# Types of Echoes in a Gap-Filler Scenario:

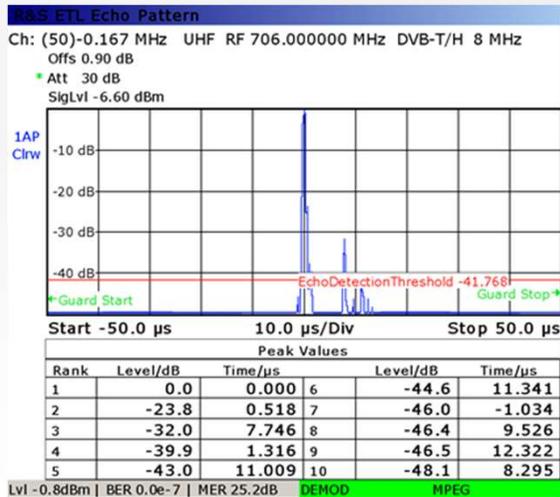


So, the signal received by the receiving antenna on a GF site is complex and varies with time, and it is a sum of many echoes, reflections and also the feedback echo coming from the Transmitting antenna of the proper GF site!

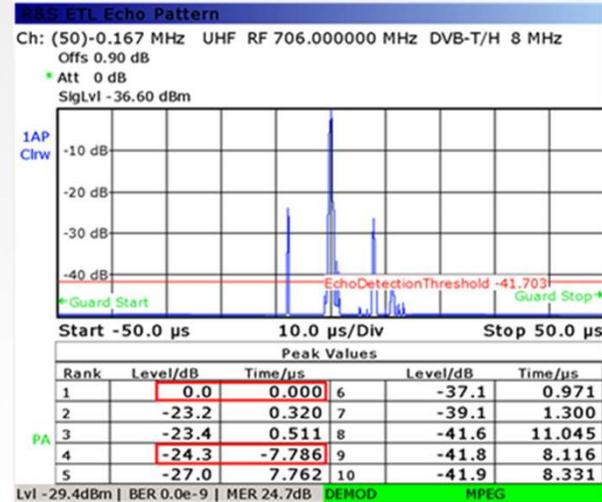
# Main Highlights of TRedess Gap-Fillers

## 1) GAIN MARGIN OF 24 dB AND OUTSTANDING OUTPUT MER PERFORMANCE ON COMPLICATED SFN ECHO CONDITIONS,

- o Gain Margin of 24 dB → guarantee an output MER > 24 dB
- o **Case of Echo 20 dB higher than signal → output MER > 27 dB**



Input Echo



Output Echo

# Main Highlights of TRedess Gap-Fillers

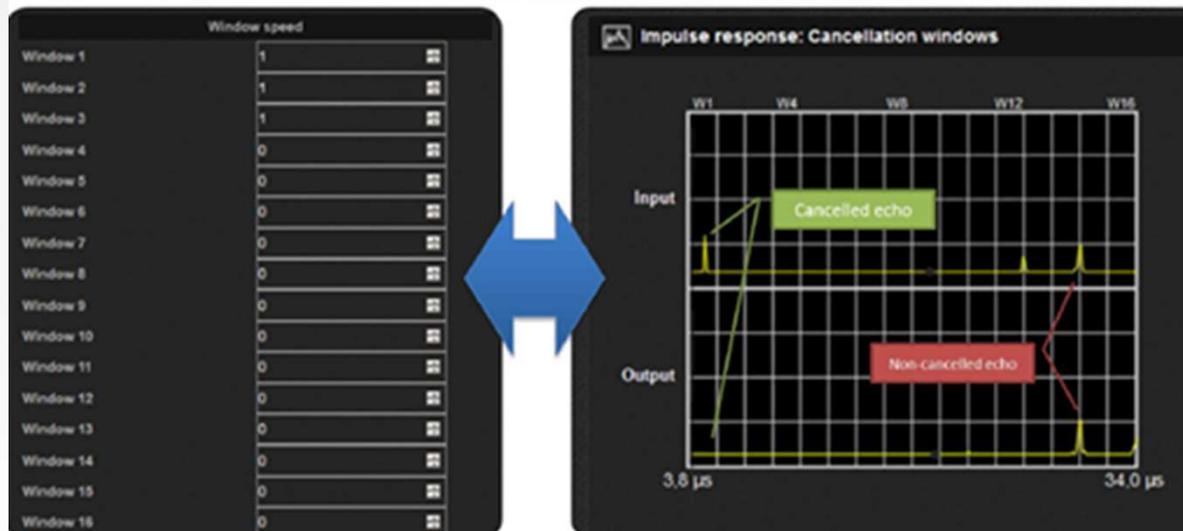
## The outstanding **GAIN MARGIN** parameter of TRedess Gap Fillers allow:

