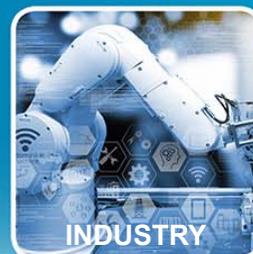




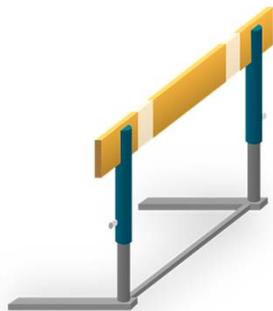
# 700 MHz Clearance Retuning Filters & Combiners



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HIGH FREQUENCY PERFORMANCE WORLDWIDE  
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# CHALLENGES



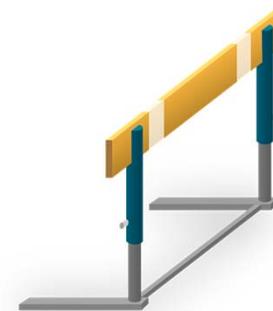
## OFF-AIR TIME

Retuning a filter/combiner or even replacing it takes time. Often the off-air time initially planned to execute this task isn't enough. More than one night may be necessary. To avoid long off-air periods, a temporary system sometimes must be used.



## SCHEDULE

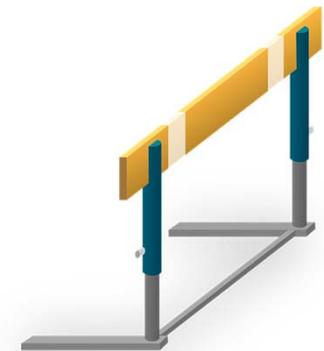
The schedule for the 700 MHz clearance is usually tight, due to pressures to release the spectrum. However, many factors can delay this. For example, many countries are currently busy with 700 MHz clearance, which limits or delays the service availability for retuning. Alternatives such as a replacement, instead of retuning should be considered.



## CHANGES IN THE INFRASTRUCTURE

Retuning or replacing a filter/combiner results in a mechanical change in the existing infrastructure, even if sometimes only temporary. For example:

- Often filters/combiner models are discontinued or replaced by versions that are not 100% identical.
- A temporary system must be installed to assure a short off-air time.



## BUDGET

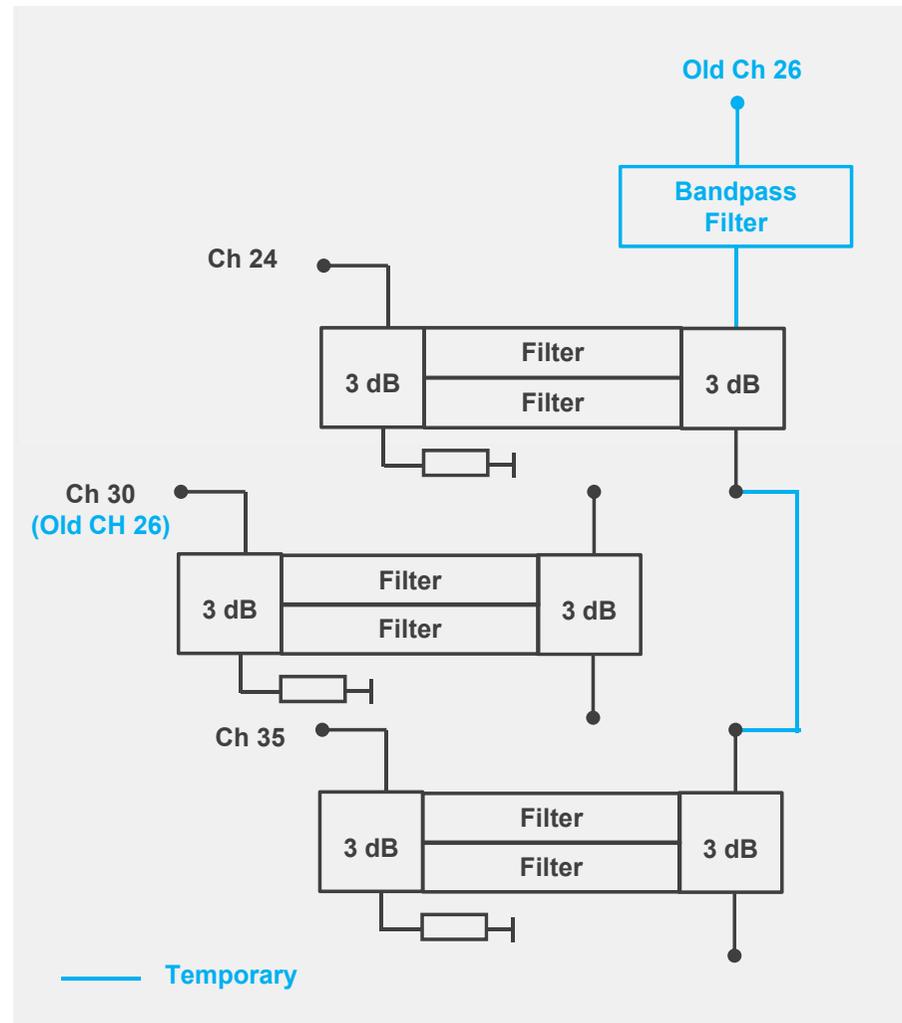
As shown, the complexity of the 700 MHz clearance can directly affect the initial budget. Therefore a pre-analysis is essential to avoid unexpected surprises. SPINNER has experience with all major roll-outs and can assist you with this.

# STRATEGIES

## Simple Retuning

Retuning only one channel can be done easily. The typical retuning time for combiners are approx. 4-6 hours and a further 1-2 hours for system optimization and measurements (test-report).

To avoid a long off-air time, it can be shortened by installing a temporary bandpass filter at the WB, tuned at the old channel. The combiner can then be by-passed, tuned at day time (on-air), and installed at night time (off-air).



# STRATEGIES

## Temporary System

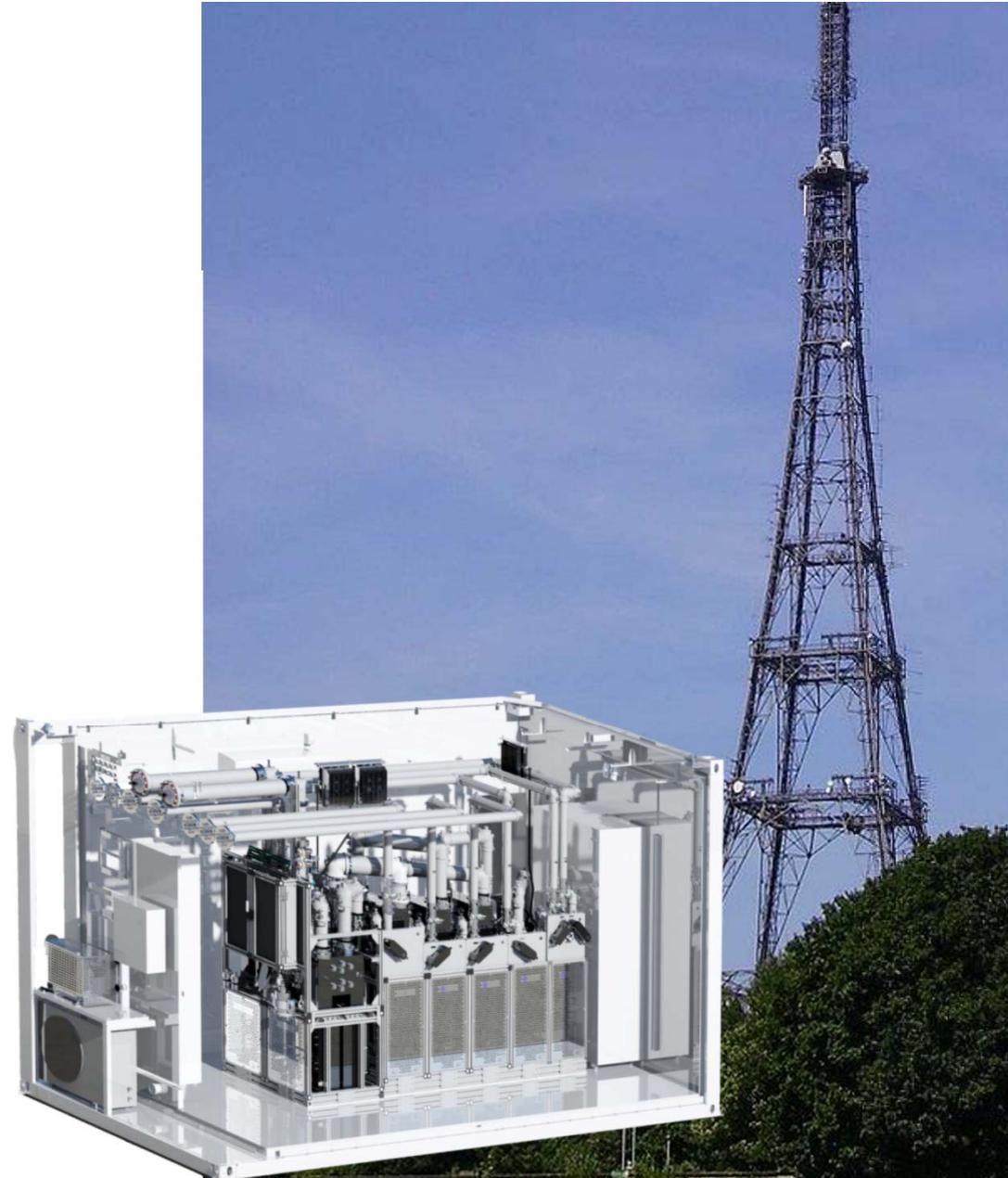
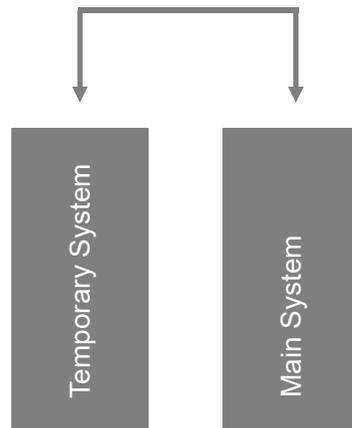


If the offer air-time is critical, a temporary system can be used. This temporary system will replace the existing system, while this is retuned. When the retuning is done, the systems are swapped back again allowing the temporary system to be used at another station.

The temporary system could be a combiner module(s) of the same type of the one(s) to be tuned or even a copy of the entire system.

In UK for example, they have used containers containing a copy of the entire combiner system.

TEMP REPLACES MAIN  
RETUNE MAIN  
MAIN REPLACES TEMP



# STRATEGIES

## Recycling System



With the recycling System, the combiner modules that need to be tuned are replaced by new ones of the same type tuned to the new channels. This replaced modules will then be retuned and used at another station.

After the clearance is done, the remaining combiners can be used as spare parts or sold as a second-hand combiners.



# STRATEGIES

## New System



The 700 MHz clearance is a good opportunity to replace existing systems, which are old and very large.

For example, old ATV combiners were very big, because they were designed with higher power levels. With the DTT, they were simply retuned and an external mask filter was used.

Since power levels are now lower, they can be replaced by a much smaller combiner. They can also have a mask filter integrated into the combiner. This does not only save space, but the overall insertion loss is lower.