- a) TRedess solutions to operate in sites where the isolation between receiving and transmitting antennas is poor
- b) Allowing TRedess Gap Filler to operate with higher output powers than any competitor on the same site conditions
- c) Also, this feature makes the GF able to work in a stable way if the input signal level is dropping (weather conditions, problem in main Transmitter..) maintaining the same output power level, as there is a bigger margin to compensate the difference between input and output levels

## 2) **VERY MINIMUM MER DEGRADATION.**

# Main Highlights of TRedess Gap-Fillers

**3) VERY FLEXIBLE CANCELLATION WINDOW SYSTEM** → system based in several configurable windows → Gap Filler can be easily adapted to almost any possible echo pattern at the input → and then optimizing the output MER on each particular site.



**4) CANCELLING ECHOES WITH VARIABLE AMPLITUDE OR FREQUENCY: DOPPLER, RICE..** → This allows TRedess Gap Filler to operate in stations close to forests, trains, seas, lakes, where most of the Gap Fillers from other suppliers have problems to operate in a stable condition...

# Main Highlights of TRedess Gap-Fillers

**5) FOURTH SERIES GAP FILLER INCLUDES ALSO DIGITAL ADAPTATIVE PRECORRECTOR → DAP with very fast response →** This is a feature that is typical in the Transmitters but not usual in the Gap Fillers, and the direct consequence is that the Gap filler automatically does an optimization of the shoulders and output MER → Outstanding MER performance.

**6) VERY SHORT PROCESSING TIME:** Echo canceller processing time ( $< 4,2 \mu\text{S}$  in FS). This very low latency implies that the GF can be installed in a site much closer to the Guard Interval limit, further away from main transmitter.

**7) VERY FRIENDLY WEB GRAPHICAL USER INTERFACE.**

# Main Highlights of TRedess Gap-Fillers

## 8) VERY EASY INSTALLATION, OPERATION AND MAINTENANCE:



Two graphs are shown on the web interface, showing the echo pattern **before/after** the echo canceller:

- Echo pattern at the input of the Gap filler.
- Echo pattern after the echo cancellation.

That means that it is possible to do an optimization of the GF configuration without the need of an external measuring equipment.

## In conclusion, the consequences of having BEST GAP-Filler with the BEST Echo Canceller in your network are as follows:

- **Being able to install Gap Fillers in the same sites where other competitors will need to install a transmitter** (with all the extra costs this would imply in terms of additional devices as GPS, sat receiver/microwave link, etc... and also implying a much simpler maintenance of a Gap Filler compared to a Transmitter site).
- **Being able to use a higher output power than any other manufacturer on the same Gap Filler site** → hence reaching a bigger coverage from the same site.
- **The best echo cancelling performance leads to a much more stable operation at the site** → implying also the very important fact that the **long term performance of the Gap filler is not affected by the fluctuations of the input signal** → leading to less need of site visits (cost savings) and also very importantly leading to a much better customer satisfaction (very important cost saving as well).

**So, if you are thinking in Gap-Fillers, think in TREDESS!!!**

# Benefits of having BEST GAP-Filler with the BEST Echo Canceller in your network

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**TRedess Gap-Fillers are the reference product in the market**