**Bypass  
Patch Panels**

**Antenna Patch  
Panel with Antenna  
Monitoring System**

**Combiner  
With integrated  
mask filter**



# STRATEGIES

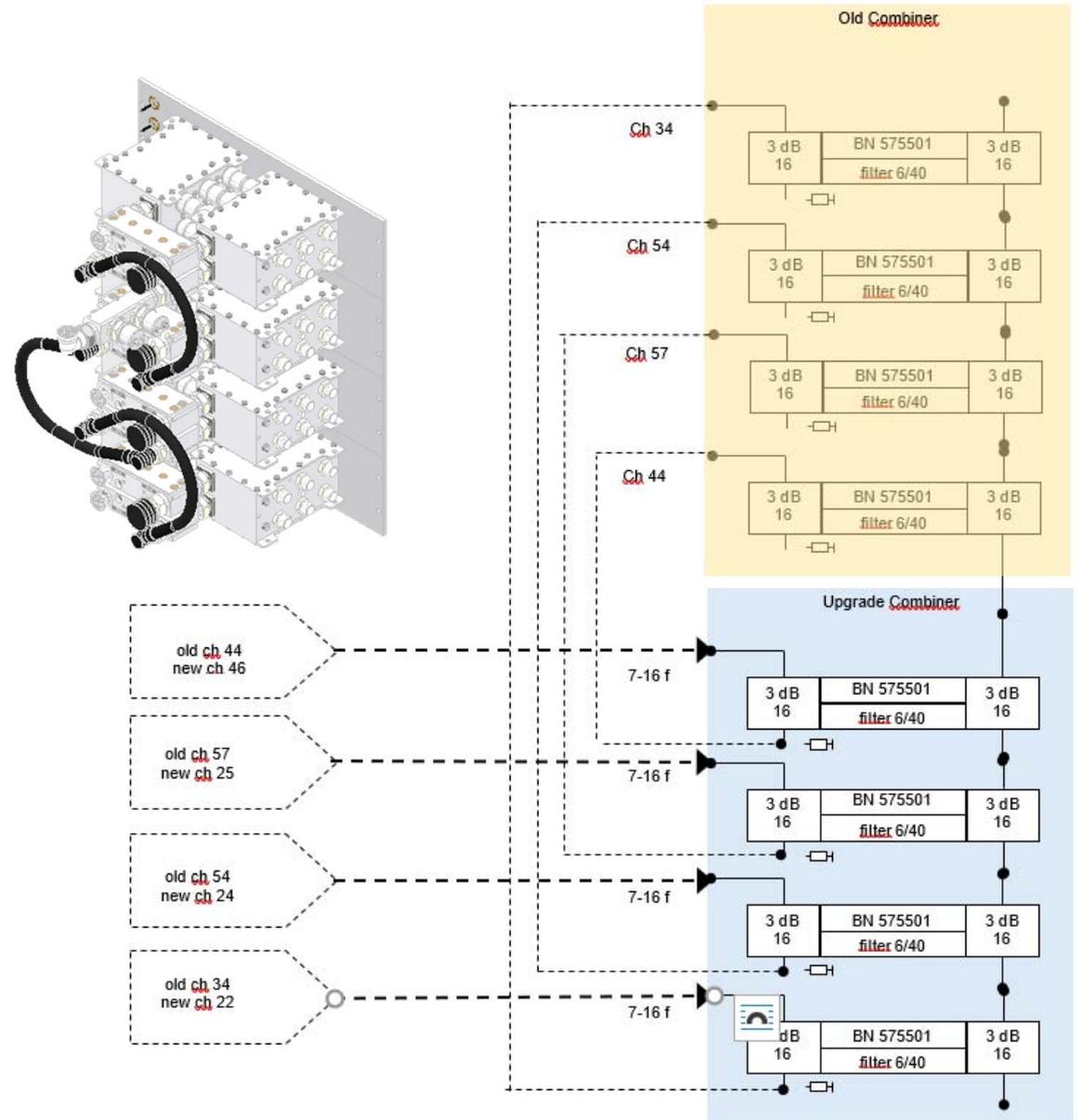
## Switchless Transfer



Norway chose to migrate at ALL stations nationwide to the new channels simultaneously.

Since there were not enough technicians to execute the retuning of all stations at the same time, a solution was needed where no personnel was required on site and the upgrade could be done remotely.

The transmitter can switch frequency remotely. For the combiners, SPINNER created a solution that works for both old and new channels. The signal is automatically forwarded to the right combiner based on the current operating frequencies.



## Contact SPINNER



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